

**AN EXAMINATION OF THE RELATIONSHIP BETWEEN  
GOVERNMENT SPENDING AND ECONOMIC GROWTH IN  
NAMIBIA**

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**Abstract**

The existing studies on the relationship between government spending and economic growth provide inconclusive empirical evidence. This study examines the causal relationship between government spending and economic growth for the Namibian economy by employing general government (final) consumption expenditure and real Gross Domestic Product (GDP) data for the period 1980 to 2012. The study employs the pair wise Granger causality test, Co-integration test and Vector Error Correction Model (VECM). The series were tested for stationarity using the Augmented Dickey-Fuller (ADF) test. The study found that the variables were non-stationary but would become stationary after being differenced once. VECM and pair wise Granger causality tests results support the hypothesis of public expenditure causing economic growth as proposed by the Keynesian theory. The results show that there is a unidirectional relationship between the two variables. The empirical investigations suggest that government spending has a significant and positive impact on economic growth in Namibia.

**DECLARATION**

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Christopher P.P. Shafuda

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## **Dedication**

To Namibia Business School, if it was not for their sponsorship, I wouldn't have completed this MBA- Finance.

To my family, especially my farther, Cornelius Shafuda, and my siblings whose words of encouragement never stop ringing in my ears and their support and patience during the period of my study.

# **1. CHAPTER ONE: INTRODUCTION**

## **1.1 Orientation to the proposed study**

The impact of government spending on the level of economic activity has been one of the subjects of long standing macro-economic debates, although it is one of the most studied subjects in the field of economics and public finance. Even though the relationship between government spending and economic growth is well established in the literature, the direction of causality of this relationship in Namibia remains unknown. Therefore, it is behind this background, that an extensive research has been undertaken in an attempt to determine the extent to which government spending affects economic growth in the Namibian economy.

Economic growth is a phrase used to indicate the increase in real GDP or in per capita GDP. It also symbolizes an increase in national output produced and national income. Many other factors like increase in aggregate income of the individuals of a nation can also reflect economic growth. Economic growth is calculated as the rate at which GDP changes in a particular period.

The change in value of goods and services produced by a country is a reflection of economic growth in that country. It can either be negative or positive depending upon the decrease or increase when compared to data of the previous years. Negative growth is often associated with economic depression and economic recession. Whenever the GDP of a country increases, it means there is economic growth which is quite beneficial for the country, its people and the global economies. Some of these benefits are improvement in living standards, high rate of employment,

increased capital investment, increased fiscal dividend, and enhanced business confidence, superior public services and lower government borrowing.

Economic growth is caused by two main factors, an increase in aggregate demand and an increase in aggregate supply (productive capacity). In the short term, economic growth is caused by an increase in aggregate demand (AD). If there is spare capacity in the economy then an increase in AD will cause a higher level of real GDP.

$$AD = Y = C + I + G + X - M \quad (1)$$

Where C represent consumer spending, I represent Investment spending, G represent government spending, while X and M represent exports and Imports respectively. Economic growth is defined as  $\Delta Y = \Delta (\text{real GDP})$ .

A change in AD (Y) can be determined by some of the following reasons:

- Change in interest rate; a decrease in interest rate reduces the cost of borrowing. Therefore, encourages spending and investment (I).
- An increase in wages; Higher real wages increase disposable income and encourages consumer spending (C);
- An increase in government spending (G);
- A fall in value of currency which makes exports cheaper and import (M) expensive and increases quantity of exports(X).
- An increase in consumer confidence, which encourages spending (C).
- Lower income tax which increases disposable income of consumers and increases consumer spending (C).

- Improvement in technology, which improve the productivity of capital and labour, which contributed to increased spending and investment (I).

This study is on the relationship between government expenditures (G) and the economic growth (Y). The study seeks to find the direction of the relationship between government spending and economic growth. According to equation 1, a change in the government spending leads to a direct change on economic growth. According to the World Bank statistic, the Namibian government spending has been increasing since independence. This study tries to ascertain the effect of an increase on government spending has on the level of economic activity in Namibia.

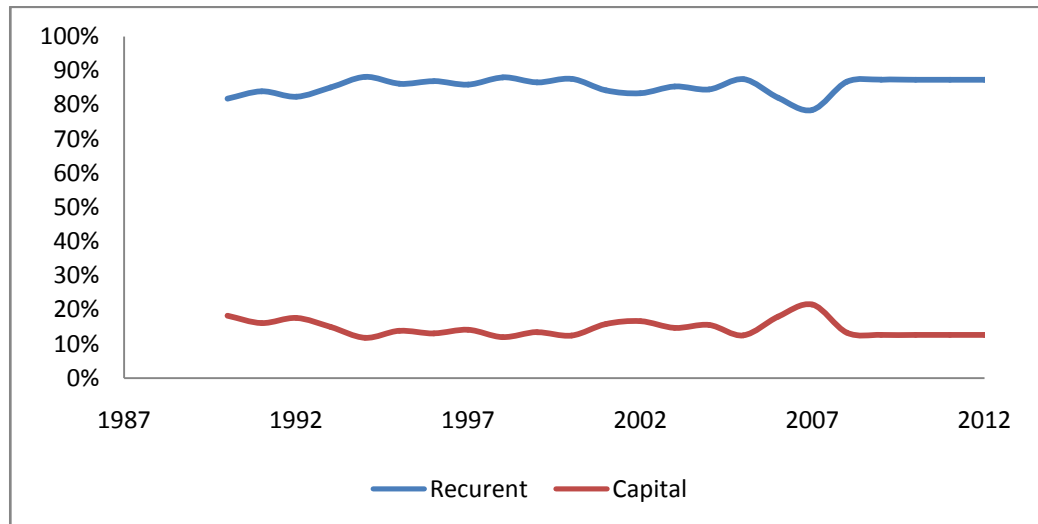
Lin (1994) outlines some important ways in which government can increase growth. These include provision of public goods and infrastructure, social services and targeted intervention such as export subsidies. In Namibia, government spending as a share of gross domestic product is split up into four major categories. The first is spending on entitlement programs, covering government expenditures on health care programs; pensions and retirement programs like Government Institutions Pension Fund (GIPF) and Social Security; and welfare or social insurance programs like food stamps, vulnerable children's compensation and old age social grant.

The second is on military spending, which include all expenditures on current personnel, military and civil, social services for personnel and their families, operations and maintenance, procurement, military research and development, military construction, and military aid expenditure. The third is on interest on the national debt. This includes coupon payments as well as all interest payments on loans and treasury securities and the principal repayment of debt.

The fourth category is spending on infrastructure and services. This category include everything else — often referred to as discretionary spending: education spending; fire services, police and the criminal justice system; spending on physical infrastructure including transportation; spending on science, technology, and research and development and any other investments. Included in the forth is general government category, which largely refers to the cost of maintaining the political system and salaries for public officials.

Each of the above government spending areas has a significant effect on economic growth. Although this study uses the general government consumption expenditure aggregated data, the composition of government spending is compared as for the background purpose, where the general government consumption expenditure is split up into two components: (1) recurrent (total government spending on consumption) expenditure and (2) capital expenditures (total government expenditure on capital project) to see how much goes into capital expenditure as a percentage of total government consumption expenditure during the period under study. On average, only 14.5% is allocated to capital expenditure from 1990 to 2012, while 85.5% goes to recurrent expenditure. The composition between capital and recurrent expenditure in Namibia after independence is shown in figure 1 below.

**Figure 1: The composition of government spending in Namibia as a percentage of total government expenditure from 1990 to 2012**



Source: Author

The effect of total general government spending on economic growth remains controversial. Lindauer and Valenchik, (1992) state that the relationship between government spending and economic growth is important especially for developing countries, most of which have experienced an increase on the levels of public expenditure over time. However, according to Folster and Henrekson, (1999) there is no agreement regarding the direction of causality between public spending and economic growth. In a debate regarding the evidence for Organization for Economic Cooperation and Development (OECD) countries, Folster and Henrekson (1999) argued that the relationship is negative whereas Angell (1999) claims that there is no any significant relationship between government spending and economic growth. However, Ram (1986), using a sample of 115 countries, found government spending

to have significant positive externality effects on economic growth particularly in the developing countries.

Theoretically, government spending is a source of economic stability. This is supported by the Keynesian macroeconomic framework, the standard effective demand theory which is based on the proposition that an increase in government spending bring about an increase on 'aggregate demand' which inspire economic growth (Keynes, 1936). However, Post-Keynesian economists argue that, increasing government spending is a primary source of business-cycle instability which is the most important cause of recessions in the long run. On the other hand the 'law of the expanding state role', by Wagner, (1890) suggests that government expenditure is an endogenous factor or an outcome, not a cause of economic development.

From an empirical perspective, however, the evidence generated points towards a more mixed picture. Some scholars promote government spending as they claim government spending is a source of economic growth. These scholars argue that increase in government expenditure on socio-economic and physical infrastructures encourages economic growth (Alexiou, 2007). They claim that government expenditure on health and education raises the productivity of labour and increase the growth of national output. Similarly, expenditure on infrastructure such as roads, communications, power, to mention a few, reduces production costs, increases private sector investment and profitability of firms, thus fostering economic growth.

Some scholars, however, do not support the claim that increasing government expenditure promotes economic growth, instead they assert that higher government expenditure may hold back overall performance of the economy. Their argument is,

in an attempt to finance rising expenditure, government may increase taxes and/or borrowing. Higher income tax discourages individual from working for long hours or even searching for jobs. This in turn reduces income and aggregate demand. On the other hand, higher profit tax tends to increase production costs and reduce investment expenditure as well as firms' profitability. Moreover, if government increases borrowing in order to finance its expenditure, it might crowd-out away the private sector, thus reducing private investment (Nurudeen & Usman, 2010).

Therefore, there is a pressing need to find out whether economic growth leads to government spending or that government spending is the engine of economic growth in Namibia. If causality runs from government spending to economic growth then it implies that an economy is government spending dependent and hence government spending is a stimulus to economic growth, implying that a reduced government spending may negatively affect economic growth or may cause poor economic performance.

Furthermore, if causality runs from economic growth to government spending, this implies that an economy is not depended on government spending and hence, increase on government spending is absolutely relevant in Namibia. Therefore, policies of keeping a government spending at minimal level may be implemented with no adverse effects on growth and employment. If there is no causality in either direction, it implies that government spending is not correlated to economic growth, so that fiscal policies on expenditure side may be pursued without adversely affecting the economy.

## **1.2 Problem Statement**

Namibia has recorded an increase in government expenditure over the past 5 fiscal years in order to cater for Namibia's developmental needs (Ministry of Finance, 2013). Some governments have tried to promote public spending due to an understanding that large government spending is a source of economic development (Loizides & Vamvoukas 2005). In addition, the authors continue to say, in some economies an explicit target for government spending has been adopted to monitor the fiscal situation and achieve sustainable growth. These economies believe that large government expenditure is a source of economic instability. Thus, the study would therefore, like to establish the effect of total government expenditure on the level of the country's economic growth.

With the conflicting opinions regarding public spending, it is not clear whether the Namibian government should keep its spending as high as possible or should set a government expenditure target/limit. There is no study done before with the aim to establish the relationship between public spending and economic growth in Namibia. Thus, the question whether government spending lead to economic instability or to economic growth in Namibia, is yet to be answered. This study is therefore, ought to address this dilemma.

## **1.3 Objectives of the Study**

The broad objective of this study is to determine if there is a causality relationship between government spending and economic growth in Namibia over the period of 1980 to 2012. This broad objective is divided into three specific objectives:

1. To establish whether, or not, there exists a causal relation between government spending and economic growth in Namibia.
2. To ascertain if exists, the direction of the causal relationship between government spending and economic growth in Namibia.
3. To test for cointegration and estimate the long-run relation between government expenditure and economic growth.

#### **1.4 Significance of the Study**

This study will shed light on the effect of Namibian fiscal policy measures by examining the relationship between government spending and economic growth. Therefore, the study will make it possible for Namibians to find out the impact of public spending on the growth of the economy. Furthermore, the study will be very important to the Namibian policy makers by helping them to determine which policies to adopt, to improve development and growth of the Namibian economy.

#### **1.5 Limitation of the Study**

The relationship between government spending and other macro-economic variables such as interest rate, investment, inflation, budget deficit amongst others can be established, but this study will not focus at all on the above mentioned variables. Furthermore, economic growth can be determined by the movement in consumer spending, government spending, investment expenditure and net export. However, this study is only concerned with the relationship between government spending and economic growth, consumer spending investment expenditure and net exports are all not part of the study.

This study will therefore, only focus on the impact of government spending on economic growth, or the impact of economic growth on government spending. Additionally, the study will only collect the data for the period of 1980-2012. It is also worth mentioning that the data used carried two phases of Namibia, Namibia as a colony from 1980 to 1990 and Namibia as an independent nation from 1991 to 2012. The purpose of government spending would be probably differing. However, after independence the government refocus its spending to different purposes, for example, education, health and capital development.

## **2. CHAPTER TWO: LITERATURE REVIEW**

Government spending and economic growth is an important area of study in a field of economic policy and public finance. This has been also an attractive area of research, theoretically as well as applied. This chapter reviews both theories and some of the empirical studies on this topic.

### **2.1 Theoretical literature**

Generally, there are eight theories concerning the impact of government expenditure on economic growth and the direction of causality. However the Keynesian macroeconomic framework for development theory and the law of the expanding state role by Wagner, Wagner's law, are the two main and common theories analysed in the recent studies as by Maku (2009), Chang (2002), Alexiou (2007) and (2009) among others. Other existing theories are the Endogenous Growth Theory, the Market Friendly Approach, Neo-Classical Counterrevolution view, Myrdal's view, Neo-Classical view and the Classical view.

Wagner (1883) introduced the 'law of the expanding state role', a model showing that public expenditures are endogenous to economic growth, and that there exist long-run tendencies for public expenditure to grow relatively to some national income aggregates such as the gross domestic product (GDP). This theory suggests the existence of the causality between public expenditure and national income runs from national income to public expenditure. Wagner suggested that government expenditure is an endogenous factor or an outcome, but not a cause of economic development. Wagner attempt to explain the increase in public sector and mathematically can be formulated as:

$$G_t = f(Y_t) \tag{2}$$

G refers to the size of the public sector, Y stands for the level of economic performance, and t is for time. Various empirical studies use different indexes to approximate the size of the government, the share of government spending on GNP, the growth rate of government spending, the per capita public spending, among others and the level of economic activity, the GNP per capita, the growth rate of GNP, to mention a few. Rostow (1960) in his Stages of Growth model also suggested that the increase in public expenditure might be related to the pattern of economic growth and development of the various societies.

Keynes (1936), however, raised the idea that during depression the use of fiscal policies improves economic activities. Thus the causality between public expenditure and national income runs from public expenditure to national income. In the Keynesian macroeconomic framework, standard effective demand theory emphasized the positive impact of an autonomous public spending on economic growth. This theory suggests that a proactive fiscal policy is an important instrument available to governments to stimulate economic activity and economic growth. As a result, economists that follow the Keynesian tradition argue that an economy needs a Keynesian-type fiscal stimulus to be applied temporarily in periods of recession by an active government (Arestis, 2011).

The Keynesian economists view government expenditure as a fiscal policy instrument is useful for achieving short term stability and higher long run growth rate. In addition, the Keynesian macroeconomics model, suggests that any kinds of public expenditures, even of a recurrent nature, can contribute positively to economic

growth, through multiplier effects on aggregate demand. On the other hand, government consumption may crowd out private investment, dampen economic stimulus in the short run and reduce capital accumulation in the long run. Strictly, crowding-out is due to fiscal deficits and the associated effect on interest rates. Arestis (2011) argued that an equally important strand in economic policy literature, rooted in Keynesian principles, that public spending can form an exogenous tool of economic policy to enhance growth through its multiple effect on aggregate demand.

Poot (2000) presented five different reasons to justify the validity of 'Keynesian Hypothesis' as government supplies pure public goods that constitute a sizeable component of the aggregate demand, government may own or operate enterprises and institutions that provide quasi-public or private goods, regulations and controls imposed by the government can facilitate the protection of property rights and enhance allocative efficiency in the presence of externalities, income taxes and transfer payments affect income distribution and may create a more equitable society and governments often act as a facilitator in markets with asymmetric and imperfect information.

In the Classical View, influenced by Smith (1776) and Ricardo (1821), views that countries with higher government expenditure are expected to experience lower economic growth. The classical economists advocated the policy of *laissez-faire* in which activities should be confined to the bare minimum, because interference with the free economy by the government would hinder economic progress. Peacock and Wiseman (1961) supported the view by arguing that social crises cause the increase in public sector expenditure.

Solow (1956) in his neo-classical/exogenous growth model viewed that there is no long run impact of government expenditures on the economic growth rate. The neo-classical growth models suggest that fiscal policies cannot bring about changes in long-run growth of output. Neo-classical economists suggests that the long run growth rate is driven by population growth, the rate of labour force growth, and the rate of technological progress which is determined exogenously. This is backed up by the neoclassical counter-revolution school of the 1980s which suggest that state intervention in economic activity slows the pace of economic growth.

Carboni (2011) offers a Non-uniform relationship between public expenditure and economic growth in a form of Neoclassical. This model determines the government's size and composition of government expenditure which maximize the economic growth and the long-term level of per capita income. With a certain level of government's size, composition of government expenditure due to the sensitivity can create different growth rates. Dar and Amirkhalkhali (2002) pointed out that in the endogenous growth models, fiscal policy is very crucial in predicting future economic growth.

The most recent neo-classical view is the market-friendly approach. It is associated mainly with the writings of the World Bank and its economists. This approach recognizes that there are many imperfections in developing or less developed countries. This view suggests that governments have a key role to play in facilitating the operation of markets through "nonselective" market friendly interventions. On the other hand Myrdal (1957) believed that government executed development plan can set in motion a process in which circular forces cumulate in an upward spiral of

development, by reducing the backwash effects and strengthening the spread effects in the underdeveloped countries.

Finally, the models of endogenous growth Romer (1986), Lucas (1988), Barro (1990) and Rebelo (1991), view that the government plays an a key role in the growth process. The endogenous growth models with suggest that higher taxation unambiguously reduces output, but such losses may be offset, by using the proceeds for productive spending items. The endogenous growth model recommend an active role for public policy in promoting economic development through direct and indirect investments in human capital formation (education), infrastructure and research and development.

The Endogenous growth models distinguish between distortionary or non-distortionary taxation as well as between productive or unproductive expenditures. Expenditures are categorised as productive if they are included as arguments in private production functions and unproductive if they are not (Barro & Sala-I-Martin, 1992). This categorisation implies that productive expenditures have a direct effect upon the rate of economic growth but unproductive expenditures have an indirect or no effect.

Barro (1990) in his endogenous growth model, government spending has shown that government expenditure on productive services enhances efficiency of labour and helps growth. However, government spending on consumer services for household utility causes leakage of fund and thereby regards growth. Expenditure on investment and 'productive' activities, in principle including State-owned production, should contribute positively to growth, whereas government consumption spending is

anticipated to be growth-retarding. However, it is difficult to determine which particular items of expenditure should be categorised as investment and which as consumption in empirical work.

## **2.2 Empirical Literature**

The evidences from the above theories on relationship between Government Expenditure and Economic Growth have been an attractive area of research. Some of the empirical studies in this area are reviewed here. Nevertheless, it is evident that the relationship between public spending and economic growth can run either ways in both the developed and developing countries where studies have been conducted.

Olugbenga and Owoye (2007) test the relationship between government expenditure and economic growth for a group of 30 OECD countries using annual data for the period of 1970-2005. The variables of interest were total government expenditure (TGE) and gross domestic product (GDP) with the use of co-integration and Granger causality tests. The results show the existence of a long-run relationship between government expenditure and economic growth. The authors further observe a unidirectional causality from government expenditure to growth in 16 countries, while Wagner's law is observed in 10 OECD countries. While 4 countries records an existence of a relationship running from both direction between government expenditure and economic growth.

Hansson and Henrekson (1994) also examined fourteen developed countries over the 1970–1987 period testing the effect of different kinds of government expenditure on productivity growth in the private sector and find that government consumption

spending is growth-retarding but spending on education has a positive impacts on growth. Devarajan, Swaroop and Zou, (1993), using a sample of 14 OECD countries, found that spending on health, transport and communication have positive impacts (spending on education and defence did not have a positive impact).

Kneller, Bleaney and Gemmell (1998) used static panel regression techniques on five-yearly averaged data and provided only limited testing for endogeneity of fiscal repressor to find that productive government spending has a positive, while non-productive spending has a negative impact on growth of OECD countries using data from 1970 to 1995. Furthermore, Perotti (2004) analyse the OECD countries to find a fiscal stimulus in the US. However, they also found that the effects of fiscal policies declined in the 1980s and some multipliers have become insignificant, others even negative.

Folster and Henrekson (2001) on a report estimates for panels varying between 22 and 23 OECD countries supporting the proposition that a large government sector lowers growth in high income countries. The authors argue that the composition of government spending varies significantly between high and low income countries, and that the growth retarding effects of government expenditures and consumption occur only after a government attains a certain threshold size. Conte and Darrat (1988) examine the effect of government spending on output using Granger-causality analysis for the OECD countries. Special emphasis is laid on feedback effects from economic growth to government growth that result from macroeconomic policy. The authors had the mixed findings, but indicate no significant relation between government spending and growth in output for most of the countries.

Kolluri, Panik and Wahab (2000), using a bivariate framework, estimated the long-run relationship between gross domestic product and government spending in the G7 countries for the period 1960-1993. Most of their empirical findings confirm Wagner's Law for the G7 countries; that is, government spending tends to be income elastic in the long run. Hsieh and Lai (1994), using the G7 countries data from 1885 to 1987 using OLS, 2SLS and 3SLS finds no evidence of causality, but government expenditure had a marginal effect on growth. Furthermore, using a Structural Vector Autoregression approach for the United States, United Kingdom, Germany and Italy, Afonso and Sousa (2009) shows that government spending shocks, in general, have a small but positive effect on GDP.

Bose, Haque, and Osborn (2007) examined the growth effects of disaggregated government expenditure for a panel of 30 developing countries over the 1970s and 1980s. The authors explicitly recognized the role of the government budget constraint and the possible biases arising from omitted variables and found that the share of government capital expenditure in GDP is positively and significantly correlated with economic growth, but current expenditure was insignificant. At the disaggregated level, the authors concluded that government investment in education and total expenditures in education are the only outlays that are significantly associated with growth once the budget constraint and omitted variables are taken into consideration.

Vu Le and Suruga (2005) investigated the simultaneous impact of public expenditure foreign direct investment (FDI) on economic growth from a panel of 105 developing and developed countries for the period 1970 to 2001 applying fixed effects model

and threshold regression techniques. Their main findings were categorized into three classes: FDI, public capital and private investment play roles in promoting economic growth. Secondly, public non-capital expenditure has a negative impact on economic growth and while excessive spending in public capital expenditure can hinder the beneficial effects of FDI. While Tanninen (1999) observe 52 country panel from 1970 to 1992 and find a negative impact of government consumption on growth. Spending on public goods is growth retarding for large government but not for small government.

A panel data study by Gupta, Benedict and Emanuele (2005) on the composition of government expenditure and economic growth for a sample of developing countries found a quite negative and significant relationship between the capital (current) component of public expenditure and per capita real GDP growth for 39 countries over the period 1990 to 2000. Easterly and Rebello (1993) investigated a Cross-section data of 100 advance developing countries and least developed countries from 1970 to 1988, and finds that government investment has a negative impact on growth, government consumption has a negative impact on growth but positive impact on private investment.

In another empirical study, Ghura (1995), using pooled time-series and cross-section data for 33 countries in Sub-Saharan Africa for the period 1970-1990 produced evidence that points towards the existence of a negative relationship between government consumption and economic growth. Ram (1986) using a sample of 115 countries, also finds the government expenditure to have significant positive

externality effects on growth particularly in the developing countries (LDC) sample, but total government spending had a negative effect on growth.

Devajaran, Swaroop, and Zou (1996) studied the relationship between the composition of government expenditure and economic growth for a group of 43 developing countries ranged from East Asia, South Asia, Latin America and Sub-Saharan Africa. The regression to illustrate that capital expenditure has a significant negative association with growth of real GDP per capita. The results showed that recurrent expenditure is positively related to real GDP per capita.

Guseh (1997) investigated the effects of government size on the rate of economic growth conducted OLS estimation, using time-series data over the period 1960 – 1985 for 59 middle-income developing countries. The results suggested that growth in government size had negative effects on economic growth, where the negative effects are three times as great in non-democratic socialist systems as in democratic market systems. Gregoriou and Ghosh (2009) also investigated the impact of government expenditure on growth, using a heterogeneous panel, for a sample of 15 developing countries over a period of 28 years, from 1972 to 1999. Using generalized method of moment's techniques, they showed that countries with substantial government current expenditure had strong growth effects, which varied considerably across the nations. The results of GMM method indicated that, for countries such as Brazil government expenditure played a major role in long-run growth, whereas for countries like Sudan, government current expenditure had a minor role in economic growth. In other words the impact of government expenditure is varying across the countries.

Niloy, Emranul and Denise (2003) examined growth effects of government expenditure for a panel of thirty developing countries over 1970-80 and found that the share of government capital expenditure in GDP is positively and significantly correlated with economic growth, but current expenditure is insignificant. Furthermore, Cooray (2009) employed an econometric model that incorporates government expenditure and quality of governance in a cross-sectional study of the relationship between government expenditure and economic growth in 71 countries. The results showed that both the size and quality of governance correlated positively with economic growth.

Dao (2012) investigated the impact of the growth of the share of various government expenditure programmes in the GDP on economic growth in developing countries based on data from the World Bank, using two samples of 28 developing economies and find that per capita GDP growth is dependent upon the growth of per capita public health expenditure, growth of per capita public spending on education, population growth, growth of the share of total health expenditure and the share of gross capital formation. Barro (1991) in a cross section study of 98 countries using average annual growth rates in real per capita GDP and the ratio of real government consumption to real GDP emphasized that government activity influences the direction of economic growth.

Abu and Abdullahi (2010) in their paper observed that rising government expenditure has not translated to meaningful development as Nigeria still ranks among world's poorest countries. In an attempt to investigate the effect of government expenditure on economic growth by employing a disaggregated analysis

the results reveal that government total capital expenditure, total recurrent expenditures, and government expenditure on education have negative effect on economic growth, while a rising on government expenditure on transport and communication, and health results to an increase in economic growth.

Oluwatobi and Ogunrinola (2011) examined the relationship between human capital development efforts of the Government and economic growth in Nigeria from 1970 to 2008 adopting the augmented Solow model. The authors engaged a three-step procedure, unit root test, Johansen co-integration technique and Error Correction Mechanism. The Johansen co-integration test and the error correction modelling were employed to find out the long run equilibrium convergence and the speed of disequilibrium adjustment respectively. The result showed that there exists a positive relationship between government recurrent expenditure on human capital development and the level of real output, while capital expenditure is negatively related to the level of real output. The study recommended appropriate channelling of the nation's capital expenditure on education and health to promote economic growth.

A further study by Egbetunde and Fasanya (2013) empirically analysed the impact of public expenditure on economic growth in Nigeria during the period 1970-2010 by using annual time series data. They employed the bounds testing approach to examine the long run and short run relationships between public expenditure and economic growth. The study confirmed that the impact of total public spending on economic growth is negative. However, the recurrent expenditure was found to have less significant positive impact on economic growth in Nigeria.

Maku (2009) examined the link between government spending and economic growth in Nigeria using the time series data for the last three decades (1977-2006) to analyse the Ram (1986) model and regression real GDP on private investment, human capital investment. The author tested for the presence of stationarity in the variables using the Augmented Dicker Fuller unit root test, and used the co-integration test to establish the long-run relationship among variable. Empirical results showed that public and private had insignificant effects economic growth during the review period.

Loto (2011) investigated the impact of sectoral government expenditure on economic growth in Nigeria for the period 1980-2008 and apply the Johansen cointegration technique and error correction model. The results deduced that in the short run expenditures on agricultures and education are negatively related to economic growth. However, expenditures on health, national security, transportation, and communication were positively related to economic growth, though the impacts were not statistically significant.

Muritala and Taiwo (2011) also used Ordinary Least Square (OLS) technique to examine the trends and effects of government spending on the growth rates of real GDP in Nigeria between 1970 and 2008. The results showed that there that there is a positive relationship between real GDP as against the recurrent and capital expenditure. Nurudeen and Usman (2010) in analysing the impact of government expenditure on economic growth in Nigeria revealed that government total capital expenditure has negative effect on economic growth.

In Thailand, Jiranyakul and Brahmaasrene (2007) investigate the relationship between government expenditures and economic growth in Thailand for the period 1993 to 2006, employing Standard Granger Causality test and Ordinary Least Square (OLS) method. The results showed a unidirectional causality from government to economic growth without feedback. Furthermore, estimation from the ordinary least square confirmed the strong positive impact of government expenditure on economic growth during the period of investigation. Komain and Brahmaasrene (2007), employing a Granger causality test examined the relationship between government expenditures and economic growth in Thailand. In their finding they indicated a unidirectional relationship, as causality runs from government expenditures to growth as the results illustrated a significant positive effect of government spending on economic growth.

In the Pakistan economy, Jamshaid, Iqbal and Siddiqi (2010) examined the nature and the direction of causality in Pakistan between public expenditure and national income along side with various selected components of public expenditure, development expenditures, administration expenditures, debt services, defense services, applying the Toda-Yamamoto causality test for annual data within the period of 1971-2006, the study concluded that there is a unidirectional causality running from GDP to government expenditure, which supports Wagner's Law. At a disaggregated level, results showed that GDP only caused administrative expenditure while no causality was found on development expenditures, debt servicing and defense expenditures.

Asghar, Azim and Rehman (2011) observed empirically the effect of government spending in social sectors on economic growth during the period 1974-2008 in Pakistan. The authors revealed the existence of positive relationship between government expenditure on human capital and economic and community services and economic growth, while the government expenditure on law and order and subsidies appear to be negatively related to economic growth. While, Rehman, Iqbal and Siddiqi (2010) tested for the causal relationship between public expenditure and national income along with various selected components of public expenditure in Pakistan. They applied the Toda-Yamamoto causality test for the period of 1971 to 2006. In their study they prove the existence of Wenger's law, by concluding that there is a unidirectional causality running from GDP to government expenditure.

Chandra (2004) examined whether the government actually succeeded in acting as an engine of growth in India. Taking 1950-1996 as the period of study, this study finds that a large government size, in terms of investment and total expenditures, has a negative influence on growth in the short term although there is no long-term relationship between government size and GDP. Ranjan and Sharma (2008) also examine the effect of government development expenditure on economic growth in India during the period 1950-2007. They concluded that there is a significant positive impact of government expenditure on economic growth. Furthermore, the authors also confirm the existence of co-integration among the said variables. While Sakthivel and Yadav (2005) also tested the relationship between government spending and economic in India and find a bi-directional causality exists between national income and public expenditure.

Chandra (2010) made an attempt to explore the causal relationship between government spending on education and economic growth of India using 1950-2009 data. The study shows that the direction of causation is from education expenditure to economic growth is not immediate to take effect, rather it can be said that investment in education is expected to affect economic growth of a country after some period. Bansal and Budhedeo (2012) examines the relationship between public expenditure and economic growth in the Indian states by empirically testing the Wagner's Law using cross-sectional data and regression analysis. The empirical evidence reported in their paper does not support Wagner's hypothesis of increasing state activities.

Devereux, Head and Laphalm (1996) examined the impact of government spending shocks using a neoclassical model with increasing returns to scale and monopolistic competition and find that an increase in government consumption generates an endogenous rise in aggregate productivity. Karras (1994) examined the change of private consumption in response to increases in government spending across a number of countries and finds that increases in government spending tend to raise the marginal utility of private consumption. The strength of this complementary relationship is shown to be negatively affected by government size.

Chang (2002) examined three emerging countries in Asia (South Korea, Taiwan, and Thailand) as well as three industrialized countries (Japan, the United States, and the United Kingdom) over the period 1951-1996, with the exception of Thailand, to supports the validity Wagner's Law. Furthermore, Toda and Yamamoto's (1995) causality test and bounds test as proposed by Pesaran, Shin and Smith (2001) based

on unrestricted error correction model using annual time series data covering the period 1979-2002 on China and Taiwan also show that Wagner's Law does not hold for China and Taiwan over this test period (Huang, 2006).

Khalifa and Ghali (1997) builds on Barro's (1990) endogenous growth model to straighten out the nature of the relationship between government expenditure and economic growth in Saudi Arabia by examining the intertemporal interactions among the growth rate in per capita real GDP and the share of government spending in GDP. Using vector autoregressive (VAR) analysis, particular attention is given to testing for the existence and direction of Granger-causality among the variables. The empirical analysis find no consistent evidence that government spending can increase Saudi Arabia's per capita output growth.

In the another studies, Mwafaq (2011) investigated the impact of public expenditures on economic growth using a time series data in Jordan for the period 1990-2006 and conclude that the government expenditure at the aggregate level has positive impact on the growth of GDP, supporting the Keynesian's theory. While in Yemen, Chemingui (2005) notes that an increase in government expenditure devoted to the three priority areas i.e. agriculture, education, and health will affect the economy through increase in sectoral or economy-wide total factor productivity in Yemen. Ramayandi (2003), using a time series data on Indonesia for the period 1969-1999, finds the share of government consumption spending to GDP decreases economic growth. The results show that public investments negatively affect economic growth.

Liu Chin, Hsu and Younis (2008) also examine the causal relationship between economic growth and government expenditure using US data during the period 1947-

2002. The causality test results revealed that that government expenditure is a source of economic growth. Furthermore, the authors conclude that, Keynesian hypothesis exerts more influence than the Wagner's law in US. Aschauer (1990) also documented a positive and significant relationship between government spending and the level of output in USA. Knoop (1999) using time series data from 1970 to 1995 for USA found that a reduction in the size of the government would have an adverse impact on economic growth and welfare. Further estimates obtained by Fölster and Henrekson (2001) when conducting a panel study on a sample of rich countries over the period of 1970-1995 lent support to the notion that large public expenditures affect growth negatively.

Loizides and Vamvoukas (2005) examined the relationship between government spending size growth and income growth from the UK, Greece and Ireland, in both bivariate and trivariate systems. The analyses were based on cointegration analysis, ECM strategy and Granger causality tests to conclude that in most countries public expenditure Granger causes growth in national income in either the short run or the long run. However, Greece is supportive of the Wagner hypothesis; increased output causes growth in public expenditure. In addition, causality from national income to public spending is the distinctive feature of the Greek case. British data also indicated a parallel pattern when a trivariate model is adopted. By contrast, the results for Ireland do not indicate any Wagnerian-type causality effect.

Afonso and Alegre (2008), using Autoregressive Distributed Lag (ARDL) model for the period 1971-2006 for 15 EU Member States identify a negative impact of public consumption and social security contributions on economic growth, and a positive

impact of public investment. Abdullah (2000) also studies the relationship between government expenditure and economic growth and reported that size of government is very important in the performance of economy by advising that government should increase its spending on infrastructure, social and economic activities. Government should also encourage and support the private sector to accelerate economic growth.

Mohammadi, Maleki and Gashti (2012) study the effect of governmental expenditure composition on the Economic development of economic cooperation organization countries in the period 1995-2009 using dynamic panel data method & generalized method of moments. The findings show that the government expenditure on health is statistically significant and has negative effect on growth while government expenditure on education expenditure has positive effect on growth government defense expenditure for the economic development of ECO countries.

Commendatore, Panico and Pinto (2009) manipulated the different types of government expenditure on growth in a post-Keynesian framework. The analysis considers a government sector with a balanced budget and an autonomous and non-linear investment function, interpreted along a Kaleckian and a Classical- Harrodian line. It shows under which conditions different types of government expenditure can be beneficial and detrimental for economic growth. Fan and Rao (2003) show that the effects of different types of government spending on economic growth in different continents are mixed. In Africa government expenditure on health and agriculture are found significantly affecting economic growth. In Asia investment in education, agriculture and defense have strong effect on economic growth. However, in Latin

America all types of government investment except health have contributed to economic growth.

Kweka and Morrissey (2000) investigated the impact of public expenditures on economic growth using time series data on Tanzania for 32 years (1965 – 1996). by formulate a simple growth accounting model, adapting Ram (1986) and find that consumption expenditure relates positively to growth. However, the expenditure on human capital investment was insignificant in the model. The authors also confirmed the view that public investment in Tanzania has not been productive, but oppose the widely held view that government consumption spending has a negative impact on growth.

Muhlis and Hakan (2003) examined Wagner's law of relationship between public expenditure and GDP for the Turkish case over the period of 1965-2000 using co-integration test and granger causality test and empirically found causality in both directions. Bataineh (2012) investigated the impact of public expenditures on economic growth using a time series data on Jordan for the period of 1990 – 2010 using the regression model, and Dicky- Fuller and Phillips- Perron unit root tests were examine the integration order of the variables, Johansson co-integration test. The study found that the government expenditure at the aggregate level has positive impact on the growth of GDP which is compatible with the Keynesians theory.

Blankenau, Simpson and Tomljanovich (2005) carried out an empirical study on government expenditure and economic growth relationship in the context of an endogenous growth model using annual data from 1960-2000 for a group of 83 countries. They found that the response of growth to public education expenditure

may be non-monotonic over the relevant range. The relationship depends on the level of government spending, the tax structure and the parameters of production technologies. Blanchard and Perotti (2002) applied structured VAR techniques to the measurement of fiscal policy effects on output and private consumption and find the unidirectional relationship running from government expenditure to output growth.

Mehdi and Shoorekchali (2012) uses the Smooth Transition Regression (STR) and annual data for the period of 1960-2009 to investigate nonlinear government size effects (Government consumption spending as a percentage of GDP) on economic growth of Italy. Results confirm a nonlinear effect of government size on economic growth showed that in both regimes, government size has had a significant negative effect on economic growth. In addition, the results showed that investment and population growth have a significant positive effect on economic growth.

While Agenor (2008) demonstrates that government expenditure helps economic growth if human capital is formed in the process of infrastructure development necessary for schooling and skill formation. Huang (2006) using bounds test and a granger non-causality test find no evidence in support of either Wagner or Keynesian hypothesis for Taiwan. Schaltegger and Torgler (2006) find that at the state, canton, and local level within Switzerland, government spending from operating budgets has a negative growth effect but government capital spending has no effect on growth.

Alexiou (2007) in a study for the Greek economy, after disaggregating government spending, reported evidence on the basis of which there is a positive association between the growth in the components of government spending and GDP growth.

Alexiou (2009) provide further evidence on the relationship between economic growth and government spending using two different panel data methodologies to seven transition economies in the South Eastern Europe (SEE), the evidence generated indicate that four out of the five variables used in the estimation, government spending on capital formation, development assistance, private investment and trade-openness all have positive and significant effect on economic growth.

Muhlis and Hakan (2003) investigated the long-run relationship between public expenditure and GDP for the Turkish economy. The study used the natural log of annual data from 1965-2000 by employing co-integration and Granger Causality tests on the following variables: Gross Domestic Product, Total Government Consumption, Total Public expenditure, and Mid-year Annual Population and discovered that neither Wagner's Law nor Keynes' hypothesis was valid in Turkey.

Another study by Chang, Liu, and Caudill (2004) tested Wagner's law for three newly industrialized countries in Asia and nine industrialized countries and found only mixed support for the law. However, the evidence seems less forthcoming for EU economies. Nonetheless, the estimated cumulative response coefficient from Kolluri and Wahab (2007) conditional asymmetric specification exceeds the estimated response coefficient from a traditional symmetric test specification which appears biased against finding support for Wagner's proposition due to omission of important directional asymmetry variables from the estimating equation.

A detailed analysis in study by Gray, Lane and Varoudakis (2007) finds that the overall size of government influences economic growth rates but that this effect

depends on the state of governance. Bigger governments can hinder growth in countries with weak governance, but this effect is nonlinear. However, infrastructure spending is unlikely to spur economic growth in a bad policy environment. The authors argue that educated population is clearly associated with faster economic growth, although more public spending on education is not always associated with better educational outcomes. While there is a positive correlation between per capita incomes and learning outcomes, some countries, such as Korea, Poland, and Romania, appear to have better educational outcomes than would be expected for their levels of per capita income, or, stated differently.

Kolluri and Wahab (2007) argued that traditional test specifications of the relationship between government expenditure suffer from aggregation (or omitted variables) biases by failing to distinguish between diverse economic growth experiences and their impact on government expenditure. The authors re-examine the evidence concerning Wagner's Law using a proposed conditional test specification that is capable of separating periods of strong and weak economic growth, accommodating possible asymmetries in the marginal responses of government expenditure to variations in economic growth and distinguishing between positive and negative asymmetries in such responses.

John and George (2005) examined whether the relative size of government, share of total expenditure in GNP, can be determined to Granger cause the rate of economic growth, or if the rate of economic growth can be determined to Granger cause the relative size of government using a bivariate error correction model within a Granger causality framework, as well as adding unemployment and inflation (separately) as

explanatory variables, creating a simple 'trivariate' analysis for each of these two variables. Using data on Greece, UK and Ireland, the analysis shows that, government size Granger causes economic growth in all countries of the sample in both short run and in the long run.

Taban (2010) examined government spending and economic growth using the quarterly data for the period 1987:Q1 to 2006:Q4 for Turkey. The author applied bounds testing approach and MWALD Granger causality test. The results show that the share of government spending and share of investment to GDP had negative impacts on economic growth in the long run. Al-Obaid (2004) examine the long-run relationship between total government expenditure and real GDP, and his empirical findings show a positive long-run relationship between the share of government spending in GDP and GDP per capita.

Kolluri and Wahab (2007) presented evidence showing that the majority of government expenditure responses tend to occur during periods of an economic slowdown characterized by GDP growth that is below trend-growth; and there is little evidence suggesting that government expenditure increases markedly during periods of an economic expansion when GDP growth is at/above trend-growth. While Keefer and Knack (2007) demonstrate that the level of public expenditure may be inversely related to its productivity due to the quality of government. Limited governments may spend less on public investment, but that investment may be productive. Weak and corrupt governments may have a high level of expenditures that is unproductive.

Ergun and Tuck (2006) studied the direction of causality between national income and government expenditures for Indonesia, Malaysia, Philippines, Singapore, and Thailand by using Granger causality test to investigate the causal links between the two variables. Annual time series data from 1960-2002 was made use of. The support for the hypothesis that causality runs from government expenditures to national income has been found only in the case of Philippines. There was no evidence for this hypothesis and its reverse for the other countries.

Pradhan (2007) investigated the causal nexus between government expenditure and economic growth in seven SAARC countries during the period 1970-2005. Using Granger causality test in the model specification from GDP to government consumption expenditure and from government expenditure to GDP, the author finds a unidirectional causality from government expenditure to economic growth in India, Nepal and Bhutan. But there is no reverse causality, from economic growth to government expenditure, in any of the seven countries. On the contrary, bidirectional causality, from government expenditure to economic growth and from economic growth to government spending, has been found in Bangladesh and Maldives and no causality has been found in Pakistan and Sri Lanka.

Joharji and Starr (2010), using time-series methods and data for 1969-2005, examined the relationship between government capital and current expenditures and non-oil sector GDP in the case of Saudi Arabia. The study shows increases in government spending have significant positive long-run effects on the growth rate for both current and capital expenditures, although the current expenditure has larger impacts on economic growth in the non-oil sector than the capital expenditure. Salih,

(2012) test the Wagner hypothesis in the context of the Sudan for the period 1970-2010 using is cointegration, causality, and error correction model (ECM) to indicate that the data for the period considered supports the Wagner's hypothesis. Sáez and Garcia (2006) find a positive relationship between government spending and economic growth using data from the EU-15 countries.

Govindaraju, Rao and Anwar (2011) by making use of annual data from Malaysia for the period 1970-2006, examined the Wagner's law and the Keynesian hypothesis concerning the link between real government spending and real GDP using both a bivariate and a multivariate model. Within the context of a bivariate model, authors empirically analysis reveals that aggregate government spending Granger causes the real GDP which used as the growth prox. However, in a multivariate framework, the authors find a support for the Keynesian hypothesis. Guerrero and Parker (2012) examine the causal relationship between federal government expenditures and growth in real GDP in the United States, using available data as from 1791 to 2006. The authors used the time-series properties of these variables for stationarity and cointegration, as well as Granger causality in detail in the context of a Vector Error Correction Model and find the causal evidence that faster GDP growth leads to faster growth in government spending.

Szarowská (2011) analysed the annual data on government spending of Czech Republic in compliance with the COFOG international standard. The study used the cross-correlation on cyclically filtered adjusted time series over the period 1995–2008. The cyclical properties of GDP and government spending function were, in average, found as weakly correlated. As regards to using government spending as the

stabilizer, total government spending, general public services, defense, economic affairs and education spending were negative correlated and it confirms countercyclical relation between these spending functions and GDP.

Gurgul, Lach and Mestel (2012) investigated the association between different kinds of budgetary expenditure and economic growth of Poland, making the use of linear and nonlinear Granger causality tests to evaluate the applicability of Wagner's Law and that of the contrasting Keynesian theory and indicates that total relation between budgetary expenditure and economic growth is consistent with Keynesian theory. Antonis, Constantinos and Persefoni (2013) use data of over a century, from 1833 to 1938, to analyse the Greece causal relationship between income and government spending in the Greek economy to some insight into Wagner and Keynesian Hypotheses. The study shows that Wagner's Law is confirmed for the entire period defined in the analysis.

Menyah and Wolde-Rufael (2013) investigated the relationship between government expenditure and economic growth in Ethiopia using the bounds test approach to cointegration. The study finds robust evidence of a long-run relationship between government expenditure and GDP as well as a unidirectional causality running only from GDP to government expenditure thus supporting the Wagnerian hypothesis of an expanding public sector.

Alsadiq (2014) empirically examined the effects of different types of government expenditures on economic growth in Saudi Arabia. This study used the different econometric techniques to estimate the short and long-run effects of these expenditures on growth and employ annual data over the period 1969-2010. The

study finds that private domestic and public investments, as well as healthcare expenditure, stimulate growth in the long-run while openness to trade and spending in the housing sector can also boost short-run production.

### **2.3 Summary**

Most of the existing literature available on the relationship between government spending and economic growth has revealed that government spending can influence economic growth in either positive or negative way through various channels. Moreover, the causality relationship can run from both sides in deferent periods as well as in deferent countries. Thus, the reviewed literature should not be used as a proxy to Namibia as it indicates that it will not give a clear indication of relationship between public spending and economic growth. Thus, the present study attempts to investigate this relationship in Namibia.

### **3. CHAPTER THREE: METHODOLOGY**

In the previous chapter, a literature review was done to explore the relationship between government spending and economic growth. The review demonstrates that the relationship can run either way. In Chapter Three the research methodology used in the study is described. The first section describes suitable research design and steps involved, followed by dataset representation and description. The third part describes the empirical techniques applied.

#### **3.1 Research Design**

This study uses the quantitative approach. Economics analytical tool ‘E-Views’ has been used to process the data. Vector Auto Regressive (VAR), Granger causality and Augmented Dickey–Fuller (ADF) unit root test as well as cointegration have been employed in the analysis. If the series are cointegrated, error correction model (ECM) will be used to analyze the relationship between government spending and economic growth as it has been used in the recent studies using GDP or per capita GDP as a proxy for economic growth (Liu Chin, Hsu & Younis, 2008), (Wahab, 2004) and (Vamvoukas & Loizides, 2005) among others.

#### **3.2 Research Methods**

##### **3.2.1 Data sources and Description**

This study uses the time series data on general government final consumption expenditure (GGS) and GDP obtained from the World Bank for the period of 1980-2012. Annual general government final consumption expenditure is based on constant 2005 US\$ (US Dollar). The choice of the starting period was constrained by the availability of data and the historical landmark as well. The collected data were

imported into E-Views, and analysed. The study firstly, calculated the descriptive statistics to describe the nature of annual time series data of GDP growth ( $Y_t$ ) and general government final consumption expenditure ( $X_t$ ). All the variables are real and in log transformed form.

According to Sims (1980), if there is simultaneity among variables, Vector Autoregressive (VAR) model should be employed. A VAR model suggests that if there is no much knowledge about the forces influencing a variable, then treat those variables symmetrically. This is shown by the following system of equations:

$$Y_t = \beta_{10} + \beta_{11}Y_{t-1} + \beta_{12}X_{t-1} + U_{yt} \quad (3)$$

$$X_t = \beta_{20} + \beta_{21}Y_{t-1} + \beta_{22}X_{t-1} + U_{xt} \quad (4)$$

Where  $U_{yt}$  and  $U_{xt}$  are correlated white noise and  $\beta_{ij}$  are coefficients. The equations shown above are in reduced form. The VAR model can be estimated with the usual ordinary least square (OLS).  $Y_t$  and  $X_t$  are the variables to be tested (GDP and total general government expenditure respectively), while  $Y_{t-1}$  and  $X_{t-1}$  are lagged values for the  $Y_t$  and  $X_t$  variables, and  $t = 1, 2, 3, \dots, T$  (1980-2012). The  $\beta$ s are parameters to be estimated.

### 3.2.2 Stationarity tests

Modern developments in the time series analysis have recommended some improvements in the standard Granger test. A stationarity test of the original variables should be done using the ADF unit root test, and then further test for cointegration between the variables. According to Granger (1969), the test is invalid if the variables order of integration is unknown. Therefore, this study will further test

for the unit root and co-integration. Dickey and Fuller (1979, 1989) devised this procedure of formally testing for non-stationarity (unit root). The key insight of their argument is that testing for non-stationarity is equivalent to testing for the existence of a unit root.

Therefore, the first step requires a determination of the order of integration of the variables of interest. The study has for this purpose used a well known test: namely the Augmented Dickey Fuller (ADF) test, based on the null hypothesis that ‘a series is not stationary’ (ie, has a unit root) against the alternative that it is stationary. If you reject the null, you conclude that the sires are stationary. The ADF test is given by the following equation:

$$\Delta X_t = a + bX_{t-1} + \sum c_j \Delta X_{t-i} + e_t \quad (5)$$

Where,  $X_t$  denotes the respective variables of interest.  $\Delta$  is the difference operator, while  $a$ ,  $b$  and  $c$  are parameters to be estimated. The tests are based on the null hypothesis ( $H_0$ ) is:  $X_t$  is not  $I(0)$ , If the calculated ADF statistics are less than (higher than in the obsolete term) their test critical values, then the null hypothesis ( $H_0$ ) is rejected and the series are stationary or integrated of order zero i.e.  $I(0)$ .

### 3.2.3 Granger causality

Sims (1980) advised that when there is simultaneity among the regressed variables, these variables should receive the same treatment. Therefore, there is one equation for each variable in this model. Furthermore, the current period (time  $t$ ) observation of each variable depends on its own lags as well as on the lags of the other variable in the model. However, a VAR model does not allow us to make statements about

causal relationships. VAR only allows interpretations about the dynamic relationship between the indicated variables. Thus, after a VAR modeling, this study goes further to test for the Granger causality for the causal relationship between two variables.

To test for the causal relationship between two variables the standard Granger test as it is stipulated by Granger (1969) has been employed in causality relationship literatures, [see (Keho 2010), Kónya (2004) among others]. Granger (1969) states that, if past values of a variable Y significantly contribute to forecast value of another variable,  $X_{t+1}$ , then Y is said to Granger cause X, the opposite is also true. The test is based on the following VAR regressions.

$$LNGDP_t = \alpha_1 + \sum_{i=1}^n \beta_i LNGDP_{t-i} + \sum_{j=1}^m \gamma_j LNGGS_{t-j} + \varepsilon_{1t} \quad (6)$$

$$LNGGS_t = \alpha_2 + \sum_{i=1}^n \sigma_i LNGGS_{t-i} + \sum_{j=1}^m \partial_j LNGDP_{t-j} + \varepsilon_{2t} \quad (7)$$

Where  $\alpha_i$ ,  $\beta_i$ ,  $\gamma_j$ ,  $\sigma_i$ ,  $\partial_j$  are coefficients while  $LNGDP_t$  and  $LNGGS_t$  are the log transformed variables to be tested (real GDP and total government spending, respectively), and  $\varepsilon_{1t}$  and  $\varepsilon_{2t}$  are mutually uncorrelated white noise errors, and  $t$  denotes the time period, while  $n$  and  $m$  are numbers of lags. In this model we can have the following cases:

From equation (7) the null hypothesis is that variable LNGDP does not Granger cause variable LNGGS, which is the case if the coefficients of LNGDP are all equal to zero, i.e.  $\gamma_j = 0$  for all  $j$ . In equation (6) the null hypothesis is LNGGS does not Granger cause LNGDP if  $\sigma_j = 0$  for all  $j$ . In both cases the alternative hypothesis is

that at least some of the  $j$ 's are not equal to zero ( $\gamma_j \neq 0$  and  $\partial_j \neq 0$  for at least some  $j$ 's). If the coefficient  $\gamma_j$ 's are statistically significant, then we reject  $H_0$  and conclude that government spending Granger causes real GDP. If the coefficients  $\partial_j$ 's are statistically significant, then we reject the null that economic growth does not Granger cause government spending. However, if both  $\gamma_j$  and  $\partial_j$  are statistically significant then causality runs both ways, and if  $\gamma_j$  and  $\partial_j$  are both not significant then there is no causality relationship between the two variables. In most cases the empirical studies examining the causality between two or more time series variables are either based on the traditional Granger (1969) causality test or on the Toda and Yamamoto Granger causality test.

### **3.2.4 Cointegration tests**

According to Asteriou (2007), the concept of cointegration was first introduced by Granger (1981) and elaborated further by Engle and Granger (1987), Engle and Yoo (1987), Phillips and Ouliaris (1990), Stock and Watson (1988), Phillips (1986 and 1987), and Johansen (1988, 1991, and 1995). It is known that trended time series can potentially create major problems in empirical econometrics due to spurious regressions. One way of resolving this is to difference the series successively until stationarity is achieved and then use the stationary series for regression analysis. According to Asteriou and Hall (2011), this solution, however, is not ideal because it not only differentiates the error process in the regression, but also no longer gives a unique long-run solution.

Testing for cointegration is a necessary step to check if there is an empirically meaningful relationship. If variables have different trend processes, they cannot stay

in fixed long-run relationship with each other. This is implying that there is no valid base for inference based on standard distributions. The concept of cointegration among variables can be defined in simple words as follow; two or more variables are said to be co-integrated if they share a common trend. This means that they have long run equilibrium relationships. This test was introduced as a remarkable link between non-stationarity process and the concept of long-run equilibrium (Granger, 1981). Engle and Granger (1987) further formalized this concept by introducing a simple test for the existence of long-run equilibrium relationships.

The Johansen co-integration approach has a number of advantages over the Engle-Granger two stage approaches. As this is a VAR based technique, less concern is needed over whether the explanatory variables are exogenous or endogenous. Restrictions can be applied to the co-integrating vector, which is not possible with the Engle-Granger approach (Asterious & Hall, 2011). It can also be used for 'Granger Causality' testing, where the lags in the error correction model can be jointly tested for significance, thereby determining any short-run causality from the explanatory variables to the dependent variable.

However, there is a specific problem associated with this Johansen co-integration approach, as it is possible to produce more than one co-integrating vector, there are potentially more than one set of long-run coefficients and resultant error correction models. To locate the most appropriate model, specific over-identifying restrictions can be applied. However, the Johansen co-integration approach is sensitive to the lag length. So, it requires the lag length to be determined in a systematic manner. Due to

the weakness of both approaches, this study will use both Eagle and Granger and the Johansen cointegration test.

#### **3.2.4.1 Engle and Granger Cointegration test**

According to Engle and Granger (1987), a linear combination of two or more nonstationary series (with the same order of integration) may be stationary. If such a stationary linear combination exists, the series are considered to be cointegrated and long-run equilibrium relationships exist. Engle and Granger (1987) suggest the test of co-integration by testing the stationarity of residuals ( $U_t$ ) from the cointegration regression. If the residuals are stationary in the level form then the variables Y (GDP growth) and X (total government expenditures) are cointegrated. The cointegration of the series is tested using variables having the same order of integration. The cointegration equation estimated by the OLS method is given as:

$$Y_t = a_0 + a_1X_t + U_t \quad (8)$$

Where  $Y_t$  is GDP and  $X_t$  is government spending  $U_t$  is the residuals

#### **3.2.4.2 Johansen Cointegration test**

A necessary but not sufficient condition for a Johansen co-integrating test is that each of the variables be integrated of the same order. The Johansen co-integration test uses two test statistics, the trace test and the likelihood eigenvalue test. The trace statistic tests the null hypothesis: “there is at most  $r$  co-integrating relations” against the alternative of “no ( $m$ ) co-integrating relations”,  $r = 0, 1, \dots, m - 1$ . The maximum eigenvalue statistic test the null hypothesis: “there are  $r$  co-integrating relations” against the alternative: “there are  $r + 1$  co-integrating relations” (Johansen 1991).

If  $Y_t$  and  $X_t$  are co-integrated, meaning  $\hat{u}_t \sim I(0)$ :  $\hat{u}$  denotes the residuals. The study, therefore, can express the relationship between  $Y_t$  and  $X_t$  with an Error Correction Model (ECM) specification as:

$$\Delta Y_t = a_0 + b_1 \Delta X_{t-1} - \pi \hat{u}_t + e_t \quad (9)$$

ECM will enable the study to include both the short and long run information. In this model  $b_1$  is a multiplier impact, short term effect, that measure the immediate impact a change in  $X_t$  will have on a change in  $Y_t$ , while  $\pi$  is the feedback effect, or the adjustment effect. It shows how much of the disequilibrium is being corrected.

In the error correction model, the relevant error-correction terms ( $EC_{t-1}$ ) are included in the standard Granger causality procedure after all variables have been made stationary by differencing, which yields equation 10 and 11.

$$\Delta LNGDP_t = \alpha_1 + \sum_{i=1}^n \beta_i \Delta LNGDP_{t-i} + \sum_{j=1}^m \gamma_j \Delta LNGGS_{t-j} - \emptyset_1 EC_{t-1} + \varepsilon_{1t} \quad (10)$$

$$\Delta LNGGS_t = \alpha_2 + \sum_{i=1}^n \sigma_i \Delta LNGGS_{t-i} + \sum_{j=1}^m \partial_j \Delta LNGDP_{t-j} - \emptyset_2 EC_{t-1} + \varepsilon_{2t} \quad (11)$$

Where  $\Delta$  is first difference operator,  $t$  is time,  $\alpha_i, \beta_i, \gamma_j, \sigma_i, \partial_j$  are coefficients associated to the VAR, the subscripts denote the order of that equation.  $\mathbf{R}_t = (\varepsilon_{1t}, \varepsilon_{2t})'$  is a vector of uncorrelated disturbances, while  $\alpha_1$  and  $\alpha_2$  are constants.  $EC_{t-1}$  is the error correction term.

The independent variables are said to cause the dependent variable if the error correction term ( $EC_{t-1}$ ) is significant ( $\emptyset_1$  or  $\emptyset_2$  are nonzero) or the coefficients of the

lagged independent variables (summation of  $\gamma_j$  or summation of  $\partial_j$  are significant. However, if the series are not cointegrated, Granger test is carried out without the error correction terms.

## 4. CHAPTER FOUR: DATA AND EMPIRICAL RESULTS

### 4.1 Data

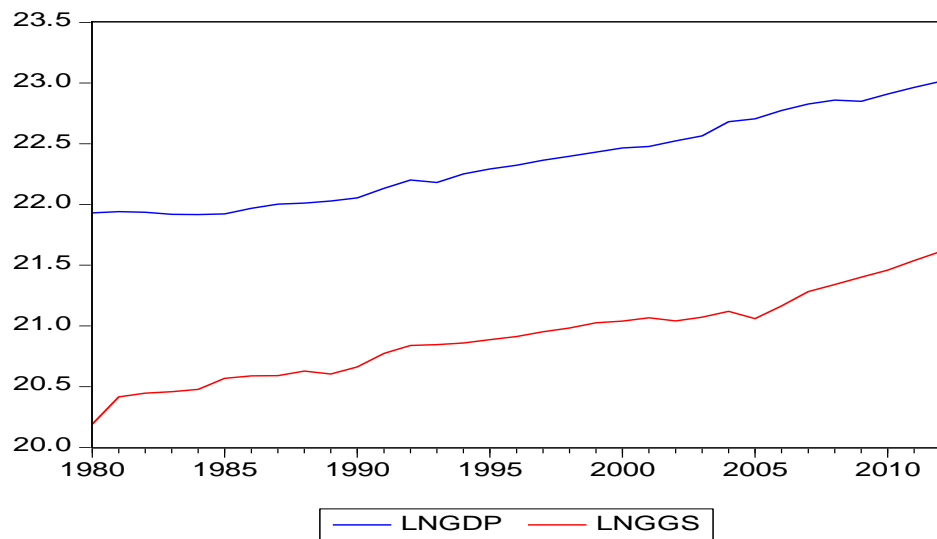
Namibia (previously South West Africa) being illegally viewed as a “provincial” part of South Africa till the 1980s (Amoo, 2008 p.69), (Hosten, Edwards, Bosman, & Church, 1997), both data on government expenditures and GDP are only available from 1980. General government final consumption expenditure (general government consumption) includes all government current expenditures for purchases of goods and services, including compensation of employees. It also includes most expenditure on national defense and security, but excludes government military expenditures that are part of government capital formation. The study uses GDP as a proxy for economic growth, while general government final consumption expenditure used as a proxy for government spending as it is used by Alexiou (2009), Egbetunde and Fasanya (2013) to mention a few. The studies generated the series descriptive statistics for both variables. The series descriptive statistics are shown in table 1 below.

**Table 1: Descriptive statistics**

	<b>LNGDP</b>	<b>LNGGS</b>
<b>Mean</b>	22.35826	20.90638
<b>Median</b>	22.32392	20.91271
<b>Maximum</b>	23.01377	21.61374
<b>Minimum</b>	21.91638	20.19031
<b>Std. Dev.</b>	0.360141	0.351335
<b>Skewness</b>	0.319910	0.115065
<b>Kurtosis</b>	1.772410	2.366856
<b>Jarque-Bera</b>	2.634976	0.624018
<b>Probability</b>	0.267807	0.731975
<b>Sum</b>	737.8227	689.9104
<b>Sum Sq. Dev.</b>	4.150459	3.949954
<b>Observations</b>	33	33

It is noted that all variables are transformed into natural logarithms and obtain the growth rate of the relevant variables by their differenced logarithms. The log transformed trends of GDP and GGS are shown in figure 2 below.

**Figure 2: Natural log transformed Plot of the GDP and GGS time series (1980 – 2012)**



Source: Author

## 4.2 Empirical Results and Discussion

### 4.2.1 Stationarity test results

Augmented Dickey Fuller test of unit root is used to test the stationarity of both the variables. Table 1 shows the results for the test of stationarity for the natural log GDP and GGS at level form. The study failed to reject the null hypothesis of non stationarity at level form including the intercept, intercept and trend and no intercept or trend for both the variables.

**Table 2: Unit Roots Test Result on level form**

Level form	LNGDP	LNGGS	Test critical values	
<b>Intercept</b>	2.062041	-0.48983	5% level	-2.96041
<b>Trend and Intercept</b>	-2.8396**	-2.65039	5% level	-3.56288
<b>None</b>	6.426803	4.894414	5% level	-1.95207

Note \*\* indicates statistical significance at 5%.

Since the study failed to reject the null hypotheses at level form, a further test for stationarity at the difference level was done. The results for stationarity tests at 1<sup>st</sup> difference level involving the intercept, trend and intercept and no intercept or trend are shown in Table 2.

**Table 3: Unit Roots Test Result on 1st difference**

1 <sup>st</sup> Deference	LNGDP	LNGGS	Test critical values	
<b>Intercept</b>	-4.836006 ***	-6.66272***	1% level	-3.661661
<b>Trend and Intercept</b>	-5.678968***	-6.70422***	1% level	-4.284580
<b>None</b>	-1.982561**	-4.56385***	1% level	-2.641672

Note: \*\*\* indicates statistical significance at 1%.

The study successfully rejects the null hypothesis of non stationarity and accepts the alternate that the data is stationary at first difference level. Thus, the study conclude that the variables under investigation are integrated of order one, that is to say I(1). Since the variables are integrated of the same order, the study, therefore, examine their co-integrating relationship using both Eagle and Granger co-integration and Johansen co-integration procedure.

## 4.2.2 Co-integration Tests

### 4.2.2.1 Engle and Granger co-integration test results

Applying the Engle and Granger co-integration approach, the study obtains the results as shown in Table 3. Residuals obtained from (ordinal least square) OLS regressions between LNGGS and LNGDP is then tested by using the ADF tests. The study rejected the null hypotheses of unit root. Therefore accept the alternative hypotheses, which imply that the test results indicate that there is a co-integrating relationship between the two variables.

**Table 4: LNGDP and LNGGS Residuals Unit Root Test Result**

Null Hypothesis: RESID02 has a unit root		
Exogenous: None		
Lag Length: 0 (Automatic based on SIC, MAXLAG=8)		
	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-4.411656	0.0001
Test critical values: 1% level	-2.639210	
5% level	-1.951687	
10% level	-1.610579	

\*MacKinnon (1996) one-sided p-values.

The Engle and Granger test results confirm the long run relationship between government spending and economic growth. The next step is therefore, to use the Johansen cointegration approach the long run relationship.

### 4.2.2.2 The Johansen co-integration test results

The Johansen Co-integration test is used to measure the existence of long run relationship between LNGGS and LNGDP. Before performing the Johansen cointegration tests, this study uses the Akaike's information criterion (AIC) to determine the optimum lag length. The series optimum lag length from the AIC is 1.

The test results are presented in Table 4 and Table 5. If the test statistic is greater than the critical value at a given level of significance, we reject the null hypothesis, and vice versa.

**Table 5: Johansen co-integrating tests (trace)**

Trend assumption: No deterministic trend (restricted constant)  
 Series: LNGGS LNGDP  
 Lags interval (in first differences): 1 to 1  
 Unrestricted Cointegration Rank Test (Trace)

Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.470726	23.60495	20.26184	0.0167
At most 1	0.117681	3.881250	9.164546	0.4301

Trace test indicates 1 cointegrating eqn(s) at 0.05 level

\* denotes rejection of the hypothesis at 0.05 level

\*\*MacKinnon-Haug-Michelis (1999) p-values

These tests indicate clearly that null hypotheses ( $r_0 \leq 0$  for trace statistic) are rejected at the 5% level of significance. Thus, we can reject the hypothesis of no cointegrating equation between LNGGS and LNGDP at the 5% significance level. However, under the null hypothesis ( $r_0 \leq 1$  for trace statistic, and  $r_0 = 1$  for maximum eigenvalue statistic), both maximum eigenvalue statistic and trace statistic are below the 5% level of significance. LNGGS and LNGDP are then said to be cointegrated at 5% level of significance. As a result, there must be a long-run relationship between government spending and economic growth for Namibia on the period of 1980 to 2012.

**Table 6: Johansen co-integrating tests (trace)**

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

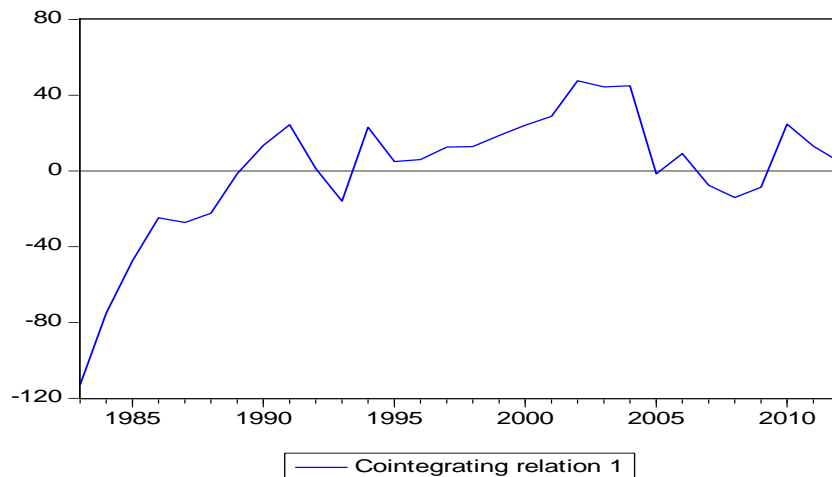
Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.470726	19.72370	15.89210	0.0119
At most 1	0.117681	3.881250	9.164546	0.4301

Max-eigenvalue test indicates 1 cointegrating eqn(s) at 0.05 level

\* denotes rejection of the hypothesis at the 0.05 level

\*\*MacKinnon-Haug-Michelis (1999) p-values

These tests indicate that null hypotheses ( $r_0 = 0$  for maximum eigenvalue) statistic is also rejected at the 5% level of significance. According to both maximal eigenvalue and trace statistic tests, the results indicate the existence of one co-integrating vector. Thus, the Johansen co-integration test suggests that there is a long run relationship between general government spending and economic growth in Namibia. The plot of co-integration relation is shown in figure 3 bellow.

**Figure 3: Plot of the co-integrating relations**

### 4.2.3 Granger Causality Tests

Co-integration implies the existence of Granger causality, but it does not indicate the direction of the causality relationship. The study investigates the direction of the relation using simple pair-wise Granger causality tests between government spending and economic growth, mainly to obtain a preliminary idea, as the two variables are I(1), the study use three lags for the Granger causality test.

**Table 7: Pair-wise Granger causality (lag length: 3)**

Sample: 1980 2012

Lags: 3

Null Hypothesis:	Obs	F-Statistic	Prob.
LNGGS does not Granger Cause LNGDP	30	3.55509	0.0301
LNGDP does not Granger Cause LNGGS		1.34408	0.2846

Table 7 shows that the null that government expenditure does not Granger because economic growth is rejected at 5% level of significance. However, the study fails to reject the null hypothesis that government expenditures do not Granger causes economic growth. Therefore, the tests reveal that there is unidirectional causality running from LNGGS to LNGDP.

### 4.2.4 Vector Error Correction Model (VECM)

Since there is co-integration, the vector error correction model is estimated. The results are presented in table 8 below. From the results, the long run relationship between economic growth and government spending is found to be positive in the

co-integrating vector. The normalized short-run co-integrating equation between government spending and economic growth can formally stated as.

$$\text{LNGDP}(-1) - 0.9959\text{LNGGS}(-1) = 0 \quad (12)$$

Equation 12 can be rewritten as:

$$\text{LNGDP}(-1) = 0.9959\text{LNGGS}(-1) \quad (13)$$

From equation (13) above the VECM result shows that there is a significant positive long-run relationship between government spending and economic growth. The findings are suggesting that an increase in government spending impacts positively on economic growth. These findings are in favour of the growth theory of Keynesian economist which says that an increase in government spending is the stimulator of the economic growth and other macroeconomic variables. However, it is against Solow (1956) argument that there is no significant long run relationship between economic growth and government spending. The findings are also not in support with the Classical View of the classical economists, which implies that high government expenditures are source of economic insatiability (Ricardo, 1821).

The long term relationship between government spending and economic growth can be estimated by equation (13) and (15) below.

$$\text{LNGDP} = \alpha\beta. \text{LNGGS} \quad (13)$$

$$\text{LNGDP} = 0.9959(0.026328) \text{LNGGS} \quad (14)$$

$$\text{LNGDP} = 0.02622 \text{LNGGS} \quad (15)$$

The estimation of a long term relationship between government spending and economic growth shows that in the long run, an increase of 1% in government spending in Namibia will slightly increase the economic growth by 0.026%. The VECM results of no intercept or trend in CE or test VAR are shown in Table 8 below.

**Table 8: VECM Estimates**

Cointegrating Eq:	CointEq1		R-squared	0.022541	0.035005
			Adj. R-squared	-0.047278	-0.033923
LNGDP(-1)	1.000000		Sum sq. resids	0.026798	0.045869
			S.E. equation	0.030937	0.040474
LNGGS(-1)	-0.995905		F-statistic	0.322851	0.507844
	(0.01725)		Log likelihood	65.34063	57.01017
	[-57.7450]		Akaike AIC	-4.021976	-3.484527
			Schwarz SC	-3.883203	-3.345754
Error Correction:	D(LNGDP)	D(LNGGS)	Mean dependent	0.034624	0.038635
			S.D. dependent	0.030230	0.039805
CointEq1	0.021828	0.026328			
	(0.00604)	(0.00791)	Determinant resid covariance (dof adj.)		1.37E-06
	[ 3.61214]	[ 3.33004]	Determinant resid covariance		1.12E-06
			Log likelihood		124.3863
D(LNGDP(-1))	0.125991	-0.097314	Akaike information criterion		-7.508795
	(0.18913)	(0.24744)	Schwarz criterion		-7.138733
	[ 0.66616]	[-0.39328]			
D(LNGGS(-1))	-0.070744	0.048407			
	(0.11045)	(0.14450)			
	[-0.64050]	[ 0.33499]			

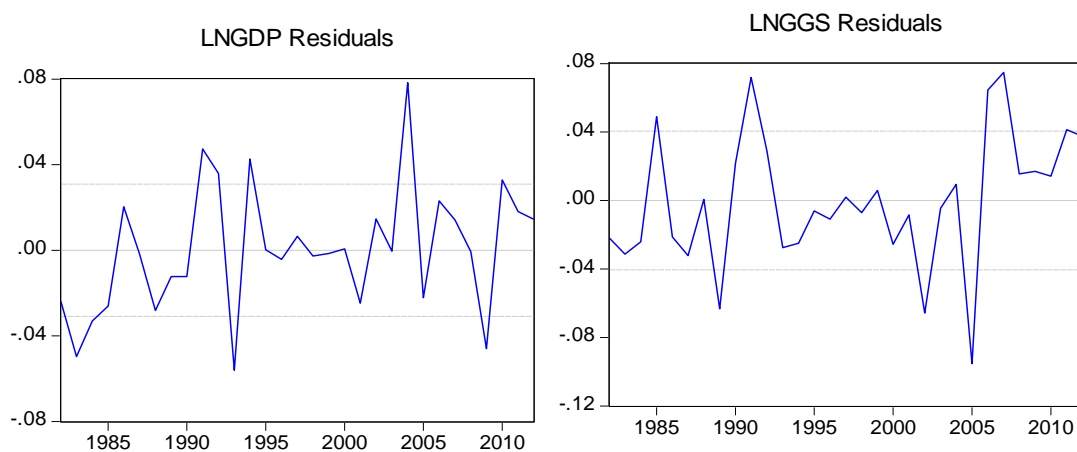
Where standard errors are in ( ),  
while t-statistics are in [ ]

The results indicated that the coefficients of error correction terms (ECT) of economic growth and government spending carry significant values of 0.021828 and 0.026328, respectively, however, they are positive. This indicates that divergences from the long run equilibrium in the system are corrected at speeds of 2.2 percent

and 2.6 percent, respectively. Nonetheless, since the values of the adjustment coefficients are small, the divergence from equilibrium takes long to correct and some of the impact of the shocks could be permanent. Meaning, every shock in the short run results in a new equilibrium.

From the VECM results, the residuals of each series can be plotted below. The residuals trend for gross domestic product maintained the interval of  $\pm 6$  between 1980 and 2004 but drifted away from the interval between 2005 and thereafter moved back to the interval. Government spending residuals moved within the interval of  $\pm 5$  but started fluctuating from 1994 to 2010.

**Figure 3: The Graphical Trend of the Residuals of the Variables used**



## **5. CHAPTER FIVE: CONCLUSION AND RECOMMENDATION**

The analysis shows that aggregate government spending has a slight positive influence on economic growth. Increase on aggregate government spending will lead to a significant increase in the level of output. This finding has a clear implication for the debate on public finances sustainability. It is often claimed that rising government spending would be a key to ensure the sustainable of economic growth over the long-run as in proposed by John Maynard Keynes.

Even though the evidences from the estimations support the Keynes theory, the findings imply that the impact of government spending on economic growth is very minimal in Namibia. The findings suggest that the Namibian government should promote its expenditure to realise a faster growth. The results further indicated that there is a long run positive relationship between general government consumptions spending and economic growth on the estimated period. Therefore, an expansionary of government expenditure should be promoted in order to realise economic growth.

From the study, the following recommendations are drawn. Government funds must be channelled in rightful projects at the right time to meet the country's demand rather than spending on enormous projects that will not translate into any meaningful growth of the economy. As it is indicated under the background of the study, 85.5 per cent of total government spending goes to government consumption spending that leaves on 14.5 per cent to capital expenditure.

Given that the impact of government expenditure on economic growth is undersized, government should restructure its expenditure where recurrent expenditure should

be, therefore, narrowed in order to enhance economic growth. The government should shift up the expenditure on capital projects and structure them in more contributively way to economic growth. Lastly, government should plan well before implementing projects so as not to initiate uneconomical projects, and neglect them in the long run and make resources wasteful.

### **5.1 Further Research**

This study is the first of this kind to be carried in Namibia. Total general government consumption expenditure aggregates the government total capital expenditure, total recurrent expenditures, and government expenditure on education or government expenditure on transport and communication, defence and health to mention a few. It is against that backdrop, the study invites further research where total general government consumption expenditure is split or disaggregated to ensure the degree of contributions of the disaggregation government expenditures on the growth of the economy.

The study also did not use other models such as the Autoregressive Distributed Lag Model (ARDL) Bounds test for Co-integration, the time-varying parameter approach, simple growth accounting model, adapting Ram (1986) and Robustness analysis to compare the findings. Therefore, this study call for, as work progresses to incorporate improvements in both the data and the model. There is a need to make comparison analysis with methodologies such as the one mentioned above. Additionally, it would be useful for economic expansion and government spending researchers if the forecasting performance of the different distributed-lag models could be also compared.

## 5.2 Conclusion

In the theoretical literature, there has been greater focus on the critical role of government spending as a vehicle to accelerate economic growth. Most economists have argued that governments should raise their expenditures as a means of achieving faster economic growth. It is asserted that a growth in government spending emanating from inward oriented economic policies leads to augment GDP growth. Also, there is potential for reverse causality, where GDP growth leads to a rise on government spending. These issues are still debatable, and there is contradictory empirical evidence which rejects the hypothesis of such relationships between economic and government spending. However, the broad consensus among economists as well as policy makers is that there is a close symbiotic relationship between GDP growth and government spending growth (Knack, 2007).

On the above background, this study has carried out an empirical analysis of the government spending-led growth hypothesis in Namibia. Within a Vector Error Correction Model (VECM) framework, the Granger causality is employed to determine the direction of causation between government spending and economic growth. The study accordingly takes into account the stationarity properties of the time series data from 1980 to 2012. The ADF test confirms the existence of unit roots for both log transformed general government expenditure and GDP series are non-stationary processes that are integrated of order one. Furthermore, co-integration tests indicate that there exists a long run equilibrium relationship between the two variables.

Within this framework, the study failed to reject the null hypothesis that government spending-led growth does not operate in Namibia. The study concludes that there is a long-run relationship between government spending and economic growth. The Granger causality testing confirms the existence of the relationship which runs from government spending to economic growth. The study indicates that government spending has a statistically significant but undersized positive impact on the economic growth in Namibia. Therefore, the findings suggest the need for a promotion on government intervention in the development strategy of economy expansion. However, the promotion of blind government spending must be discouraged.

Finally, the results presented in this study are preliminary in nature. Therefore, their implications should be taken with the necessary caution. Some of the shortcomings are a too high degree of aggregation. The study did not split or disaggregate the government spending into spending purposes of functions, for instance, government total capital expenditure, total recurrent expenditures, and government expenditure on education or government expenditure on transport and communication, defence and health to mention a few. Furthermore, the study also did not use other models such as The Autoregressive Distributed Lag Model (ARDL) Bounds test for Cointegration, simple growth accounting model, adapting Ram (1986) and Robustness analysis. Perhaps it is to be hoped that this study will motivate further research designed to overcome some of these weaknesses mentioned earlier.

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## **7. APPENDIX**

### **7.1 Data sources and description**

#### **Data sources**

Both GDP and General government consumption expenditure data are available at Namibia Statistic Agency (NSA), Ministry of Finance and the World Bank Data portal. However, Both Ministry of Finance and NSA do not have any record of data of the pre-independence era. This study, therefore, uses the time series data of general government final consumption expenditure (GGS) and GDP data is obtained from the World Bank data portal, at <http://data.worldbank.org/country/namibia>, for the period of 1980-2012, as the only source with the data for the period. Annual general government final consumption expenditure is based on constant 2005 US\$ (US Dollar). The choice of the starting period was constrained by the availability of data and the historical milestone as well. Namibia being viewed as part of South Africa before, both government expenditures and GDP data are only available from 1980.

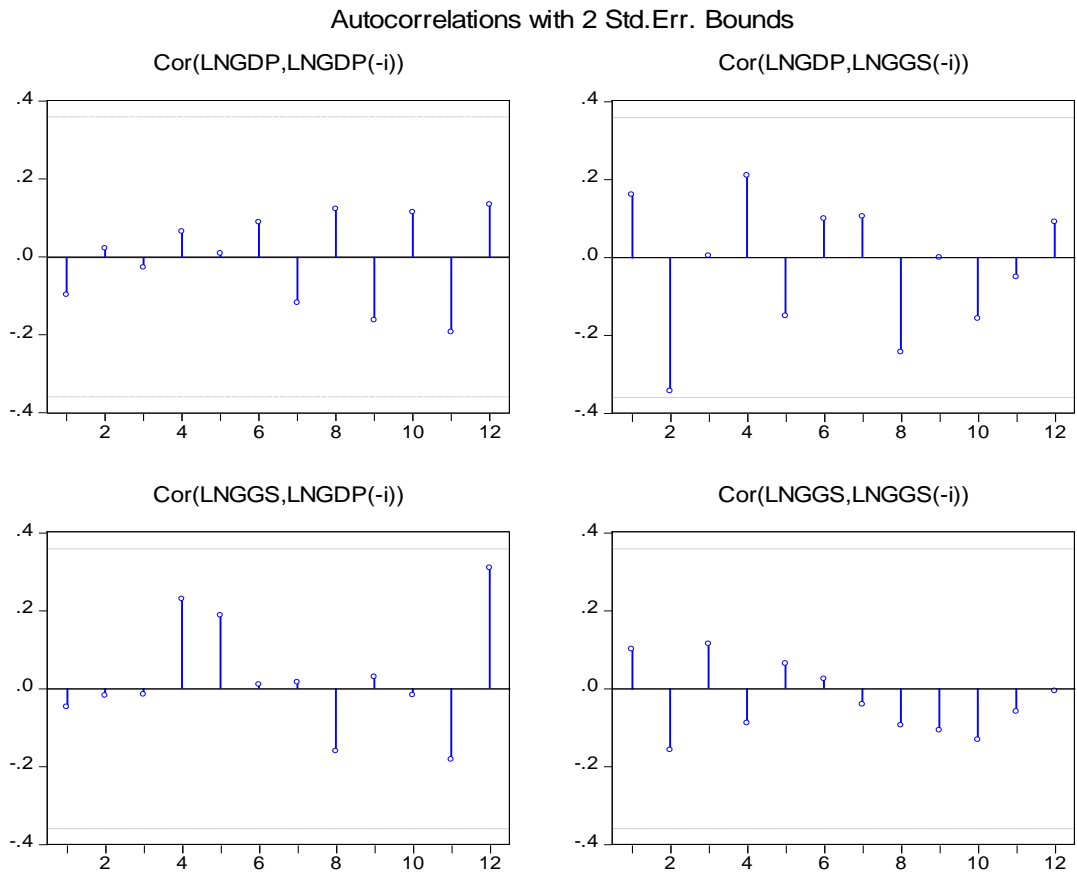
#### **Classifying Government Expenditures**

Government expenditures are usually allocated according to economic or functional classifications. The economic classification is the more aggregated form and usually identifies two types: capital (sometimes called investment or development) and recurrent expenditure. Capital/investment expenditure is mainly used for procurement of capital/intermediate goods and related government investment activities. As the name suggests, recurrent expenditure includes spending on recurrent expenses (or government services) that are incurred each year, e.g. wages and salaries, administration, transfers, debt repayments and welfare services.

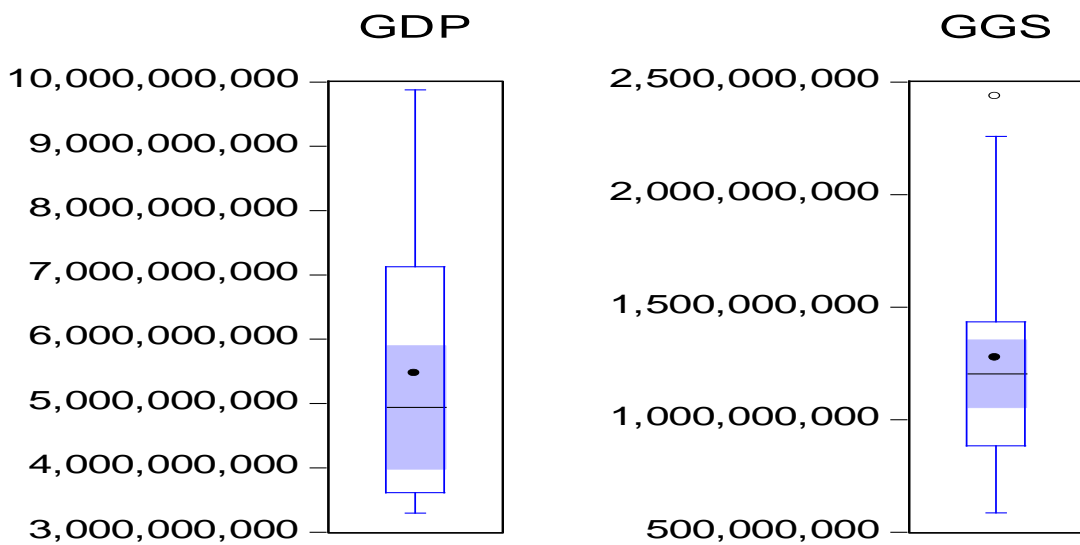
Functional classifications comprise detailed categorisation of expenditures into different social and economic sectors or functions. Each of the functional categories usually has both a capital and recurrent component, and these are summed together to obtain the aggregate economic classification. Unfortunately, full details for the recurrent/capital decomposition by function were not available for all the years in our sample (especially for education and health category). Therefore, the study opted to use the aggregated form of general government consumption expenditure, which includes all government current expenditures for purchases of goods and services, including compensation of employees. It also includes most expenditure on national defense and security, but excludes government military expenditures that are part of government capital formation.

## 7.2 Additional information

**Appendix Figure 1: Serial correlation**



**Appendix Figure 2: GDP and GGS box plot**



**Appendix 2: LNGDP and LNGGS Residuals Unit Root Test Result**

Null Hypothesis: RESID02 has a unit root  
 Exogenous: None  
 Lag Length: 0 (Automatic based on SIC, MAXLAG=8)

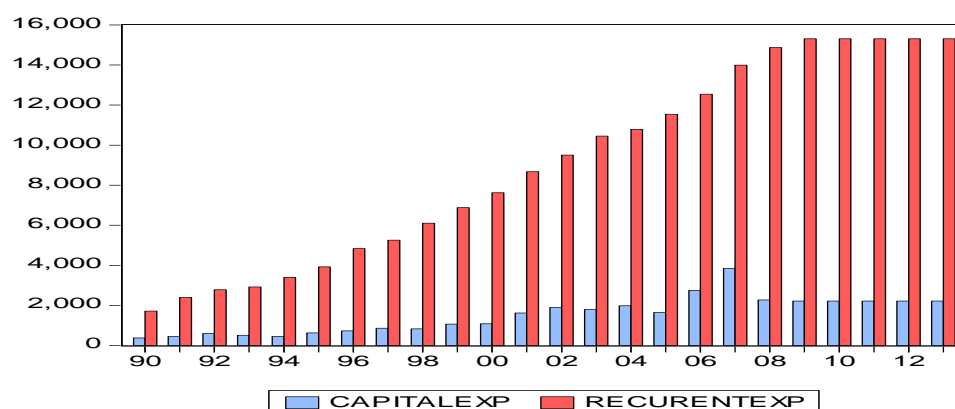
	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-4.411656	0.0001
Test critical values: 1% level	-2.639210	
5% level	-1.951687	
10% level	-1.610579	

\*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation  
 Dependent Variable: D(RESID02)  
 Method: Least Squares  
 Date: 09/05/14 Time: 11:41  
 Sample (adjusted): 1981 2012  
 Included observations: 32 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RESID02(-1)	-0.400147	0.090702	-4.411656	0.0001
R-squared	0.352254	Mean dependent var		0.012515
Adjusted R-squared	0.352254	S.D. dependent var		0.054505
S.E. of regression	0.043867	Akaike info criterion		-3.384559
Sum squared resid	0.059654	Schwarz criterion		-3.338755
Log likelihood	55.15294	Hannan-Quinn criter.		-3.369376
Durbin-Watson stat	1.114236			

**Appendix Figure 3: Actual composition of government spending in Namibia from 1990 to 2012**



### Appendix Figure 4: Johansen Co-integration results

Sample (adjusted): 1982 2012  
 Included observations: 31 after adjustments  
 Trend assumption: No deterministic trend  
 Series: LNGDP LNGGS  
 Lags interval (in first differences): 1 to 1

#### Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.389981	19.15016	12.32090	0.0031
At most 1	0.116162	3.827928	4.129906	0.0598

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level

\* denotes rejection of the hypothesis at the 0.05 level

\*\*MacKinnon-Haug-Michelis (1999) p-values

#### Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.389981	15.32223	11.22480	0.0091
At most 1	0.116162	3.827928	4.129906	0.0598

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level

\* denotes rejection of the hypothesis at the 0.05 level

\*\*MacKinnon-Haug-Michelis (1999) p-values

#### Unrestricted Cointegrating Coefficients (normalized by $b^*S11*b=I$ ):

LNGDP	LNGGS
-1.087585	1.083132
14.40771	-15.40301

#### Unrestricted Adjustment Coefficients (alpha):

	D(LNGDP)	D(LNGGS)
	-0.020071	-0.005218
	-0.024207	0.008087

1 Cointegrating Equation(s):                      Log likelihood                      124.3863

#### Normalized cointegrating coefficients (standard error in parentheses)

LNGDP	LNGGS
1.000000	-0.995905
	(0.01725)

#### Adjustment coefficients (standard error in parentheses)

D(LNGDP)	D(LNGGS)
0.021828	0.026328
(0.00604)	(0.00791)

### Appendix Figure 5: VECM Estimates

Sample (adjusted): 1982 2012  
 Included observations: 31 after adjustments  
 Standard errors in ( ) & t-statistics in [ ]

Cointegrating Eq:	CointEq1	
LNGDP(-1)	1.000000	
LNGGS(-1)	-0.995905 (0.01725) [-57.7450]	
Error Correction:	D(LNGDP)	D(LNGGS)
CointEq1	0.021828 (0.00604) [ 3.61214]	0.026328 (0.00791) [ 3.33004]
D(LNGDP(-1))	0.125991 (0.18913) [ 0.66616]	-0.097314 (0.24744) [-0.39328]
D(LNGGS(-1))	-0.070744 (0.11045) [-0.64050]	0.048407 (0.14450) [ 0.33499]
R-squared	0.022541	0.035005
Adj. R-squared	-0.047278	-0.033923
Sum sq. resids	0.026798	0.045869
S.E. equation	0.030937	0.040474
F-statistic	0.322851	0.507844
Log likelihood	65.34063	57.01017
Akaike AIC	-4.021976	-3.484527
Schwarz SC	-3.883203	-3.345754
Mean dependent	0.034624	0.038635
S.D. dependent	0.030230	0.039805
Determinant resid covariance (dof adj.)	1.37E-06	
Determinant resid covariance	1.12E-06	
Log likelihood	124.3863	
Akaike information criterion	-7.508795	
Schwarz criterion	-7.138733	