INTERNATIONAL JOURNAL OF ACADEMIC RESEARCH IN ECONOMICS & MANAGEMENT SCIENCES

OPEN ACCESS JOURNAL

Vol 4, Issue 1, (2015) E-ISSN: 2226-3624

Testing the Validity of Wagner's Law of Government Size in Tanzania, 1966–2011: A Cointegration and Causality Analysis

Richard Fue Kiangi (PhD Scholar)

Mohanlal Sukhadia University, Centre of Study: Birla Institute of Management Technology (BIMTECH), Plot No. 5, Knowledge Park II, Greater Noida Uttar Pradesh-201306, India The Institute of Finance Management (IFM) Shaaban Robert Street, P.O. Box 3918, Dar es salaam, Tanzania

E-mail: rkiangi@gmail.com

To Link this Article: http://dx.doi.org/10.6007/IJAREMS/v4-i1/1493 DOI:10.6007/IJAREMS/v4-i1/1493

Published Online: 09 January 2015

Abstract

This paper presents an empirical analysis of the validity of the Wagner's Law in the context of Tanzania for the period spanning 1966-2012. It analyses the long-run and causal relationship between public expenditure and economic growth. The Augmented Dickey Fuller test was first applied to analyse the stationarity properties of the data. With regard to this test all the variables were found to be non stationary at level, but stationary after the first difference. The Johansen test of co-integration was further deployed in which we found no co-integrating vectors or no long-run relationship among the variables. Besides, the study applied Granger causality test to test the validity of the Law as it requires existence of unidirectional causality running from GDP to public expenditure. By applying this test we noted no causality running from economic growth to public expenditure and vice versa for all six versions of the law analysed in this paper. Therefore, both Johansen co-integration and Granger causality tests revealed no empirical evidence to support validity of the Law in Tanzania. This implies that that public expenditure plays no significant role and cannot be used as a policy instruments in promoting economic growth in Tanzania.

Keywords: Wagner's Law, Co-integration, Causality, Economic Growth and Public Expenditure

JEL Classification Codes: C32, O10, H50

Introduction

There has been a long debate on the long-run relationship between the size of the public sector and economic growth. For a long period of time since 1880s many studies related to this relationship have been based on developed nations. This is probably because of the data availability in such countries. However, after the World War II in particularly the 1960s the attention of policy makers, researchers, activists and scholars moved to developing countries as well. In fact, most of the developing countries by then were characterized by huge economic hardships associated with poverty of the people and underdevelopment of the country which were envisaged to constitute a vicious circle. To reduce the vicious circle of

under-development we need economic growth through industrialisation. Besides, the external shock of public intervention is required in order to convert the vicious circle into virtuous circle of prosperity and development (Cf. Myrdal Gunnar, 1953). Through such intervention, therefore, public expenditure is needed not only for pushing the economy onto its long-term growth path but also for keeping it moving from lower to each successive higher development stage. This makes public expenditure grow incessantly through time. Thus public expenditure in general and public investment in productive and welfare promoting activities is postulated to be the major factor of economic growth in general and growth of developing economies in particular.

Furthermore, it is important to note that owing to the absence of a well a functioning private sector in many of the developing countries, on attainment of their political independence in 1960s the roles and functions of the public sector played a considerable role. Public sector was viewed as the channel through which governments and states could provide social goods and services, social economic infrastructures, expand the level of investments and industrialization, and create more employment opportunities. At the same time many governments established a number of public enterprises and privately owned enterprises were nationalized. Evidently, an increase in publicly owned enterprises led to a rapid increase in the size public sector in the economy (Aladejare, 2013).

It is believed that the idea of the long-run relationship between public expenditure growth and activities of the state was first propounded by the German economist known as Adolph Wagner in 1883. Wagner developed the law of increasing government and state activities on historical experiences, based on German economy. His law meant that there is a tendency for the size of the public sector to grow faster than national income (GDP). This reveals a functional relationship between economic growth and government activities (Bhatia, 2002, p.219). It is further postulated that Wagner's law gained more support from economists, economic historians and research scholars after the Second World War following the increasing importance of public sector in economic activities. The publication of Wagner's work in English translation initiated many researchers worldwide to test its validity in various countries and in different time periods. Many researchers have developed different interpretations regarding the law. In short, they have been primarily interested in understanding the flow of causality between public expenditure and growth of the economy.

It can further be noted that, the ideas of Wagner can be linked with the new philosophy and political theory of the state which emerged after the World War II. With this new philosophy the concept of ruling state was replaced by the welfare state where government/state has to protect and promote wellbeing of the people. There has been a spectacular expansion in the functions of state and this resulted in an increase in the role of the state and public expenditure in various countries. Pigou (1928), the author of '*Economics of Welfare*' initiated the study of public expenditure on social welfare. Wagner himself believed that the welfare state evolves from the *laissez faire* philosophy due to increasing demand for social services by the population. Among other scholars, who have popularly explained the role of state and its expenditure in the economy, Keynesian Hypothesis is important. Wagner's Law suggests the tendency of bureaucracy to spread its wings as a consequence of which public expenditure increases continually. Keynes advocated government intervention to propel effective demand by public expenditure.

Review of various studies related to the functional relationship between the size of the public sector and economic growth with reference to Wagner's law reveal that this area has received little attention of researchers in Tanzania so far. To the best of our knowledge, no study

except one was found to be directly related to this paper in Tanzania. We have come across one study that focused on impact of public spending on economic growth in Tanzania for the period 1965-1996. This empirical study is mainly intended to cover the limitation of the previous study by Kweka and Morrissey (1999) that never intended primarily to test the validity of Wagner's law in Tanzania. Their investigation focused on the impact of government spending on economic growth of Tanzania. Similarly, the sample that our study covers is different from that covered by Kweka and Morrissey from 1966 to 2011 which extends to the more recent years. Furthermore, this study is aimed also to enrich the literature of Tanzania by providing fresh insights in terms of Wagner's law in order to develop better and up-to-date theories related to public expenditure in the case of Tanzania.

The rest of the paper after the introductory part is organized as follows: section 2 presents literature review on this issue, section 3 provides description of data, methods and models, section 4 discusses the empirical findings and section 5 provides conclusions and some policy implications.

Literature Review

Theoretical Literature

The concern of Wagner was mainly to explain the share of GDP taken-up by the public sector (government). According to Bird (1971) Wagner did not have any law explaining his ideas about the relationship between public sector growth and economic activities but this was done by the later commentators. The law was named after Wagner (1835 -1917) observation of 1893 based on historical experiences of the early stages of industrialization in a number of European countries, USA and Japan. He first observed the increasing role of the state activities using the data for Germany but he later observed other countries in Europe, USA and Japan. His observations propounded that economic and political factors were the main factors that led to the growth of the fraction of public expenditure to GDP in many Europeans countries, USA and Japan. Wagner identified three major factors for heightened public expenditures i) the social activities of the state which increase as the national economy grows, ii) the administrative and protective role of the government and iii) the welfare functions of the state such as education, health services and other public or merit goods which increase in demand as the economy expands (Afzal and Abbas, 2009). Wagner's law was then called the 'law of increasing expansion of public sector and particularly state activities' and it has been validated by a number of economists using econometrics techniques like Peacock and Wiseman, (1961), Musgrave, (1969), Bird, (1971), Beck, (1982) and others. Bird is honoured for being the first researcher to identify evidence of a positive relationship between the level of economic growth and the size of the public sector activity.

Adolph Wagner (1883) further postulated that "as the economy develops and becomes more industrialized over time, the activities and functions of the government increase". Private expenditure on (i) health (ii) education (iii) irrigation depends on public expenditure. Besides, increase in public expenditure on economic infrastructure like roads, aviation, banking and insurance also stimulates private expenditure on such items (Cf. Prakash, 1996). Keynesian Hypothesis states that public expenditure overcomes the constraining influence of inadequacy of effective demand; it paved the way for active public policy and decisive roles and functions of the states and government in economic affairs of the country. Unlike Adam Smith, this theory was one of the earliest attempts to emphasize the relations between the size public sector and economic growth. Wagner, however, treated public expenditure as an endogenous factor or an outcome. As the economy grows there is an increased demand for

public goods and services which implies an increase in the size of public sector. The causality in this case therefore runs from economic growth to public spending. Wagner considered public expenditure growth as a natural consequence of economic growth. The idea behind Wagner's law is that the amount of public goods and services provided by the state and its government through public enterprises tend to increase as the level industrialization increases. Such goods include redistribution through transfers, infrastructural development, health and education and other social welfare services. As the economy grows and becomes more industrialized i) the administrative and protective roles and functions of the government substitute public for private activity; ii) there is a need for increased provision of social and cultural goods and services; iii) government intervention is required to manage and finance natural monopolies and to ensure the smooth operation of the forces of demand and supply (Bird, 1971). One major criticism of Wagner's work is that he does not specify whether he refers to the growth of (i) absolute public expenditure, or (ii) public expenditure relative to GDP, or (iii) public sector relative to the size of the economy (Prakash and Chowdhury, P. 30). However, Musgrave (as cited in Brown and Jackson, 1990) interpreted Wagner's statement as relating to the size of public sector relative to the size of the economy.

Contrary to Wagner's view, John Maynard Keynes in 1936 stressed that an increase in public spending promotes economic growth by injecting purchasing power into the economy. According to Keynes, an increase in public spending can be an effective tool to stimulate aggregate demand for a stagnant economy and to bring about crowed-in effects on private sector. Keynes considered public expenditure as an exogenous factor that can be used as an important policy tool to promote growth of the economy. Keynesian framework indicated that causality runs from public spending to economic growth. Although the Keynesian hypothesis has fallen out of favour since 1970s, it still influences various policy discussions in various world economies, particularly on whether or not changes in public expenditure have transitory and/or permanent economic impacts. For instance, some policy makers use Keynesian analysis to argue that higher or lower levels of public spending will stimulate or dampen economic growth. Keynes further argues that public spending can boost economic growth through either multiplier or accelerator effects since aggregate demand function comprises both consumption and investment expenditure. In fact, incremental output/income resulting from a given consumption expenditure, public or private or both becomes available to generate subsequent aggregate demand till 15-17 rounds of the cycle are completed though each successive round shall be subject to diminishing magnitudes of consumption, investment and income. While public spending on administration and welfare promotes economic growth through multiplier, public spending on capital investment promotes growth via what Hicks called accelerator. But his matter of the fact is that income, irrespective of its genesis or source, is allocated both for consumption and investment, though the marginal propensity to consume (MPC) and marginal propensity to save (MPS) may differ from round to round (Prakash and Sharma, 2013).

There are other economists who have explained Wagner's ideas. Musgrave (1969) and Rostow (1971) propounded that an increase in public spending is related to the pattern and size of economic growth of a country. In analysing Wagner's law they concluded that at the initial stages of economic growth and development the rate of growth of public expenditure is expected to be high because of the increased demand for public goods and other social services which require financing from the government. They considered public expenditure on health, education, roads, railways, electricity, and water supply as necessities that can push the economy from traditional stage to take-off stage of economic development making

the government to incur more expenditure. They also argued that in all stages of economic growth and development, there exists market failures which may hinder the economy to push to maturity stage, thus the government intervention becomes important in order to correct these inefficiencies associated with market failures.

Wiseman-Peacock (1961) analysed public expenditure of the United Kingdom for the period 1890 – 1955 based on Wagner's law and found it to be still valid. They postulated that public expenditure tends to increase sharply and in a step-wise manner rather than continuously and smoothly. This is caused by the expenditure needs for periodic occurrence of socio-political and economic disturbances, and/or natural disasters and calamities which make public expenditure exceed revenue limits. This generates what is called "displacement effect theory" by moving expenditure and taxation to higher level necessary for generating revenue to be used to overcome these disturbances. The main implication in this theory is that as the economy grows, tax revenue tends to rise even at constant tax rates and thus the public expenditure would also rise in line with GDP growth. For example during social upheavals like wars, famine and other crisis there is a rapid increase in public sector expenditure. This increase is not reduced even after the war time or crisis; instead the public expenditure remains at high levels (Neck and Getzner, (2007)). Furthermore, although P-W hypothesis is consistent with British data its validity for other countries seems to be questionable. In developed countries where economic growth and development has been initiated, sustained and guided through public enterprises or by the government, public expenditure grows consistently under the impact of growth of planned investment. In developing countries the rapid growth of public expenditure may not explain the systematic growth of public investment in economic development.

Furthermore, Musgrave and Musgrave (1990) in emphasising Wagner's hypothesis opined that as a nation progresses and become industrialized, the share of public sector in the national economy grows continually. They argued that there exists a functional relationship between economic growth and the growth of public activities and the public sector grows faster than GDP. The growth of the economy is usually accompanied with increased urban centres which experience increase in crimes and pollution. All these require government intervention through maintenance of laws and order, justice, police and defence. Therefore Musgrave and Musgrave confirm that the rise in economic growth leads to more demand for social infrastructures such as roads, education and health facilities that have to be provided by the government and thus an increase in public expenditures.

Empirical Literature

The impact of public expenditure on growth of GDP has received a great attention among economists in various corner of the world particularly after the World War II. There is a number of studies which are based on the empirical long-run relationship between public spending and economic growth all over the world. However, results reached are widely varied. For instance, Landau (1983) used cross sectional data for 104 countries to study the relationship between the share of public consumption expenditure in GDP and the rate of growth in real per capita GDP. His investigation revealed a negative relationship between public consumption expenditure in GDP and per capita GDP for the full sample of countries. These results are consistent with the proponents of *laissez faire* views that within the market economy the growth of public expenditure hurts economic growth. Therefore, in order to achieve faster economic growth there is a need for minimal government intervention in economic activities. Furthermore, Conte and Darrat (1988) used Granger causality approach

to investigate the causal relationship between public sector growth and real economic growth rates for the member countries of Organization for Economic Co-operation and Development (OECD). Their investigation generated evidence that growth of public sector has a mixed effect on economic growth of the countries, but which in some countries growth was positive and in some, it was negative. Similar evidence was also given by Grier and Tullock (1989) who studied 115 countries and found that the growth rate of public consumption expenditure as a share in GDP and real GDP are negative correlated.

Another investigation by Barro (1991) using cross section data of 98 countries strongly concluded that there is a negative long-run relationship between GDP growth and public consumption expenditure. He also revealed that the rate of economic growth is positively related to measures of political stability and negatively related to a proxy for market distortions. Government intervention was postulated as the source of market distortion, though others will like to term it market correction where governments use policy instruments to remove and verse effects private business.

Hsieh and Lai (1994) examined the interrelations between public spending and economic growth using multivariate time series analysis in the context of vector autoregressive model for a sample of seven countries. Their findings suggest a varied relationship between public expenditure and GDP growth across time as well as across major industrialized nations. Moreover, their study provide no evidence to support the hypothesis that growth of public expenditure can increase per capita GDP. However, they revealed that public expenditure growth seems to have a small contribution to economic growth.

Ghura (1995) used time-series and cross-section data for 33 countries in Sub-Saharan Africa to analyse the impact of public expenditure on gross domestic product (GDP) growth. The results obtained revealed a negative relationship between public expenditure and GDP growth. This type of interferences may emanate from the negligence of distinction between i) growth related productive and growth unrelated non-productive public expenditure, and ii) use of methods/models that do not differentiate between direct and indirect and long-run rates of growth. For example, if government sanctions funds for the sick and poor, its growth effect will be indirect and it will emerge only in the long-run. He also found that economic growth of the SSA is mainly affected by the real world interest rates and terms of trade. Such results are relevant for such countries for which international trade and FDI account for substantive proportion of GDP.

Fan and Rao (2003) investigated the impact of various components of public spending on overall GDP growth across 43 developing countries between 1980 and 1998 using OLS estimates of regression model. Their empirical work revealed mixed results. In Africa, public spending on agriculture and health was found to have a significant impact economic growth. Besides, all components of public expenditure considered in their study (agriculture, education, and defence) were found to have positive contribution to economic growth in Asia countries. In Latin America, health spending was found to have a positive growth-promoting effect. These results tend irrelevance in the postulation of this thesis that consideration of typology of public expenditure is as important as absolute level of expenditure. Structural adjustment programs also had a positive growth-promoting effect in Asia and Latin America, but not in Africa. In fact, structural adjustment programs hurt economic development in Africa. Another empirical investigation was done by Gregoriou and Ghosh, (2007) to examine the impact of public expenditure on economic growth, in a context of 15 developing countries; they used using generalized method of moments (GMM). Their findings provided evidence that countries with high level of government spending have strong growth effects

compared to countries with small public spending. This study also revealed that for countries like Brazil, current public expenditures play a significant role in determining long-run economic growth, whereas for countries like Sudan, current expenditure has a minimal impact on growth of the country. Results of these studies highlight an important aspect of growth effect of public expenditure; it is that growth effect of public expenditure depends partly on the degree of market orientation which directly affects the level of public expenditure.

Sheng-Tung, Chi-Chung, and Yoonbai (2011) analysed the relationship between the size of the public sector and economic growth by employing the quartile regression approach based on a panel data set for 24 OECD countries. They found that the magnitude and size of public sector differs through quartiles. This means that for quartiles with low economic development and growth, increasing the size of the public spending may have a positive impact in promoting economic growth. However, for those quartiles experiencing increases in the rate of economic development and growth, such an impact decreases and has a negative impact on economic growth. Similarly, Abu Al-Foul and Al-Khazali (2003) did an empirical study to test Wagner's law, using Granger causality test for the data from the Jordanian economy. The findings of their investigation revealed that public expenditure and GDP growth are positively related. They further argued that the growth of the economy granger causes the growth in the public sector. These results indicate validity of Wagner's Law in the context of Jordan. In other words, economic growth in Jordan highlights that as the economy grows, public control over investible resources also increases which results in the growth of public expenditure.

Another empirical investigation was that of Abu-Bader, S., and Abu- Qarn, A. (2003) who applied multivariate co-integration and variance decomposition techniques to analyse the causal relationship between the size of public sector expenditure and economic growth for Egypt, Israel and Syria, for 1975-1998, 1967-1998 and 1973-1998 respectively. Basing on their investigation they found a bi-directional causality running from public expenditure to economic growth with a negative long-term relationship between the two variables. However, when testing for causality within a trivariate system –they found that military expenditure affects GDP growth negatively for all the countries, and that welfare public expenditure cause positive effect on economic growth in Israel and Egypt. These results also substantiate the postulation of this thesis that productive and non-productive public expenditure cannot be expected to promote growth. Such expenditure leads to divergence of funds from development to growth constraining use.

The data of Greece, UK and Ireland were used to examine whether size of government spending causes economic growth, or if the rate of economic growth can be determined by the relative size of government. The analysis was carried out by both bivariate error correction models within a Granger causality framework and trivariate analysis. The results showed that government size constitutes Granger causality of economic growth in all three countries in the short-run and in the long-run for Ireland and UK alone. For Greece, it was different in the long-run in which economic growth shows Granger causality increases towards the size of public sector, (Loizides, and Vamvoukas (2005)).

Various empirical investigations in terms of the Wagner's law (also known as WL) have given ambiguous results to validate the law. This implies that there is no clear consensus on the empirical findings. For instance, while some of the studies provide evidence to support the validity of the law in some countries; some few studies provide no significant evidence which support the law and others provided mixed results. These variations in terms of empirical

findings seem to emanate from the nature of data and methodology used. Some of those studies used cross-sectional data while others used time series data but the results found differ from country to country and from period to period (Demirbas, 1999).

Bagdigen and Cetintas (2004) used Engle-Granger test of co-integration and Granger causality test to examine the validity of Wagner's law of long-run relationship between public expenditure and economic growth for Turkey. On the basis of Engle-Granger test they found no long-run relationship between public expenditure and GDP. Similarly on the basis of Granger causality they also found no causality between public expenditure and economic growth. His study revealed no evidence that support the law. Babatude (2007) also found no evidence which support Wagner's law. Instead, he found no significant long-run relationship between public expenditure and economic growth in Nigeria. While Bagdigen and Cetintas and Babatude provided no evidence to support the law, Scully (1989) and Aruwa (2010) revealed evidence which support law in which public expenditure and GDP were found to have causal relationship. Validity of Wagner's law was further supported by Aregbeyer (2006) who used Johansen co-integration to test its validity in Nigeria. His study revealed existence of a long-run relationship between non-transfer public expenditure and national income but no relationship between public expenditure and GDP.

Methods and Models

Formulations and testing of Wagner's law

The purpose of this paper is to test empirically the validity of Wagner's law in Tanzania for the period 1966 to 2012. As it was noted by Dutt and Ghosh (1997) that Wagner did not present his law in mathematical forms, however, over years different studies have developed tested this law using different mathematical forms. There are six well known formulations of Wagner's law that have been developed over time by various economists which form the basis of our analysis in this study. In this study we apply advanced econometric approaches namely co-integration and Granger causality to investigate the validity of the law. We test all six known mathematical models of the law. The rationale for testing all six models in this study is due to nonexistence of a standard decision as to which one is the most appropriate and suitable in testing of the law. These six formulations are applied to test the long-run as well the short-run relationship between public spending and economic growth in Tanzania. All models are similar as they all test elasticity of the explained variable (public expenditure or public expenditure expressed as an aggregate, relative to GDP or per capita) with respect to the explanatory variable (GDP expressed as an aggregate or per capita) Dolenc, (2009). Dolenc provided a more general mathematical function that can be applicable to all six models of Wagner's law as follows:

$$y_t = \beta_0 x_t^{\beta_1} \quad \text{.....(1)}$$

where *y* represents the explained variable and x the explanatory variable. This function can be expressed as a linear function as follows:

$$\ln y_t = \beta_0 + \beta_1 \ln x_t + \mu_t \quad \text{.....(2)}$$

Thus, in testing the Wagner's law, the elasticity is taken into consideration. However the value differs among various models. The most commonly known and cited functional forms of the law and the acceptance criteria for each individual model are presented in Table 1 below:

Table 1
Regression Models of Wagner's Law

Number	Functional Form	Model	Criteria
Model 1	$\ln PE_t = \beta_0 + \beta_1 \ln GDP_t + \mu_t$	Peacock-Wiseman (1961)	$\beta_1 > 1$
Model 2	$\ln(PE/P)_t = \beta_0 + \beta_1 \ln(GDP/P)_t + \mu_t$	Gupta and Michas (1967 & 1975)	$\beta_1 > 1$
Model 3	$\ln PE_t = \beta_0 + \beta_1 \ln(GDP/P)_t + \mu_t$	Goffman (1968)	$\beta_1 > 1$
Model 4	$\ln PCE_t = \beta_0 + \beta_1 \ln GDP_t + \mu_t$	Pryor (1968)	$\beta_1 > 1$
Model 5	$\ln(PE/GDP)_t = \beta_0 + \beta_1 \ln(GDP/P)_t + \mu_t$	Musgrave (1969)	$\beta_1 > 0$
Model 6	$\ln(PE/GDP)_t = \beta_0 + \beta_1 \ln GDP_t + \mu_t$	Mann (1980)	$\beta_1 > 0$

where: GDP represents real gross domestic product, P=Population, PE=Total real public expenditure and PCE=Total real public consumption expenditure.

Model 1: This model is known as Peacock-Wiseman (P-W) model. The model is deemed to support Wagner's law if the coefficient β_1 which implies the elasticity of real public expenditure with respect to real GDP is found to be greater than unity.
Model 2: This model was adopted by Gupta who argued that the effect of an increase in real public expenditure per capita depended upon real per capita income. In this model Wagner's Law is accepted to be valid if and only if the elasticity coefficient (β_1) of real per capital public expenditure with respect to real per capital GDP is greater than one.
Model 3: This model was formulated by Goffman (1968). In this model the real public expenditures are modelled as a function of real per capita GDP. With this model the validity of Wagner's law is only if the slope coefficient (β_1) also known as elasticity of real public expenditure with respect to per capita GDP exceeds unity.
Model 4: This model was introduced by Pryor (1968). Pryor introduced this after seeing what happens in developing countries where the share of real public consumption expenditure to real GDP is increasing with time. In his model he considered real public consumption expenditure to be a function of income. In this model the Wagner's law is deemed to be valid if the slope or elasticity coefficient (β_1) of public consumption expenditure with respect to real GDP is greater than unity. Pryor seems to have used the same model as Peacock and Wiseman but instead of using real public expenditure he used public consumption expenditure as the dependent variable. In his model, he did not include population increase effect as the case of Gupta, Goffman and Musgrave.
Model 5: This model was proposed by Musgrave (1969) and it has also been adopted by Ram (1987) and Henrekson (1993). It is considered that the proportion of real public expenditure to real GDP to be a function of real per capita GDP. In this model the WL holds true if the slope coefficient (β_1) or elasticity of real public expenditure with respect to real GDP per capita to be more than zero. This model has gained a more or less universal acceptance and application as compared to other models. Musgrave further argues that the relative size of public sector tends to fall as the total investment as a share of GDP rises (Brown and Jackson, 1990).
Model 6: The latest widely accepted model for testing the WL was suggested by Mann (1980). This model portrays the modified version of Peacock and Wiseman. In this model the ratio of real public expenditure as a share of GDP is assumed to be a functional form of real per capita

GDP. The validity of WL in this model requires that the elasticity coefficient (β_1) of real public expenditure as a share of GDP to be greater than zero.

Methodology

In testing the Wagner's law we employ the advanced econometric techniques such as Augmented Dickey-Fuller, co-integration and Granger Causality tests. These econometric tests are used to analyse if there exists a relationship between public expenditure and economic growth in the context of Tanzania. Six versions of the WL are used to analyse the long-run and short-run relationship between public expenditure and GDP growth. Variables that will enter the model are real gross domestic product (GDP), real total public expenditure (PE), real total public consumption expenditure (PCE) and population (P).

The ordinary least squares (OLS) technique is used as the estimation model with the use of empirical econometric analysis software, E-views 7. In order to avoid spurious results associated with OLS among the variables we first subject all our variables to Augmented Dickey-Fuller test. This test helps us to check if our variables are stationary or are integrated of the same order in order. The second step is to apply Johansen test of co-integration in order to ensure that errors or residuals are stationary. Lastly we estimated the direction of causality between variables using Granger Causality test.

The following versions of (RWM) are used and Augmented Dickey-Fuller unit root test is applied to the same:

$$\Delta y_{it} = \delta y_{it-1} + \sum_{i=1}^{n} \phi_i \Delta y_{t-i} + \mu_t \quad \text{.....(3)}$$

$$\Delta y_{it} = \gamma_0 + \delta y_{it-1} + \sum_{i=1}^{n} \phi_i \Delta y_{t-i} + \mu_t \quad \text{.....(4)}$$

$$\Delta y_{it} = \gamma_0 + \delta y_{it-1} + \gamma_1 T + \sum_{i=1}^{n} \phi_i \Delta y_{t-i} + U_t \quad \text{.....(5)}$$

where $\rho = 1 + \delta$ and ρ is the root of the equation, μ_t is assumed to be white noise with zero mean and constant variance σ_μ^2. y_t is a stationary series if -1<ρ<1. If ρ=1 then y_t is non-stationary random walk, $y_t = y_{t-1} + \mu_t$ and is said to have a unit root. The hypothesis of stationarity can be evaluated by testing whether the value of δ is strictly less than zero. The Dickey-Fuller (DF) test takes the unit root as the null hypothesis, that is, $\mathrm{H}_0 : \rho = 1$ and it is tested against a one sided alternative hypothesis, that is, $\mathrm{H}_1 : \rho < 1$. The test is carried out by estimating the equation of first order differences of y_t, that is, Δy_t as a function of y_{t-1}, y_{t-1} subtracted from both sides of equation. After testing for unit roots the co-integration error–correction analysis will be performed using Johansen procedure to determine whether a group of non-stationary series is co-integrated or not. Engle and Granger, (1987) demonstrated that although the variables may be non-stationary, there may be a linear combination among the set of non-stationary variables, which is stationary. Generally a set of variables is said to be co-integrated if a linear combination of the individual series, which are $I(d)$, is stationary. This means that, if $x_t \sim I(d)$ and $y_t \sim I(d)$, a regression is run such as: $y_t = \beta x_t + \mu_t$.

If the residuals, μ_t are $I(0)$ then x_t and y_t are co-integrated implying that there is a long–run equilibrium relationship between them such that they can be estimated in levels even if they are singly non-stationary. The major advantage of this approach is that it integrates short-run

dynamics with the long-run equilibrium without losing long-run information, (Pesaran et al., 2001).

Following Johansen and Juselius (1990) and Johansen (1991) a vector of endogenous variables, y_t, that are integrated of order 1, is analysed using the vector error correction model (VECM). For example series (y_t) will be co-integrated of order (d), that is, $y_t \sim I(d)$ if it is stationary after differencing it d times. In order to test for the presence of co-integration, we will need the unrestricted VAR model so as to determine the optimal lag length of the system. EViews can be used to implement VAR-based co-integration tests using the methodology developed in Johansen (1991, 1995). We first consider a VAR of order p:

$$y_t = A_1 y_{t-p} + ... + A_p y_{t-p} + Bx_t + \mu_t \quad (6)$$

where y_t is a *k*-vector of non-stationary $I(1)$ variables, x_t is a *d*-vector of deterministic variables, and μ_t is a vector of innovations with zero mean. We may rewrite this VAR as,

$$\Delta y_t = \mu + \sum_{i=1}^{p} \Psi_i \Delta y_{t-i} + \pi x_t + \mu_t \quad (7)$$

where $\mu_t = \sum_{i=1}^{p} A_i - I, \Psi_i = -\sum_{j=i+1}^{p} A_j$. These parameters (μ and $\Psi_1,...,\Psi_p$) are allowed to vary without restrictions, *p* is the lag length of the model and μ_t is a vector of normally distributed shocks with a mean of zero. The presence of co-integration is tested by examining the rank of μ . Johansen's method is used in this analysis to estimate the μ matrix from an unrestricted VAR and to test whether we can reject the restrictions implied by the reduced rank of μ.

Following the Granger (1969) approach, the question of whether *x* causes *y* and determine how much of the current *y* can be explained by past values of *y* , and, then determine whether adding lagged values of *x* improve the explanation of the model. y is said to be Granger-caused by *x* if *x* helps in the prediction of *y* , or equivalently if the coefficients on the lagged $x's$ are statistically significant. Therefore, an increase in public spending does not Granger-cause an increase in GDP if and only if, all the coefficients of public spending in the GDP equation at all lags are equal to zero. Reverse causality from GDP to public spending may also exist. For a simple bivariate model, we can test if *x* is granger causing *y* by estimating equation (8) by using the standard ward test of joint insignificant of *betas*. Tests involve estimation of the regular Granger-type equation:

$$\ln y_t = \alpha_0 + \sum_{i=1}^{p} \alpha_{2i} \ln y_{t-i} + \sum_{i=1}^{p} \alpha_{3i} \ln x_{t-i} + \mu_t \quad (8)$$

$$\ln x_t = \beta_0 + \sum_{i=1}^{p} \beta_{2i} \ln x_{t-i} + \sum_{i=1}^{p} \beta_{3i} \ln y_{t-i} + \nu_t \quad (9)$$

$$H_0 : \alpha_1 = \alpha_2 = ... = \alpha_p = 0$$

$$H_1 : \alpha_1 \neq \alpha_2 \neq ... \neq \alpha_p \neq 0$$

where α_0 is a constant and μ_t and ν_t are white noise error terms. Variable *x* is said to Granger-cause variable *y* if we reject the null hypothesis which implies that a temporary change in public spending leads to permanent changes in economic growth (GDP). On the other hand, failing to reject the null hypothesis of no causality will mean that growth in GDP is not directly explained by public spending. Similarly, we can test if *y* causes *x* by replacing *y* for *x* in equation (8) and (9).

Data Description

This study employed data related to economic growth as a proxy of Real GDP, total real government expenditure, total real government expenditure and population. The data used are time series for 47 years spanning over 1966 to 2012. All the variables are deflated at 2005 prices using appropriate deflator. To estimate the relative elasticities, the natural logarithms have been used. These data were collected from secondary sources including the Statistical Bulletin of the Central Bank of Tanzania, Ministry of Finance and Empowerment and Tanzania National Bureau of Statistics.

Findings

By applying the Augmented Dickey-Fuller (ADF) test we observe that all the variables are non stationary at level but they appear to be stationary after their first difference (they are integrated of order one) at 5 percent level of significance.

Table 2

ADF Unit Root Test in Levels and First Difference (with an Intercept but Without Trend)

At level	Test Statistic	First Difference	Test Statistic
$\ln(GDP)$	2.1197(1)	$\Delta\ln(GDP)$	-3.3161(0)
$\ln(GCE)$	-0.4579(0)	$\Delta\ln(GCE)$	-6.0344(0)
$\ln(GDP/P)$	1.6356(1)	$\Delta\ln(GDP/P)$	-5.0596(0)
$\ln(GE)$	0.3774(0)	$\Delta\ln(GE)$	-7.6548(0)
$\ln(GE/GDP)$	-0.1208(0)	$\Delta\ln(GE/GDP)$	-7.4690(0)
$\ln(GE/P)$	0.5601(0)	$\Delta\ln(GE/P)$	-7.5490(0)

Note: The critical values at 5% level of significance for the variables in levels and first differences are -2.9266 and -2.9281respectively. For the test statistic, the number in parenthesis gives the number of lags. In determining the lag length we used the Akaike Information Criterion (AIC).

Table 3

ADF Unit Root Test in Levels and First Difference (with an Intercept and Trend)

At level	Test Statistic	First Difference	Test Statistic
$\ln(GDP)$	0.3705(1)	$\Delta\ln(GDP)$	-4.0103(0)
$\ln(GCE)$	-1.7141(0)	$\Delta\ln(GCE)$	-5.9973(0)
$\ln(GDP/P)$	0.6362(0)	$\Delta\ln(GDP/P)$	-5.6218(0)
$\ln(GE)$	-2.5160(0)	$\Delta\ln(GE)$	-7.6300(0)
$\ln(GE/GDP)$	-2.2931(0)	$\Delta\ln(GE/GDP)$	-7.3797(0)
$\ln(GE/P)$	-2.5908(0)	$\Delta\ln(GE/P)$	-7.5387(0)

Note: The critical values at 5% level of significance for the variables in levels and first differences are -3.5107 and -3.5131respectively. We have applied the Akaike Information Criterion (AIC) to determine the number of lags for each test statistic which are shown in parenthesis.

Table 4 reports the results for Johansen co-integration test for the six models of the Wagner's hypothesis. Evidence from Johansen Co-integration test based on both Trace and Maximal Eigen value statistic reveals that the null hypothesis *r=0* is not rejected in all models of the

Wagner's Law. This implied that there is no co-integrating vector which exists among the variables or there is no long-run relationship between public expenditure and economic growth in the case of Tanzania. This by implication supports Johansen co-integration test of no long-run relationship among the employed variables. However, this evidence is not sufficient to conclude that the Wagner's Law is not valid in Tanzania. Thus we have to use granger causality and Wald tests to examine the direction of causality and if there is any short-run relationship between public expenditure growth and GDP.

Table 4
Unrestricted Johansen co-integration test

Hypothesized No of CEs		Intercept (no trend) in co-integrating equation			
Null	Alternative	λ - Trace	5% CV	λ – Max-Eigen	5% CV
1. Johansen co-integration test for Peacock-Wiseman Model					
$H_0: r = 0$	$H_1: r = 1$	5.5353	15.4947	5.4671	14.2646
$H_0: r \leq 1$	$H_1: r > 1$	0.0681	3.8415	0.0681	3.8415
2. Johansen co-integration test for Gupta Model					
$H_0: r = 0$	$H_1: r = 1$	7.2398	15.4947	6.3157	14.2646
$H_0: r \leq 1$	$H_1: r > 1$	0.9241	3.8415	0.9241	3.8415
3. Johansen co-integration test for Goffman Model					
$H_0: r = 0$	$H_1: r = 1$	6.8529	15.4947	6.1360	14.2646
$H_0: r \leq 1$	$H_1: r > 1$	0.7168	3.8415	0.7168	3.8415
4. Johansen co-integration test for Pryor Model					
$H_0: r = 0$	$H_1: r = 1$	13.0131	15.4947	9.2062	14.2646
$H_0: r \leq 1$	$H_1: r > 1$	3.8069	3.8415	3.8069	3.8415
5. Johansen co-integration test for Musgrave Model					
$H_0: r = 0$	$H_1: r = 1$	7.2398	15.4947	6.3157	14.2646
$H_0: r \leq 1$	$H_1: r > 1$	0.9241	3.8415	0.9241	3.8415
6. Johansen co-integration test for Mann Model					
$H_0: r = 0$	$H_1: r = 1$	5.5353	15.4947	5.4672	14.2646
$H_0: r \leq 1$	$H_1: r > 1$	0.0681	3.8415	0.0681	3.8415

Notes: Test assumption is linear deterministic trend in the data: An intercept and no trend in the co-integrating vectors. Trace as well as max-eigen tests indicate no co-integrating vector at the 0.05 level where *r=0* means there is no co-integrating vector and r represents the number of co-integrating vectors.

Short-Run Causality

We conducted a Wald test to investigate the short-run causal relationship between public spending and economic growth. Based on the results of this test reported in Table 6 observed that there is no significant short-run causality running from GDP to public expenditure and vice versa for all six models. The public expenditure on does not have any short-run effect on GDP for the case of Tanzanian economy.

Table 6
Wald Test of Short-Run Causality

Null Hypothesis	Chi-square value	Probability
Peacock-Wiseman	1.9467	0.5835
Gupta and Michas	3.4112	0.3325
Goffman	2.8962	0.4079
Pryor	7.1897	0.0661
Musgrave	2.3612	0.5009
Mann	2.6676	0.4458

The null hypothesis of no causality is tested and reported in Table 7 using F-statistics. The results indicate that there is no evidence of support for Wagner's Law in Tanzania at 5 percent significance level. We fail to reject the null hypothesis for all the six versions of Wagner's Law except for model 4 where the null hypothesis of no causality running from GDP to public consumption expenditure is rejected at 5 percent significant level.

Table 7
Pairwise Granger Causality Tests

	Null Hypothesis	F-Statistic	Prob.
Model 1	Ln(GDP) does not Granger Cause LnPE	0.41685	0.6619
	Ln(PE) does not Granger Cause LnGDP	0.28146	0.7562
Model 2	Ln(GDP/P) does not Granger Cause Ln(PE/P)	1.26189	0.2941
	Ln(PE/P) does not Granger Cause Ln(GDP/P)	1.89432	0.1637
Model 3	Ln(GDP/P) does not Granger Cause Ln(PE)	0.87900	0.4231
	Ln(PE) does not Granger Cause Ln(GDP/P)	1.59329	0.2159
Model 4	Ln(GDP) does not Granger Cause Ln(PCE)	3.32969	0.0460
	Ln(PCE) does not Granger Cause Ln(GDP)	0.00292	0.9971
Model 5	Ln(GDP/P) does not Granger Cause Ln(PE/GDP)	0.81750	0.4488
	Ln(PE/GDP) does not Granger Cause Ln(GDP/P)	1.89432	0.1637
Model 6	Ln(GDP) does not Granger Cause Ln(PE/GDP)	0.96808	0.3885
	Ln(PE/GDP) does not Granger Cause Ln(GDP)	0.28146	0.7562

Conclusion

The aim of this paper was to examine the validity of the Wagner's Law in the Tanzanian economy using econometric techniques namely (i) Augmented Dickey Fuller (ADF); (ii) Johansen co-integration test; (iii) Granger causality and Wald test. In doing so we reached a conclusion that there is no evidence that supports the validity of law in Tanzania. We tested the Law using annual aggregate time series data of public expenditure and economic growth. We applied Augmented Dickey Fuller test to analyse the properties of time series data both at level and first difference. We found all variables under this study to be non stationary at level with and without intercept but after differencing them they became stationary which means they are integrated of order one (I(1)). We also employed the Johansen cointegration test to the six models of the Wagner's law to examine if there exists any long-run relationship between public expenditure and GDP variables for any of the six models of the Law. According to this test we found no cointegrating or long-run relationship between public expenditure

and economic variables of the Law as listed in Table 1. We further applied Granger causality and Wald test to examine if there exists any short-run relationship among the variables under investigation. However, the findings also revealed no evidence to support the Wagner's law in Tanzania. These results suggest that public expenditure growth in Tanzanian economy is not determined or linked to economic growth as stated in the Wagner's law. The growth of public expenditure in Tanzania seems to be determined by the changing economic circumstances, political processes and influence of the interest groups. In this study we have used the aggregate data in the six models of Wagner's law but in future it may be important to test the Law using disaggregated data of public expenditure because this study could not provide any evidence which supports the Law using the aggregated data.

References

Abu-Bader, S., & Abu- Qarn, A. (2003). Government Expenditures, Military Spending and Economic Growth: Causality Evidence from Egypt, Israel, and Syria. *Journal of Reseach in Business, Vol.4, no.6, 1320-1338.*

Afzal, M., and Abbas, Q. (2010). Wagner's law in Pakistan: Another look. *Journal of Economics and International Finance*, Vol. 2(1) pp. 012-019.

Aladejare, S. A. (2013). Government spending and economic growth: evidence from Nigeria, *MPRA Paper*, *43916*. Retrieved from http://mpra.ub.uni-muenchen.de/43916/.

Aregbeyen, O. (2006). Cointegration, Causality and Wagner's Law: A Test for Nigeria, 1970-2003, *Central Bank of Nigeria, Economic and Financial Review,* 44 (2), 1-17.

Aruwa, S. (2012). Public Finances and Economic Growth in Nigeria*, Public and Municipal Finance*, Vol. 1(2).

Babatunde, M. A. (2008). A Bound Testing Analysis of Wagner's Law in Nigeria: 1970-2006, *Department of Economics, University Ibadan, Ibadan Nigeria.*

Bagdigen, Muhlis and Cetintaş, Hakan (2003). Causality between Public Expenditure and Economic Growth: The Turkish Case*. Journal of Economic and Social Research*, Vol. 1(6), 53-72.

Barro, Robert J. (1991). Economic Growth in a cross section of countries. *The Quarterly Journal of Economics*, vol 106(2).

Bassam AbuAl-Foul and Al-Khazali, Osamah (2003). The Long Run Relationship Between Government Expenditures and Economic Growth Case of Jordan. *Economics and Economic Education Research Journal*, Vol. 4(3), 49-60.

Baumol (1967). Macroeconomics of Unbalanced Growth: The Anatomy of Urban Crisis. *The American Economic Review*, Vol. 57(3), 415-426.

Beck, Morris,(1982). Toward a Theory of Public Sector Growth, *Public Finance,* 37:163-77.

Berry, W. D., & Lowery, D. (1984). The Growing Cost of Government: A Test of Two Explanations. *Social Science Quarterly*, *65*, 735-749.

Berry, W. D., & Lowery, D. (1984). The Measurement of Government Size: Implications for the Study of Government Growth. *Journal of Politics*, *46*, 1193-1206.

Berry, W. D., & Lowery, D. (1987). Explaining the Size of the Public Sector: Responsive and Excessive Government Interpretations. *Journal of Politics*, *49*, 401-440.

Bhatia, (2002*). Public Finance*, (23rd Revised Ed.), Vikas Publishing House PVT Ltd, New Delhi, India.

Bird, R.M., (1971). Wagner's 'Law' of Expanding State Activity, *Public Finance/Finances Publique*, 26(2), 1-26.

Brown and Jackson, (1990). *Public Sector Economics*, 4th Ed. Blackwell Publishers, Oxford UK and Cambridge USA.

Conte, M.A. and Darrat, A.F. (1988). Economic growth and the expanding public sector: A re-examination. *Review of Economics and Statistics.* 70(2): 322-30.

Demirbas, S. (1999). Cointegration Analysis- Causality Testing and Wagner's Law: The Case of Turkey, 1950 – 1990. This paper was presented at the Annual Meeting of the European Public Choice Society that held in Lisbon (April: 7-10, 1999) at the Instituto Superior de Economiae Gestao, Universidade Technica de Lisboa.

Dolenc, (2009). Wagner's Law is Still Applicable: Empirical Evidence For Slovenia: NG, št. 5–6/2009 Izvirni znanstveni članki/Original scientific papers.

Dutt, S. D., and Ghosh, D. (1997). An Empirical Examination of the Public Expenditure-Economic Growth Correlations. *Southwest Oklahoma Economic Review*, Vol. 12(4), 14-26.

Engle, Robert F., and Clive W. J. Granger (1987). Cointegration and Errorcorrection: Representation, Estimation, and Testing. *Econometrica* 55: 251-76.

Fan, S. and Rao, N. (2003). Public Spending in Developing countries: Trends, Determination, and Impact*, EPTD Discussion Paper No. 99*, USA.

Ghura (1995). Macro Policies, External Forces, and Economic Growth in Sub-Saharan Africa: Chicago Journals, Economic Development and Cultural Change, Vol. 43(4), 759-778.

Goffman, J. J., (1968). On the empirical testing of Wagner's law: a technical note. *Public Finance/Finances Publiques*, 3 (3), 359–364.

Granger, C. W. J. (1969). Investigating Causal Relationships by Econometric Models and Cross-Spectral Methods. *Econometica* 37:424-38.

Gregoriou, A & Ghosh, S (2007), The Impact of Government Expenditure on growth: Empirical evidence from Heterogeneous panel, [Retrieved from http://www.brunel.ac.uk/__data/assets/pdf_file/0006/83994/0701.pdf].

Grier K. and Tullock G. (1989). An empirical analysis of cross-national economic growth, 1951-1980, *Journal of Monetary Economics*, 24(1), 259-276.

Gujarati, D. N. (1995). *Basic Econometrics*, (3rd Ed.), *New York:* McGraw-Hill.

Gupta, S.P. (1967). Public Expenditure and Economic Growth: A Time-Series Analysis. *Public Finance* 22(4), 423–461.

Henrekson, M., (1993). Wagner's law – a spurious relationship'? *Public Finance/Finances Publiques,* 48 (2), 406–415.

Hsieh, E. and Lai, K. S., (1994). Government spending and economic growth: the G-7 experience. *Applied Economics*, 26 (6), 535–542.

Johansen S. and Juselius K. (1990), Maximum Likelihood Estimation and Inference on Cointegration with Applications to the Demand for Money, Oxford Bulletin of *Economics and Statistics, 52, 169-210.*

Johansen, S. (1991), "Estimation and Hypothesis Testing of Gaussian Vector Autoregression Models", *Econometrics 59.*

Kweka, J. P. and Morrissey, O. (1999). Government Spending and Economic Growth, Empirical Evidence from Tanzania (1965-1996), CREDIT and School of Economics, University of Nottingham.

Landau, Daniel, (1983). Government expenditure and economic growth: a cross-country study. *Southern Economic Journal* 49, 783-92.

Loizides, J. and Vamvoukas, G. (2005). Government Expenditure and Economic Growth: Evidence from Trivariate Causality Testing. *Journal of Applied Economics, Vol. VIII,Adjustment, and Growth in Low- income Countries," IMF Working, pp. 02/77.*

Lowery David, and William D. Berry (1983). The Growth of Government in the United States: An Empirical Assessment of Competing Explanations, *American Journai of Political Science,* 27:665-94.

Mann A.J. (1980). Wagner's Law: An Econometric Test for Mexico, 1925–1976, *National Tax Journal* 33(2), 189–201.

Michas, N.A. (1975), Wagner's Law of Public Expenditures: What is the Appropriate Measurement for a Valid Test? *Public Finance* 30(1), 77–84.

Musgrave, R.A. (1969). *Fiscal Systems*, New Haven and London: Yale University Press.

Musgrave, R.A., and Musgrave, P. B (1984), Public Finance in Theory and Practice, 4th Edition, McGraw-Hill Book Company, New York.

Myrdal, Gunnar (1953). *Economic Theory and Underdeveloped Regions*, Popular Prakashan, Mumbai.

Neck, R., & Getzner, M. (2007). Austrian Government Expenditures: 'Wagner's Law' or 'Baumol's Cost Disease? *International Business & Economics Research Journal, 6*(11), 49-66.

Peacock, A.T., and Wiseman J. (1961), *The Growth of Public Expenditure in the UnitedKingdom*, Princeton: Princeton University Press.

Pesaran, M.H., Y. Shin., and Smith R. (2001). Bounds testing approaches to the analysis of level relationships, *Journal of Applied Econometrics,* 16, 289-326.

Pigou, A. C. (1928) [1946]. *The Economics of Welfare*, Fourth edition. London: Macmillan [*earlier editions*: 1920 first edition, 1924 second edition and1929 third edition].

Prakash, S. and Chowdhury, (1995). *Expenditure on Education-Theory and Growth*, NIEPA (Now NUEPA), New Delhi.

Prakash, S. and Ritu Sharma, (2013). Multiplier Effect on Growth of Income and Investment: Analysis of Sequential Rounds in Input Output Framework.

Prakash, S., Buragohain, Tarujyoti, and Gupta, Abha (1993). Literacy and development: An analysis of 114 countries, 26 states and 452 districts of India, *Journal of Education Planning and Administration*, Special Issue of Literacy and Development in Developing Countries, NIEPA, New Delhi.

Pryor, F.L., (1968), Public Expenditure in Communist and Capitalist Nations, *London:George Allen and Unwin.*

Ram, R., (1987), Wagner's hypothesis in time series and cross section perspectives: evidence from 'Real'data for 115 countries, *Review of Economics and Statistics,* 69 (2), 359–393.

Rostow, W. W. (1971). *The stages of Economic Growth*, Cambridge: Cambridge University press.

Scully, G. W. (1989). The Size of the State, Economic Growth and the Efficient Utilization of National Resources. *Public Choice* 63:149-164.

Sheng-Tung, C., Chi-Chung, C. & Yoonbai, K. (2011). Economic growth and government size in OECD countries: New evidence from the quantile regression approach. *Economic Bulletin*, 31(1), 416-25.

Wagner, A. (1950), Finanzwissenschaft, Leipzing, 3rd edn. Referred from Bird, R.M. (1971), 'Wagner's Law of Expending State Activity', Public Finance, Vol.26, p.1-26.

Wiseman, J. and Peacock, A.T. (1961), *The Growth of Public Expenditure in United Kingdom*, Princeton University.