AN INVESTIGATION OF THE RELATIONSHIP BETWEEN ECONOMIC GROWTH AND GOVERNMENT EXPENDITURE: THE CASE OF SOUTH AFRICA

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DECLARATION

I, Oladele Musili Folasade, declare that the dissertation entitled "**An investigation of the relationship between economic growth and government expenditure: the case of South Africa",** hereby submitted for the degree of Master of Commerce in Economics, has not previously been submitted by me for a degree at this or any other university. I further declare that this is my work in design and execution and that all materials contained herein have been duly acknowledged.

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I thank the Almighty God for giving me the strength to complete this study. Without Him, I would not have been able to come this far. Furthermore, I wish to express my gratitude to my dear husband, Professor Idowu Oladele, for his support. I wish to thank my children for their understanding and care as well. May Almighty God bless you all.

DEDICATION

I dedicate this study to the Almighty God, for His guidance and protection during this academic journey.

ABSTRACT

The issue of whether government expenditure helps or hinders economic growth is still debatable. There are differences among policy makers on whether an increase in government expenditure helps or hinders economic growth. This study investigates the relationship between economic growth and government expenditure in South Africa using annual data spanning from 1980 – 2014. The Vector Error Correction Model and the impulse response function were used to analyse the data. The Vector Error Correction Model is used to estimate the relationship between the variables of this study while impulse response function is used to examine the response of shocks on the variables. The VECM results indicate a significant and negative relationship between GDP and expenditure. A positive and insignificant relationship was found between investment and GDP, and a significant and negative relation exists between GDP and money supply. The impulse response results revealed that GDP responds positively to shocks from the variables in this study. Based on the findings, there is a negative relationship between government expenditure and economic growth in South Africa during the period of study. Therefore, based on this result, it is recommended that government should focus on and direct more spending to priority sectors of the economy such as infrastructural development and industry in order to accelerate economic growth. Both private and government investors should be encouraged since investment showed a positive relationship but insignificant. Monetary policy should be used as an instrument to control money supply in the economy.

Keywords: Economic growth, government expenditure, public goods, inflation, public debt.

JEL Classification:

GLOSSARY OF TERMS

Cointegration: A statistical property of time series variables. It is also an econometric technique for testing the correlation between non-stationary time series variables.

Crowding-out: A situation when government is spending on financial and other resources which would have otherwise be used by private enterprise and when such government spending fail to increase overall aggregate demand because an increase in government spending leads to an equivalent fall in private sector spending and investment.

Developed country: A sovereign state that has a highly developed economy and advanced technological infrastructure relative to other less industrialised nations.

Developing country: Also referred to as an underdeveloped country. A nation with an underdeveloped industrial base, and a human development index (HDI) compared to other countries. It can be described as a country with a low standard of living and a low level of industrial production.

Deficit: The amount by which a resource falls short of a mark, most often used to describe a difference between cash inflows and outflows.

Dependent variable: It represents output or effect used to test if in cause and effect.

Economic growth: It can be described as the most watched indicator that tells us how much more the economy is producing than it did before, it tells us if the economy is producing more and if businesses are more profitable and stock prices are on the rise, which give companies capital to invest and have more employees as more jobs are created.

Employment: This can be expressed as a relationship between two parties. It is usually based on a contract where work is paid for, a situation where one is the employer and the other is the employee.

Fiscal policy: A policy used by government to regulate spending levels and tax rates in order to monitor and influence a nation's economy.

Government expenditure: This can be explained as spending by the government sector and includes both the purchase of final goods and services, or Gross Domestic Products (GDP) and transfer payments.

Human capital: A measure of economic value as an employee's skill set. It is the stock of knowledge, habits, social and personality attributes including creativity, embodied in the ability to perform labour so as to produce economic value.

Independent variable: Refers to the input or cause used to test if it is in cause and effect.

Investment: A means of using money with the hope of making more money.

Infrastructure: The fundamental facilities and systems of serving a country, city or area. This includes services and facilities necessary for an economy to function.

Inefficiency: The word inefficiency can be explained to be the absence of efficiency. It can mean the inability to do something or produce something without wasting materials, time or energy.

Inflation: The rate at which the general level of prices for goods and services is rising and the purchasing power of currency is falling.

Money supply: The total supply of money in circulation in the economy of a given country at a particular time.

Population growth: An increase in the number of people residing in a country, state or city.

Public good: A product that one individual can consume without reducing its availability to another individual and from which no one is excluded.

Public debt: Debt owed by a central government; it may also refer to debt owed by a state or provincial, municipal or local government.

Productivity: An economic measure of output per unit of input. This input includes labour and capital while output is measured in revenue and other GDP components such as business inventories.

Per capita income: The average income earned per individual in a given place or area either in a city, region, country and so on.

Stagnant economy: Also referred to as economic immobilism. It a prolonged period of slow economic growth, usually measured in terms of GDP growth and usually followed by high unemployment.

Technology: The collection of techniques, skills, methods and processes used in the production of goods or services or in the accomplishment of objectives such as scientific investigation.

LIST OF ABBREVIATION AND ACRONYMS

ADF	Augmented Dickey Fuller
DF	Dickey Fuller
ERS	Elliott Rothenberg and Stock
ECM	Error Correction Model
GDP	Gross Domestic Product
IRF	Impulse Response Function
MS	Money Supply
NP	Ng Perron
OLS	Ordinary Least Square
PP	Phillip Perron
SARB	South African Reserve Bank
US	United State
UK	United Kingdom
VAR	Vector Autoregression
VECM	Vector Error Correction Model

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CHAPTER ONE

ORIENTATION OF THE STUDY

1.1 Introduction

Many high income countries are still struggling to grapple with legacies of the global financial crisis since economies are less dynamic now than the way they were in the past. Global growth in 2014 was lower than expected and this has been the disappointing outturns for the past several years. However, growth picked up from 2.5% in 2013 to 2.6% in 2014. Several forces are behind driving back global growth; among these are: soft commodity prices, persistence of low interest rates but increasingly divergent monetary prices across major economies as well as weak world trade and, most importantly, the sharp decrease in oil prices (World Bank, 2015).

Fedderke (2006) compared the rate of economic growth in South Africa during the nineteenth and twentieth century's to be higher compared to any other century. According to Moalusi (2004), the standard of living could be compared to the way people lived during the past two hundred years. When there is government expenditure, government is expected to perform a range of distinctive functions in society. Government capital spending is positively affected by external shocks and plays an important role in explaining the dynamics of growth in government spending.

Economic growth is a means of sustainable development. Economic growth helps to attain a better standard of living for the people and this can be attainable through improvement in health, housing, education, infrastructure as well as agricultural productivity. Economic growth can be said to be attainable when there is increase in the level of national income and output of a country. Economic growth can also be an increase in the level of net national product in a given period of time. According to Todara and Smith (2006) economic growth is a steady process by which productive capacity increases over time to bring an increase in the level of national output as well as income. However, economic growth helps to attain high rates of structural transformation, international flows of labour, goods and capital (Ochejele, 2007).

However, economic growth, which serves as an indicator of economic performance within a country, is being considered as an objective which many countries would embrace because of

its role in elevating the standard of living as well as the level of employment. Most importantly, government as an economic agent has a fundamental function to take part in the country by providing public goods and services. Therefore, economic growth becomes an objective pursued by government in order to acquire resources needed for the provision of public goods and services (Alexiou, 2007).

South Africa's economy has over decades been improved by inwardly-focused policies that aimed at industrialisation and import substitution. During this period many companies in South Africa were highly protected from international competition as well as pressure from foreign markets this however allowed local industries to grow in such a way that would not have been possible in the absence of import protection. This however has improved the economy in its real GDP growth in its contemporary history and this is as a result of sound and transparent fiscal and monetary policies. South Africa's economy recorded an increase in growth in gross domestic product (GDP) of 5.4% in 2006, which is the best performance since 1984. This growth can be attributed to robust consumer demands in recent years and bringing of foreign wealth into South Africa, which motivated investor confidence and wide concert of household financial resources (Hanival and Mala, 2014).

The ratio of government expenditure to economic growth in South Africa has been fluctuating since 1960. From 2002 to 2005, the ratio of government expenditure to economic growth stood at 19%, though the ratio changed to 20% in 2006. However during 2007-2008, it dropped to 19% and later increased to 21% in 2009, which is the highest record of government expenditure from 1960 to 2011 (Odhiaambo, 2013).

South Africa's growth in 2014 recorded only 1.5% which was the weakest performance since the global financial crisis. The nation's economy was affected as a result and demand from trading partners are significantly weak. Many areas such as poor infrastructure, inadequate energy supply, weak domestic demands, and investment rate acted as a drag on growth. However, there are improvements in the global economy; the completion of important government projects, and the new investment plans revealed that growth can still boost to 2,0% in 2015.

Moreover, fiscal policy has been a source of help to the country in the area of prevailing economic situation and the objectives the government wants to achieve. Fiscal policy is the part of government policy with the responsibility of raising revenue through taxation and other means and it helps government to decide on the level and how to pattern the spending

in order to influence economic activities. According to Kumo, Omilola and Minsat (2015) the fiscal position in South Africa has improved which helps to reduce the level of deficit to 3.4% of gross domestic product (GDP), an increase in tax revenue has however helped to increase government expenditure.

According to the Keynesian school of thought, government spending can have a positive influence when government borrows from the private sector and uses the various spending programmes to pay back to private sector such as by infrastructural development. It is argued that an increase in government expenditure can be an effective tool to improve aggregate demand in a stagnant economy as well as to improve the private sector. However, it is assumed that an increase in government spending is likely to increase employment, profitability and investment as well as having multiplier effects on aggregate demand, thus government expenditure can contribute positively to economic growth (Chipaumire, Ngirande, Method and Ruswa, 2014).

According to Barro (1990), an increase in government expenditure (such as socio-economic and physical infrastructure) impacts on the rate of growth in the long run. For example government spending on education and health increases productivity of labour and subsequently leads to an increase in national output. However, expenditure on infrastructure such as roads and power reduce production costs, leading to an increase in private sector investment which ensures economic growth. A good example is the 2010 FIFA World Cup tournament which led to an increase in government expenditure on infrastructure in South Africa (Chipaumire *et al,* 2014).

On the other hand Chipaumire *et al.,* (2014) argue that government participation in the economy through expenditure may in the long run have negative effects on the economy. This can be in the form of debt burden to the national budget, inflation and taxes that might not be conducive for investors. Incessant government spending may also have a negative influence on the economy. For instance, a rise in government spending may increase the level of public debt, and government consumption crowd–out. Private investments affect the economy in the short run and decrease capital accumulation in the long run. Some economists believe that increased government expenditure can lead to stagnation in aggregate demand in the economy and consequently to crowd– in effects on the private sector (Chipaumire et al, 2014).

The importance of the relationship between government expenditure and economic growth cannot be overlooked, especially in a country such as South Africa that has always enjoyed government spending over the years. There are several factors that contribute to the growth of the nation's output. These are growth in the number of the workforce; increase in the level of equipment; and economic productivity. In order to ensure well-equipped markets and stimulate economic growth, government needs to enforce contracts and maintain national security as well as provide important public goods (Chude and Izuchukwu, 2013).

The focus of this study is to estimate the relationship between economic growth and government spending in South Africa and to examine the response from shocks using the VECM and the impulse response function.

1.2 Problem Statement

The government intervention in South Africa's natural resources has risen inordinately since the beginning of the 1980s. Government participation directly in the market mechanism and its finance has led to some consequences, among which are: government expenditure to gross domestic product which rose from 24.4 percent in fiscal 1979/80 to a temporarily estimated 31.4 percent in fiscal 1992/93. This however has resulted in a higher tax burden which increased from 15.8 percent in 1979/80 fiscal year to an estimated of 21.9 percent in fiscal 1992/93. This also has brought about a short fall between the current expenditure and current revenue and resulted in lack of saving which reached 4.8 percent of gross domestic product in 1992. Government expenditure later led to an increasing trend in government debt. Recently, the deficit before borrowing and debt repayment has increased very sharply to a high level of 8.6 percent of gross domestic product in fiscal 1992/93 and to a budgeted level of 6.8 percent of gross domestic product in fiscal 1993/94. There are many factors that contributed to the deterioration of government spending in South Africa; among these is the process of socio-political reform during the past few years which resulted in an imbalance between government revenue and government expenditure (Van der Merwe,1993).

There is controversy among policy makers on whether an increase in government expenditure helps or hinders economic growth. It is argued that costly 'public goods' like education and infrastructure escalating government expenses and allows people to have more money which improve economic growth, while others argue that more spending by government complicates efforts of implementing pro-growth policies (Alexiou,2009).

Vedder and Gallaway (1998) agree that when government spends too much money it can become a burden at some point because it may contribute to economic stagnation and decline. This may be as a result of misallocation of money or because spending becomes too large. In such situation, the costs outweigh the benefits. Moreover, government spending sometimes may cause extra cost which includes borrowing money from developed countries. Government will not spend money without considering where the money will come from, and all the means that government uses to obtain money have their own consequences, for instance, increasing in taxes which discourages productive behaviour (Mitchell, 2005).

Moreover, too much spending by government may lead to the displacement of cost. Every dollar that is spent by government has its equivalent one less dollar in the productive sector of the economy. Marinkov (2014) maintains that this may, however, dampen growth which implies that economic output may be affected when government does not use resources efficiently. Furthermore, government spending sometimes finances harmful interventions which may have negative impacts on economic activities.

In addition, government spending encourages destructive choices. Many government programmes encourage people to be indolent and psychologically handicapped. Some welfare programmes allow people to choose leisure over work. For example, unemployment programmes encourage people to be unemployed; flood insurance programmes stimulate construction in flood plains. These are some government programmes that reduce economic growth which in the long run, reduce national output because these programmes promote mismanagement, or underutilisation of resources. Also, some of these programmes such as those that subsidise retirement, housing and education discourage people from saving, since there are government programmes that cater for their needs. Other government spending programmes such Medical-aid which generates a negative impact on economic growth because of eligibility rules also discourages people from saving their incomes (Mitchell, 2005).

There may sometimes be a delay connecting costs and the profit that may be derived from it. For instance, spending on education may take a long time to put into action before it can finally be realised and the outcome may sometimes fail to accomplish. This may however be as a result of delays or lack of information. Spending money in order to prop up development may sometimes be inflationary especially in a situation whereby government needs to scrounge from financial markets, or if there is excessively money in circulation. As suggested

by New-Classical economists the supply-side performance ought to be improved especially labour productivity. New-Classical economists also emphasise the need for government to influence consumer behaviour. (Odhiambo, 2013).

However, the large size of government's expenditure is often the cause of many economic ills in both developed and developing countries. These ills include large economic deficits, internal imbalances (e.g. inflation, rising interest rate) and external imbalances, for example trade deficits and falling exchange rates. It has been argued that an increase in government expenditure may not have its intended salutary effect in developing countries due to the unstable level of public debts (Fedderke, 2006).

Another problem emanating from government spending is the issue of crowding out. Crowding out is the 'squeezing' out of private organisations through the expansion of the public sector. When government uses scarce resources there will be less available for the private sector to use. Government spending can help in overcoming inefficiencies of the market system in the allocation of economic resources. It can also help for the smoothing of cyclical fluctuations in the economy and influence the level of employment and price stability. Thus, government plays a crucial role in the economic growth of a country (Alesina, 2008).

1.3 Aims and Objectives of the study

The aim of this study is to examine the relationship between economic growth and government expenditure in South Africa.

The specific objectives are to:

- Determine the nature of the relationship between economic growth and government expenditure;
- To examine the response of government expenditure to shocks from the variables; and
- Make policy recommendations based on the outcome of the empirical findings

1.4 Research Questions

The research questions asked were:

- What is the relationship between government spending and economic growth in South Africa?
- What will be the response of government spending to shocks from the independent variables such as money supply and investment?.
- What are the effects of policy recommendation on economic growth in South Africa?

1.5 Significance of the study

According to Paternostro (2007) there is no compromise in theoretical literature on the collision of public spending on economic. Several studies that have been carry out on the important of public expenditure on economic growth. Niloy (2002) and Sutherland (2009) point out the effects of positive growth on public expenditure while Schaltegger and Torgler (2006) argue that large government spending is detrimental to economic growth in developed countries. However, areas in which to allocate public expenditure that are more likely to contribute to growth need to be empirically established

However the importance of this study is to empirically investigate the impact of government expenditure to the stakeholders such as creditors, the directors, employees and particularly to the policy makers and most importantly how it contributes to economic growth in South Africa.

1.6 Organization of the Study

Chapter 1 of the study provides the introduction of the study, statement of the problem, aims and objectives, research questions, and significance of the study. Chapter 2 provides an overview of government expenditure and economic growth in South Africa as well as the consequences of rising government spending. Chapter 3 focuses on the literature review and is divided into two sections: theoretical and empirical aspects of the study. Chapter 4 gives the methodology used in conducting the study. It explains the research methods and methodological procedures used in the study. Chapter 5 presents results of the different tests used in the study. Chapter 6 presents the summary, limitations of the study, areas for further research and recommendations. Lastly, there is a list of the references.

CHAPTER TWO

AN OVERVIEW OF GOVERNMENT EXPENDITURE AND ECONOMIC GROWTH IN SOUTH AFRICA

2.1 Introduction

This chapter explains the history of government spending and economic growth in South Africa. The section elaborates on the overview financial system of the country and the factors that contribute to government spending and the consequences of government overspending on the economy of South Africa.

2.2. Overview of the Economy of South Africa

South Africa was able to stay on its feet despite the staggering of other countries during the global financial meltdown. Generally, the country is politically stable and has a capitalised banking system. There are abundant natural resources, well-developed regulatory systems and a well-established manufacturing base. It is ranked by the World Bank as an "upper middle-income country". The country has been positioned as one of the largest economies in Africa. Moreover, South Africa's legislation in terms of commerce, labour and maritime is considered to be particularly strong (South Africa, 2014).

The economy has a marked duality with a known financial and industrial economy which has long been an underdeveloped informal economy. The Global Competition Report of 2012–2013 ranked South Africa second in the world for its accountability in private institutions and third for its financial market development. The country is highly recommended for its financial markets at a time when the financial markets of other countries are returning slowly. However, in 2014, South Africa's rating was downgraded due to poor growth prospects caused by instability of the labour market as well as increase in government debts. This led to high deficits on current accounts. There are improvements in outcomes of the service and government is taking measures in place in order to reinforce the effectiveness of open expenses and eliminate fraud in the nation. According to the South Africa Reserve Bank (SARB, 2015) inflation has been moderate and prices have been fairly steady. As at January 2013 the annual consumer inflation rate was 5.4%, down from the 5.7% experienced in

December 2012. Price stability and low inflation have helped protect the standard of living, especially among working groups and low-income households (World Bank, 2015).

South Africa has a diverse economy which contributes to GDP as follows: Agriculture with 2.2% as at 2012, 10%, for mining, 12.3%, for manufacturing, 2.6%, for electricity and water 3.9% for construction and 16.2% for wholesale, rental and motor trade. For the past three years, the government has spent R642 billion on infrastructure development and is planning to spend more than R827 billion over the next three years in order to improve export markets and reduce costs in the economy. Money will be spent to improve the energy sector and to double the generation of electricity, there will be improvements in terms of transport and logistics, hospitals and clinics as well as education which is investment in human capital (Lawisso, Rielander and Omilola, 2014).

Despite the accomplishments, South Africa's economic transformation remains incomplete. The little progress realised since 1994 is helping to lift the standard of living of citizens. An inequality in terms of income has affected social life and has grown into an open public debate. A complex social and economic challenge in South Africa has led to low equilibrium level, slow growth, persistent poverty and an increase in unemployment (World Bank, 2015).

Unemployment is one of the major problems faced by South Africa. It currently stands at 25% and is a major challenge for government considering the fact that it is one of the government's priority areas. The preoccupation of government is to eliminate poverty and reduce inequalities by 2030. This will be achieved through: investing in and improving infrastructure; providing support to industries such as mining, and agriculture; eliminating any constraints that can hinder growth in different sectors: and compel reforms to lesser the price of undertaking trade in the country (Nilas, 2002).

The two pressing challenges faced by South Africa are infrastructural bottlenecks and job creation, even though the two go together. Growth that needs to reduce unemployment requires progress in the area of infrastructure, especially electricity generation. Rigidities in labour constitute another problem that South Africa needs to fight against. The collective bargaining system ought to provide interest of the society rather than insiders, manufactured goods need to face contest which will result in the creation of fresh businesses both little and intermediate sized enterprises. These reforms will lead to lower prices which at the same time, will increase productivity. South Africa needs a capable economic manager who will

maintain prudent macroeconomic policies and initiate or provide an economic climate to be conducive enough for growth and job creation (Lipton, 2013).

Fedderke and Perkins (2006) emphasise the issues of unemployment and inequalities, which are the most salient economic problems in South Africa, and are the main reasons for crime in the country. This will in the long run hurt investment and growth as well as have negative effects on employment. Crime is considered to be most severe constraint on investment. South Africa, compared to other emerging markets, struggled in the recession that occurred in the 2000s but was able to recover through private and public consumption growth while export volumes and private investment are still to fully recover. Per capita GDP growth has proven to be mediocre even though there is improvement in growth by 1.6% a year from 1994 to 2009 and also by 2.2% from 2000 to 2009 compared to global growth of 3.1% over the same period.

Economic growth can be said to be a powerful tool for minimising poverty in a country. When there is increase and sustained economic growth, there is also an increase in the demand for labour, and when people receive wages this automatically reduces poverty in the society (Barro, 1990). Economic growth can thus be considered as the most essential tool for altering growing poverty and creating hopes for development in the society. Moreover, expenditure can assist in promoting economic growth and encouraging private investments.

In South Africa, the monetary and fiscal policies, (such as taxation, expenditure, and correction market failure), and the provision of a variety of public goods have become essential tools for economic growth. In addition, Keynesians maintain that public spending increases economic activities and also stands as an intrument to stabilise fluctuation in aggregate demand (Ju-Huang, 2006).

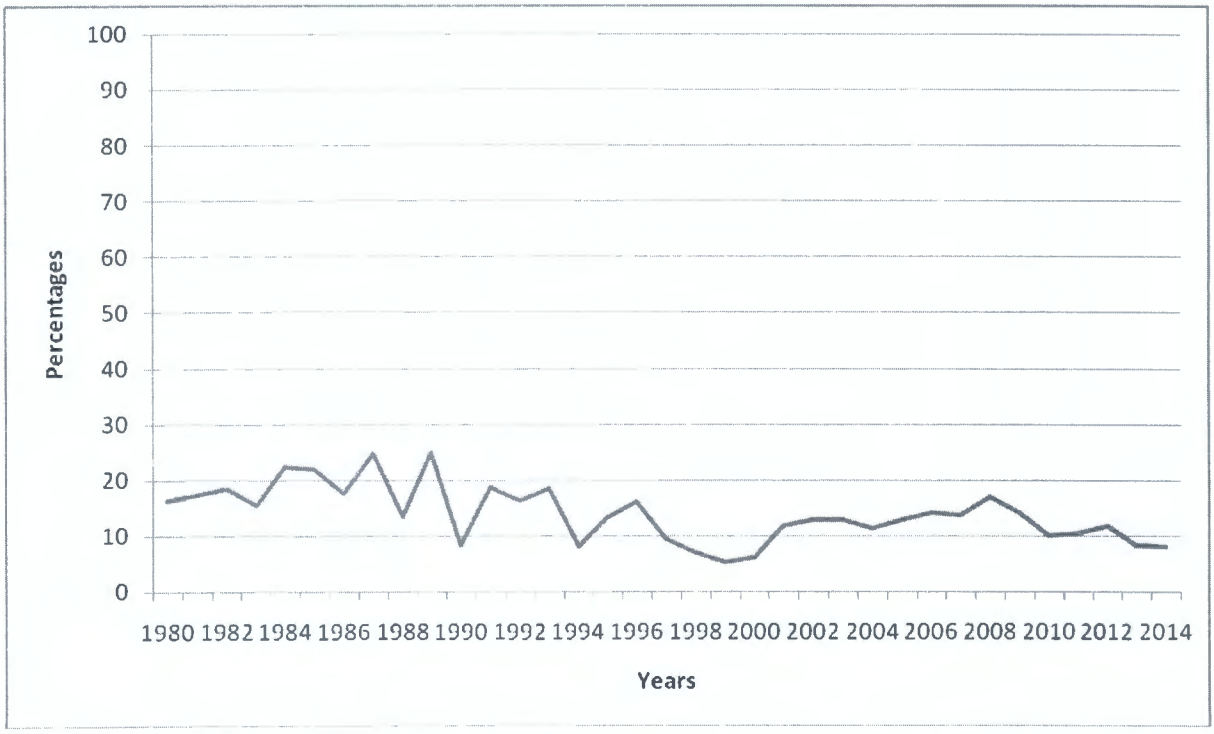
2.3 Government spending in South Africa

Government expenditure in South Africa includes administration, infrastructures, social amenities, security and defence, grants and aids and so forth, hence people depend on these for their sustenance. Therefore government expenditure can be explained as expenses of the government for its own maintenance as well as on the society and the economy as a whole. Government expenditure can be grouped into recurrent expenditure and capital expenditure. Recurrent expenditure can be termed the expenditure that occurs regularly throughout the

year in order for the functions of government to be maintained, while capital expenditures on the other hands are expenditures of government on the acquisition of things that are permanent in nature such as construction of roads, bridges and other permanent assets (Nwaeze, 2010).

South Africa has spent R642 billion on infrastructure development during the past three years and is still planning to spend more than R827 billion over the next three years so as to improve access to export market and also to reduce costs in the economy. Government is willing to improve the level of transport and logistics, hospital and clinics as well as education as stated in South Africa information business (South Africa Information, 2013).

Figure 2.1 Graphical representation of government spending in South Africa



According to the financial statistics of National Government Report, R1trillion has been spent by government in the 2012/ 13 fiscal year, which is almost double the R567 billion spent in 2007/2008. According to the report, increase in government spending over the last six years shows that spending was mostly driven by increased allocations from national government to provincial government. There was an increase from about R298 billion in 2007/08 to about R550 billion in 2012/13 of the total expenditure (South Africa Statistics).

The report of financial data from 40 government departments shows the impact of government spending on certain functions; for example spending on health, education, defence, salaries and wages provide a picture of what national government is spending money on and it also shows an indication of what government is spending on in South Africa. Other government expenditure, when classified by economic use includes social benefits which is 11% or R110 billion and also 10% or R105 billion as compensation of national government employees, R67 billion as the main contributors to compensation of employees and R17 billion for safety and defence.

The main factors that contribute to the enormous increase in government expenditure are, firstly, an increase in defence expenditure (which is one of the areas in which government spends huge amounts of money in order to protect the country from war). A country engaged in the production of costly war materials such as air-to-air missiles, jet planes, hydrogen bombs, tanks and submarines cost a huge amounts of money to the exchequer. This type of spending is going on in almost all countries of the world including South Africa (Economics Concept, 2015).

Another factor behind South Africa government expenditure is the expansion of government's function of improving the welfare of the citizens (social spending). Every government ought to spend money on the construction of roads, buildings and hospitals, hydroelectric projects and other public works programmes. A huge amount of money is also spent on the provision of education, housing facilities, public parks, libraries, museums, and medical aid, among others. However, government expenditure will increase faster due to an increase in population. Generally governments spend huge amounts of money to improve the standard of living of citizens especially people living in underdeveloped areas (Economics Concept, 2015).

An economy's growth rate is to a certain extent determined by the way in which capital, labour and other factors of production increase and the efficiency with which they are used. Economic growth is difficult in the sense that there are some subsidiary factors that influence these fundamental variables such as labour productivity, market structures, regulation and other microeconomic policies. South Africa experienced the worst period of economic growth after the Second World War. This declining growth rate can be attributed to trade and financial sanctions imposed on the apartheid government, political instability and

macroeconomic policy decisions that led to higher inflation, increased uncertainties and a reduction in investment (Faulkner and Loewald, 2008).

The key reasons behind economic growth in South Africa include actions of government to end armed conflicts, improvement of macroeconomic conditions and reforming of microeconomic in order to create a better business climate. Moreover, there was a reduction in average inflation rate from 22% in the 1990s to 8% after 2000 which made the economy grow healthier. There was also a reduction in foreign debt by one quarter and in budget deficits by two thirds. However, government has used different policies to strengthen the markets and this has allowed and opened up trade in favour of private enterprises. There has also been a reduction in corporate taxes which has energised both regulatory and legal systems. Lastly, there has been the provision of social infrastructure (Leke, Lund, Roxburgh and Wamelen, 2010).

South Africa's experiences in terms of economic growth over the past four decades have been enormous and varied. There have been periods of high growth and periods of stagnation. The achievement of productivity has also been varied, ranging from important improvements and sometimes, the performance has been poor. However, significant changes have been noticed in the economic structure and there have been policy – driven changes from both inward looking and outward looking economies (Leke, Lund, Roxburgh and Wamelen, 2010).

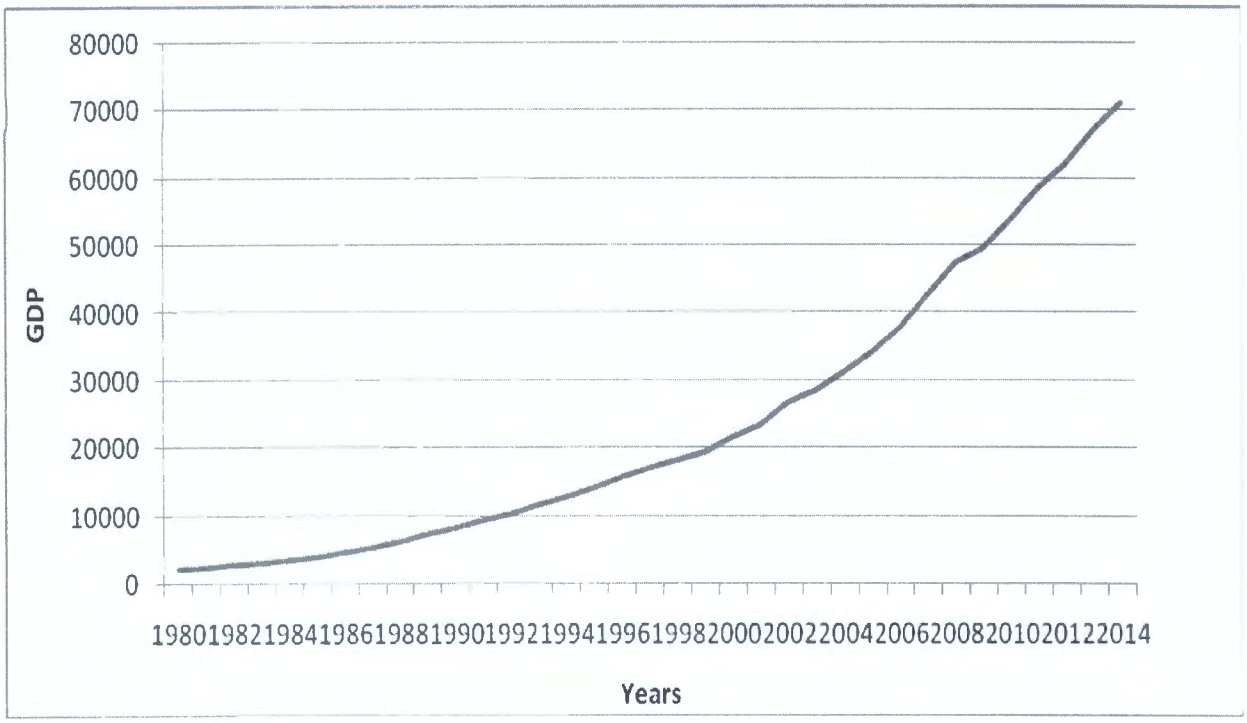
Political changes constitute another factor that has contributed to economic growth. It contributed to major changes in the labour market which was characterised by segmentation and discrimination. Some of the microeconomic challenges that prevent South Africa from improving sustainable economic growth include competitiveness, market structure and competition, productivity, tariff and pricing issues. In addition, rapid growth in productivity which can only be achieved through greater use of labour has actually slowed down economic growth in the country (Faulkner and Loewald, 2008).

2.4 Economic Growth in South Africa

According to Figure 2.1, GDP growth pace in South Africa amount to 3.09% from 1993 up to 2014, elevated to 7.60% in the fourth quarter of 1994 and a low affirmation of -6.10% in the first section of 2009. This development is confirmed by Statistics South Africa. South Africa is being commended as the second leading economy in Africa. Even though the

country is blessed with innate wealth and is a foremost nation in terms of the production of platinum, gold, chromium and iron, in recent years, the country has failed to address some structural problems. These problems include for instance, the widening gap between the rich and poor, a decrease in productivity, growing joblessness dwindling infrastructure, increasing fraudulence and misdemeanour. In view of these, growth has been sluggish and below Africa's average (Trading Economics, 2015).

Figure 2.2 Graphical representation of economic growth in South Africa



According to Global Forecast Growth, South Africa recorded global growth of 3.3% in 2013 and 4 % in 2014. Even though it has three- speed global recovery, there is still a need for full- speed recovery which means the country needs to be strong to have a balanced growth. South Africa has a challenge of avoiding the reduction of productive public investment and effective pro-poor spending (Lipton, 2013).

2.4.1 Reasons for Changes in Economic Growth

The recent recession during 1988 – 1993 was the longest period in South Africa history and this was as a result of a decline in investment by parastatals in 1985 and also as a result of

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lack of consumer and business confidence. For 30 years GDP in South Africa has been declining. Since 1965, unemployment has increased enormously; inequality between black and white is becoming wider, which may be as a result of the increase in population growing at about 2.6 percent every year. Despite government implementation of policies that are directly aimed at creating an environment conducive to growth, economic reform packages including fiscal prudence, trade reform and sector deregulation have been set as tools towards eradication of unemployment (Bhorat and Cassim, 2004).

In respective of recovery in 1986 - 1988, growth is being manipulated by political indecision and social turbulence. Growth has been progressively more unsteady in the economy. This however has affected the country asset. This has been seriously affected by the important sectors of the country; such as crop growing, mining and industrialisation. Investment in South Africa did not create more jobs and increase economic growth satisfactorily; this may be as a result that both investment and growth in the capital stock declined during the 1980s. Also it may be as a result of deterioration in the allocation of capital stock. There was a lower return on investment which is caused by inadequate acquisition of skills within the workforce (South Africa Inf., 2016)

There was a decline in economic growth in the late 1970s and the early 1980s. The decrease was not as a result of declining gold revenues but because of rising prices for oil imports and also an increase in international export commodities. Decline in growth in the 1980s actually led to an overall decline in the standard of living as population growth outpaced economic expansion and this led to a decline in GDP by more than 10 percent during the decade, and for the average individual real wealth was no higher than it was in 1970. South Africa was faced with foreign debt crisis in 1985 when a group of banks led by Chase Manhattan, withdrew a substantial amount of money on credit lines. As a result of this incidence the value of the Rand dropped precipitously and this made the government close down the financial and foreign exchange markets (South Africa).

After the Second World War, South Africa experienced the worst decline of economic growth. The causes of this slow growth could be attributed to trade and financial sanctions in opposition to the apartheid government, political instability and macroeconomic policy decisions that caused higher inflation, increase in uncertainty as well as a decrease in investment (Faulkner and Christopher, 2008).

2.4.2 The Measures used by Government to Improve Economic Growth

Though the country is faced with a deep recession, things can still be improved. GDP could still be raised with investment. Few new investments will be needed to a substantial part of the transport and communication system. Moreover, the country foreign debt- to- GDP is stumpy which means if the alien business is protected higher venture can be easily financed by outside sources. This means however that if the public organisation dissaving can be guarded and output increases the country could provide further and the growth can be increased within a sustainable period of time (South Africa Statistics, 2016).

There is need for private sector revival for higher growth in South Africa. This will increase employment and reduce income differentials between blacks and whites. This will also redress massive inequality and people will have access to public services and facilities and this will help people to have access to land ownership. There is also need for redistribution which may be through diversion of public expenditure towards investment activities that benefit the deprived and that have a important quantity of the common expenditure that can be cleared in a few years without violation imperative macroeconomic constraints (Fallon with Luiz, 1994).

According to section A of government promoting economic, the presidency aims to improve economic growth so as to create a better life for all by investing in community services and human development and also providing a progressive social security. Also, there is need to improve the capacity and effectiveness of the state and this includes fighting against crime and promotion of service-oriented public administration, and building regional and international partnerships for growth and development. In order to improve and support sustainable growth, government has decided to reduce currency volatility and to ensure efficiency in public spending to improve budgeting and to have effective planning as well as removing obstacles to public and private investment (Statistics South Africa, 2015).

2.5 Consequences of Government Spending on the Economy

There are some government spending, especially expenses on community goods,' that smooth the progress of the market economy. Private contracts for example need to be facilitated by a well-functioning legal system. Other types of government expenses however have a minor impact on economic activity. For instance, government programmes; if spending on government programmes does not facilitate economic activity, then the impact of spending on such programmes will be negative because there will be limited benefits to outweigh the costs. Also, if such programmes undermine work, saving and investment, or such programmes encourages misallocation of resources, and then the overall adverse impact on economic growth will be useless. A good example of this is the recent event of federal flood insurance. The amount spent on the program, apart from requiring wealth to be taxed or involving borrowing from the industrious segment, it also led to deluge zones which eventually led to the devastation of affluence during likely problems.

There are many consequences of government spending. One of them is 'resources displacement' which has been explained above when government spend money by using labour and capital and these resources are no longer available for private sector uses. Another consequence is 'financing cost'. This levy not only affect the industrious organisation but government also raises money from people through tax method which discourages people from working, saving and also investing. More so, if government spending is through debt, it moves money out of the private credit market (Mitchell, 2015).

Also, there are some particular programs renderers by the government that put off good behaviour from the economy. For examples, there are many government programs that discourage people from saving while other programs make people redundant. Education is being measured as open goods hence there is substantial proof that the way of rendering such open goods is unproductive because of the very low amount of educational achievement per dollar spent.

According to Mitchell (2015) the coefficient of the additive terms of the government-size variable indicates that a 1% increase in government size decreases the rate of economic growth by 0.143%. A study in public choice reported that "one percent increase in government spending as a percent of GDP (say 30 to 31%) would raise the unemployment rate by approximately 36 of one percent (say,8 to 8.36 percent)".

2.6 Conclusion

This chapter explained the overview of the economy in South Africa by looking at the contribution of government spending and its impacts on economic growth. The chapter explained the reason for changes in economic growth and the measure used by government to improve the decline in economic growth in South Africa. From the trend analysis government expenditure and economic growth during the period of study indicates that an increase in government spending mostly affect the tax payers because it always increase taxes this makes expenditure to be more procyclical in nature. Also this section analysed the consequences of government overspending in South Africa.

CHAPTER THREE

THEORETICAL AND EMPIRICAL LITERATURE REVIEW

3.1 Introduction

Many researches have been carried out on the relation between government expenditure and economic growth both in developed and developing countries like South Africa. This chapter presents the theoretical framework and empirical literature. The theoretical framework explains the relevant theories applicable to the study such as Solow's growth theory, Keynesian, Neoclassical, Endogenous, Musgrave theory of public expenditure growth and Wagner's theory. On the other hand, the empirical review focuses on studies conducted by other researchers on issues of economic growth and government expenditure in developed and developing countries.

3.2 Theoretical Framework

This presents the theoretical framework of the relevant theories applicable to the study a review of studies conducted by other researchers to support the effect of government expenditure on economic growth.

3.2.1 Musgrave's Theory of Public Expenditure Growth

This theory was first introduced by Musgrave who emphasised that a low level of per capita income leads to a decrease in the demand for public services. According to observations and findings, when per capita income is concentrated on primary needs and per capita income rises above the level of low income, the demand for health, education and transport supplied by the public sector will start to rise and these will force government to spend more (Verbeck, 2000).

According to Paternostro (2007) there is no consensus in theoretical literature on the role of public spending on growth. Many studies that have been carried out on the connection between public expenditure and economic development. Niloy (2002) and Sutherland (2009) point out the effects of positive growth on public expenditure while Schaltegger and Torgler (2006) argued that large government spending is detrimental to economic growth in

developed countries. However, areas to allocate public expenditure that are more likely to contribute to growth need to be empirically established

3.2.2 Wagner's theory

According to Odhiambo (2013) Wagner's theory, also referred to as the law of increasing in government spending "is an increase in national income to aggravate government expenditure. In other words, an increase in the economy as a result of industrialisation will enhance the share of government in total expenditure and it will increase political pressure for social progress which in the long run increases allowance for social consideration in the behaviour of industry. However, this can be attainable as a result of an increase in administrative functions in the state," spending more on welfare services, and also an increase in social function of the state. Wagner's law, however, concludes that government expenditure depends on national income flow which will result in the expansion of the public sector.

3.2.3 Keynesian theory

Among all economists who discuss the relationship between government expenditure and economic growth, Keynesian is the most remarkable. According to the Keynesian theory, government expenditure is regarded as a factor which can serve as a policy tool to be used to promote economic growth. From the Keynesian point of view, public expenditure can contribute immensely to economic growth and in the long run, lead to an increase in the level of employment, profitability and investment (Chude and Izuchukwu, 2013). The theory also suggests that an increase in government expenditure leads to an increase in economic growth. The implication is that an increase in government spending automatically leads to production elevation which in the long run increases aggregate demand which leads to an increase in GDP of a country. According to the Keynesian model, if there is an increase in demand, business concerns will produce more merchandise and services which in the long run, will lead to a substantial increase in GDP compare to enhancement in government spending. Boosting in budgetary spending increases demand and production within sectors that do not have any direct contact with public demand (Alshahrani and Alsadiq, 2014).

The Keynesian theory emphasises that economic can be improved if government borrow from private organisation and use the various spending programmes to pay back to them. Keynesian asserted government deficit spending could bring about short-term stimulus to bring an end to recession or depression. Moreover, Keynes argued that policymakers should help to reduce government spending once the economy is recovered so as to prevent inflation which they believe may lead to too much economic growth. Though Keynesian economics dominated public policy from 1930-1970 the theory has since fallen out of favour (Chude and Izuchukwu, 2013).

Harrod-Domar maintains that the net investment spending is an addition to the stock of capital and an increase in economic productivity which later increases its potential level of income. He emphasises that changes in productivity depend on the level of investment, as well as potential social average of new investment (Stanley and Randy, 2010). The Keynesian model on consumption is assumed to be stable in relation to this. It therefore assumes that expenditures are growing in anticipation of expanding income. However, investment spending is an essential source to increase aggregate demand from one period to the other.

Keynesian IS LM model also supports how government can use its spending activities to boost the level of interest rates and economic output. The IS symbolises the good market stability and LM is the Keynesian money market balance. However, when IS and LM combine together, it shows the stability stage of productivity and also interest rates in the country economy and this reveals the impact of government contribution on productivity as well as interest rate. This however shows that increase in government spending will elevate earnings and interest rate since increase in expenses by the government will compete with the private organisations as a result of limited loans in the money market (Chipaumire *et al.*, 2014).

3.2.4 Classical Economists' Hypothesis

The argument of classical economists such as Adam Smith (1990) were based on the assumption that the economy should be left to itself, then it would lead to full employment whereby people who wants to work are able to find work (Froyen, 2008). The classical economists believe that government plays no major role other than the provision of peace and security for investment in the country and that there is no long run relationship between government spending and economic growth. The classical economists' view is the opposite

of the Keynesian hypothesis. The classical view is on the argument that increased government spending will not lead to an increase in the national output. Government increased spending is seen as the destabilizing force in the development of the economy instead of the driving force of economic growth as Keynesian economists have argued. According to classical economists government intervention in the economy can lead to a serious problem which may lead to stifle growth and cause less output. According to classical economists an increase in government expenditure would not affect employment or the price level except it is financed by money creation and thus changes in the monetary policy. This is because an increase in spending while money supply is fixed will compete with private sector in the money market and hence increase interest rates. However, higher interest rates discourage private investment and this in the long run affects public investments. Therefore the classical view believes that increase in government spending will however not lead to increase in income but rather substitute private business investment with public programmes if the money supply remains fixed (Froyen, 2008).

3.2.5 Solow's growth theory

According to the Solow model, the important economic growth determinants are; saving and population growth rate. When there is an increase in saving or investment, this will generate more capital per worker which in the long run, will increase output per worker. However, a high population growth rate affects economic growth in that higher fractions of saving in economies will be depreciated with high population (Verbeck, 2000).

The Solow's theory was first introduced in 1956 by Robert Solow. Unlike the Harrod-Domar theory which emphasises that economic growth path is unstable. Solow's theory supports the neoclassical view that the economy can be adjusted in order to maintain stable equilibrium growth. Solow's theory analyses the aggregate production function in which technology is constant and where total output relies on capital stock as well as labour input (Stanley and Randy, 2010).

3.2.6 Endogenous growth theory

According to Verbeck (2000) endogenous theory is based on the determinant of technology improvement and that it can be attainable by what people do which means it depends on the creation of new ideas instead of assuming it to be exogenous. Economic growth can mostly

be achieved through technological progress such as investment, capital stock and also human capital stock which will enhance economic organisation to utilize its productive resources more effectively and the ability to use these newly created facilities in a more productive ways comes from learning processing. There is need for the government to invest in technology relevant to the domestic economy. Endogeneous theory was popularised in 1980s and the theory help to explain the economic benefits of industrialized countries versus non-indutrialised countries. Endogeneous explains the long-term development speed of an economy on the basis of endogenous factors as against exogenous factors of the neoclassical growth theory.

However, this theory has some policy implications that are very important such as the measured contribution of both physical and human capital to growth which may be larger than suggested by the Solow residual model. Also, investment on both the education and enlargement of a firm has not only had good impact on the firm itself but also on the country as a whole. Another policy implication is that endogenous growth theory is not compulsory that economies must increase returns to scale before it can get to a stable stage of income growth as Solow-Swan model suggested. Moreover, when countries have more inputs on research and development this will enhance faster rate of economic growth (Chand, 2015).

3.2.7 Neo-classical theory

Neo-classical economists believe that activist fiscal policy is not important to increase employment and production. Government expenditure is found to be consumptive and that it can lead to crowd out of private investment if financed with public debt. According to this theory, three things are required for effective growth; increase in labour supply, capital stock and increase in productivity. Increase in labour supply will enhance larger output and this can be generated if many people are involved in a country's production either through immigration or people who are not part of the labour force but who are forced to work. As far as capital is concerned both physical and human capital enhances productivity and provides valuable services. Human capital is seen to be more productive because those with skill can be more effective than those without skills. An increase in productivity is a rise in output which cannot be related to input and which can be affected by a number of factors (Joberg, 2003).

3.3 Empirical Literature

3.3.1 Empirical review in developed countries

Economic theory does not actually agree with the conclusion that the impacts of government spending encourage economic performance. Most economists would agree with the opinion that there are circumstances where lower levels of government spending will actually increase economic growth and that there are also other circumstances whereby an increase in government spending will be necessary. However, if there is no government spending at all, then, presumably there will be little economic growth. The reason behind this is that there will be no contracts and the protection of property. Moreover, developing infrastructure will be very problematic when there is no government spending at all. This is an indication that government spending cannot be an oversight because it is important for the necessary operation of the rule of law (Alshahrani and Alsadiq, 2014).

In addition, other economists will agree that at some point, government spending can become burdensome because it might become cumbersome or misappropriated. In that case, government spending will exceed profit. Government spending requires a lot and the spending of money must first be extracted from someone. The challenge is that the option where government extracts money indirectly has adverse consequences on people, especially in the United States (US) where the tax system imposes high tax rates on work, savings, investments and some other productive behaviour, borrowing becomes so difficult for private investment and in some cases, the high interest rates discourage investments (Mitchell, 2005).

After using panel data for 14 developed countries from 1970 to 1990, Devarajan, Swaroop and Zou (1996) obtained results of some functional types of expenditure such as health, education and transport. Explanatory variables revealed that results for health, transport as well as communication had a significant positive effects while education and defence on the other hand, had negative effects on economic growth.

Mitchell (2005) argues that in the United States, government spending actually displaces private sector activities. This is caused by the fact that every dollar that is spent by government means one less dollar in the economy of the productive sector. Moreover the

money spent is dictates by political forces. And also, government fails to use the resources efficiently which in the long run results in less economic output.

Bleany *et al.*, (2001) carried out research on the impact of government spending on economic growth using OLS and GLS methods and came out with the results that productive public expenditure increases economic growth while non-productive public expenditure does not. And this goes along with the prediction by Barro (1990).

Another empirical evidence provided by Gemmell and Kneller (2001) on the effect of fiscal policy on long-run for European economy indicated that public investment spending has great positive impacts on economic growth while expenditure on consumption and social security have no significant impact.

Jiranyakul and Brahmasrene (2007) conducted a study on the economy of Thailand using Granger causality test. In their findings, it was concluded that government spending and economic growth are not cointegrated but that there are undimensional relationships. Furthermore, Schltegger and Torgler (2006) conducted a study on the effects of public expenditure at state and local level in Switzerland and identified that most studies focused on aggregate public expenditure. Their study covered the period from 1981 to 2001 and their findings revealed a negative correlation between government spending and economic development.

Recently, UK experienced low standards of living due to high population growth. The current recovery experienced in the economy of the UK has been a concern compared to the level of population growth. This has adversely affected economic growth and the type of jobs created by the UK or which the government intends to create as low paying jobs in the services sector (Craig, 2014).

In the US, government spending plays a negative role in financing harmful intervention and this has a negative effect on economic activities. Government spending encourages destructive choices. Most government programmes are termed to be undesirable decisions. For instance, the welfare programme allows people to be unproductive, and people prefer leisure to hard work. Unemployment programmes make people reluctant to work. All these government programmes reduce economic growth and in the long run, decrease national

output since all give room for the misallocation or underutilisation of resources (Mitchell, 2005).

In addition, government spending in US discourages productivity. This is because all government programmes have restricted people from struggling for their living since government programmes discourage saving which will enable people to provide money for asset. All these have a negative impact on the economy because of eligibility rules that motivate people to depress their incomes and misuse wealth (Mitchell, 2005).

The US government spending also changed resources allocation, and prices in a competitive market are determined by buyers and sellers. This disallows the essential role of competitive markets which cause inadequacy in sectors like health care and education. In conclusion, government excessive spending is regarded as a less useful way to distribute services. Services provided by government such as education, airports and postal operations can as well be delivered by the private sector even at lower cost (Mitchell, 2005).

3.3.2 Empirical review in developing countries

Many studies based on the relationship between economic growth and government expenditure in developing countries show that results from developing and developed countries vary from one country to another. According to Alexander (1990) using the OLS method for the period 1959 to 1984 revealed that from a sample of 13 countries, government expenditure has important positive impacts on economic growth. A study by Moalusi (2004) based on heterogeneous panel data examined the relationship between government spending and economic growth and revealed that huge government spending can lead to higher economic growth.

Olorunfemi (2008) examined the direction and strength of the relationship between public investment and economic growth in Nigeria and concluded that expenditures have positive impacts on economic growth. Using time series data from 1975 to 2004, the study also emphasised that there is no relationship between gross fixed capital formation and GDP. Important information from the report is that only 37.1% is apportioned for capital expenditures while the remaining 62.9% is for current expenditures.

Olapade and Olepade (2010) ascertained the influence of monetary policies on economic growth and development and concluded that there is no significant relationship between most of the components of expenditure and economic growth. An investigation of the relationship between government expenditure and economic growth conducted by Abu and Abdullah (2010) between 1970 and 2008 in Nigeria found that government total capital expenditures, total recurrent expenditure and education have negative effects on economic growth. On the other hand government expenditure on transport, communication and health reveals that there is increase in economic growth. Therefore, government needs to improve spending on capital spending, recurrent spending such as expenditure on schooling and ensure that money allocated for the development of these sectors are directly utilised and that government should fight corruption in public offices in Nigeria by spending more on anti-corruption agencies.

Mo (2007) after studying 138 countries using the data compiled by Barro and Lee (1994), concluded that government expenditure affects economic growth via three channels; factors of productivity, the investment as well as aggregate demand. Bose et al (2007), who carried out the long-run test on the relationship and causality between government expenditure and economic growth in a panel of 30 developing countries, concluded that capital government spending has a positive influence on economic development while current spending is statistically unimportant.

Empirical studies suggested by Wagner's law may work for developed countries and against developing countries. However, other studies suggest that government spending may have a positive impact on economic growth if the expenditure is invested in infrastructure, but on the other hand, if invested in government consumption, it may, however, have a negative effect. [(Wu, 2010) using pooled time series and cross section data for the period 1970-1990 for 33 countries]. Ghura (1995) found a negative relationship between government expenditures and economic growth in the sense that huge amounts of government spending negatively affect growth.

According to Baro (1991), in his investigation of 98 countries for the period 1960 to 1985, concluded that economic growth and government consumption is negative and significant. Jong-Wha (1995) concluded that there is relationship between economic growth and government expenditures. Using an endogenous growth model of an economy, it was discovered that government consumption was accompanied with lower growth, Grier and

Tullock (1989) empirically investigated 113 countries using cross – section time series data and concluded that government consumption is negatively associated with economic growth.

Another researcher, Faris (2002), uses a multivariate cointegration test of Johansen on public expenditure aggregated as well as disaggregated data. The findings show that there are relationships between national income and total spending and also capital spending and current spending. Kolluri *et al.*, (2000) examined the relationship between government expenditure and economic growth in the sense of Wagner and concluded that it satisfied 67 countries within the stipulated period of 1960-1993. Moreover, Chang (2002) concluded that Wagner's law is accepted in all countries with the exception of Thailand.

Biswal *et al.*, (1991) tested both Wagner's law and the Keynesian hypothesis in Canada by using both aggregated and disaggregated data on government expenditure. When carried out, the research using aggregate data showed the Engle-Granger cointegration test agreed with both Wagner's law and the Keynesian hypothesis. However, current expenditure on goods and services has long-run equilibrium on economic growth (Mulamba, 2009).

The idea shared by most economists and political scientists to discover if there exists a correlation between economic growth and government expenditure was tested by Abisadeh and Yonsefi (1998). It was however argued by Abisadeh and Yonsefi that government expenditure is an important macroeconomic variable in developing countries and has great impact on national economic resources and also has an influence on economic performance.

Contrary to the negative findings by some researchers, a growing body of literature suggest that appropriate implementation of policies growing productive activities and eliminating or reducing unproductive ones can redress the balance of expenditure and economic growth. Alexiou (2007) disagrees with the findings that there is a positive relationship between economic growth and government spending including GDP growth. Aschauer (1990) concurs a positive and important relationship is necessary between government spending and economic growth.

Despite the crowding–out literature on the important effects of public investment on growth, social programmes have been neglected with the exception of education. The implication is that most studies conducted have focused essentially on education as a significant impact of growth and its impact on human capital (Barro, 1995).

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In Syria, government expenditure on economic growth has been analysed using two different theories in macroeconomics to understand the effect of government spending on the business cycle. The Keynesian model shows how an increase in government expenditure affects economic growth. It also shows that government spending increases demand and boosts production, the demand for labour and real income as a result of the inflexibility of prices of goods. Moreover, when there is an increase in government spending, there will be more money in circulation which on the other hand motivates firms to increase production (Ludger and Andreas, 2003). However, according to the neoclassical theory, an excessive government spending reduces consumption through the effect of negative wealth, which goes with the supply of labour, hence produces an increase in output and employment while lowering wages (Bouakez and Rabei, 2007)

3.4 Conclusion

This chapter discussed both the theoretical and empirical part of this study. The theoretical explained some theories which related to this study such as Keynesian theory who regarded government expenditure as a policy tool to promote economic growth. However, with all the arguments from various theories, Keynesian is considered to be the most suitable for this research in the sense that it is of the opinion that government expenditure is regarded as an instrument to be used to advance economic expansion. The theory also supports how government can use its spending activities to boost the level of interest rates and economic output in the economy.

The empirical study was carried out as well which explained the research carried out by other researchers both in developed and developing countries such as Mitchell (2005), Alshahrami and Alsadiq (2014), Bleany *et al.*, (2001) and Jiranyakul and Brahmasrene (2007). According to the empirical study carried out by Biswal *et al.*, (1991) which agreed on both the Wagner's law and Keynesian hypothesis that expenditure plays an immensely role on economic growth. However, in this study Keynesian theory is adopted. Reason being that the theory emphasised on the important of government expenditure on economic growth.

CHAPTER FOUR

METHODOLOGY

4.1 Introduction

This chapter explained the research methodology used in this study which is sub-divided into three sections as follows: The first section presents the data, the model specification and a description of the model used in the study. The second section provides a definition of the various variables used in the study and the third section explains the test techniques used in this study in order to examine the relationship between government expenditure and economic growth in South Africa.

4.2 Theoretical Model

The way through which expenditure affects economic growth depends on the size of total expenditure that is allocated to economic and social development projects in the economy. This study is build upon existing literature in the framework of the Keynesian theory. From the Keynesian point of view, public expenditure can contribute immensely to economic growth and in the long run boost the level of employment, profitability and also investment in the country.

In examing the impact of government expenditure, money supply and investment on economic growth, the studies adopt the above theoretical model and modify it by employing the Vector Error Correction Model (VECM). According to the economic theory, the relationship of government spending may be positive or negative on economic growth while some empirical studies which have included money supply provide a negative relationship between money supply and economic growth. Real GDP, used as a proxy for economic growth, is the dependent variable of this study, while government expenditure, investment and money supply are the independent variables. This study examines dynamics of the relationship between economic growth and government expenditure in South Africa from 1980 to 2014 using annual data obtained from the website of the South Africa Reserve Bank (SARB). All variables, with the exception of those already expressed as percentages, such as government expenditure, were transformed into their normal logarithms so as to avoid the obvious problems of heteroscedasticity. According to Peter (2013), it is *important to*

transform variables into logarithms in order to render them more meaningful. Another reason is to provide a simple interpretation in terms of multiplicative for the regression coefficient (for instance, percent). Gelman and Hill (2007) argue that it prevents a few observations from being extremely influential. Lastly, it is also helpful because coefficients on the natural log scale are directly interpretable as approximates of proportional differences.

The model to be estimated will be written as follows:

RGDP = f (investment, money supply, government expenditure)

Which is further converted to a linear expression as follows:

$$RGDP_t = \beta_o - \beta_1 Inv_t - \beta_2 MS_t + \beta_3 Gexp_t + u_t \quad (3.1)$$

where:

RGDP = gross domestic product

MS = money supply

Gexp = government expenditure

Invt = investment

u_t = white noise error term.

4.3 Definition of Variables and Expected Sign

The two major variables used in this research are: economic RGDP and real government expenditure. Economic growth can be defined as a positive change in the output or production of a country or an economy. However, economic growth can be calculated as a percentage increase in the GDP of a given economy. However, the unit of measurement for this GDP is current prices. An increase in company profits will translate into an increase in tax collection for the government and this in the long run, will reduce the level of unemployment and increase prospects for a better economy (WiseGEEK, 2015).

On the other hand, government expenditure can be described as the money spent by government. WiseGeek (2015) maintains that expenditures take place at every level of government, from local to federal organisations. It includes the purchase and provision of goods and services, investment and money transfers. However, for the purpose of this study, total government expenditures were utilised with 1 term % change as a unit of measurement. Much of government expenditure is involved in the creation of goods and services because not all basic needs can be met by the private sector; these includes defense, roads and bridges. Government also provides some merit goods like hospital and schools, wellbeing payments and provision of employment and others assistance. For instance, government spends money on education and also training in order to advance labour efficiency. Government spending help to diminish the harmful effects of externalities like contamination controls. In addition, government spends money so as to redistribute income and also to achieve more equity. Some goods and services may not be produced at all by private sectors while some that are produced may not be affordable to all citizens. Mostly, government expenditure is financed through different methods. Most often, government uses taxes to fund programmes and expenditures, sometimes it may borrow based on future projected budgets in order to fund programmes. Furthermore, government expenditure has a positive significance on economic growth in the sense that it creates employment for the people, especially when done on investment. This notion is supported by the Keynesian theory which postulates that an increase in government expenditure elevates aggregate demand and increases consumption which in the long run increases production and faster recovery from recessions (WiseGEEK, 2015).

Investment can be described as increasing in capital spending, for example, purchasing new machines or building bigger factories. Investment is a component of Aggregate Demand (AD) therefore; an increase in investment will boost Aggregate Demand and in the long run increase economic growth. Moreover, an increase in AD may breed inflation if the economy is close to full capacity instead of an increase in real GDP. Moreover, an increase in investment may increase the productive capacity of the economy. For example, investment in skill and education in the long run will increase labour productivity and investment in new technology as well as capital will boost productive capacity of the economy and this can increase growth without inflation (Pettinger, 2008). Hassett (2008) describes investment as the most important variable in economics. It can also be regarded as the production of goods that can be used to produce other goods. It has a positive impact on economic growth because

more investment in business can create more jobs for the people and can lead to national economic growth. Investment may not always take the form of privately-owned physical product; it may be in the form of human capital as well. However, the investment use for this study can be regarded as others investment. Most importantly, Hassett (2008) argues that government investment may be geared towards the construction of a bridge or roads which in the long run, leads to economic growth. This type of investment could be achieved either through savings or borrowing from neighbouring countries. However, the challenge is that in most cases, a country that bases its finances on borrowing could find out that there might be little capital to finance future consumption.

Money is primarily defined as a medium of exchange or means of exchange. According to Walker (2011) 'Money is as money does'. This simply means that money can be anything which performs the functions of money such as medium of exchange, measure of value, unit of account and so on. Money supply helps to provide crucial information about the near-term course for the economy and also to measure the level of prices and inflation (Singh, 2011). The money supply used for this study is M2 and the money data used is based on monetary aggregates. However, M2 is chosen among others monetary aggregates because M2 provides saving that can easily be converted to M1 and is also considered by many as the best measure of liquid spendable property Moreover M2 serves as a better quantity of total money for the economy than M1 and to crown it all, government stabilisation policies focus more on M2 rather than M1. An increase in money supply causes lower interest rates, which spurs investment and when there is too much money in the hands of consumers; it makes them feel wealthier and increases spending. This, however, will stimulate business activities and the demand for labour. It will also increase the demand for capital goods. Moreover, if the expansion of money persists, it will lead to inflation and a decline in purchasing power. M2 constitutes money market deposits which mostly held by households for saving. It also constitutes repurchase union and Eurodollars that bank and businesses exploit for short-term storage of funds (Schwartz, 2008).

4.4 Research method

The Vector Error Correction Model (VECM) was used in the study. This approach comprises stationarity tests, cointegration tests, diagnostic and stability tests. The Impulse Response Function (IRF) was also generated to explain the response to shock among the variables. In

order to test for the order of integration of variables, the Augmented Dickey Fuller (ADF), the Phillips Perron (PP) and the Ng Perron (NP) unit root tests were used.

4.4.1. Visual inspection

A visual inspection of the available graph is reported in Figures 4.1 to 4.12 for in-depth results of unit root to know if the variables are stationary or not.

4.4.2. Unit root test

Testing for stationarity of all variables used in this study was determined through unit root testing. Virmani (2014) maintains that it can also be referred to as a statistical test for proposition in an autoregressive statistical model of a time series where the autoregressive parameter is one. These tests determine whether a given time series is consistent with a unit root process and can be introduced by considering the following model:

$$Y_t = Y_{t-1} + u_t \qquad (3.2)$$

where u_t is the stochastic error term. Unit root testing is essential in the sense that it examines whether a time series is stationary or not. It also helps to determine whether the disturbance term of cointegration has a unit root or not.

It is used to decide if trending data should be first differenced or regressed on deterministic functions of time to make the data fixed. Economic theory constantly suggests the reality of long run stability relationship among nonstationary time series variables. However, cointegration techniques can be used to model these long run relation if the variables are I(1); if not, there will be the need for pre- testing for unit roots and this will be the first step in cointegration modeling (Ng and Perron, 2001).

According to Kungl (2003), a stationary occurs when its mean, variance and auto covariance continue the same whatever way they assume. For a fixed process, the pace of mean reversion is based on the autocovariances. The reason for testing time series for stationarity is because in time series analysis, nonstationarity may cause spurious regression except if there is at least the existence of one cointegrating relationship. Therefore, a unit root test is carried out so as to keep away from generating counterfeit regression results in this study. The decision rule considered for these tests is that if the test statistics is smaller than the critical

value, then the null hypothesis (Ho) of nonstationarity is rejected and if otherwise, the alternative hypothesis (H1) is accepted and the level of significance is 0.05 (Caner and Kilian, 2001).

As indicated earlier, the following unit root tests are employed in the study:

4.4.2.1 The Augmented Dickey – Fuller test

According to Caner and Kilian (2001), the ADF test is used to test for the existence of a unit root in a time series sample and the ADF test statistics used in the test must be a negative number. It is carried out to help decide whether a time series is stationary or not. The more negative it is, the stronger the rejection of the hypothesis (that there is a unit root at some level of confidence).

Furthermore, the ADF test adjusts the Dickey Fuller (DF) test in order to take care of possible serial correlation in the error terms by adding the lagged difference terms of the regressand. DF test is important in the sense that the error terms $(U)_t$ are interdependently and identically distributed. It is also useful to test the null hypothesis that a time series y_t is 1(1) against the alternative that it is I (1). Using the ADF test, there is stationarity when the test statistics is smaller than critical values, thereby the null hypothesis of the presence of nonstationarity is rejected otherwise, the null hypothesis is accepted.

The ADF test is given by the following equation:

$$\Delta Y_t = a_0 + yY_{t-1} + a_2 t + \sum_{i=1}^{p} \beta_i \Delta Y_{t-1} + u_t \qquad (3.3)$$

And the test is performed in three different ways as follows:

Regression with constant:

$$\Delta Y_t = \alpha + \delta Y_{t-1} + u_t \qquad (3.4)$$

Regression with constant and time trend:

$$\Delta Y_t = \alpha + \beta T + \delta Y_{t-1} + u_t \qquad (3.5)$$

Regression without constant and time trend:

$$\Delta Y_t = \delta Y_{t-1} + u_t \qquad (3.6)$$

(Caner and Killian).

4.4.2.2 The Phillips- Perron test

The test is named after Phillips and Perron (PP) it is also a unit root test used in time series analysis to test for the null hypothesis that a time series is integrated in the order of (1). It has developed a more comprehensive theory in the sense that even though it is related to the ADF test, it incorporates a mechanical adjustment to the DF technique to give room to autocorrelated residuals. Chingunu and Fu-Shuen (2004) conducted a study to demonstrate that PP test is more comprehensive in the sense that it is more robust to the general form of heteroscedasticity in the error term v_t. The test also makes a non- parametric correction to the t – test statistics. Similarly, it uses the existence of a unit root as the null hypothesis. One of the important features of this test is that it helps to adjust the test statistics to account for serial correlation. This is achieved by using the nonparametric statistical ways to make use of the serial connection in the error term without adding any lagged difference terms. Though the test statistics is complex, the calculations are the same as those of ADF test (Lee, 2004).

The main objective of the test is to test the null hypothesis that $\varphi = 1$ in:

$$Y_t = \varphi Y_{t-1} + U_t \qquad (3.7)$$

Where:

H_0: Series contains a unit root

Vs

H_1: Series is stationary

are used and the following regression can also be applied:

$$\Delta Y_t = \Psi Y_{t-1} + U_t \qquad (3.8)$$

If the unit root test is non stationary, the null hypothesis which states the existence of unit root cannot be rejected. This is an indication that the variables are nonstationary. On the other hand, if all the variables or a variable is stationary, the null hypothesis will be rejected.

4.4.2.3 Ng and Perron (NP) unit root test

"Ng and Perron (2001) emphasised that the estimation of the long run variance λ^2 has important implications for the finite sample behaviour of the Elliott, Rothenberg and Stock (ERS) (1996) point optimal test and the efficient modified PP test." Ng and Perron point out that an autoregressive estimate of λ^2 should be used to achieve astable finite sample size. Ng and Perron also stress that good size and power properties of the entire efficient unit root test rely on the proper choice of the lag length P used for specifying the regression test. However, in order to conclude stationarity under Ng Perron test, it involves the same rule as applicable to ADF and PP. The existence of unit root is rejected if the test statistics is smaller than the critical value and on the other hand, the null hypothesis of the existence of unit root is accepted if the test statistics is greater than the critical values, which means there is the existence of nonstationarity among variables (Lee, 2004).

4.4.2.4 Lag length selection criteria

There are information criteria such as Akaike (AIC), Schwarz (SC), Hannah-Quinn (HQ) Sequential modified LR test statistic (LR), Final prediction error (FPE). Information criteria are the initial measures that can be adopted when selecting the appropriate 'Lag Length' in a time series. AIC can be found to be more appropriate especially when observations are less than 60. In this study AIC was chosen to be an appropriate lag length (Ozcicek and McMillin, 2015).

4.4.3 Cointegration analysis

Chipanmire *et al.*, (2014) point out that the concept of cointegration is based on the premise that although two time series are individually nonstationary, their linear combination can be stationary. Cointegration analysis serves as a solution to the problem of the presence of nonstationary data in order to avoid problems associated with spurious regression. Long run correlation exists when there is conitegration of two or more time series. If for example, the two variables are tested and there is a long term equilibrium relationship between the two, in the short-run there may be disequilibrium. Therefore, one can treat the error term as the "equilibrium error" (Sjo, 2008).

The two common methods that can be used to test for cointegration are: the Engle Granger approach; and the Johansen approach. The later was employed in this study. The Johansen method builds directly on maximum likelihood estimation instead of partly on least squares. This method permits more than one cointegrating relationship if the data set involves two or more time series. The test is considered to be superior to other cointegration tests because it has desirable statistical properties (Erik and Par, 2007).

Ssekuma (2011) maintains that the importance of cointegration analysis is that it can be used to deal with difficulties that arise when using nonstationarity series, especially those that have long run equilibrium relationships. Furthermore, cointegration tests can also be used to test stationary linear relatives or cointegration relations between nonstationary time series variables. For instance, it can be used to test the relationship between consumption and income.

Furthermore, Virmani (2014) argues that the concept of cointegration would not have been so important without a statistical theory for testing for cointegration and the estimating parameter of linear system with cointegration. The theory of cointegration is summed up and extended by Engle and Granger (1987) where the theorem of Granger is rigorously proven. Engle and Granger (1987) consider the problem of testing the hypothesis of no cointegration between a set of I (1) variables. However, when the null hypothesis of a unit root is rejected, it means it is in favour of cointegration.

The equation is as follows:

$$X_{1,t} = \alpha_1 + \gamma_1 z_{1,t} + \gamma_2 z_{2,t} + \ldots + \gamma_{pt} + \varepsilon_{1,t} \quad (3.9)$$

$$X_{2,t} = \alpha_2 + \emptyset_1 z_{1,t} + \emptyset_2 z_{2,t} + \ldots + \emptyset_p z_{p,t} + \varepsilon_{2,t} \quad (3.10)$$

The Johansen approach is mainly based on two different likelihood tests which are the trace and the maximum eigenvalue tests. Their equations are represented as follows:

$$J\,\text{trace} = -\,T \sum_{i=r+1}^{n} \text{In}\,(1-\lambda_i) \quad (3.11)$$

$$J\,\text{max} = -\,T\,\text{In}\,(1-\lambda_{r+1}) \quad (3.12)$$

Where T stands for sample size and λ_i is the *ith* largest chronicle correlation. The trace statistics test the null hypothesis of 'there are at most r cointegrating relations against the alternative of' m cointegrating relations. On the other hand, the maximum eigenvalue tests

the null hypothesis of r cointegrating vectors against the alternative hypothesis of $r+1$ cointegrating vectors. The Johansen methodology is basically used in a setting where all variables in the system are I (1). Moreover, the trace test has been found to be the best because it appears to be more robust to skewness and excess kurtosis. Furthermore, it can be most useful in the case of small samples (Sjo, 2008).

However, according to Harris (1995), there are many steps involved in the Johansen cointegration approach as follows:

- Testing the order of integration of each variable that enters the multivariate model;
- Selecting the correct lag length, K of the vector autoregression (VAR) model. This is to ensure that the (Vector) error correction model has Gaussian errors;
- Detecting if the system needs to be conditioned on any I (0) variables, including dummy variables;
- Carrying out tests to reduce rank of the system. The Johansen cointegration test can be used to know whether $\pi\ (=\ \alpha\beta\ )$ has reduced rank and also to know the value of r with $r \leq (n-1)$ the number of cointegration vectors present in β;
- Knowing if the system is to be estimated with deterministic variables (constant and trend) or not;
- Testing for weak exagoneity;
- Testing for unique cointegrating vectors as well as linear hypothesis on cointegrating relationships; and
- Imposing joint tests of restriction on the α leading matrix and the β cointegrating vector (Cuthbertson, 1992).

If cointegration is detected among the variables understudy, the VECM approach is followed.

4.4.4 Vector Error Correction Model

Vector error correction model (VECM) is a restricted VAR that has cointegrations built into the specification so that it is designed for use with nonstationary series that are known to be cointegrated. Vector error correction model can be applied when there is cointegration among the series. Therefore, in this study VECM was applied so as to evaluate the short run properties of the cointegrated series. It is prefer to other models because it provides a opportunity to apply Vector Autoregressive (VAR) Model in order to incorporate

multivariate time series. It is a special case of the VAR when variables are fixed in their differences. For example, I (1). It was popularised by Engle and Granger to correct for disequilibrium and can be used to estimate the effect of one time series on another in the short run as well as the long run. In addition VECM can also be used as a tool in reconciling the short run behaviour of an economic variable using its long run behavior. It is possible to include exogenous variables such as seasonal dummies or time trends in a VAR system. However, with two variables, x and y VAR would represent the two equations:

$$y_t = \beta_{yo} + \beta_{yy1} y_{t-1} + \ldots + \beta_{yyp} y_{t-p} + \ldots + \beta_{yxp} x_{t-p} + v_t \qquad (3.14)$$

$$x_t = \beta_{xo} + \beta_{xy1} y_{t-1} + \ldots + \beta_{xyp} y_{t-p} + \beta_{xx1} x_{t-1} + \ldots + \beta_{xxp} x_{t-p} + v_t \qquad (3.15)$$

The Vector Error Correction Model (VECM) will then be applied to the study if the variables are found to be cointegrated. Chipaumire et al, (2014) employed VECM in their study despite the fact that their study had two negative relationships among the variables and only twenty observations. This therefore suggests that this study however can employ VECM. VECM comes from cointegration relationship and is an exceptional case of VAR for variables which at their differences, are fixed for example, I (1). Also, VECM can acquire any cointegrating relationship along with variables. However, the VECM for two variables will be as follows:

$$\Delta y_t = \beta_{yo} + \beta_{y1} \Delta y_{t-1} + \ldots + \beta_{yp} \Delta y_{t-p} + \gamma_{y1} \Delta x_{t-1} + \gamma_{yp} \Delta x_{t-p}$$

$$-\lambda_y (y_{t-1} - \alpha_0 - \alpha_1 x_{t-1}) + v_t \qquad (3.16)$$

$$\Delta x_t = \beta_{x0} + \beta_{x1} \Delta y_{t-1} + \ldots + \beta_{xp} \Delta y_{t-p} + \gamma_{x1} \Delta x_{t-1} + \ldots + \gamma_{xp} \Delta x_{t-p}$$

$$-\lambda_x (y_{t-1} - \alpha_0 - \alpha_1 x_{t-1}) + v_t \qquad (3.17)$$

where:

$y_t = \partial_0 + \partial_1 x_t$ is the long run cointegrating relationship between the two variables and λ_y and λ_x are the error correction parameters that measure how y and x react to the deviations from long-run equilibrium. However, there is a possibility that more than one cointegrating relationship exists among the two variables when there is the application of VECM to more than two variables (Hauser, 2010).

After performing unit root testing, cointegration analysis and VECM, the next step is to take the model through diagnostic and stability testing.

4.5 Diagnostic Test (Residual)

4.5.1 Normality test (Histogram)

Residual can be defined as the difference between the original data and the predicted value from the regression equation. As a residual, it should not be either systematically low or high which means that it ought to centre on zero throughout the range of fitted values. However, in the OLS context, random errors are supposed to produce residuals that are normally distributed. Therefore, residuals should be in a symmetrical pattern and have a constant speed throughout the range (Frost, 2012).

According to Wheeler (2013), the reason why residuals must be normally distributed is because they have normally distributed data and residuals which have been in direct proportion to the availability of software to perform a lack–of test. Though there is a possibility of having residuals that are pure noise; however, it cannot be taken to be an indicator that the residuals do not contain further relationships with the independent variables.

According to Lucarelli (2013), many common tests of null hypothesis on regression require normality. Therefore, if residuals are not normal, then it may be difficult to perform the hypothesis test. However, there are many useful procedures for performing a statistical test on ordinary linear regression even when residuals are not normal. Furthermore, Lucarelli emphasises that one of the consequences of violating normality assumption, especially when dealing with unemployment in a country is that the violation may lead to wrong results of the analysis. If the assumption of mutual independence of the sample is violated, then, the results of the normality test will be unreliable. However, the effect of the violation assumption depends on the extent of the violation. Some few violations may have little effect on the analysis, while some may render the result of the normality test useless or uninterpretable.

4.5.2 Heteroscedasticity (White)

Wooldridge (2009) maintains that in the absence of constant variation, that is, if the error term does not have constant variance, then it is an indication that there is heteroscedasticity. Therefore, it can be referred to as the absence of homoscedasticity. There are many factors that can cause heteroscedasticity such as measurement. It may also occur as a result of subpopulation differences or other interaction effects. For example, the effect of income on expenditure is different from one country to another and from white people to black people. It may also occur with cross sectional data.

Wooldridge (2009) argues that heteroscedasticity is important in the application of regression analysis because its presence can invalidate statistical tests of significance which assumes that modelling errors and their variance do not vary with the effect being modeled. One of the problems is that it can take many different forms when handling it. Hence, the purpose of this test is to provide a simple way of computing t statistics that are asymptotically t distributed to know if heteroscedasticity is present or not. It is also carried out in order to determine whether the variance error depends on independent variables or not. The White test for heteroscedasticity is also applied in the study.

4.5.3 Serial Correlation (LM test)

Based on Gau (2002), serial correlation can be described as a situation when error terms from different time periods are correlated or as relationships between a given variable and itself over various time intervals. Serial correlations can take place when the error that is associated with a given time period is carried over into future time period in the time series studies. For instance, the prediction of stock dividend growth which can cause over-estimation of one year leads to overestimation in succeeding years. Serial correlation is often found in repeating patterns when the levels of a variable affect its future level and when the errors that are associated with a particular period shift over into future periods. In such case, it violates the assumption that residuals from different time periods are independent of each other. Gau (2002) indicates that there are different types of serial correlation such as first order serial correlation and positive serial correlation. First order serial correlation takes place when errors in one time period are correlated directly with errors in the ensuing time period, whereas positive serial correlation occurs when errors in one time period are positively correlated with errors in the next time period.

One of the consequences of serial correlation is that it does not affect the unbiasedness or consistency of OLS estimators but only affects their efficiency. With a positive serial correlation, the OLS estimates will be smaller than the true standard error which means the parameter estimates are more accurate than what they really are. This, on the other hand may result in the rejection of the null hypothesis when it should not. Another consequence is that it may make a model look better than it actually is (Gau, 2002).

Gau (2002) also points out that there is a need for serial correlation so that there will not be omissions of variables and also that there will not be any cause for ignoring nonlinearities. Hence, there is a need to test for serial correlation in order to detect dynamic misspecification. Sometimes, static and finite distributed lag models may have serial correlated errors even when there is no underlying misspecification of the model. Therefore, it is important to know the consequences and the solution for serial correlation for these useful classes of models. There are three factors that can contribute to serial correlation errors namely omitted variables, ignoring nonlinearities and measurement errors.

According to ArcGis (2015), one of the consequences of ignoring serial correlation is that the OLS estimates will be unbiased and consistent even when the error terms are serially correlated. Moreover, the variance of the OLS estimate for regression coefficient will also be biased. Therefore, OLS estimates are not the best linear unbiased estimator (BLUE) and are thus inefficient. However, the consequences of ignoring autocorrelation are the same as those of ignoring heteroscedasticity.

4.5.4 Jarque – Bera Test

Most of the tests are based on comparing empirical cumulative distribution with theoretical normal cumulative distribution. Contrary to Jarque – Bera, the test is based on sample skewness and sample kurtosis. It is commonly used to test for normality of distribution. The Jarque and Bera test was published in 1980, and explains more advanced simultaneously testing, the normality, homoscedasticity and absence of autocorrelation in residuals from the linear regression model (Lawford, 2004).

The Jarque–Bera test is defined as:

$$JB = n/6 \cdot \{s^2 + \frac{(k-3)}{4}\} \qquad (3.18)$$

S, K and N implies skewness, kurtosis and size accordingly. The test compares how far the asymmetry and kurtosis measure divergence from value characteristics of normal distribution. Jarque Bera asymptotically has a chi– square distribution with two degrees of freedom which can be used to test the hypothesis that the data is from a normal distribution. This test also represents a goodness–of–fit analysis which shows if sample data has skewness and kurtosis corresponding to normal distribution (Domanski, 2010)

Givology (2015) states that the probability in Jarque Bera is the information that is used, either to reject or accept the hypothesis, that the true coefficient is zero. Normally, a probability that is lower than 0.05 is regarded as a strong evidence of rejection of that hypothesis.

4.6 Stability Test

Stability test is the quality or state of something that is not easily changed or likely to change. It can also be explained as the quality or state of something that is not easily moved. Stability, however, can be termed as the property of a body that causes it, when disturbed from a condition of equilibrium that restores the original condition. It may also be referred to as a motion to develop forces (Keil, 2013).

4.7 Impulse Response Function (IRF)

IRF is the reaction of any dynamic system in response to some external shocks. It is called an impulse because of its dynamic system when presented with a brief input signal (Lu and Xin, 2010). Finally, it explains the reaction of endogenous macroeconomic variables, for instance, GDP, investment, money supply and government expenditure at the time of shock and over subsequent points in time.

4.8 Conclusion

This chapter has explained the model specification, defined the variables and presented the sources of data in order to examine the relationship between economic growth and government expenditure. The chapter has also explained preliminary data preparation such as ADF test, PP test and the Ng Perron test to know if stationarity is present or not. This was followed by the cointegration test using the Johansen approach. Furthermore, diagnostic tests for normality, heteroscedasticity test and serial correlation were explained in this section. In

addition, the VECM method was discussed alongside IRF in order to understand the response to shock amongst variables.

CHAPTER FIVE

DATA ANALYSIS AND INTERPRETATION

5.1 Introduction

The primary objective of this study was to explain the relationship between economic growth and government expenditure in South Africa. This chapter presents results of all the tests employed in this study. These tests include the unit roots test of each variable in the model followed by the Johansen cointegration test to establish the long run relationship among variables. The VECM was estimated to determine the cointegration of economic growth on government expenditure. This was followed by the presentation of diagnostic and stability tests and finally, IRF analysis.

5.2. Diagnostic Result

Figures 5.1 to 5.8 show the graphical examination of the series to test for stationarity.

5.2.1 Graphical representation of data

Figure 5.1: Graphical presentation of GDP at level

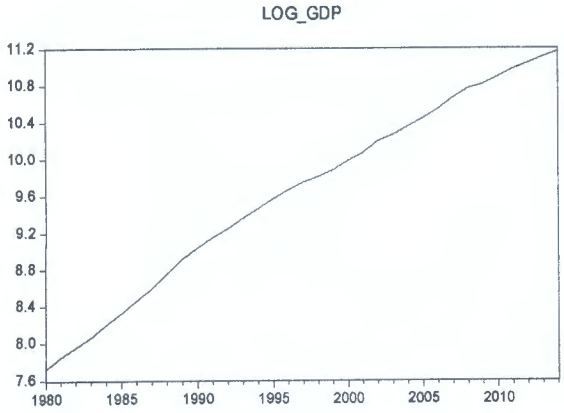


Figure 5.2: Graphical presentation at first difference

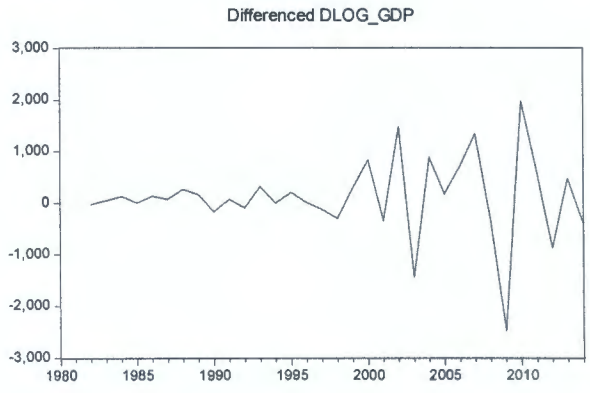


Figure 5.1: shows that GDP has an unstable trend which indicates nonstationary because its trend is rising all the time. Figure 5.2 shows the plot of the same variable at first difference which shows that GDP is stationary.

Figure 5.3: Graphical presentation of government expenditure at level

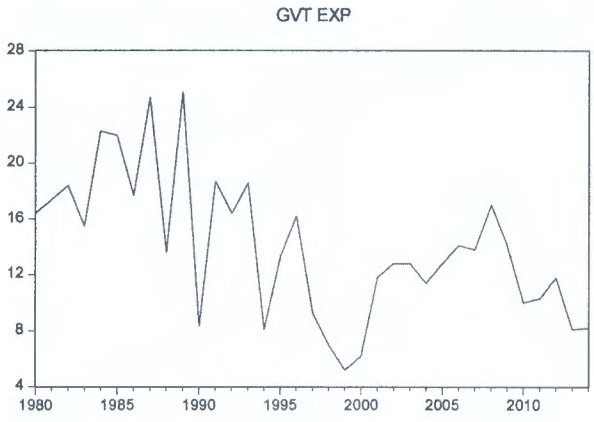


Figure 5.4: Graphical presentation of government expenditure at first difference

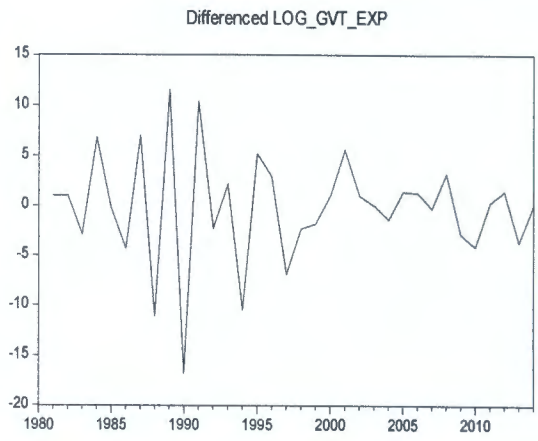


Figure 5.3 shows government expenditure at levels which display a downward trending movement and indicates that series is nonstationary. After differencing in Figure 5.4, it shows more signs of stationarity in shape which indicates that the means and variance are more constant than at level in Figure 5.3.

Figure 5.5: Graphical presentation of money supply at level

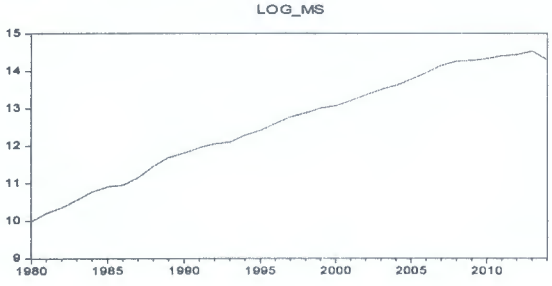


Figure 5.6: Graphical presentation of money supply at fist difference

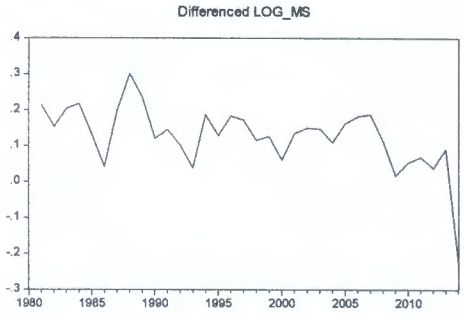


Figure 5.5 shows money supply at level and the trend level is upward movement which indicates nonstationarity. However, Figure 5.6 shows constancy in mean and variance which signifies stationarity.

Figure 5.7: Graphical presentation of investment at level

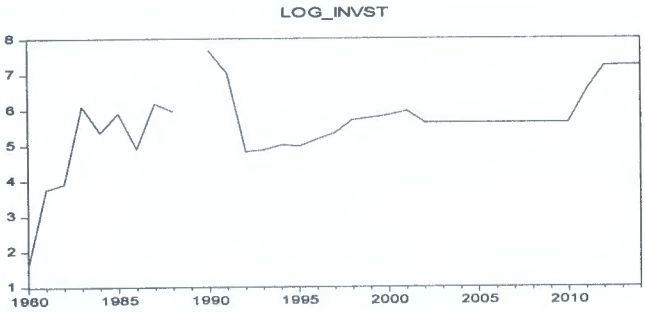


Figure 5.8: Graphical presentation of investment at first difference

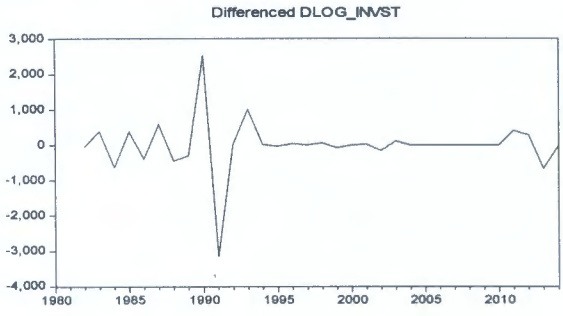


Figure 5.5 shows investment at a level which is nonstationary at intercept and trend and also at intercept. However, figure 5.6 shows difference at first difference and all are statistically significant at all levels.

5.2.2 Results of unit roots test

Table 5.1: Results of ADF unit roots test

Variables	Model specification	Levels	First differences	Conclusion
Log RGDP	Intercept & Trend	[-0.404] (-3.548)	[-4.116]** (-3.553)	I(1)
Log Gexp	Intercept & Trend	[-2.419] (-3.553)	[-12.334]*** (-3.553)	I(1)
Log MS	Intercept	[1.243] (-2.976)	[-3.568]** (-2.976)	I(1)
Log Invest	Intercept & Trend	[-3.337] (-3.548)	[-6.037]*** (-3.558)	I(1)

*Statistically significant at 10% level
**Statistically significant at 5% level
***Statistically significant at 1% level
( ) Stands for test critical values
[ ] Stands for test statistics
Significance at 5%

In this unit roots test, results of RGDP, government expenditure, money supply and investment, are nonstationary at levels. However, when all the variables are differenced, they

all become stationary at 5% significance level. This shows that the variables are integrated at first difference I (1) which is an indication that they are integrated at the order of one.

The ADF unit roots test between economic growth and government expenditure in South Africa are calculated over the sample period and their significance tested by t-test. Since the t- statistics is lesser compare with essential value, it is therefore, concluded that the null hypothesis is rejected and there is therefore the presence of stationarity.

5.2.3 Phillip Perron unit root

Table 5.2: Results of PP unit roots test

Variables	Model specification	Levels	First difference	Conclusion
Log RGDP	Intercept &Trend	[-0.510] (-3.548)	[-4.092]** (-3.553)	1(1)
Log Gexp	Intercept &Trend	[-5.234]*** (-3.548)	[-16.099]*** (-3.553)	1(1)
Log MS	Intercept	[-3.261]** (-2.951)	[-1.978] (-2.954)	I(0)
Log Invest	Trend &Intercept	[-5.399]*** (-3.558)	[-6.610]*** (-3.568)	I(1)

*Statistically significant at 10% level
**Statistically significant at 5% level
***Statistically significant at 1% level
( ) Stands for test critical values
[ ] Stands for test statistics
Significance at 5%

From Table 5.2, government expenditure, money supply, and investment are found to be stationary at levels on intercept at 5%.Consequently, the null hypothesis is rejected. This shows that the variables are stationary at levels. After differencing, all variables become stationary at 1%, 5% and 10% respectively which is an indication that the null hypothesis is rejected. This is an indication that the variables are integrated at the order of one I (1).

5.2.4 Ng Perron unit roots test

Table 5.3: Results of Ng Perron unit roots test

Variables	Model specification	Level	First difference	Conclusions
Log GDP	Intercept	[10.727]** (-8.100)	[-9.828]** (-8.100)	1(1)
Log Gexp	Intercept	[-4.153] (-8.100)	[-9.341]** (-8.100)	1(1)
Log MS	Intercept	[-1.373] (-8.100)	[-11.059]** (-8.100)	1(1)
Log Invest	Intercept	[-1.754] (-8.100)	[-9.042]** (-8.100)	I(1)

*Statistically significant at 10% level
**Statistically significant at 5% level
***Statistically significant at 1% level
( ) Stands for test critical values
[ ] Stands for test statistics
Significance at 5%

Table 5.3 shows results of the Ng Perron test and how it was carried out. Government expenditure, money supply, and investment are found to be nonstationary. This means that all the variables are nonstationary at levels. However, RGDP is statistically significantat intercept.Therefore, the null hypothesis which states that there is the existence of unit root is rejected. When all variables are differenced at first difference, stationarity is obtained at 1%, 5% and 10% respectively. It is, however, concluded that the variables are integrated at the order of one.

5.3 Analysis of Cointegration

Since it is concluded that there is stationarity among variables, the next step is to determine if there is long run equilibrium among them by means of cointegration. The lag length used is 1 and this can be justified according to the lag order of the selection criteria in Table 4. This is done in order to ensure that VECM has Gaussian errors. Cointegration test is, therefore, based on this lag length.

5.3.1 VAR lag order selection criteria

Table 5.4: Results of VAR lag order selection criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	- 123.829	NA	0.0590	8.522	8.709	8.582
1	11.140	224.950*	2.15e-1*	0.591*	1.525*	0.889*
2	22.975	16.569	3.02e-1	0.868*	2.550	1.406

From Table 5.5, there is at least one cointegration among the variables, the probability is less than 5% which means the null hypothesis can be rejected which is an indication that there is cointegration. Also, the trace statistics is greater compare to the critical value which means the null hypothesis cannot be accepted.

However, under 'at most 1,' the probability is greater than 5% which means the null hypothesis cannot be rejected. This is also supported by the test statistics which is less than the critical value. This, therefore, indicates that there is at least one cointegration equation in the whole system at 5% level. This shows existence of long run connection among the variables. Therefore, the VECM can be estimated (Hjalmarsson and Osterholm, 2007).

Table 5.5 Unrestricted Co- integration test results (Trace)

Hypothesised No. Of CE(s)	Eigenvalue	Trace statistics	0.05 Critical values	Probability**
None*	0.546	49.756	47.856	0.033
At most 1	0.453	26.015	29.797	0.126
At most 2	0.223	7.988	15.495	0.467
At most 3	0.013	0.416	3.841	0.519

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

Table 5.6: Results of Unrestricted Co -integration test (Maximum Eigenvalue)

Hypothesised No. of CE(s)	Eigenvalue	Max –Eigen statistics	0.05 Critical values	Probability**
None	0.545	23.666	27.584	0.147
At most1	0.453	18.102	21.132	0.126
At most 2	0.223	7.573	14.265	0.424
At most 3	0.014	0.416	3.841	0.519

Max-eigenvalue test indicates no cointegration at 0.05 level
* Denotes rejection of the hypothesis at 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

From the results in Table 5.6, it is clear that there is no cointegration among the variables. This is because the probability is greater than 5%. Moreover the max statistic is less than the critical value; therefore, the null hypothesis cannot be rejected.

However, if the null hypothesis is 'at most 1,' the probability is greater than 5%; it means the null hypothesis cannot be rejected but accepted. The result of max statistics also is less than the critical values. This implies that one cannot reject the null hypothesis, an indication that there is no cointegration in the whole system at 5% level. This suggests that the variables have no long run relationship which means that all the variables are not cointegrating (Hjalmarson and Osterholm, 2007).

Sjo (2008) maintains that the trace test is the better test between the two because it has proven to be the most useful in the case of small samples. It also appears to be more robust to skewness and excess kurtosis. This study relied on results of the trace test in order to proceed with the estimation of the VECM model.

5.4 Vector Error Correction Model (VECM)

VECM can be used when there is cointegration among the series, this means that there is existence of long-term equilibrium between then. VECM can also be used to estimate the short run properties of the cointegrated series. However, under VECM, the cointegration level indicates the quantity of cointegrating vectors.

In Table 5.7, a negative and significant coefficient of VECM shows that any short-term fluctuation between the dependent and independent variables will increase the long run

relationship between them. From the results, it can be concluded that government expenditure has a negative influence on GDP while investment has a positive consequence on economic development while money supply is negative but has a great power on economic growth. The results revealed that the coefficient is significant and also negative.

5.4.1 Long Run Equilibrium:

Table 5.7: Vector Error Correction Model

Variables	RDGP(-1)	GExp(-1)	Invst(-1)	MS(-1)
Coefficient	1.000000	-0.024 (0.009) [-2.577]	0.025 (0.047) [0.522]	-0.628 (0.027) [-23.650]

The long run regression results are provided below:

$$RGDPt = 0.460127 - 0.035441GEXPt + 0.731816MSt + 0.007140INVESTt \quad (5.1)$$

As indicated earlier, the empirical results reveal that government expenditure is significant and has a negative relationship between economic growth and government expenditure. A 1% increase in government expenditure reduce economic growth by 0.003%. This is not actually expected according to the Keynesian view because an increase in government spending is supposed to accelerate country's output. However, the negative result may be due to overspending by government on public programmes which may cause wastage and losses in the long-run.

Also, a 1% increase in money supply leads to an increase in GDP by 0.73% even though an increase in money supply ought to have an inflationary effect on the economy which in the long-run may have an effect on economic growth.

According to the results of long run regression as expressed in equation (4.1), there is a positive relationship between investment and RGDP. A 1% increase in investment leads to an increase in RGDP by 0.007% which is lower to expectation. An increase in government

spending may affect private investment in the long run. Therefore, from regression 4.5, it is clear that the variables are cointegrated which justifies the use of VECM.

5.4.2 Short Run Equilibrium:

Table 5.8: Short Run Equilibrium

Error Correction:	D(LOG_GDP)	D(LOG_GVT_EXP)	D(LOG_INVST)	D(LOG_MS)
CointEq1	-0.118	8.275	-0.581	-0.154
	(0.030)	(6.219)	(0.757)	(0.135)
	[-3.842]	[1.330]	[-0.767]	[-1.143]
R^2 = 0.684				
Adj.R^2 = 0.526				

( ) stands for standard errors

[ ] stands for t-statistics

Source: Authors' Own Computation using Eview 8

From the results, it can be concluded that there is a short run relationship among variables. Asiri, Baharuddin, Jusoh, Mohamad, Shamsudin and Jusaff (2011) maintain however, that a negative and significant coefficient of VECM shows that any short-term fluctuation between the dependent and independent variables will give stability in the long run relationship between variables. According to Chipaumire *et* at., (2014) the coefficients of the error correction terms are interpreted as speed of adjustment to long run equilibrium. The speed of adjustment is showed by the coefficient of the error terms as indicated above. However, based on these results, GDP is negative and significant which means that there is a short run relationship from the independent variables such as government spending, money supply and investment. This shows that independent variables have influence on RGDP in the long run. Moreover, both the $R^2$and Adjusted.R^2 are more than 5% which shows that the variance in the dependent variable is explained by independent variables.

The coefficients of the error correction terms are interpreted as speed of adjustment to long run equilibrium. The speed of adjustment is showed by the coefficient of the error terms as indicated above.

5.5 Results of Diagnostic and stability tests

Moreover, there is the need to confirm whether RGDP, as a dependent variable, has any statistic error or not by carrying out diagnostic and stability tests. A diagnostic test is a very important test that helps in time series modeling to test for model accuracy. Stability, however, can be described as the property of a body that causes it when disturbed from a condition of equilibrium (Keil, 2013).

5 .5.1 Breusch-Godfrey Serial Correlation LM Test

Table 5.9: Results of Breusch-Godfrey Serial Correlation LM Test

F-statistic	7.503	Prob. F(2,28)	0.003
Obs*R-squared	11.864	Prob. Chi-Square(2)	0.003

Table 5.13 shows results of serial correlation using the Breusch-Godfrey method. The null hypothesis of the study states that there is no serial correlation in residuals. The probability value from the Table is 0.0027 which is smaller than 0.05. Therefore, the null hypothesis can be rejected. This means that there is serial correlation.

5.5.2 Heteroscedasticity Test: White

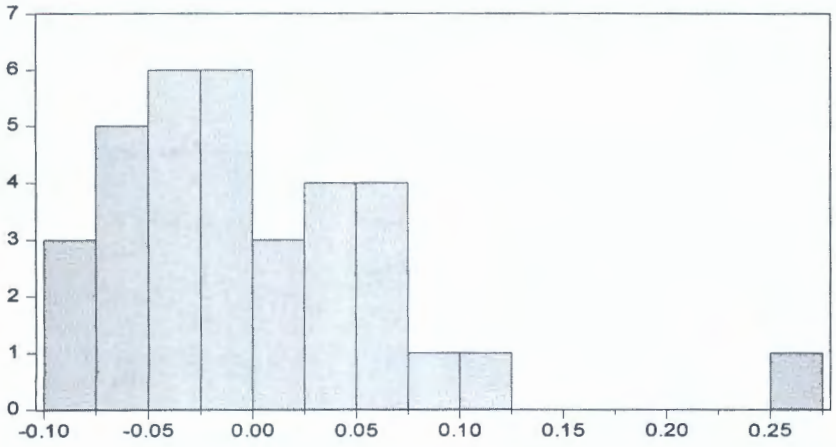
Table 5.10: Heteroscedasticity Test: White results

F-statistic	0.815	Prob. F(9,24)	0.608
Obs*R-squared	7.960	Prob.Chi-Square(9)	0.538
Scaled explained SS	18.668	Prob. Chi-Square(9)	0.028

The results in Table 5.14 show the output from heteroscedasticity. The probability value from the result is 0.5382 which is greater than 0.05, therefore, the study accepts the presence of the null hypothesis that there is no heteroscedasticity. This means that for the current study, there is no heteroscedasticity up to order q in the residual.

5.5.3 Normality Test on Residual

Figure 5.9: Results of normality Test on residuals



Series: Residuals	
Sample 1980 2014	
Observations 34	
Mean	-1.73e-16
Median	-0.015519
Maximum	0.260364
Minimum	-0.096201
Std. Dev.	0.069158
Skewness	1.610740
Kurtosis	7.024549
Jarque-Bera	37.64781
Probability	0.000000

The Jarque –Bera test statistics tests whether the variable is normally distributed or not. The only way to determine if the variable is normally distributed or not is to carry out the Jarque–Bera test. Figure 5.13 shows that residuals are not normally distributed. The rule of thumb for the test is that if P is less than 0.05, the null hypothesis will be rejected. The result of the probability is 0.0000 and is smaller compare to 0.05. Therefore, the null hypothesis cannot be accepted. This shows that the residuals are normally distributed.

Table 5.11 Ramsey reset test on residual

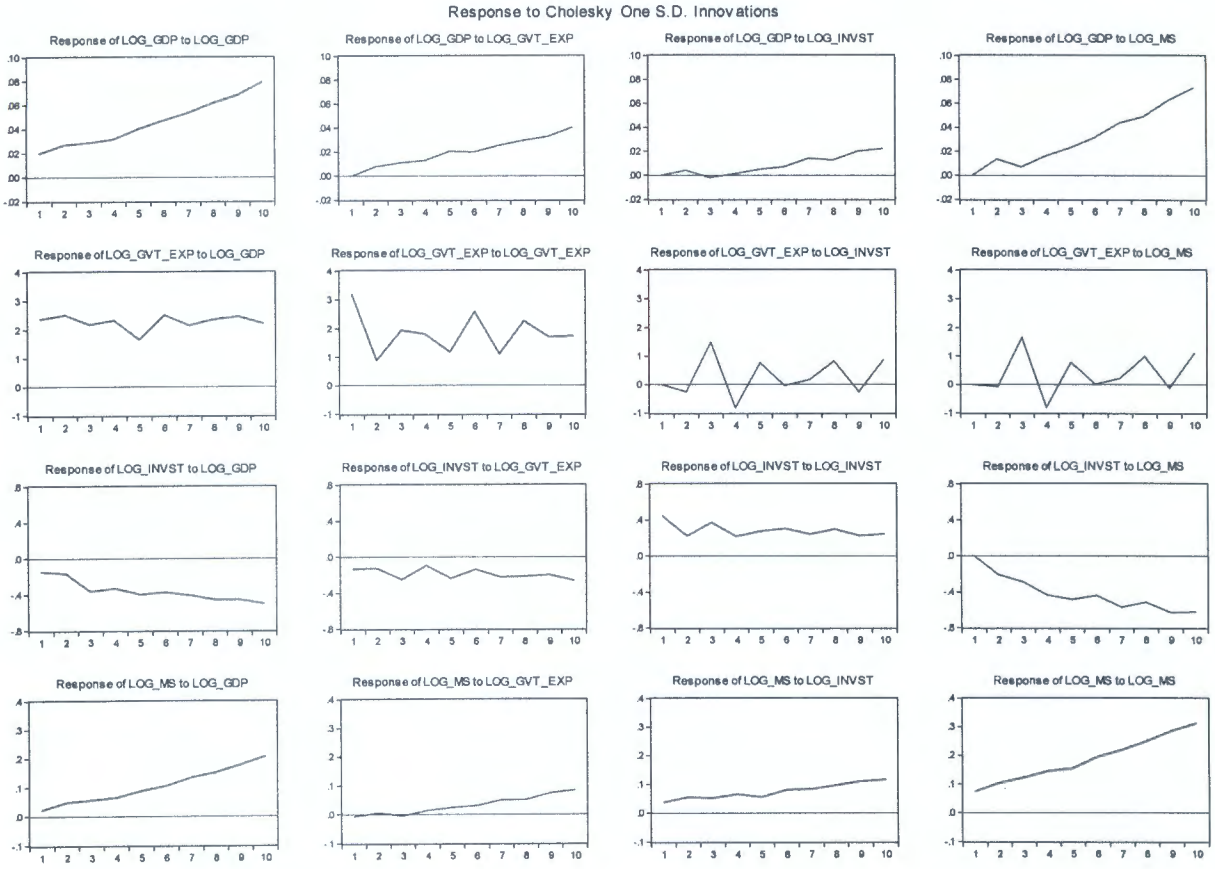
	Value	Df	Probability
T-statistics	0.303	29	0.764
F-statistic	0.092	(1,29)	0.764
Likelihood ratio	0.107	1	0.743

The Ramsey reset test can also be referred to as regression specification error test. The probability value is greater than the critical probability value of 0.05. Therefore, the null hypothesis of the miss-specification in the model is accepted. This implies that the model is correctly specified.

5.6 Impulse Response function

This study employed impulse response function in order to serve as an additional check of the finding of the cointegration test. Cholesky's model of contemporaneous identification is used to provide meaningful interpretation.

Figure 5.10: Impulse Response Function



According to Ronayne (2011), Cholesky methods are simple to implement and also easy to understand. From Figure 5.14, the response of RGDP to RGDP is positive which means that the response of RGDP to shock for the ten periods of the year is positive. The response of RGDP to government expenditure is also positive. This is clear as the line is above the shock level which shows that the response of RGDP to shock is positive. This is an indication that there is a positive association among the dependent RGDP and independent government spending.

However, the response of RGDP to investment from the first year is positive and drops during the third year after which it rises again and remains positive for the rest of the period. The response of RGDP to money supply is positive during the first period and later drops in the third period after which it remain stable and positive. This means when RGDP has a positive shock, money supply becomes positive.

In addition, according to Lu and Zin (2010), the response of independent variables to the dependent variables such as response of government expenditure to RGDP is positive. This implies that a positive shock in government expenditure leads to a positive response to RGDP. Also, investment has a negative shock response to RGDP which shows a negative relationship between the two variables. Money supply on the other hand, has a positive change to shock as it leads to a positive reaction on GDP.A positive shock of one standard deviation to money supply leads to a positive change on RGDP. However, it can be concluded that the reaction of variables to shock are consistent except for investment that fluctuating to shock.

5.7 Conclusion

This study used ADF, PP and Ng Perron unit roots in order to test for the stationarity of the data. Results from the unit root model revealed that variables are non-stationary at levels and become stationary at first difference. Results of cointegration showed that there is at least one cointegrating vector among the variables. VECM was introduced to determine the short run effect of economic growth and government expenditure. The results, however, revealed that there is a long run relationship from independent variables to the dependent variable since the coefficient is significant as well as negative in the long run. However, the result of the short run is also negative and important and is an indication that there is short run relationship among the variables. Other tests such as diagnostics, stability and IRF were also used to determine the relationship between economic growth and government expenditure in South Africa. Results of the diagnostic tests were significant. There was response to shock as IRF was carried out to recognize the reaction of the reliant variables in VAR as a shock is put to the error term.

CHAPTER SIX

SUMMARY CONCLUSION AND POLICY RECOMMENDATION

6.1 Introduction

This chapter provides the summary, conclusion and policy recommendations of the study. The introduction, research problem and methodology are discussed under the summary while the conclusion is derived from the findings of the study.

6.2 Summary

This study based on the correlation between government spending and economic development in South Africa using Vector Error Correction Model (VECM) and Impulse Response Function (IRF). Money supply and investment were included in the model and these variables go along with the government expenditure which helps to influence the economic activity of the country. The main objective of this study is to examine the relationship between government expenditure and economic growth in South Africa and also to examine the response of government expenditure to shocks from other variables and to make policy recommendations based on the outcome of the empirical findings. The study explained the consequences of government spending in the economy and how overspending can lead to economy debt trap.

The theoretical framework was employed in the study to explain the relevant theories that is applicable to the study such as Solow's growth theory, Keynesian theory, Endogenous, Musgrave's theory of public expenditure growth as well as Wagner's theory. Also the empirical literature was explained to review the studies conducted by other researchers to help in predicting the relationship between government expenditure and economic growth. The study provided evidence from developed and developing countries on the relationship between government expenditure and economic growth. The data used was collected from the website of the South Africa Reserve Bank for the period 1980 – 2014.

The results obtained from the study, give evidence that there is a negative relationship between government expenditure and economic growth even though the results showed that government expenditure was significant in South Africa during the period of study which is

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consistent with the Keynesian macroeconomic theory which states that government spending has a significant role to play in a nation's output.

6.3 Recommendations

Based on the results of VECM it is obvious that government expenditure has a negative relationship on economic growth of South Africa even though the results indicate the significant of expenditure in the economy. The result of Impulse Response Function however showed positive shocks which indicate that economic growth has positive shocks on government expenditure. This however may be as a result of inefficiencies of the government programs. It is therefore recommended that the South Africa government should focus its spending on macroeconomic objectives which will enable the economy to grow and also there is need for improvement on efficiencies of public programs so as to eliminate wastage and make use of limited economic resources.

The investment in economic growth is positive and insignificant. Government needs to improve the area of investment and invest in productive goods in order to improve output. Moreover the relationship between money supply and economic growth is negative and significant. This implies that more money in circulation will affect economic growth. Government therefore needs to control money supply in the country through monetary policy in order to curb overspending.

Furthermore, government should address the level of spending with the hope that spending be directed towards projects that contribute directly to the nation's output. Moreover, fiscal policy will be a significant macroeconomic instrument for economic stability in South Africa. The policy makers should provide an appropriate environment conducive to oversee government spending on capital formation as well as private investment spending. Fiscal spending programmes should be employed in allocating expenditure to various sectors especially during global financial crises.

6.3 Limitation of the Study and Area for Further Research

This study used four variables as follows: RGDP, government expenditure, money supply, and investment. It examined the relationship among the variables. Due to research limitation, such as inadequate information on data basis, this study would have preferred using quarterly

data which may have improved the results and some other restrictions. However, other researchers may use other methods to improve results of GDP in future.

REFERENCES

Alexion, 2009. Government Spending and Economic Growth:Econometric Evidence from the South Eastern Europe, Journal of Economic and Social Research, 11(1):1 – 16.

Alshahrani, S. A and Alsadiq, A. J. 2014. Economic Growth and Government Spending in Saudi Arabia:An Empirical Investigation, International Monetary Fund.

Asiri, H.A., Baharuddin,Jusoh, Mohamad, Shsmsudin, and Jusaff, 2011. A Vector Error Correction Model. Approach in Explaining the Relationship between Interest rate and Inflation towards Exchange rate Volatility in Malaysia, World Applied Sciences, Journal 12: 49-56, IDOSI Publications.

Alesina, A and Wacziarg, R. 1998. Openness Country Size and Government, Journal of Public Economic, Vol. 49 pp305.

Ali, S. and Al-Shatti, 2014. The Impact of Public Expenditure on Economic Growth in Jordan, International Journal of Economics and Finance, Canadian Center of Science and Education.

Anna, J., 2008. The Concise Encyclopedia of Economics Money Supply, 2nd Edition, Library of Economics and Liberty. Liberty Fund Inc.

ArcGis Resources http://resources.arcgis.com/en/help/main/10.2/index.

Al –Bataineh, I. 2012. The Impact of Government Expenditure on Economic Growth in Jordan, Interdisciplinary Journal of Contemporary Research in Business 4(6).

ArcGis Resources, 2014. http://resources.arcgis.com/en/help/main/10.2/index.

Anil, S. 2007. Granger Causality, http://www.scholarpedia.org/article/grangercausality.

Ali, S and Al-Shatti, 2014. The Impact of Public Expenditures on Economic Growth in Jordan. International Journal ofbEconomics and Finance, Canadian Center of Science and Education.

Baro, R. 1990. Government spending in a Simple Model of Endogenous Growth, Journal of Political Economy, 98(5) pp103-125.

Berry, C. 2014. Quantity over Quality: A Political Economy of "Active Labour Market Policy" in UK, Policy Studies.

Bouakez, H. and Rebei, N., 2007. "Why Does Private Consumption rise After a Government Spending Shoch?" Canadian Journal of Economics, Vol. 40. No 3.

Chude, N.P and Izuchukwu, C.D. 2013.International Journal of Business and Management Review, Vol. 1, No. 4 pp.64-71, Published by European Centre for Research Training and Development, UK.

Chipaumire, G.et al, 2014. Mediterranean, Journal of Social Sciences, MCSER Publishing, Rome –Italy, Vol.5 No. 1 pp106.

Caner, M.and L. Kilian, 2001." Size Distortions of Test of the Null Hypothesis of Stationarity: Evidence and Implications for the PPP Debate" Journal of International Money and Finance, 20, 639-657.

Chipaumire, G., Ngirande, H., Method, M. and Ruswa, Y. 2014. The Impact of Government Spending on Economic Growth: Case of South Africa, Mediteranea, Journal of Social Science.

Craig, B. 2014. "Quantity Over quality: a Political Economy of "Active Labour Market Policy" in the UK, Policy Studies, Sheffield Political Economy Reaearch Institute (SPERI).

Chinweoke, C. N., Ray, N. and Paschal, N.O. 2014. Impact of Government Expenditure on Nigeria's Economics Growth, The Macrotheme Review, A Multidisciplinary Journal of Global Macro Trends.

Chand, S., 2015. The Endogenous Growth Theory: Models and Implications, Articlelibrary.com.

Devaragan, S., Swaroop, V. and Zou, H. V.1996. the Composition of Public Expenditure and Economic Growth, Journal of Monetary Economics 37: 313-344 Dickenson, T.D I 1996 Economics of Public Sector, Malaysia: Macmillan Press Ltd.

Domanski, C. 2010. Properties of The Jarque Bera Test, Acta Universitatis Lodziensis Folia Oeconomica 235,2010.

Economicsconcept, 2015. Definition and Explanation of Public Expenditure,http://www. economicscencept.com/public-expenditure.

Erik,H. and Par, O. 2007. Testing for Cointegration Using the Johansen Methodology When Variables are Near- Integrated, federalreserve.gov/pubs/ifdp915.p.

Frank, A. and Ishmaell, A. 2014. Revisiting Government Spending and Growth Analysis in Ghana: A Disaggregated Analysis from 1970-2010, Journal of Economics and International Finance. Vol.6 (7) pp134-143.

Frost, J. 2012. Why you need to check your Residual Plots for Regression Analysis: or, To Err is Human, to err randomly is Statistically Divine, Minitab. Com.

Faulkner, D. and Loewald, C. 2008. Policy Change and Economic Growth: A Case Study of South Africa, http:www.econrsa.org/system/files/publication.

Fedderke, J. W., Perkins, P and Luiz, J. 2006. "An Analysis of Economic Infrastructure Investment in South Africa" World Development, Volume 34, No. 6, pp.1037-59.

Frankel, J. 2008. The Concise Encyclopedian of Economics Foreign Exchange, Liberty Fund Inc.

Gewase, S. 2003.Economic Development and the Role of the State in Botswana,In: Development Policy Management Network Bulletin.

Givology, 2015. What is Economics? www.whatiseconomic.org/macroeconomics/economic-growth.

Gau, Y. 2002. Serial Correlation. http://www.ncku.edu.tw/account/chinese/course.

Hassett, K. A. 2008. The Concise Encyclopedia of Economics Investment, Liberty Fund, Inc. 2nd Edition.

Hauser, M. 2010. Financial Econometrics Vector Error Correction Model, VECM Cointegrated VAR, http://statmath.wu.ac.at/hauser/LVSfinEtricsQF/FEtrics.

Hjalmarsson, E. and Osterholm, P., 2007. Testing for Cointegration using the Johansen Methodology when Variables are Near-Integrated,International Monetary Fund, Western Hemisphere Division.

Hanival, S. and Mala, J. 2014. An Overview of the Performance of the South Africa Economy since 1994, Industrial Development Corporation.

Ju – Huang, C. 2006. Government Expenditures in China and Taiwan: Do they follow Wagner's law? Journal of Economic Development, 31(2) pp139-148.

Jaranyakui, K. and Bratimasrene, T. 2007. The Relationship between Government Expenditure and Economic Growth in Thailand, Whitney Press, Inc.

Kungl, 2003.Time Series Econometrics Vetenskapsakademien, the Royal Swedish Academy of Science.

Keil, P. 2013. Predictors, Responses and Residuals: What Really Needs to be Normally Distributed? Powered by Wordpress Org.

Kumo, W.L.,Omilola, B. andMinsat, A. 2015. South Africa www.africaneconomic outlook.org.

Kuan, C. 2009. Time Series Diagnostic Test, Institute of Economics Academia Sinica, Taipei 115, Taiwan.

Ludger, L. and Schabert, A. 2003. "Fiscal Policy in the New Neoclassical Synthesis" Journal of Money, Credit and Banking, Vol. 35, No. 6 pp.911-929.

Lawisso,W., Rielander, J. and Omlola, B. 2014. South AAAfrica,www.africaneconomicoutlook.org.

Lu, C. and Xin, Z. 2010. Impulse Response Function Analysis: An Application to Macroeconomy Data of China, Hogskolan Dalarna, Sweden.

Lawford, S. 2004. Finite – Sample Quantiles of the Jarque – Bera Test, Brunel University Preprint, 2004.

Lucarelli, G., 2013. What are the Consequences of Violations of the Residuals Normality Assumption in a Linear Regression Model? Victoria Aldridge.

Leke, A., Lund, S., Rakburgh, C. and Wamelen,A. 2010. What Driving Africa's Growth, http://www.mckinsey.com/global-themes/middle-east-and-africa/what-driving-africas-growth.

Lee, C. and Fu-Shuen, 2004. Fractional Integration and the Phillips Perron Test, http://www.airtilibrary.com/publication/aiDetailedMesh?.docid=1018161x-200406-32-2-273-312-a.

Lipton, D. 2013. South Africa Facing the Challenges of the Global Economy, International Monetary Fund.

Masilo, B. and Maundeni, Z. 2014 Informal Sector- State Interaction in Botswana: Conflict and Cooperation? http://www.academia.edu/16602164/informal_sector_development.

Marinkov, M., 2014. The Impact of Aggregate Revenue and Expenditure Assignment on Economic Growth: The case of Provinces and Municipalities in South Africa.

Moran, L.R. and McCully, C .P. 2015. Personal Consumption Expenditures, US. Bureau of Economic Analysis.

Mehmood and Sadiq, 2010. The Relationship Government Expenditure and Poverty: A Cointegration Analysis. Romanian Journal of Fiscal Policy, Volume 1, Issue 1, page29-37.

Moalusi, D. K. 2004. Causal Link between Government Spending and Revenues: A case study of Botswana, International Journal of Economics and Management Engineering (IJEME).

Mulamba, K.C.2009. Long run Relationship between Government Expenditure and Economic Growth: Evidence from SADC Countries, ujdigispace Institutional Repository and Scholarly Communication.

Meng, J. 2004. "Ghana's Development: Miracle of Mirage" History 107. http:/www.joycemeng.com/writings/Ghana.pdf.

Mitchell, D. J. 2005. The Impact of Government Spending on Economic Growth, the Heritage Foundation.

Moce, N. *et al,*. 2014. Effect of Government Expenditure on Economic Growth in East Africa: Panel Data Analysis, Journal of International Academic Research for Multidisciplinary, Volume2, Issue 4.

Mohr, A. 2014. Factor Affecting Economic Development and Growth,Hearst Newspapers LLC, Houston Chronicle, P.O.Box 4260, Houston, Texas 77210-4260.

Nilas, B. 2002. Inflation, the Credit Market and Economic Growth, Oxford Economic Papers Vol.54, No.3 pp412-434.

Nwaeze, C. 2010. Public Financial Management: Theory and Practice. Reconciliation Publishers Limited, Aba.

Ng, S. and P. Perron, 2001 "Lag Length Selection and the Contruction of Unit Root Test with Good Size and Power" Econometrica, 69, 1519-1554.

Nsoni, M.S., Rached, M. and Norbert, F. 2002. The Speed of Adjustment and the Sequencing of Economic Reforms: Issues and Guidelines for Policymakers, International Monetary Fund.

Niloy, 2002. Inflation, The Credit Market and Economic Growth, Oxford Economic Paper Vol.54, no. 3 pp412-434.

Olorunfemi, S. 2008. "Public Investment and Economic Growth in Nigeria: An Autoregressive Model" Journal of International Finance and Economics.

Olapade, B. and Olopade, D. 2010 "The Impact Growth and Development in Developing Countries: Nigeria as a case study, http://ecomod.net/sites/default/files/document-conference/ecomod2010/1369.pdf.

Ozcicek, O. and McMillin, W.D. 2015. Lag Length Selection in Vector Autoregressive Models: Symmetric and Asymmetric,Taylor and Francis Jounal in its Journal Applied Economics.

Ochejele, J. J. 2007. Economic Analysis. Ichejum Press, Jos.

Odhiambo, N. M.2015.Government Expenditure and Economic Growth in South Africa: An Empirical Investigation, International Atlantic Economic Society.

Paterostro, S. 2007. How Does the Composition of Public Spending Matter? Oxford Development Studies Vol. 35, No1. pp47-82.

Pettinger, T. 2014. UK Economy, Tejvan Studied PPE at LMH, Oxford University, Economics Help. Org.

Peter, E. *et* al,. 2014. www.africaneconomicoutlook.org.

Plan to Return to Budget Balance, Budget, 2014, The Mowat Centre, Ontario's Voice on Public Policy.

Rashid, M. and Sara, S. 2010. The Relationship Government Expenditure and Poverty: A Cointegration Analysis. Romanian Journal of Fiscal Policy, Volume 1, Issue 1, page 29-37.

Ronayne, D. 2011. Which Impulse Response Function? Warwick Economic Research Papers No 971.

Schaltegger, A. and Torgler, B.2006. Growth Effects of Public Expenditure on State and Local Levels: Evidence from a Sample of Rich Government Applied Economic Vol. 38.

Sjo, B. 2008. Testing for Unit Roots and Cointegration, https://www.ie.lin.se/nek/ekonometrisk-teori-7-5-hp-730a07/labbor/1.233753/dfditab76.pdf.

Sjoberg, P. S. 2003. Government Expenditure Effect on Economic Growth: The Case of Sweden 1960-2001, http://epubl.luth.se11404-5508/2003/130/LTU-SHU-EX-03130-SE.

Ssekuma, R. 2011. A Study of Cointegration Models with Applications, http:uir.unisa.ac.za/bitstream/handle/10500/4821/thesis_sskuma_r.pdf.

Stanly, B and Randy, G. 2010. The Evolution of Economic Thought, Thomson Higher Education, 5191 Natorp Boulevard 5191 Natorp Bonlevard Mason, OH 45040, USA.

Stan, P. and Smith, B. 2006. Economic Growth in South Africa since1994, Journal of IDEAS http://ideas.repec.org/p/sza/wpaper/wpapers15.html.

Schwartz, A.J. 2008. Money Supply, The Concise Encyclopedia on Economics, 2nd Edition, Library Economics Liberty.

South Africa: Economy Overview http://www.southafrica.inf/business/economy/econ.

Saiyed, S. 2013. Empirical Evaluation of Effect of Sectoral Government Expenditure on Economic Growth in Gujarat State of India. Vol.2.

Tatahi, M., Cetin, E.I. and Cetin, K.M. 2014. The Cause of Higher Economic Growth: Assessing the Long- Term and Short – Term Reltionship between Economic Growth and Government Expenditures.

Todara, M.P. and Smith, S.C. 2006. Economic Development, 9th Edition. Pearson Educational Limited England.

Trading Economics, 2015. http://www.tradingeconomics/south-africa/gdp.

Verbeck, W.2000. "The Nature of Government Expenditure and its Impact on Sustainable Economic Growth", Middle Eastern Finance and Economic Journal, 4(3) pp25-56.

Vedder, R.K. and Gallaway, L.E. 1998. "Government Size and Economic Growth", Ohio: Washington, D.C.

Virmani, V. 2014. Unit Root Test: Results from Some Recent Tests Applied to Select Indian Macroeconomic Variables Science Publishing Group.

Veseth, M. M. 2015. Definition of Exchange Rate, The Wine Economist Wordpress. Com.

WiseGEEK, 2015.www.wisegeek.com/what-is-Government-Expenditure.htm.

World Bank http://www.worldbank.org/en/country/southafrica.

World Bank Group Macroeconomic and Fiscal Management, update on the Economic Impact of the 2014 Ebola Epidemic on Liberia, Sierra Leone and Guinea,International Bank for Reconstruction and Development/ the World Bank 1818, H Street NW, Washington DC, 20433.

Wheeler, D.J.2013. Should the Residuals be Normal? http://www. Qualitydigest.com/inside/quality-insider-article/should-residuals-be-normal.html.

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Appendices

Appendix A: Data

YEAR	GDP	GVT.EXP	MS	INVEST
1980	2271	16,4	21707	5
1981	2575	17,4	26889	43
1982	2857	18,4	31356	50
1983	3193	15,5	38465	447
1984	3658	22,3	47825	215
1990	8430	8,3	134244	2143
1991	9451	18,7	155363	1125
1992	10377	16,4	172214	125
1993	11623	18,6	178963	131
1994	12870	8,1	215823	151
1995	14320	13,3	245722	145
1996	15782	16,2	295313	176
1997	17122	9,3	350700	211
1998	18162	7	393806	303
1999	19493	5,2	446935	323
2000	21657	6,2	474848	344
2001	23481	11,8	544056	389
2002	26778	12,8	632621	279
2003	28632	12,8	733453	279
2004	31370	11,4	818740	279
2005	34281	12,8	963515	279
2006	37899	14,1	1156842	279
2007	42863	13,8	1396325	279
2008	47512	17	1562428	279
2009	49682	14,1	1589340	279
2010	53823	10	1678417	279
2011	58584	10,3	1798932	689
2012	62475	11,8	1869050	1379
2013	66842	8,1	2049694	1402

2014	70819	8,2	1635184	1402

Appendix B: Johansen Cointegration Test

Date: 10/20/15 Time: 13:20

Sample (adjusted): 1982 2014

Included observations: 30 after adjustments

Trend assumption: Linear deterministic trend

Series: LOG_GDP LOG_GVT_EXP LOG_INVST LOG_MS

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 *	0.545641	49.75618	47.85613	0.0328
At most 1	0.453047	26.09015	29.79707	0.1260
At most 2	0.223084	7.988382	15.49471	0.4667
At most 3	0.013761	0.415686	3.841466	0.5191

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	0.545641	23.66602	27.58434	0.1468
At most 1	0.453047	18.10177	21.13162	0.1261
At most 2	0.223084	7.572696	14.26460	0.4238
At most 3	0.013761	0.415686	3.841466	0.5191

Max-eigenvalue test indicates no cointegration 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):

	LOG_GVT_E		
LOG_GDP	XP	LOG_INVST	LOG_MS
-5.636675	-0.308034	-0.266706	4.166848
5.486152	0.039979	-1.579290	-3.567511
11.03688	0.125003	0.057396	-7.034226
17.21512	-0.096106	0.266892	-13.07374

Unrestricted Adjustment Coefficients (alpha):

D(LOG_GDP)	-0.008217	-0.002347	-0.009187	0.000403
D(LOG_GVT_EXP)	2.276391	-0.812981	-0.799773	-0.052740
D(LOG_INVST)	0.035959	0.371810	-0.071378	-0.034739
D(LOG_MS)	0.000208	0.028480	-0.016023	0.006172

1 CointegratingLog
Equation(s): likelihood 9.930241

Normalized cointegrating coefficients (standard error in parentheses)

	LOG_GVT_E		
LOG_GDP	XP	LOG_INVST	LOG_MS
1.000000	0.054648	0.047316	-0.739239
	(0.01123)	(0.05361)	(0.03981)

Adjustment coefficients (standard error in parentheses)

D(LOG_GDP)	0.046317
	(0.02464)

D(LOG_GVT_EXP)	-12.83128
	(3.42156)
D(LOG_INVST)	-0.202689
	(0.74278)
D(LOG_MS)	-0.001174
	(0.08694)

2 CointegratingLog Equation(s): likelihood 18.98113

Normalized cointegrating coefficients (standard error in parentheses)

LOG_GDP	LOG_GVT_EXP	LOG_INVST	LOG_MS
1.000000	0.000000	-0.339442	-0.636587
		(0.07697)	(0.05251)
0.000000	1.000000	7.077242	-1.878406
		(1.80055)	(1.22846)

Adjustment coefficients (standard error in parentheses)

D(LOG_GDP)	0.033441	0.002437
	(0.03417)	(0.00135)
D(LOG_GVT_EXP)	-17.29142	-0.733707
	(4.59276)	(0.18137)
D(LOG_INVST)	1.837119	0.003788
	(0.84734)	(0.03346)
D(LOG_MS)	0.155073	0.001074
	(0.11237)	(0.00444)

3 Cointegrating Equation(s):		Log likelihood	22.76748

Normalized cointegrating coefficients (standard error in parentheses)

LOG_GDP	LOG_GVT_EXP	LOG_INVST	LOG_MS
1.000000	0.000000	0.000000	-0.610247
			(0.04511)
0.000000	1.000000	0.000000	-2.427591
			(1.21115)
0.000000	0.000000	1.000000	0.077599
			(0.19252)

Adjustment coefficients (standard error in parentheses)

D(LOG_GDP)	-0.067954	0.001289	0.005371
	(0.05311)	(0.00131)	(0.00628)
D(LOG_GVT_EXP)	-26.11842	-0.833682	0.630901
	(7.59789)	(0.18771)	(0.89847)
D(LOG_INVST)	1.049327	-0.005135	-0.600884
	(1.44658)	(0.03574)	(0.17106)
D(LOG_MS)	-0.021766	-0.000928	-0.045954
	(0.18848)	(0.00466)	(0.02229)

Appendix C: Vector Error Correction Model

Vector Error Correction Estimates

Date: 09/22/15 Time: 19:28

Sample (adjusted): 1983 2014

Included observations: 28 after adjustments

Standard errors in ( ) & t-statistics in [ ]

Cointegrating Eq:	CointEq1
LOG_GDP(-1)	1.000000
LOG_GVT_EXP(-1)	-0.023563
	(0.00914)
	[-2.57715]
LOG_INVST(-1)	0.024575
	(0.04707)
	[0.52207]
LOG_MS(-1)	-0.627994
	(0.02655)
	[-23.6502]
C	-1.552407

Error Correction:	D(LOG_GDP)	D(LOG_GVT_EXP)	D(LOG_INVST)	D(LOG_MS)
CointEq1	-0.118078	8.275170	-0.580849	-0.154238
	(0.03074)	(6.21902)	(0.75748)	(0.13491)

	[-3.84156]	[1.33062]	[-0.76682]	[-1.14330]
D(LOG_GDP(				
-1))	-0.083716	86.08496	2.745592	0.540686
	(0.22628)	(45.7835)	(5.57645)	(0.99316)
	[-0.36997]	[1.88026]	[0.49236]	[0.54441]
D(LOG_GDP(				
-2))	-0.125434	-1.466963	1.099901	-0.043934
	(0.24645)	(49.8634)	(6.07338)	(1.08166)
	[-0.50897]	[-0.02942]	[0.18110]	[-0.04062]
D(LOG_GVT				
_EXP(-1))	-0.000237	-0.549626	-0.028800	0.000817
	(0.00111)	(0.22440)	(0.02733)	(0.00487)
	[-0.21360]	[-2.44927]	[-1.05368]	[0.16781]
D(LOG_GVT				
_EXP(-2))	-0.000724	-0.150630	-0.044175	-0.006645
	(0.00110)	(0.22294)	(0.02715)	(0.00484)
	[-0.65743]	[-0.67565]	[-1.62683]	[-1.37410]
D(LOG_INVS				
T(-1))	-0.003726	-0.690081	-0.237560	0.009700
	(0.00606)	(1.22562)	(0.14928)	(0.02659)
	[-0.61513]	[-0.56304]	[-1.59136]	[0.36483]
D(LOG_INVS				
T(-2))	-0.005695	1.861858	0.399433	-0.022111
	(0.00517)	(1.04633)	(0.12744)	(0.02270)
	[-1.10120]	[1.77942]	[3.13422]	[-0.97418]
D(LOG_MS(-	0.108680	4.108402	-3.178080	0.303979

1))				
	(0.08314)	(16.8209)	(2.04880)	(0.36489)
	[1.30726]	[0.24424]	[-1.55119]	[0.83308]
D(LOG_MS(-2))	-0.217469	9.729625	-1.434569	-0.052161
	(0.08250)	(16.6927)	(2.03318)	(0.36211)
	[-2.63592]	[0.58287]	[-0.70558]	[-0.14405]
C	0.132798	-10.55302	0.358066	0.042707
	(0.03626)	(7.33751)	(0.89371)	(0.15917)
	[3.66190]	[-1.43823]	[0.40065]	[0.26832]
R-squared	0.683929	0.468054	0.541499	0.442632
Adj. R-squared	0.525893	0.202080	0.312248	0.163948
Sum sq. resids	0.006973	285.4660	4.234978	0.134329
S.E. equation	0.019682	3.982364	0.485053	0.086387
F-statistic	4.327691	1.759777	2.362036	1.588294
Log likelihood	76.44016	-72.23714	-13.28671	35.02503
Akaike AIC	-4.745726	5.874081	1.663336	-1.787502
Schwarz SC	-4.269938	6.349869	2.139124	-1.311715
Mean dependent	0.097188	-0.464286	0.159695	0.119573
S.D. dependent	0.028585	4.458219	0.584889	0.094478

Determinant resid covariance (dof adj.)	4.27E-06
Determinant resid covariance	7.29E-07
Log likelihood	38.92836

Akaike information criterion	0.362260
Schwarz criterion	2.455724

Appendix D: Breusch-Godfrey Serial Correlation LM Test

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	7.503118	Prob. F(2,28)	0.0025
Obs*R-squared	11.86368	Prob. Chi-Square(2)	0.0027

Test Equation:

Dependent Variable: RESID

Method: Least Squares

Date: 10/20/15 Time: 21:37

Sample: 1980 2014

Included observations: 34

Presample and interior missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG_GVT_EXP	0.002902	0.002891	1.003795	0.3241
LOG_INVST	-0.001107	0.011120	-0.099532	0.9214
LOG_MS	0.012358	0.010724	1.152398	0.2589
C	-0.183546	0.151614	-1.210611	0.2362
RESID(-1)	0.797840	0.272940	2.923135	0.0068
RESID(-2)	0.065226	0.292767	0.222790	0.8253

R-squared	0.348932	Mean dependent var	-1.73E-16
Adjusted R-squared	0.232669	S.D. dependent var	0.069158
S.E. of regression	0.060581	Akaike info criterion	-2.610887
Sum squared resid	0.102762	Schwarz criterion	-2.341529
Log likelihood	50.38507	Hannan-Quinn criter.	-2.519028
F-statistic	3.001247	Durbin-Watson stat	1.384112
Prob(F-statistic)	0.027169		

Appendix E:Heteroscedasticity: White

Heteroskedasticity Test: White

F-statistic	0.815158	Prob. F(9,24)	0.6077
Obs*R-squared	7.960012	Prob. Chi-Square(9)	0.5382
Scaled explained SS	18.66779	Prob. Chi-Square(9)	0.0282

Test Equation:

Dependent Variable: RESID^2

Method: Least Squares

Date: 10/20/15 Time: 21:57

Sample: 1980 2014

Included observations: 34

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.310457	0.499598	-0.621413	0.5402
LOG_GVT_EXP^2	1.61E-05	0.000131	0.122460	0.9036
LOG_GVT_EXP*LOG_ INVST	-0.000951	0.000764	-1.243994	0.2255
LOG_GVT_EXP*LOG_ MS	-0.000329	0.000950	-0.346525	0.7320
LOG_GVT_EXP	0.009390	0.015366	0.611096	0.5469
LOG_INVST^2	-0.000553	0.001944	-0.284479	0.7785
LOG_INVST*LOG_MS	0.001982	0.003695	0.536437	0.5966
LOG_INVST	-0.002533	0.034622	-0.073175	0.9423
LOG_MS^2	-0.001689	0.002127	-0.794177	0.4349
LOG_MS	0.037475	0.061088	0.613459	0.5453

R-squared	0.234118	Mean dependent var	0.004642
Adjusted R-squared	-0.053088	S.D. dependent var	0.011566
S.E. of regression	0.011869	Akaike info criterion	-5.789901
Sum squared resid	0.003381	Schwarz criterion	-5.340971
Log likelihood	108.4283	Hannan-Quinn criter.	-5.636803

F-statistic	0.815158	Durbin-Watson stat	1.647917
Prob(F-statistic)	0.607682		

Appendix F: Ramsey Test

Ramsey RESET Test

Equation: UNTITLED

Specification: LOG_GDP LOG_GVT_EXP LOG_INVST LOG_MS C

Omitted Variables: Squares of fitted values

	Value	df	Probability
t-statistic	0.302562	29	0.7644
F-statistic	0.091544	(1, 29)	0.7644
Likelihood ratio	0.107158	1	0.7434

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	0.000497	1	0.000497
Restricted SSR	0.157835	30	0.005261
Unrestricted SSR	0.157339	29	0.005425
Unrestricted SSR	0.157339	29	0.005425

LR test summary:

	Value	df
Restricted LogL	43.08968	30
Unrestricted LogL	43.14326	29

Unrestricted Test Equation:

Dependent Variable: LOG_GDP

Method: Least Squares

Date: 10/21/15 Time: 10:24

Sample: 1980 2014

Included observations: 34

Variable	Coefficient	Std. Error	t-Statistic	Prob.

LOG_GVT_EXP	-0.003054	0.003274	-0.932801	0.3586
LOG_INVST	0.008371	0.013534	0.618500	0.5411
LOG_MS	0.669657	0.200768	3.335473	0.0023
C	0.782893	1.189741	0.658037	0.5157
FITTED^2	0.004316	0.014264	0.302562	0.7644

R-squared	0.995705	Mean dependent var	9.652140
Adjusted R-squared	0.995112	S.D. dependent var	1.053587
S.E. of regression	0.073658	Akaike info criterion	-2.243721
Sum squared resid	0.157339	Schwarz criterion	-2.019256
Log likelihood	43.14326	Hannan-Quinn criter.	-2.167172
F-statistic	1680.691	Durbin-Watson stat	0.746401
Prob(F-statistic)	0.000000		

Appendix G: Regression

Dependent Variable: LOG_GDP

Method: Least Squares

Date: 10/20/15 Time: 12:45

Sample: 1980 2014

Included observations: 34

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG_GVT_EXP	-0.035441	0.039018	-0.908329	0.3709
LOG_INVST	0.007140	0.013350	0.534876	0.5967
LOG_MS	0.731816	0.011454	63.89141	0.0000
C	0.460127	0.201388	2.284782	0.0296

R-squared	0.995677	Mean dependent var	9.652140
Adjusted R-squared	0.995245	S.D. dependent var	1.053587
S.E. of regression	0.072650	Akaike info criterion	-2.296197
Sum squared resid	0.158341	Schwarz criterion	-2.116625
Log likelihood	43.03534	Hannan-Quinn criter.	-2.234958
F-statistic	2303.462	Durbin-Watson stat	0.717759
Prob(F-statistic)	0.000000		