Testing Keynesian versus Wagner Hypothesis on the linkage between Government Spending and Economic Growth in Oman

Saleh Said Masan,
School of Business and Economics,
Loughborough University,
United Kingdom.
Email: S.S.S.Masan@lboro.ac.uk

Abstract
This paper investigates the relationship between GDP and total as well as disaggregated public expenditures in Oman over the period 1980-2005. Engle-Granger’s two-step cointegration and Granger Causality techniques as embodied in Error correction modelling approach are applied to investigate long-run as well as short run relationship between government expenditures and GDP. Most results do not show the existence of long-run equilibrium between government expenditures and national income, but they support the short-run unidirectional causality from economic growth to government expenditures, implying that increases in national income may be causing the growth of government expenditure as suggested by Wagner’s Law. The empirical analysis does not support the hypothesis of government expenditure causing economic growth as proposed by Keynesian theory. Thus, the government can limit its expenditures to control its budget deficits without worrying about any detrimental effects of contractionary fiscal policy on the economic growth.
1. Introduction

The continuing growth of government expenditure in developing countries is one of the main features of the contemporary world (Demirbas; 1999). Hence, the size of government expenditures and its long-run effects on economic growth, and vice versa, has been an issue of sustained interest for the last two decades (Loizies and Vamvoukas; 2004). Consequently, many countries have realized the need for fiscal adjustments and restructuring of their public sector. These structural adjustments were concerned even with harder questions, that is, which components of government spending should be dropped and which maintained. An answer to such question depends on the contribution of each component to economic growth (Devarajan et. al; 1996). Public sector in these countries is the main player in the economy with a big role. Governments create economic infrastructure like communication facilities, build roads, ports and airports. They also spend much resource in developing human resources like education, training and health services. Governments also participate in capital formation and research and development beside stimulating saving and investment (Tulsidhara; 2006). Above all, the public sector in these countries is a major employer.

The essence of government intervention and so its spending started with the theory of market failures. This argues that it is the provision of public goods, addressing externalities, imperfect information and missing markets that are the basis for government intervention (Grossman; 1988). Over time the conventional wisdom turns out to be that public investment in human capital and infrastructure is necessary to increase the productivity of private capital and has positive effects on economic growth (Khan and Kumar; 1997). Government also is seen as important to support socially desirable investment and hence harmonizing conflicts between social and private interests and resisting foreign exploitation (Grossman; 1988). As the result, there are two schools of thought discussing the causative relationship between government expenditure and economic growth. The core theme of these schools focuses on the direction of causality between government spending and economic growth; which attempt to unveil whether government expenditure is a cause or an outcome of economic growth (Biswal et al, 1999). Whereas Wagner’s Law argues that government expenditure is endogenous and is affected positively by economic growth, the Keynesian approach on the other hand considers government spending as an exogenous variable that could be used to enhance economic growth. “If these positive features of government interventions are true then Keynesian hypothesis should hold in the short and long-run relationship between government spending and economic growth”, (Al-Ansar et. al; 1993). Other authors that have developed models to link public spending or its components to economic growth have not succeeded in developing rigorous theoretical models. Most of these models assume that
government spending is productive and their empirical application found a positive relationship between public investment and growth rate.¹

On the other hand, it is argued theoretically that government is less efficient than private sector and so the more intervention by government the lower is economic growth. Most government operations are conducted by state-owned enterprises that are inefficient compared to private sector and hence they reduce the overall productivity of the economy (Khan and Kumar; 1997). Public investment can crowd out private investment by using scarce resources and so have an adverse effect on growth (Khan and Kumar; 1997). Moreover, the expansionary fiscal policies contribute towards distorting economic incentives and leads to sub-optimal economic decisions (King and Rebelo, 1990). Barro (1989) contends that an increase in government expenditure causes an increase in debts which leads to high taxes in future and hence lowering aggregate demand that in turn would lower national output. Therefore, the role of government spending in promoting economic growth remains debatable in both developed and developing countries. Both economic theory and empirical literature have not yet succeeded in providing clear cut answer to the question of how public spending affects economic growth (Devarajan et al., 1996).

Much of the empirical literature examining relationships between economic growth rates and fiscal variables differs in terms of the size sample of countries, period of estimation and econometric techniques; and thus has produced conflicting results (Kweka and Morrissey; 2000). There is widespread non-robustness of coefficient signs and statistical significance even with similar specifications for similar variables. For example, while conventional wisdom suggests that government investment (consumption) is positively (negatively) correlated with economic growth, there are few consistent findings across studies.

Earlier studies that test the association between government expenditure and economic growth used cross-section data partly due to lack of long time series data for most countries (Dipendra, 2007). The few studies that used time series framework did so without checking for the stationarity; which makes their results spurious (Jeselius and Hendry, 1999). Dipendra (2007) argues that studies that use cross section data are less useful because, as Bird (1971) stated, “there is nothing in any conceivable formulation of Wagner’s law which tells us country A must have a higher expenditure ratio than country B simply because the level of average per capita income is higher in A than B at particular point in time” (pp. 3). As a result, time series research is necessary to further recognize the causal relationship between public expenditure and economic growth.

In spite of the fact that Wagner’s Law and Keynesian hypothesis have been investigated in cross-sectional and time-series framework, knowledge of the true direction of causality between public expenditure and national growth is needed to determine the validity of Wagner’s Law and Keynesian Hypothesis. Both hypotheses have been tested by many researchers (Courkis, et al, 1993). Initially most economists that test this hypothesis have used traditional regression analysis but few tested for the causality. More recently cointegration analysis has been used widely (Demirbas 1999), yet still empirical results that test Wagner Law and Keynesian hypothesis have remained inconclusive.

Recent developments in time series econometrics have permitted the investigation of short- and long-run causal relationship between public expenditure and economic growth in terms of causality testing in the cointegration and error correction approach (Jiranyakul and Brahmasrene; 2007). Indeed, empirical testing and determination of causal direction only became possible after approaches developed by Granger (1969), Sims (1972) (Demribas; 1999). It is hoped that causality empirical analysis using such advanced time series econometrics technique should cut this debate by determining the nature and direction of the relationship between government spending and economic growth. Still though, there are some methodological shortcomings that make results in this area inconclusive.

With respect to Oman, there is no known previous study that takes Oman as specific case and uses recent developments in times series econometric techniques such as cointegration and Granger causality techniques. Two notable past studies are cross-country studies which have included Oman in the sample. Al-Sheikh (2000) investigates the existence of Wagner’s Law for 27 countries including Oman using aggregate government spending and national income. He found evidence of Wagner’s Law for most countries including Oman. Al-Faris (2002) examined the relationship between disaggregated government expenditures and national output for GCC countries without making a clear distinction between long and short-term relationship.

Thus, our contribution to literature in this paper is taking Oman as country-specific study, use time series data, and disaggregating government expenditure into public investment expenditure and current expenditure and examine their relationship with economic growth. Also, we overcome Al-Faris (2002) methodology shortcoming by making clear distinction between short and long-run causal relationships. Moreover, to avoid what has been raised in the literature of whether the variables should be measured in nominal or real values, we use both real and nominal terms (Beck, 1982).

As a small open economy, Oman is particularly interesting case study for some reasons. Firstly, the public sector in Oman is a major component of GDP, on average accounting
around 43% of GDP for the period under study (1980-2005). Secondly, over the past two decades Oman experienced a decrease in the size of the public sector as a share of GDP, accompanied by an increase in GDP for the same period. Thirdly, 70% of total government expenditure is financed by oil revenues which are influenced by international oil market fluctuations. Generally, public sector is considered as leading sector and engine of economic growth in oil exporting countries, particularly the GCC countries\(^2\), which is highly dependent on oil revenues (Auty, 2001).

In this paper we model the relationship between aggregate as well as disaggregated government expenditures (public investment expenditure and consumption expenditure), and GDP by applying five versions of Wagner’s law within a time-series framework. Recent advance in econometric techniques has been taken into account to avoid spurious findings. First, stationarity properties of the data are investigated using Dicky-Fuller unit-root test to determine orders of integration for nominal and real data. Second, Engle-Granger two steps procedure is applied across five of Wagner’s versions to examine the existence of long-run relationships (cointegration) between Oman economic growth and total government expenditure in the first stage and its categories (i.e. public investment and public consumption expenditures) in the second stage. Then we use Granger causality test to test whether the relationship between government expenditures and economic growth is Wagnerian phenomenon (government expenditure is endogenous variable) or the Keynesian phenomenon (government expenditure is exogenous variable). The results support the existence of Wagner proposition at short-term whilst there is no evidence of Keynesian Hypothesis neither in the short nor long-term.

The remainder of the paper is organized as follows. Section 2 presents overview of Oman economy. Section 3 presents theoretical basis. Section 4 reviews the empirical literature. Section 5 present and discuses the empirical results and discussion while policy implication and conclusion are in section 6.

2. Overview of Oman Economy

Oman started its economic expansion in 1970 when His Majesty Sultan Qauabus came to power. Oman, with a small population of 2.5 millions is classified as an upper medium income developing country with annual GNI per capita $ 13191 in 2006, according to the Ministry of National economy statistics. Even though Oman’s oil resources are modest compared to its Gulf neighbour countries, the economic development is mainly attributed to oil resources (Oman Chamber of Commerce website). The petroleum industry remains the backbone of Oman’s economy, averaging of 70-80% of government revenues; more than 70%

\(^2\) These countries are Bahrain, Kuwait, UAE, Saudi Arabia, Qatar and Oman
of total exports and about 35% of GDP down from 70% at the beginning of 1970s (Pat; 2003).

Oman economy has expanded by 76% over 1990s because of rising of oil prices, and more recently, liquefied natural gas (LNG) production (Siddiqi; 2003). During the last three decades, greater inputs of external capital, optimal utilization of oil revenues, sustained political stability and increasing private and public investments in the non-oil economy as well as technological transfers are the main sources of economic growth in Oman (Oman Achievements and Challenges; 2004).

Oman government has an excellent debt service record and foreign financial institutions are comfortable with Omani risk. The budgetary surplus devoted to accumulating foreign assets and to lowering debt since 1999 (Ministry of National Economy website), which declined from 32.2% of GDP in 1998 to 16% by 2002.

It seems from IMF indicators, Central bank of Oman (CBO), Ministry of National Economy (MONE) figures that Oman economy is active and healthy economy. However, it should be noted that these good indicators are attributed to oil revenue. As a result of decreasing oil prices in 1986, Oman economy experienced economic recession until 1990 when recovery began to take place. These fluctuations in oil prices and moderate oil reserves reinforce the government for structural reforms, aimed at achieving more source diversification through development of the non-oil activities. The government focuses on agriculture, fisheries, mining, light and some heavy industry and recently tourism as other sources of economic diversification away from oil (Sustainable Development Indicators; 2006).

The objectives of recent Omani industrial strategy according to the Ministry of commerce and industry are to increase value-added products, export-oriented manufacturing output as well as encouraging foreign direct investment through more privatization and opening different sectors to foreign and private investors. Recently, Oman has started to construct big industrial projects such as aluminum smelter project and petrochemical complex project that will help diversify export earnings in the long-term (Ministry of commerce and industry website).

Foreign direct investment (FDI) remains small and mostly confined to tourism and hydrocarbon sector. The government has recently offered many incentives to induce FDI in the non-oil sector. A new corporate tax law of 1996 allows non-Omani investors to pay same very low tax as their Omani counterparts. Also, companies with foreign ownership get tax exemptions for five years. Oman tries to attract foreign investment in tourism, telecommunications, financial services and utility projects (Page, 1999).

Oman’s membership of the World Trade organization (WTO) would open more regional trading markets and greater opportunities for outward and inward investment. The
membership of WTO commits Oman to greater deregulation, improving foreign direct investment (FDI) regime, and fostering domestic competition (Siddiqi, 2003). Under the WTO’s laws, foreign equity participation should be permitted in insurance, banking and brokerage services.

One of the government’s advantages is putting long-term plan in order to increase the growth of economy which is Vision 2020. It is a blueprint for development, aims to put Oman’s economy on a par with the newly industrialized economies, by undergoing structural change, including deregulation and heavy investment in the non-oil sector, greater liberalization and open the economy for foreign world and get as much benefits from globalization as possible. One of main objectives of this long-term development program is to apply fiscal reform by reducing public expenditure to 38% of GDP. It emphasises human resource development by enhancing skills in technical and engineering fields. Moreover, diversification of economy sources away from oil sector by encouraging private investment in sectors that Oman enjoys competitive advantages and developing small industries (Oman Achievements and Challenges; 2006).

The government claims that Oman is poised to become a diversified liberal economy within the next 13 years according to Vision 2020. The oil industry’s share of GDP would fall to 9% and non-oil sector would be the main component of GDP in 2020. Indeed, a developed industrial base is vital for sustainable growth away from fluctuations in world oil markets which impose the economy to high risks. However, the real process of development in Oman dose not correspond to vision 2020. Firstly, privatization plans are not moving ahead as quickly as some local business had hoped, but the government argues that privatization is processing at a rate that is appropriate to the market. Secondly, membership of the World Trade Organization (WTO) which commits Oman to greater deregulation, improving foreign direct investment (FDI), and fostering domestic competition adds more pressure on Oman economy.

High population growth exerts pressure on public services and forces the government to increase its provision of public goods and also has created a glut of labor. Every year, about 30,000 nationals enter the labor market and unofficial estimated put the unemployment are at 10-15% (Siddiqi; 2003). Within private sector, Omanis comprised only 11.3% or 73,699 of a total workforce of 651,247 in 2003, according to the Ministry of Manpower figures.

Oman, like many developing countries, has a problem of applying economic plans that are created by various departments of public sector. The government economic policy operated under five-year development plans starting from 1976 (Evaluation of Oman National Economy performance; 2006). The second five-year plan (1981-85) suffered from the impact of falling oil prices in the early 1980s. The third and fourth development plan objectives were to encourage the private sector to play a larger role in the economy and
achieve average economic growth of 6% and increase the rate of diversification of national income sources to reduce the dependence on oil revenues. The aim of fifth and sixth development plans were to achieve a balanced budget and reduce dependence on government spending and employment in order to let private sector being the engine of economic growth (Evaluation of Oman National Economy performance; 2006). The achievement of most of these plans is limited compared to their basic goals.

It is clear that since the beginning of these five-year plans, the government of Oman recognizes that because of oil sector's potential is already being utilized, the economy long-term strategy should focus on sustaining the growth of non-oil sectors as well as undertaking serious fiscal consolidation in order to enhance economic growth and create more jobs in the economy. However, have these plans been achieved and if not why? Also is it possible to increase the contribution of some economy sectors dramatically like raising the contribution of non-oil industrial sector to be 29% of GDP as it is stated in the vision 2020 which means in the next 13 years? And if not are these kinds of non-realistic plans harming the economy? Moreover, what are sorts of government interventions that should be applied to reach vision 2020 goals, to achieve optimal government spending; to increase the share of private sector in the economy; to attract more foreign investment; and to create good employment opportunities for the growing Omani nationals.

Indeed, Oman is at the crossroads between oil-based economy and diversified and private sector led economy. Hence the government should restructure its government spending to be conducive for growth and diversify the sources of economy in order to lower its dependence on oil prices fluctuations and give more space for private sector. Also, government should determine the future challenges and points of weaknesses and strengths to achieve its economic goals of shifting the country to be one of the most dynamic Middle Eastern economies in the next decade as it is stated by the government.

3. Theoretical Basis

The relationship between public expenditure and national income has been treated in two areas of economic policy which are public finance literature and macroeconomic modelling literature (Ansari; 1993). Public finance studies posit that economic growth causes the growth of public expenditure. On the other hand macroeconomic modelling literature argues that growth of public expenditure causes economic growth. These different views on the causative relationship between national income and government expenditure are because of differences in assumptions (Huang; 2006).

Public finance studies follow Wagner (1890), a leading German economist of the time. Wagner (1890) offered a model of the determination of public expenditure in which public expenditure growth is outcome of increasing national income. He considered public
expenditure as a behavioural variable, similar to private consumption expenditure. He formulated “the law of increasing extension of state activity” which has now come to be known as “Wagner’s law”. This law is one of public finance theories that emphasize economic growth as fundamental determinant of government size. Wagner’s Law states that as real income per capita increases, the share of public expenditure increase (Chang; 2002).

According to Henrekson (1993), Wagner has three reasons to believe that government’s role would increase over time as a result of economic growth. First, during the process of modernization and industrialisation, public activities would substitute private activities and so public expenditure would increase as there is more demand for administrative and legal services. Second, cultural and welfare services are income elastic and they would increase with an increase in national income. Wagner argues that private sector is inefficient in providing some goods and services like culture and educational needs and so public expenditure would expand as society gets richer. Third, as national income increases, public sector is required to finance large-scale projects to satisfy technological needs and manage monopoly. For example, airports, ports and railroads should be monopolised by state according Wolf Wagner (Tulsidharan; 2006).

Ansari (1993) states that Wagner’s hypothesis is often considered representing a long-term relationship between national income and public expenditure which applied to countries during their early stages of growth and development. The law states that government grows because of increases in demand for public goods as society get richer. Also governments need to manage externalities and control of monopoly as national income increases and this would also increase public expenditure. Therefore, the implication of Wagner’s Law is that causation runs from economic growth to growth in public expenditure and so public expenditure is considered as endogenous to the growth of national income.

Wagner’s theory predicts that development of an industrial economy will be accompanied by an increase in the share of public expenditure in GDP. According to Wagner’s Law, public sectors in industrialising countries will grow at faster rate than per capita income. Empirical results show that Wagner’s Law differs from country to country and from period to period. Henrekson (1993) states that Wagner’s Law is more practical on the time-series behaviour of public expenditure in a country for as long a time period as possible rather than on cross-section of countries at different income levels. Therefore, in this paper we will examine whether there is a long-run relationship between total public expenditure or its disaggregated components and GDP, along the line suggested by Wagner’s Law, for the case of Oman.

Some economists criticise Wagner’s Law because of ambiguity of the measurement of government expenditure (Musgrave; 1969). Commentators on Wagner’s Law claimed that it is unclear whether the law of increasing extension of state activity relates to the absolute level of government or to the share of government in national income (Henrekson; 1993). Gandhi
(1971) points out that imprecision of the Law has led to the development of five different versions of Wagner’s Law. But Henrekson (1993) argues that this claim of ambiguity is unjustified and that through Timm (1961)’s assessment of Wagner’s writing it is demonstrated that Wagner means the relative growth when he formulated the Law. Thus, the Law according to Henrekson (1993) should be interpreted as increasing share of government expenditure in total economy.

Since there has been no agreement on the functional form describing Wagner’s law, different interpretation of Wagner’s Law has been applied to different countries (Halicioglu; 2003). According to Demirbas (1999), there are at least six versions of Wagner Law.

1) \( E = F (GDP) \)
2) \( CE = F (GDP) \)
3) \( E = F (GDP/P) \)
4) \( E/GDP = F (GDP/P) \)
5) \( E/P = F (GDP/P) \)
6) \( E/GDP = F (GDP) \)

Where, \( E \) represents the total government expenditure, \( P \) is the population, \( GDP \) is the gross domestic product, \( CE \) is the government consumption expenditure.

These versions differ in formulation of the relationship between government spending and national income. Wagner’s version 1 was initially used by Peacock-Wiseman (1961) and also Goffman and Mahar (1971), and Musgrave (1961) utilized in their analysing the relationship between national income and government spending. Pryor (1969) argue that Wagner’s law should be tested on the relationship between government consumption and national output (version 2). The third formulation was used by Goffman (1968) who contend that income per capita is an appropriate variable to be used against government spending to test the validity of Wagner’s law.

Henrekson (1993) asserted that Wagner’s Law should be interpreted as the growth of government expenditure relative to GDP and its relation to development of GDP per capita as it is represented in version 4 which is a Musgrave (1969) version. Version 5 is Gupta’s (1967) version and also used by Michas (1975) who noted that this formulation is monotonically related to Musgrave, (1969). The sixth functional form was adopted by Mann (1980) as modified version of Peacock-Wiseman (1961). In this paper we used all above versions to support our results except functional form 2 (Pryor, 1969 version), because we have already disaggregated government expenditure into current and investment expenditures and so there is no need for this version to be used.

On the other hand, macro-economic models treat public expenditure as exogenous. Keynes argues that government spending enhance economic growth by injecting purchasing power into economy (Biswal et al; 1999). Keynesian theory treats public expenditure as
policy instrument designed to correct short-term cyclical fluctuations in aggregate expenditure (Singh and Sahni; 1984). In his theory, government play a role in recession by borrowing money from private sector and return it back by various spending programs.

The Keynesian economics is a theory of total spending and how it affects national output. In this theory, the level of employment and national output is determined by effective demand (Ansari et al; 1997). Keynes argues in his General Theory of Employment, Interest and Money (Keynes, 1935) that government intervention in the marketplace is the only method of ensuring stability and economic growth (Al-Sheikh; 2000). Keynesian economists believe it is government’s job to smooth out the business cycles fluctuations (Dogan; 2006). The government should manipulate the level aggregate demand to avoid insufficient or excessive demand by adjusting government expenditure and taxation to reach full employment (Demirbas; 1999).

Classical economists argue that adjustments in prices would automatically lead demand to the full employment level, but Keynes argued that self-correcting process is impossible without government intervention pointing to the sharp fall in output and employment in 1930s (Demirbas; 1999). Therefore, Keynesian economists asserted that demand management by the government is required to stabilize economy and have more efficient outcomes than laissez faire policy (Loizides and Vamvoukas; 2004). Keynes argues that waiting for the economy to recover by itself is irresponsible and so the active use of fiscal policy is very essential to returning the country to high employment (Blanchard; 2003).

The concept of multiplier in Keynesian theories is based on the role of public expenditure in enhancing economic growth. Keynesian multiplier explains how shock to demand can be amplified and leads to larger shifts in output. It refers to the idea that an exogenous increase in spending can lead to multiple increase in aggregate demand and hence greater increase in national income (Al-Sheikh 2000). In other words, an initial change in aggregate demand by increase of government spending can cause further change in aggregate output for the economy. So the Keynesian Hypothesis states that government spending gives short-term stimulus to end recession. Hence, the causation in these models runs from government expenditure to economic growth (Ansari; 1993). Therefore, Keynesian school of thought recommends expansionary fiscal policies to avoid long recession whereas classical economists believe that hide hand of market return economy to long-run equilibrium by labour market adjustment. Keynesian economists refuse market self correcting without government intervention. They argue that labour market rigidity is one factor that prohibits market long-run equilibrium (Demirbas; 1999).

Traditional Keynesian models argue that government consumption leads to more employment, investment and higher profitability through multiplier effects on aggregate demand (Al-Saikh; 2000). These models dominate macroeconomic analysis from 1930-1970s
and still attract a lot of attention on policy discussion of economic effects of government expenditure (Chow; 2002). However neoclassical economists assert that fiscal policies are ineffective because growth of government expenditure rises a demand for borrowing money which will increase interest rate and therefore decrease private investment and hence public expenditure will crowd-out private investment which is more efficient and so this will slower economic performance (Khan and Kumar; 1997).

Recently, the endogenous growth models have lent support for public sector role on economic growth. Unlike the Neoclassical growth models (as it was formulated by Solow 1956) that did identify the channels through which government expenditure could impact long-run growth, the endogenous growth models postulate that economy’s output is conditional not only on the level of labour stock and physical capital, but also on additional production factors which may enter the production function with constant returns to scale alone (Barro; 1990). If this is the case, then there is a possibility of both long-term effect and temporary effect from government spending on economic growth. This give some support for using fiscal policies to enhance economic stability and increase economic growth as it is opposed by Keynesian Hypothesis. However, endogenous growth models show also the negative effects of government expenditure.

Indeed economic theory does not give strong conclusions about the impact of government spending on economic growth. There would be agreement that there are circumstances in which higher levels of government expenditures would be growth-augmenting and other situations in which lower levels of government expenditures would improve economic performance (Mitchell, ;2005). Gupta et al. (2002) argue that even though that public expenditure may crowd out private sector spending which is more efficient and hence lower economic growth, but on the other hand, it enhances macroeconomic stabilization and economic growth.

4. Empirical Review

There are many studies that focus on the association between government expenditure and national income. This relationship has been discussed in two specific areas, namely causality testing and estimation of the public sector on the economic growth by regression analysis, but the outcome of both types of analysis has been inconclusive (Demirbas; 1999). Most earlier studies of the relationship between government spending and growth have used cross-section analysis to investigate the linkage between them [Feder (1983), Landau (1983,1986), Ram (1983, 1986), Romer (1986), Barro (1990,1991), Devarajan et al. (1996), Sala-i-Martin (1997)]. However, Barro (1991) argue that these cross-section analyses provide only pooled estimates of growth effects of government expenditure. They do not capture the
dynamics of the relationship between these two variables and do not take into account country-specific factors (Bird 1971).

Another problem of most cross-section studies is interpreting a significant coefficient of government expenditure in growth regressions as a confirmation of causality from government spending to economic growth. “However a significant coefficient in growth regression can be equally compatible with Keynesian view-causality from government to growth, or with Wagner’s law-from growth to government expenditure as well as a bi-directional causality between the two variables” (Abu-Bader and Abu-Qarn; 2003, pp. 568). Therefore typical growth regressions just identify the correlation between growth and government spending, but do not determine the flow of causality between them (Hsieh and Lai; 1994).

Ram (1986b) used government consumption as proxy for government size and develops the estimating equations in the production function framework, using cross-section and time-series data for 115 countries. He found that the marginal externality effect and the growth impact of government size for most countries have been positive. In the time series, estimating models using ordinary least squares (OLS) for non-stationary variables can give spurious results (Juselius and Hendry; 1999). The shortcoming of traditional time series studies is assuming of stationarity of variables and this makes their estimates unreliable (Chang et al; 2004). Therefore, most recent papers have used recent development in time-series econometrics that checks the properties of data before investigating the direction of the causality between economic growth and government spending.

Since the literature of the relationship between government spending and national income is huge, nevertheless to pertain to the topic of this paper, I will focus on reviewing the causality testing literature that used modern time series econometrics to test for the direction of causality. Ahsan et al; (1992) contend that casual relationship between national output and public expenditure was initially examined by Singh and Sahni (1984). Singh and Sahni, (1984) investigated the direction of causality between national income and total as well as various components of public expenditure for India for the period 1950-81, using Granger method. Data used in the study were annual and deflated by using implicit national income deflator. They found that the growth in public expenditure as aggregate or by functions namely, administration, social and development, and defence serve both as cause and effect of growth of in national income. So they recommend that two variables be treated as jointly-dependent in both the public finance and macroeconomic studies. Ram (1986) test Wagner and Keynes Hypotheses for 63 countries for the period 1950-80. He found no causality between GDP per capita and government expenditure per capita. Only one-fourth to one-third support either WH or KH.
Recent studies employed cointegration tests, error correction models and Granger causality techniques to study the relationship between government expenditure and economic growth. These modern time series econometric techniques have cast doubt on the existence of Wagner’s proposition (Halicioglu, 2003). Henrekson (1993) re-examine Wagner’s law in the case of Sweden over the period 1861-1990 using Engle-Granger two-stage cointegration and has found no support for the law despite that most earlier studies that have used Sweden data suggested the existence of Wagner’s Law.

Most recent studies in the relationship between government spending and economic growth are either country-specific or cross-country studies. Some researchers prefer to perform cross-country research using recently developed econometrics techniques to investigate the relationship between government expenditure and economic development in order to compare between different countries. Chang, (2002) examined five different versions of Wagner’s law by employing annual time-series data on six countries (South Korea, Japan, USA, UK, Taiwan, and Thailand) over the period 1951-96. The hypothesis of a long-run relationship between income and government spending using bivariate cointegrated systems and employing the methodology of cointegration analysis as suggested by [Johansen (1988)] and [Johansen and Juselius (1990)] was used. His results indicate that there is a long-run relationship between income and government spending for sample countries studied with the exception of Thailand. Then error correction model is conducted to check for Wagner’s Law validity and he found that it held for selected countries studied with the exception of Thailand.

Dogan (2006) examines the causality direction between government expenditure and economic growth for five South East Asian countries (Indonesia, Malaysia, Philippines, Singapore, and Thailand). Johansen-Juselius cointegration method was applied to detect a long term relationship between real per capita national income and real per capita government expenditure in all sample countries, but do not detect any such relationship, except for Indonesia. The results of Granger causality tests indicate that Wagner’s law is not supported by the data of five countries in their sample. The Granger causality tests indicate that the Keynesian hypothesis is supported only by the Philippines’s data, suggesting that the direction of causality is from government expenditure to national income. Ansari et. al., (1997) applied both the Granger and Holmes- Hutton statistical procedures to test the income-expenditure hypothesis for three African countries (Ghana, Kenya and South Africa). The results neither support Wagner’s Law (economic growth cause public expenditure growth) nor Keynesian Hypothesis (government expenditure enhance economic growth).

Abu-Bader and Abu-Quran (2003) argue that country specific factors are likely to affect the casual direction of economic growth and government expenditures. Indeed, Country-specific studies of association between government expenditure and economic growth are also
very popular in recent literature. Demirbas (1999) investigates the existence of long-run relationship between public expenditure and GNP in terms of cointegration analysis error correction model (ERM) for Turkey over the period 1950-1990. He finds no empirical support for Wagner’s Law.

Dipendra (2007) studies the relationship between GDP and government expenditure for Thailand data for 1950-2003. ARDL approach to cointegration and Toda-Yamamoto Granger causality tests that he used show that there is no causality flowing from either direction between GDP and government expenditure. Sinha (1998) targets on the causal relationship between GDP and government expenditure in Malaysia over the period 1950-92 using Johansen cointegration tests between various forms of government expenditure and GDP. He finds the existence of long run relationship between GDP and government expenditure, but when he perform augmented Granger causality tests between the growth rates of two sets of the variables, he does not find no causality in any direction.

Most of the recent casual studies of the relationship between government expenditure and national income are undertaken with aggregate data on government expenditure rather than disaggregated data of specific component of government expenditure. Assery and Perdikis (1999) argue that contradicting results of recent econometric tests might be due to using econometric work with an aggregated level lumping all government expenditure together. Therefore, some researchers address this inadequacy of literature and take a different approach by disaggregating the total government expenditure into sub-categories or functional components and related to national output. Biswal et al. (1999) attempted to test Keynesian verses Wagnerian hypotheses by examining the relationship between the total public expenditure as well as its various components and national output of Canada over the period 1950-1995. Error correction models and Engle-Granger two step cointegration tests are applied to test these two hypotheses. When aggregate expenditure data is used, the results support both hypotheses. On the other hand, the results do not support any long-run relationship between the disaggregated public expenditures and GDP, but they show the existence of short-run causation implying that components of total government expenditure is related with national income in the short run.

The causal relationship between GDP and decomposed government expenditures is investigated in Greece for the period 1958-1993 by Chiletsos and Kollias (1997). Cointegration and error correction approach are employed to test for the relationship between their variables. They argue that using of disaggregated variables offers a better explanation of the role of each component in the economic process. Their results suggested only the growth of defence expenditure that may be explained by Wagner proposition. Assery and Perdikis (1999) used disaggregated data of government expenditure divided by economic category and major function for Iraq over the period 1950-1980. Their data are measured in both real and
nominal terms, but they leads to contradictory results. Whereas nominal data show evidence of Wagner’s law, however their real data support Keynesian hypothesis.

Ahsan et. al. (1992) tried to explain the diversity in results among the existing causality studies. One of the main factors that they argued may explain the inconsistency of results obtained by different authors is the influence of omitted variables. This could lead to misleading causal relationship between variables. They applied trivariate tests of Granger causality to (G-7 minus USA) and introduced interest rate as omitted variable in the system. Their empirical evidence supported causal link between national income and government expenditure. Following Ahsan et. al (1992), Ghali (1999) asserted that the weakness of most previous causality studies was the failure to form cointegration of the time series in trivariate framework. Ghali (1998) used multivariate cointegration techniques and built model of dynamic interaction between government spending and economic growth in a five-variable system consisting total government spending, growth rates of GDP, exports, imports and investment for ten OECD countries. Results of the study support the existence of Keynesian hypothesis for all countries (government size Granger-cause economic growth).

Loizides and Vamvoukas (2004) examined if the relative size of government can be Granger-cause economic growth or the economic growth Granger cause the relative size of government in Greece, UK, and Ireland for different period for each country. They use bivariate error correction model within a Granger causality framework as well as trivariate analysis by adding unemployment and inflation separately. Their analysis shows that economic growth Granger causes the relative size of government for all three countries when they used trivariate system. Also, they found strong support for Keynesian hypothesis for UK and Ireland in short and long run. Their research shows that combined analysis of bivariate and trivariate tests offers a rich menu of possible causal patterns.

GCC oil exporting countries are among countries that have received little attention in the empirical literature on the relationship between public expenditure and national income (Burney, 2002). Generally, most Middle East countries are characterized by large fiscal imbalances due to high expenditures and vulnerability of government revenues to external shocks (Abu-Bader and Abu-Qarn, 2003). Therefore, it is interesting to investigate the causal relationship between government spending and economic growth in this region.

Al-Faris (2002) has considered the structure of the relationship between government expending and economic growth for GCC countries for the period 1970-1997. Based on multivariate cointegration test and disaggregated government expenditures, he found that majority of these countries (including Oman) support the proposition that economic growth is a predictive factor of government expenditure growth (Wagner’s Law). In Oman, he did not find the casual effect of GDP on capital expenditure same as our results get, and it is
insignificant in the case of current expenditure, but it is significant in our results. The main problem of Al-Faris (2002) methodology is that he did not make clear distinction between long and short-run causality and thus he attributed the short-run interactions to long-term causality and this what we have avoided it in our paper. Al-sheikh (2000) investigate the existence of Wagner’s Law for aggregate government expenditure using cointegration analysis and error correction models for 27 countries different in their stage of economic development (including Oman) and found the evidence for Wagner’s Law for most of these countries including Oman.

There are some country-specific studies of the causal relationship of government size and economic growth for some GCC countries but on the best of our knowledge there is no one about Oman. Ghali (1997) empirical analysis for Saudi Arabia, found no consistent evidence for Keynesian hypothesis, but there is flow of causality running from output growth to government spending as proposed by Wagner Law. Al-Batel (2002) also study the same relationship in Saudi Arabia, but using aggregated as well as disaggregated public expenditure data and support the existence of Wagner’s Law in Saudi Arabia.

The relationship between a number of socioeconomic variables including national income and government expenditure for Kuwait as an oil-exporting country over the period 1970-95 was analysed by Burney (2002). Burney (2002) has augmented the function form 5 of Wagner’s versions to include Zt as set of other relevant explanatory variables reflecting specific characteristics of the economy. He used Engle-Granger cointegration test and error correction model and his finding does not support the validity of Wagner’s Law in Kuwait.

It is clear from above mentioned summary of literature and Table 1 in Appendix that the causal relationship between government and national income has been inconclusive. These studies show full continuum from no causality to bidirectional causality between the two variables. These varieties of results may be due to the sensitivity of causality tests to functional form of different Wagner’s versions or to the lag structure specified and to filtering techniques used to achieve stationary variables (Haliciouglu, 2003). It might be due to different nature of political climate and economic system (Liu et. al 2002).

Assery and Perdikis (1999) argue that the reason of contradicting results of recent econometric tests might be due to using econometric work with an aggregated level lumping all government expenditure together. Another explanation of inconsistency of results according to Ahsan et. al (1992) is the influence of omitted variables. The weakness of most previous causality studies was the failure to form cointegration of the time series in trivariate framework. Hence, future research that combined analysis of bivariate and trivariate tests would offer a rich menu of possible causal patterns (Ghali 1999).
5. Data and Econometric Methodology

5.1 Data: Sources and Description

The core equations to be estimated, that is, equations 3 and 4, look at whether expenditure is a cause or an outcome of the economic growth. To get the feel of our sample data, we summarize, plot and explore correlations and trends among the key variables under different measures. Our core variables are total expenditure which include all government expenditures and Gross Domestic Product (GDP) both at real and nominal. Government expenditure is further disaggregated into current and investment expenditure. Of which, the current expenditure includes expenditure of Civil Ministries, Defence and National Security, interest paid to loans and all other items whereas investment expenditure is made up of National Gas exploration, development expenditure to Public petroleum company, civil ministries investment expenditure, and contribution for private sector. All these categories of government expenditures are measured in millions of local currencies and have been collected from: (a) Ministry of National Economy- Statistical Year Book various issue and (b) World Development Indicators (WDI) 2008.

In the case where government expenditure is considered as the outcome, the dependent variables are made up of three varieties of government expenditure: total government expenditure (EXP); government investment expenditure (IV); and government current expenditure (CU). All these are considered both as real and nominal expenditures. And for the case where government expenditure is considered as a cause, GDP is our dependent variables. In addition to real and nominal GDP, we also consider it at level and per capita GDP. But following most authors, we use the natural logarithms for all variables. For the definition of each variable see the Appendix B Table B1.

Figure 1 summarises the trends in the main variables for the real data. Besides total government expenditure, the government expenditure is further broken into government current and investment expenditure. GDP here is at the level though there is no marked difference when per capita GDP is used. At the beginning of the period, that is, from 1980-1986, Oman GDP was in rise mainly due to high prices of petroleum oil in that period. Comparing increases in GDP and increases in public expenditure, it seems that they have one-way directional trend from 1980-86, which give impression of Wagner law. This therefore suggests that, rising in GDP has been pulling government total, current and investment expenditures. Which in a way could be attributed to increasing in oil prices during the period such that the government had more revenues to spend more on both current and investment expenditure.

From the early mid 1980s the oil prices decreased but pick up at the end of 1980s. This is reflected in a slightly fall in the GDP during the mid 1980s, but picking up back to its normal...
level afterwards. During this period onwards, the government expenditure as whole has been fluctuating around the same level and not rising with DGP as before, rather falling in some years. Disaggregating public expenditure in absolute value indicates that while public investment has been low and fluctuating, current expenditure has been high and steady. For the political, social and stability factors, it is the investment expenditures which suffered most compared to current expenditure, that is, the personal emoluments and other charges. Also, current expenditure remains at steady state with total government expenditure because it dominates total expenditure, accounting about (%) of public expenditure. Thus, as shown in Figure 1, current expenditure follows movements in public expenditure. There is no a difference when nominal data are used.

![Figure 1: Trends and Patterns of the Core Variables for the Real Data, 1980-2005](image)

Source: Authors own compilation from the Data

In 1990s, oil prices started to increase and so is GDP as result of that. Even though, the government expenditure did not rise in the same way as the rises in GDP. This may be due to the fact that the government has already restructured its spending to avoid earlier problems. At the same time Oman started to open up its economy and privatization was in government agenda. As result, as shown in Figure 2, the relative share of government expenditure to GDP has been decreasing from mid 1980s onwards compared to the early period where it was rising. It is thus obvious from Figure 2 that relative share of public expenditure in GDP increased sharply from 1980 until mid 1980s, then decreased onwards. It has decreased from 60% in 1986 to about 38% in 2003.
The same trends in the variables repeated when we used nominal data instead; except for correlation between government nominal GDP. It seems that there is somewhat correlation between nominal government investment expenditure and nominal GDP, at least in the long run. Overall, the trend in most of government expenditures and GDP seems to suggest that, for the case of Oman, it is the GDP which determine government expenditure, at least in short run. Such results are also supported by descriptive statistics as summarised in Appendix B Table B1 and B2. Even though, this is a weak association as many econometric issues have not been addressed, the focus of next section.

5.2 Econometric Methodology

The econometric methodology used in this paper is Engle-Granger cointegration tests in bivariate system and Granger casualty tests embodied in error-correction modelling approach. Firstly, the time series properties of investigated variables were tested for unit root to avoid spurious relationships. Secondly variables of same order of integration I(1) are tested for cointegration to determine whether there is long-run equilibrium relationships between gross domestic product (GDP) and different measures of government expenditures. Thirdly, causality test were then conducted to determine the causal direction between total government expenditure as well as its disaggregates (public investment and public current expenditure) and GDP.

The purpose of this paper is to fill gap by modelling long-run and short-run dynamic interactions between aggregate and disaggregated government expenditures and GDP in Oman as there is no specific study using modern time series econometrics in case of Oman.
5.2.1 Unit Root Test

The investigation of non-stationarity properties of time series is the basic test in empirical investigation in order to avoid spurious results. There are a number of alternative tests of time series properties. In this paper Augmented Dickey-Fuller (ADF) test is used to check the order of integration of variables in our data set. The Augmented Dickey-Fuller (ADF) test is designed to distinguish between stationary either about mean or trend and non-stationary processes (Lloyd and Rayner; 1993). A series $X_t$ is said to be integrated of order $d$ denoted by $X_t\sim I(d)$ if it becomes stationary after differencing $d$ times and thus $X_t$ contains $d$ unit roots (Lloyd and Rayner; 1993). The general form of the Dickey and Fuller test can be written as follows:

$$\Delta Y_t = \alpha_0 + \alpha_1 Y_{t-1} + \sum_{j=1}^{p} \beta_j \Delta Y_{t-j} + \epsilon_t$$

(1)

The null hypothesis here is that the investigated variable has a unit root. So if the null hypothesis of $\alpha_i = 0$ is not rejected, it can be said that the series is non-stationary with a unit root. But if it is rejected which means then $X_t$ is stationary and integrated of order $I(0)$.

<table>
<thead>
<tr>
<th>Unit Root Statistic</th>
<th>Real Variables</th>
<th>Level, trend</th>
<th>Difference, no trend</th>
</tr>
</thead>
<tbody>
<tr>
<td>lnGDP</td>
<td>-3.6166</td>
<td>-2.9951</td>
<td></td>
</tr>
<tr>
<td>lnGDPC</td>
<td>-3.4423*</td>
<td>-3.3306*</td>
<td></td>
</tr>
<tr>
<td>lnEXP</td>
<td>-2.4257*</td>
<td>-3.6933*</td>
<td></td>
</tr>
<tr>
<td>lnEXPC</td>
<td>-2.274*</td>
<td>-3.6659*</td>
<td></td>
</tr>
<tr>
<td>lnIv</td>
<td>-3.481*</td>
<td>-4.4253*</td>
<td></td>
</tr>
<tr>
<td>lnIvc</td>
<td>-3.4383*</td>
<td>-4.4247*</td>
<td></td>
</tr>
<tr>
<td>lnIv</td>
<td>-2.429*</td>
<td>-3.5034*</td>
<td></td>
</tr>
<tr>
<td>lnIvc</td>
<td>-2.264*</td>
<td>-3.4718*</td>
<td></td>
</tr>
<tr>
<td>Nominal Variables</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>lnGDP</td>
<td>-2.9984*</td>
<td>-4.3441*</td>
<td></td>
</tr>
<tr>
<td>lnGDPC</td>
<td>-3.1939*</td>
<td>-4.3944*</td>
<td></td>
</tr>
<tr>
<td>lnEXP</td>
<td>-2.696*</td>
<td>-3.967*</td>
<td></td>
</tr>
<tr>
<td>lnEXPC</td>
<td>-2.4909*</td>
<td>-3.967*</td>
<td></td>
</tr>
<tr>
<td>lnIv</td>
<td>-3.5446*</td>
<td>-3.6917*</td>
<td></td>
</tr>
<tr>
<td>lnIvc</td>
<td>-3.5446*</td>
<td>-3.6952*</td>
<td></td>
</tr>
<tr>
<td>lnIv</td>
<td>-2.7756*</td>
<td>-4.5178*</td>
<td></td>
</tr>
<tr>
<td>lnIvc</td>
<td>-2.5289*</td>
<td>-4.4756*</td>
<td></td>
</tr>
<tr>
<td>lnEXPGDP</td>
<td>-3.6121*</td>
<td>-5.2456*</td>
<td></td>
</tr>
</tbody>
</table>

*-denotes significance at 5%

Table 1 shows the calculated $t$-values of ADF test of investigated variables in level and in first difference for both real and nominal variables. In order to confirm that variable is non-stationary $I(1)$, it has not to reject the null hypothesis of unit root of ADF at level and reject the null at first difference which means that it renders to stationary in the first difference.
(Lloyd and Rayner; 1993). It is clear from the table that the null hypothesis of non-stationarity for both nominal and real variables at level can not be rejected at the 5% level of significance except real GDP. Moreover, the null hypothesis is rejected for all variables at first difference at 5% level of significance. These results show that most variables are non-stationary at level and stationary at first difference. Hence, we can say that these variables include unit root [i.e., integrated of order one, I(1)].

Regarding real GDP, its calculated t-values at level and difference are (-3.6166, -2.9951) respectively and the critical values for both are (-3.6119, -2.9970), so it can be seen that its calculated t-values are at borderline. The visual checking of the variable show that it is non-stationary and has unit root. And since Thomas (1997) argue that ADF is known to lack power and it is not accurate in rejecting and accepting of the null hypothesis, and since that real GDP calculated t-values of level and difference are located at borderline between non-stationary and stationary, we can accept real GDP variable as non-stationary variable and we can say that it is integrated of order one, I(1).

5.2.2 Cointegration Analysis

After establishing that interested variables include unit root and they are integrated of the same order one, I(1), the next step is to check whether there is any long-run relationship among them. Engle and Granger (1987) two step procedure is applied to determine if total government expenditure and its disaggregates, and GDP are co-integrated. Cointegration explains how a set of economic variables behaves in the long-run equilibrium. “If several variables integrated, then they may drift apart in the short-run. But in the long-run, economic forces will draw them back to their equilibrium relationship” (Yuk (2005, pp. 11).

In general, a set of variables is said to be cointegrated if a linear combination of the individual variables is stationary. So if Xt and Yt are both non-stationary and integrated of order 1 and if residuals (et) of cointegration regression are stationary [i.e., I(0)], then we can say that Xt and Yt are cointegrated. Pesaran and Pesaran (1997) argued that Engle-Granger cointegration test is inefficient and can lead to contradictory results, but Inder (1993) mentions that it is good regression for modelling long-run equilibrium relationship. Holden and Thomson (1992) argue that this approach is efficient because it reduces the problem of multicollinearity. Indeed, most researchers that used bivariate system prefer to use Engle-Granger two steps approach.

The long run relationships between government expenditures and Gross domestic product (GDP) are estimated by ordinary least square (OLS) (i.e., cointegrating regression) as following:

\[ \ln G_t = \alpha + \beta \ln Y_t + \varepsilon_t \]  

(2)
Where \( G_{it} \) is government expenditure (in aggregate or disaggregate) and \( Y_{t} \) is GDP or GDP per capita for both real and nominal terms.

Equation (2) presents an estimation of the long-run relation between different measures of government expenditures and gross domestic product (GDP) across five Wagner versions for both real and nominal data.

### Table 2: Cointegration Results

**Engle-Granger Residuals Based on Cointegration ADF Test results**

<table>
<thead>
<tr>
<th>Wagner’s law versions</th>
<th>Real EXP</th>
<th>Real INV</th>
<th>Real COS</th>
<th>Nominal EXP</th>
<th>Nominal INV</th>
<th>Nominal COS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>-2.66 (1)</td>
<td>2.72 (1)</td>
<td>-2.06 (0)</td>
<td>-1.73 (1)</td>
<td>-4.38* (2)</td>
<td>-0.99 (0)</td>
</tr>
<tr>
<td>2</td>
<td>-0.35(0)</td>
<td>-3.56(2)</td>
<td>-1.38(0)</td>
<td>-1.45(0)</td>
<td>-3.91* (2)</td>
<td>-1.04(0)</td>
</tr>
<tr>
<td>3</td>
<td>-1.85 (0)</td>
<td>-2.03 (0)</td>
<td>-2.68 (0)</td>
<td>-2.61 (0)</td>
<td>-4.24* (2)</td>
<td>-1.28 (0)</td>
</tr>
<tr>
<td>4</td>
<td>-0.28(0)</td>
<td>-2.63(0)</td>
<td>-1.34(0)</td>
<td>-1.64(1)</td>
<td>-4.43* (2)</td>
<td>-1.54(0)</td>
</tr>
<tr>
<td>5</td>
<td>-2.13 (0)</td>
<td>-2.79 (1)</td>
<td>-2.06 (0)</td>
<td>-2.24 (0)</td>
<td>-4.28* (2)</td>
<td>-0.99 (0)</td>
</tr>
</tbody>
</table>

*Denotes significance at 5%

Note: - Number in bracket () indicate the lag length determined by AIC and SBC

The null hypothesis of cointegration test is that residuals series of each cointegration regression is not stationary (i.e., no cointegration). The ADF unit root tests are employed to each residuals series of above cointegration regression for all five Wagner versions for both nominal and real data to test whether or not \( et \) in equation 2 is stationary. If the null hypothesis of residuals is rejected (i.e; \( et \) is stationary) then government expenditure and GDP are cointegrated which means long-run relationship holds between them, otherwise they are not cointegrated.

Table 2 show the ADF test results of residuals based on co-integration of government expenditures and GDP. In all functional forms of Wagner versions for real data, the null hypothesis of no cointegration between various definitions of government expenditure and GDP can not be rejected at 5% levels of significance. These results suggest that neither total real government expenditure nor its disaggregated components (real public investment and public current expenditure) are cointegrated with GDP which means that there is no long-run equilibrium relationship between them.

On the other hand, when nominal data are used for cointegration test, the null hypothesis of no cointegration between various specifications of government expenditures and GDP can not be rejected for total government expenditure and government current expenditure same as real variables. However, the null hypothesis of no cointegration is rejected at 5% level of confidence when ADF test is applied to the residuals of public investment expenditure and
GDP cointegration regression for all various functional forms of Wagner’s versions which means that residuals are stationary. These results suggest that public investment expenditure and GDP are cointegrated (i.e.; they contain long-run equilibrium relationship).

Although, all real and most nominal variables do not show cointegration between government expenditures and GDP, we have to treat these results with caution. It might be that this failing to reject the null hypothesis of no cointegration because of the weaknesses and limitation of cointegration analysis (Demirbas; 1999). It might be that Dickey-Fuller procedure used in testing residuals stationarity does not have sufficient power against the alternative hypothesis to allow measurement of the long-run relationship (Demirbas; 1999). Musteletti and Hurn (1992) pointed out that the omission of important variables may lead to rejecting cointegration. Therefore, it might be that some additional variables are needed to obtain cointegration between government expenditure and national output. Moreover, we have to note that our sample is small; hence our results should be treated as indicative not as definitive results.

5.2.3 Causality Test

Even though we do not find any cointegration between total government expenditure as well as its components and GDP in real terms which means there is no long-run relationship between them, it may possible to model short-run behaviour between public expenditure and national income applying Granger causality test (Demirbas; 1999). Hence we are looking to short-run relationship between the variables.

Causality is assumed to mean that the effect cannot come before the cause, implying that for GDP to have an effect on Public expenditure, an increase in GDP should give good prediction of public expenditure growth. According to the concept of Causality (Granger; 1969), a variable A is caused by a variable B if A can be predicted better from past values of both A and B than from past values of A alone.

Since there is no cointegration between real government expenditures and GDP variables (GDP or GDP per capita) in all Wagner’s versions as mention above. So Standard Granger Causality in first differences is applied to detect the direction of causality between variables. The optimal lag length for the causality test is determined by Schwarz Bayesian Criterion (SBC) and Akaike Information Criterion (AIC). Granger Causality regression can be formulated to test for causality as following:

$$\Delta\text{EXP}_t = \alpha_1 + \sum_{i=1}^{p} \beta_{1i}\Delta\text{EXP}_{t-i} + \sum_{i=1}^{q} \lambda_{1i}\Delta\text{GDP}_{t-i} + \mu_t$$  

$$\Delta\text{GDP}_t = \alpha_2 + \sum_{i=1}^{p} \beta_{2i}\Delta\text{EXP}_{t-i} + \sum_{i=1}^{q} \lambda_{2i}\Delta\text{GDP}_{t-i} + \varepsilon_t$$
Technically, the Granger causality test examines the null hypothesis that GDP does not Granger-cause EXP which is rejected if the coefficient $\lambda_1$ in Equation (3) is significant and hence we can say that GDP is Granger cause EXP. The same applies to GDP with respect to EXP in equation (5) if $\beta_2$ is significant.

The null hypothesis of non-causality is tested using $t$-statistics and results are shown in Table (3) for real data and Table 4 for nominal data. There are four patterns of causality can be expected:

1. Unidirectional causality from GDP to EXP if $\lambda_1 \neq 0$ and $\beta_2 = 0$ (Wagner law is valid)
2. Unidirectional causality from EXP to GDP if $\beta_2 \neq 0$ and $\lambda_1 = 0$ (Keynesian Hypothesis is valid)
3. Bi-directional causality between EXP and GDP if $\lambda_1 \neq 0$ and $\beta_2 \neq 0$ (Both Wagner law and Keynesian Hypothesis are valid)
4. No Causality if $\lambda_1 = 0$ and $\beta_2 = 0$ (Non of them is valid)

### Table 3: The Results of Causality Tests for Real Data

<table>
<thead>
<tr>
<th>Wagner Versions</th>
<th>Aggregate Expenditure</th>
<th>Investment Expenditure</th>
<th>Current Expenditure</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>GDP $\Rightarrow$ Exp</td>
<td>Exp $\Rightarrow$ GDP</td>
<td>GDP $\Rightarrow$ Exp</td>
</tr>
<tr>
<td>Mahar (1971)</td>
<td>1.92(2.92)**[1]</td>
<td>0.142(1.52)[2]</td>
<td>2.19(1.64)[1]</td>
</tr>
<tr>
<td>and Musgrave (69)</td>
<td>1.60(2.07)*[1]</td>
<td>(1.54)[2]</td>
<td>(1.73)[1]</td>
</tr>
<tr>
<td>Mann (1980)</td>
<td>(4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Musgrave (1969) (1)</td>
<td>1.02(2.31)**[1]</td>
<td>0.59[2]</td>
<td>(1.03)[1]</td>
</tr>
<tr>
<td>Gupta (1967)</td>
<td>1.58(2.04)*[1]</td>
<td>(1.46)[2]</td>
<td>2.401.93[1]</td>
</tr>
<tr>
<td>Mann (1980)</td>
<td>(5)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: - Number in bracket [ ] indicate the lag length determined by AIC and SBC
- T-statistics are in parentheses ( )
- **denotes significance at 5%; *** denotes significance at 1%
The main results of the causality tests of real data from Table 3 can be summarized as follows:

1. The null hypothesis of economic growth does not Granger cause total government expenditure is rejected at 5% percent level of significance for all Wagner’s versions. Therefore, unidirectional causality from economic growth to total government expenditure is exists. On the contrary, the null hypothesis of government expenditure does not Granger cause economic growth can not be rejected. Thus, the causality from government expenditure to economic growth is not observed. This result supported the Wagner proposition which argues that causation runs from economic growth to government expenditure. This result was consistent across five Wagner’s versions which support the existence of Wagner’s law of increasing government expenditure as a result of increasing GDP, but in short run.

2. Where Investment expenditure (i.e., as dependent variable) is tested for causality relation with GDP variables (GDP or GDP per capita) there is no presence of causality either from public investment to economic growth (Keynesian Hypothesis) nor from economic growth to public investment (Wagner’s law) for all Wagner versions.

3. Where government current expenditure (i.e., as dependent variable) is tested for causality relation with GDP variables, It shows that there is unidirectional causality and it runs from economic growth to government current expenditure. This results support the existence of Wagner’s law for current expenditure at short run.

So these consistent results across all Wagner versions support the existence of Wagner’s Law in Oman for total government expenditure, implying that economic growth leads to increasing total government expenditure and this mainly because of increasing current government expenditure responding to increasing GDP but there is not effect on public investment expenditure in the short term.

It should be noted that results do not support running of causality from government expenditure to economic growth either for aggregate government expenditure or after it is disaggregated into investment expenditure and current expenditure. Therefore, there is no existence of Keynesian Hypothesis between real government expenditures and economic growth in Oman. On the basis of these results one can conclude that neither government expenditure in aggregate nor its components can be used as instrument of stabilization policy as it is suggested by Keynesian theory.

Table 4 shows the results of the causality tests of nominal data. It can be seen that there are some differences in causality testing results between nominal and real data. First, there is weak support for Wagner’s law in aggregate expenditure for nominal data that only two
models out of five Wagner’s versions support the direction of causality from economic growth to total government expenditure. In current expenditure, there is no causal relationship between GDP and current expenditure in any direction.

The most notable result when nominal data are used to detect the casual relationship between government expenditure and national income is the existence of cointegration between public investment expenditure and GDP, as is shown at cointegration section. Thus, according to this result there is long-run relationship between nominal public investment expenditure and GDP. For variables that are cointegrated, Causality tests in the context of Error Correction Model (ECM) should incorporate error term of cointegration regression \( ECT_{t-1} \), representing the disequilibrium residuals to allow for causal linkage between variables in long-run relationship in addition to short-run relationship. In this ECM, a variable reacts both to short-run changes in other variables individually and to changes to long-run cointegrating relationship (Juselius; 2006). Granger Causality regression can be formulated to test for causality as following:

\[
\Delta EXP_i = \alpha_1 + \sum_{i=1}^{p} \beta_{1i} \Delta EXP_{t-i} + \sum_{i=1}^{q} \lambda_{1i} \Delta GDP_{t-i} + ECT_{t-1} + \mu_i \tag{5}
\]

\[
\Delta GDP_i = \alpha_2 + \sum_{i=1}^{p} \beta_{2i} \Delta EXP_{t-i} + \sum_{i=1}^{m} \lambda_{2i} \Delta GDP_{t-i} + ECT_{t-1} + \varepsilon_i \tag{6}
\]

\( ECT_{t-1} \) is the error correction term lagged one period [i.e one year lagged residuals from cointegration equations (1) and (2)], accounting for the existence of cointegration among variables. It is incorporated to capture the short-run adjustments to long-run equilibrium. If the error correction term coefficient in equation (5) is significant and so we reject the null hypothesis it means that GDP is Granger cause EXP, for long term, and the same for equation (6), but the flow of causality would be in the reverse direction.

**Table 4: The Results of Causality Tests for Nominal Data**

<table>
<thead>
<tr>
<th>Wagner Versions</th>
<th>Aggregate Expenditure</th>
<th>Investment Expenditure</th>
<th>Current Expenditure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mahar (1971) and Musgrave(69)</td>
<td>(0.83)[2]</td>
<td>(-0.39)[1]</td>
<td>-0.27(-1.35)[1]</td>
</tr>
<tr>
<td>Mann(1980) (4)</td>
<td>(0.83)[2]</td>
<td>(-0.74)[2]</td>
<td>0.66(2.87)**[1]</td>
</tr>
<tr>
<td>Musgrave (1969) (1)</td>
<td>0.44(2.13)*[2]</td>
<td>(0.08)[1]</td>
<td>1.49(3.42)**[1]</td>
</tr>
</tbody>
</table>
The results show that the coefficient of economic growth in equation (5) is positive and statistically significant at 1% level of significance for 4 out of 5 Wagner’s versions. But looking at the other direction of causality, we can see that coefficients of investment expenditure in equation (6) are insignificant. Therefore, we can say that there is unidirectional short-term causality from economic growth to investment expenditure, but investment expenditure does not Granger cause economic growth in short term. For the long run relationship, the error correction term coefficients in equation (5) are negative and statistically significant at 1% level of significance for 3 models of Wagner versions, implying that there is unidirectional long-term causality from economic growth to investment expenditure. The error term coefficients range from -0.57 to -0.74 which means that from 57% to 74% of investment expenditure are corrected each year to ensure that nominal government expenditure and GDP would converge to their equilibrium relationship. On the contrary, where GDP is taken as dependent variable, as in equation (6), most error correction term coefficients are insignificant meaning that there is no long run flow of causality from government expenditure to economic growth.

6. Discussion and Policy Implication

In the light of empirical results, there is no cointegration between GDP and different measures of government expenditures across all five Wagner’s versions and consistent for both nominal and real data except for nominal investment expenditure. It means there is no existence of long-run relationship between total government expenditure as well as government current expenditure and national output. These results may not be surprising if non-economic factors such as political processes are more important than economic factors in explaining the growth of government expenditure in the long-run (Sinha; 1998). Omani development model as more reliance on oil revenues and state economic activities rather than the market may also be cited as possible explanatory variables for government expenditure growth (Chletsos and Kollias; 1997).

For investment expenditure, there is contradictory evidence between nominal and real data. While real data does not show any cointegration between public investment and GDP, nominal data support the existence of long run relationship between them. This raise interesting questions regarding the use of real and nominal data (Asseery and Perdkikis; 1999).
Granger causality, in the context of error correction modelling approach, shows that higher economic growth is accompanied by an increase in the total public expenditure and its disaggregates (i.e., investment expenditure and current expenditure). The direction of causality is running from economic growth to government expenditure in the short-run as proposed by Wagner’s law. Hence, it can be said that the relationship between government expenditures and GDP in the short-term is compatible with Wagner’s proposition. The implication is that as economy activities expand, more government expenditure is required for the short period.

The decomposition of real government expenditure shows that this strong causality from economic growth to aggregate government expenditure is stemming from government current expenditure increasing in respond to increasing GDP. In case of Oman as oil exporting country and that Oil contribution in government expenditure is approximately more than 70% this is realistic that when oil prices increase government revenue increase immediately and they use this increasing of revenue in government current expenditure. Hence we can consider the government behavioural expenditure in Oman similar to private consumption behaviour that it increases immediately when its income increases.

The results of Granger causality tests do not find any unidirectional causal relationship running from any government specifications to GDP for both real and nominal data. Therefore, the Keynesian hypothesis of the effective role of government expenditure in economic growth is neither existing in short nor long-run. Hence, such results suggest that neither changes in aggregate government expenditure nor its components (investment expenditure and current expenditure) tend to accelerate or slow economic growth in Oman in short or long-run. Therefore, Oman government could cut spending without negatively affecting economic growth. The government could shrink the size of the government or limit its role when facing budget deficits without harming economic growth.

In light of these results, government expenditure in Oman is determined by GDP not the reverse. It means that government expenditure is an endogenous variable of economic growth and hence it is outcome not the cause of economic growth. The absence of Keynesian hypothesis in short-run and long-run in Oman is counterintuitive because public expenditure plays the central role in economy especially in the early stages of development (1970s and 1980s). There are some possible explanations for ineffective role of government expenditure in enhancing economic growth. Firstly, the structure of government expenditure might be not conducive for economic growth. Secondly, public expenditures might have low productivity as it is expected on most developing countries. Thirdly, long time lag between government expenditure and economic growth is not captured by these techniques of analysis. Moreover, many infrastructure projects in Oman are led by political-bureaucratic motivation without being justified on economic grounds and according to Khan and Kumar (1997) that regional and
other political considerations often results in the uneconomic location, size and make public investment unproductive and even retard economic growth.

These results also suggest that there is a need to identify the impediments that makes government expenditure unhelpful for growth. Macroeconomic stabilisation as well as Structural reforms in the fiscal, labour and financial sector might be needed to enhance the productivity of public sector expenditures which in turn affect economic growth positively. The other reason for an absence of an effect of government expenditure on growth might be the excessive amount of expenditure that makes spending unproductive (Devarajan et al. 1996), thus Oman should encourage privatisation programs that reduce government size to optimal level which is conducive for economic growth. Private sector involvement can increase total productivity and raise allocational efficiency as well as decreasing government size (Khan and Kumar; 1997).

Ansari, (1993) states that Wagner hypothesis is often considered representing a long-term relationship between national income and public expenditure which applied to countries during their early stages of growth and development. In contrast to our findings that show no long run (ie, cointegration) relationship between aggregate government spending and GDP, Al-Shaikh (2000) found long run relationship between both variables. Also he support the existence of Wagner’s Law between aggregate government expenditure and GDP for Oman in the long-run, but our results support Wagner proposition only for the short-term. This might be due to different period of time that we use for investigation the relationship between government spending and national output that his sample cover the period 1963-1988 which the period of oil discovery and Oman was in its early stage of economic development and hence the government has just started providing its public goods. Ansari, (1993) states that Wagner’s Law of long-term relationship between national income and public expenditure applied mostly to countries during their early stages of growth and development. Al-Faris (2002), also found the existence for Wagner’s law for aggregate government expenditure and not for capital expenditure nor current expenditure, but he does make clear if these results for short- or long-run relationship. On the other hand, our findings are parallel to these studies of refusing Keynesian causal behaviour in Oman.

7. Conclusion

There are two schools of thought discussing the direction of causality between government expenditure and economic growth. The Wagner’s Law treats government expenditure as an increasing function of a country economic growth: so the causation runs from economic growth to government expenditure. In contrast, Keynesian theory regards fiscal policy as instrument for macroeconomic stabilization: hence the causality runs from government expenditure to economic growth.
The purpose of this paper is to assess empirically whether the Omani government expenditure behaviour (both at aggregate and disaggregate level) is consistent with Keynesian Hypothesis or Wagner’s Law over the period 1980-2005. Engle-Granger cointegration test and Granger causality techniques in the context of error correction modeling have been applied to analyze the long-run as well as short-run relationship between different measures of government expenditures and GDP - both in real and nominal terms. The results show that there is no cointegration between all measures of government expenditure and GDP when real data are used. However, there is one between government investment expenditure and GDP when nominal data are used. This implies that there is no long-run equilibrium relationship between government total and current expenditure and GDP, but there is mixed results for public investment.

On the basis of Granger causality results, the data in real terms confirm the validity of Wagner’s Law for total government expenditure and government current expenditure for all five Wagner’s versions in the short run. But there exists no causality in any direction between government investment expenditure and GDP.

On the other hand, nominal data findings support the causation from economic growth to total government expenditure in short run. For public investment, the error correction terms were significant for most Wagner’s versions indicating the existence of long-term relationship between public investment and GDP in nominal terms. These different findings between real and nominal data raises interesting questions regarding the use of real and nominal data.

This shows the existence of Wagner’s Law between public investment expenditure and GDP in the long-term, though not consistent across all Wagner’s versions. This raises interesting questions regarding the use of real and nominal data.

Therefore the findings of this paper generally support short-term unidirectional causality from economic growth to various specification of government expenditure. There is no existence of Keynesian neither in short-term nor in the long-term across the five Wagner’s versions for both nominal and real variables. This implies that government expenditure is the outcome not the cause of economic growth and hence can not be used as policy variable to enhance economic growth.

Given the short time span of our analysis, Engle-Granger cointegration test might be unreliable to investigate the long-run equilibrium relationship. As for future research, it might be convenient to use Pesaran et al.’s bond test (2001) for a cointegration relationship to tackle the problem of small sample size and short time span (Huang; 2006). Ahsan et al. (1992) observed that additional variables to government expenditure and GDP relationship do matter. The introduction of a third variable to our simple bivariate system might alter the magnitude of estimates and help to find cointegration between the variables [Ghali (1998)]. This is highly recommended to adjust for the cointegration result in the case of trivariate
framework by adding more monetary and fiscal variables. Data limitation, however, did not allow us to add more variable to our model. Omani development model that relies on oil revenues and state economic activities rather than the market may be cited as possible explanatory variables for government expenditure growth in the future research. In addition, for future research, it might be interesting also to subdivide government expenditure further by economic categories and major functions.

Oil exporting economies have less control of oil production level and price of oil in international market (Albatel; 2002). In Oman, oil activities constitute more than 40% of Omani GDP and hence a major part of GDP is determined outside economic system and the country has little control over it. Therefore, GDP could be not a good indicator of the overall level of economic growth and process of development. In this case, non-oil GDP could be a good variable to be investigated to assess real economic growth and this is what we are looking to take into account in the future research about the relationship between government expenditure and economic growth in Oman.

Appendix A:

Table A1: Summary of Empirical Review

<table>
<thead>
<tr>
<th>Author(s)</th>
<th>Data</th>
<th>Test Aim</th>
<th>Estimation technique - Methodology</th>
<th>Major Finding(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Singh and Sahni</td>
<td>India 1950-81</td>
<td>The direction of causality between various components of government expenditure and national output</td>
<td>Granger-Sims framework</td>
<td>The two variables are jointly dependent variables</td>
</tr>
<tr>
<td>(1984)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ansari et. al.</td>
<td>Three African countries for last four decades</td>
<td>The relationship between national income and government expenditure</td>
<td>the Granger and Holmes- Hutton statistical procedures</td>
<td>neither Wagner’s Law nor Keynes hypothesis is valid</td>
</tr>
<tr>
<td>(1997)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jackson and Fethi</td>
<td>Northern Cyprus 1977-1996</td>
<td>Relationship between economic growth and government spending</td>
<td>Johansen Maximum likelihood estimation and Granger causality procedure</td>
<td>Mixed evidence</td>
</tr>
<tr>
<td>(1998)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Demirbas (1999)</td>
<td>Turkey 1950-1990</td>
<td>The existence of relationship between public expenditure and GNP</td>
<td>Engle-Granger cointegration and Granger causality procedure</td>
<td>No support for Wagner’s Law</td>
</tr>
<tr>
<td>Sinha (1998)</td>
<td>Malaysia 1952-92</td>
<td>The causal relationship between GDP and government expenditure</td>
<td>Johansen cointegration tests and Granger causality tests</td>
<td>No support for Wagner nor Keynes Hypotheses</td>
</tr>
<tr>
<td>Muhlis and Hakan</td>
<td>Turkey 1965-2000</td>
<td>long-run relationship between public expenditure and GDP</td>
<td>co-integration test and the Granger Causality test</td>
<td>neither Wagner’s Law nor Keynes hypothesis is valid</td>
</tr>
<tr>
<td>(2003)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chow et. al.</td>
<td>UK 1948-1997</td>
<td>relationship between public spending and national income</td>
<td>Multivariate cointegration and causality tests</td>
<td>strongly supportive of Wagner’s</td>
</tr>
<tr>
<td>(2002)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Halicioglu (2003) Turkey 1960-2000 Relationship between public spending and national income Co-integration test and the Granger Causality test The law does not hold for Turkey

Mohammadi et. al. (2007) Turkey 1951-2005 The existence of relationship between public expenditure and GNP ARDL bounds testing methodology Strong support for the validity of Wagner’s Law

Chletsos and kollias (1997) Greece 1958-1993 Investigate empirically the traditional Wagner’s hypothesis in the case of Greece using disaggregated data of public expenditures Cointegration and the related notion of error correction Growth of defence expenditure may be explained in terms of Wagner’s law.

Islam (2001) USA for 1929-1996 The causal relationship between per capita real income and the relative size of Johansen and Juselius cointegration and exogeneity tests Strong evidence for Wagner’s Law and there is no existence of Keynesian Hypothesis

Burney (2002) Kuwait 1969-1995 the relationship between public expenditure and a number of socioeconomic variables including income Cointegration tests, and an error-correction model The evidence does not lend support to the validity of Wagner’s law

Chang (2002) Six countries over the period 1951-1996. examine five different versions of Wagner’s law Cointegration and error-correction modelling techniques the validity of Wagner’s Law are also held for selected countries studied with the exception of Thailand


Abu-Bader and Abu-Qarn (2003) Egypt, Israel, and Syria for different periods The causal relationship between economic growth and government expenditures in civilian and military components Multivariate cointegration and variance decomposition techniques Military and civilian expenditures negatively (positively) affected economic growth Support for Keynesian Hypothesis for all countries in short and long run and there is also existence of Wagner’s Law for Greece and UK

Loizides and Vamvoukas (2004) Greece, UK and Ireland The causal relationship between government size and income growth in bivariate and trivariate systems Conintegration and ECM strategy and Granger Causality tests

Source: Author’s own compilation

Appendix B: Data: Sources and Description

Table B1: Definition of the Variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
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</thead>
<tbody>
<tr>
<td>Ln GDP</td>
<td>natural log of GDP</td>
</tr>
<tr>
<td>Ln GDPC</td>
<td>natural log of GDP per capita</td>
</tr>
<tr>
<td>Ln EXP</td>
<td>natural log of total expenditure</td>
</tr>
</tbody>
</table>
Ln EXPGDP | natural log of share of expenditure to GDP
Ln IV | Natural log of investment expenditure
Ln Ivc | natural log of investment per capita
Ln cu | natural log of current expenditure
Ln cuc | natural log of current expenditure per capita

<table>
<thead>
<tr>
<th>Variables</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Skewness</th>
<th>Kurtosis - 3</th>
<th>Coef of Variation</th>
</tr>
</thead>
<tbody>
<tr>
<td>LNGDP</td>
<td>8.233</td>
<td>0.404</td>
<td>-0.651</td>
<td>-0.46117</td>
<td>0.0386</td>
</tr>
<tr>
<td>LNEXPN</td>
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<td>0.285</td>
<td>-1.617</td>
<td>2.1918</td>
<td>0.0444</td>
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<td>-0.014</td>
<td>0.18771</td>
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<td>LNCU</td>
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<td>0.1755</td>
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<td>LNEXPGDP</td>
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<td>0.197</td>
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<td>LNGDPC</td>
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<table>
<thead>
<tr>
<th>Variables</th>
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</table>

References


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Oman Chamber of Commerce. Available online:


