Government Expenditure and Economic Growth in South Africa:
Causality and Cointegration Nexus

BY

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DECLARATION

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I, Ifeoma Anthonia Iwegbunam declare that this dissertation ***"Government Expenditure and Economic Growth in South Africa: Causality and Cointegration Nexus"*** is my original work and has not been presented at any other University for a similar or any other degree awarded. All the sources that I have used or quoted from have been indicated and acknowledged by means of complete references.

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ABSTRACT

This study examined the effects of government expenditure on different components of economic growth in South Africa using quarterly data from the period 1970Q1 to 2016Q4. The six key policy variables employed in the analysis were derived from the Ram (1986) production model and the New Growth Path (NGP), a macroeconomic framework designed to address the main challenges (unemployment, poverty and inequality) facing the economy as a result of its political past. The analysis of the relationship was carried out using the VECM while the findings from the analysis revealed that though there exists a long-run equilibrium relationship among the variables. The long-run estimates showed that aggregate private consumption expenditure and employment-to-population ratio are significant but negatively, related to economic growth. However, the net inflows of foreign direct investment and gross fixed capital formation are negatively related to gross government expenditure. This implies that excessive public capital expenditure might reduce the positive impact of the two variables on economic growth. The study therefore suggests that government should consider increasing its expenditure on the significant variables that support labour and capital development, in order to enhance economic growth in South Africa.

KEY TERMS

Economic Growth Models; Government Expenditure; Productive Expenditure; Unit Root; Cointegration; Granger Causality; Long-Run Estimates; VECM; South Africa

DEDICATION

To my lovely daughters – Chimdalu and Chimsimdi

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Although the institution and individuals mentioned above contributed to the success of this work; all errors, omissions, theoretical and empirical implications emanating from this study are completely mine and should not be attributed to any of the above mentioned individuals or institution.

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ACRONYMS

2SLS	Two Stage Least Square
3SLS	Three Stage Least Square
AD	Aggregate Demand
AS	Aggregate Supply
ASGISA	Accelerated and Shared Growth Initiative of South Africa
ADF	Augmented Dickey-Fuller Test
AIC	Akaike Information Criterion
AK	Capital
ARDL	Autoregressive Distributed Lag
AR	Autoregressive
ARRA	American Recovery and Reinvestment Act
CAP	Capital (Gross Fixed Capital Formation)
CCT	Conditional Cash Transfer
CVA	Construction Value Added
DOLS	Dynamic Ordinary Least Squares
ECB	European Countries Bulletin
ECM	Error Correction Mechanism
EU	European Union
FDI	Foreign Direct Investment
FPE	Final Prediction Error
FGLS	Feasible Generalised Least Squares
GDP	Gross Domestic Products
GEAR	Growth Employment and Redistribution
GEXP	Gross Government Expenditure
GFCF	Gross Fixed Capital Formation
GMM	General Methods of Moments
G7 Nations	Canada, France, Italy, Germany, United States of America, Japan and United Kingdom
GSP	Gross State Products

GSDP	Gross State Domestic Products
HQC	Hannah-Quinn Criterion
ICP	International Comparison Project
LAB	Labour
LDC	Less Developed Countries
LR	Likelihood Ratio
MIDC	Mid-Income Developing Countries
MPS	Marginal Propensity to Save
MTSF	Medium Term Strategic Framework
NDP	National Development Programme
OECD	Organisation for Economic Co-operation and Development
OLS	Ordinary Least Square
PMG	Pooled Mean Group
PEXP	Private Consumption Expenditure
PP	Philip-Perron
RDP	Reconstruction and Development Programme
SIC	Schwartz Information Criterion
SGP	Stability and Growth Path
UECM	Unrestricted Error Correction Mechanism
UK	United Kingdom
USA	United States of America
VAR	Vector Auto Regressive
VECM	Vector Error Correction Mechanism

CHAPTER ONE
Overview and Background of the Study

1.1 Introduction

Much emphasis has been placed on the level of economic achievements in developing economies around the world since the last two decades. Considering their economic strength, these countries have become important trading partners of the developed world, and have also supported the expansion of production activities amongst themselves. Although increasing economic performance in these countries is a priority, high unemployment rate, inequality and poverty still prevail, and the quest for all-inclusive, equitable and sustainable economic growth has challenged the structure of government expenditure and its relationship to economic growth. Research conducted by Africa's Pulse (2013) indicated that government expenditure has been much less growth-enhancing in developing countries due to high rate of poverty and increasing inequality, which has led to resource over-dependence in these economies.

Keynes (1936) proposed the approach of using public spending to stimulate economic growth, especially when private expenditure and investment are insufficient. The ideology behind Keynes' views is that the discretionary fiscal policy, if effectively utilised, can increase aggregate demand, thereby stimulating the macro-economy. Wagner (1883) came up with a law based on the direction of causality between government expenditure and economic growth which lies on the belief that increases in the level of GDP as a result of industrialisation will increase the share of government expenditure.

Expenditure by government consists of two types: recurrent and capital expenditure. The former includes wages, salaries, subsides, transfers and other consumption expenses, while the latter encompasses government spending on capital projects, such as the construction of physical infrastructure and provision of social and health care services. These services rendered by the public sector might be too expensive for private

sectors to provide for the public, but when provided by government, they can improve competitiveness, which in turn leads to economic growth (Maingi, 2007).

In light of the above, several economic researchers have applied disaggregated methods of measuring the impact of government expenditure on economic growth. For example, Barro (1990) designed a model of government expenditure in a theory of endogenous growth, whereby the long-run rate of growth depends on the structure of government expenditure, which is classified as productive and non-productive. To support Barro's views, Deverajan and Nabi (2006) highlighted the importance of considering how different categories of government expenditure impacts on economic growth. In this regard, the central argument amongst most economists has been whether it will be worthwhile for government to be selective with its expenditure, and if so, how to choose the most beneficial of all.

Empirical studies conducted in relation to the South African economy (Fedderke et al., 2006; Chipaumire et al., 2014; Mosikari and Matlwa, 2014 and Odhiambo, 2015) provide an in-depth analysis of the relationship between aggregate and disaggregated government expenditure and economic growth, or their direction of causality. However, the studies do not consider whether the South African government is applying an effective policy framework. This implies that previous studies have not helped to answer the question as to how government will be able to identify the core areas where increased expenditure can be most productively employed, in order to curb the inefficiencies existing in the economy. To examine whether government outlays are directed towards the right policy framework, an existence of a long-run equilibrium relationship among the variables needs to be established, and whether the relationship is positive or not. Moreover, isolating the precise effects of government expenditure on aggregate economic performance might be impossible without considering the structure of this expenditure. In this regard, results have been somewhat inconclusive, which has left gaps that need to be filled in terms of understanding the effects of government expenditure on different components of economic growth in South Africa. This study is different from previous one in that:

Firstly, it empirically examined the externality effects of government expenditure on the adopted key policy variables, as contained in the Ram's production model and New Growth Path (NGP) 2010.

Secondly, in its analysis, this study uses recent quarterly time series data from 1970Q1 to 2016Q4 -in view of the significance of the 1970s and 1990s in the country's economic history to analyse the variables' short-run and long-run impacts on economic growth.

1.2 Problem Statement

Although, not much was done to extend increased government expenditure to the black majority in South Africa during the pre-1994 period. However, after independence, government expenditure, both recurrent and capital, increased significantly due to various macroeconomic policies designed by government to make the economy all-inclusive (Moyo and Mamabolo, 2014).

The policy framework since independence has led to enormous economic achievements in the country but the economic condition of the previously marginalised black population does not seem to be much better than it was before independence. Again, the gap between the sophisticated formal economy and the second informal economy, which is characterised by three main challenges namely unemployment, poverty and race-based inequality keeps widening. It is this second economy that presents challenges, which are considered by the government to be the most salient economic problems facing the country. Statistics South Africa's poverty trends (2017) shows that between 2011 and 2015, the proportion of people living in poverty, who are earning below the poverty line of one thousand, one hundred and thirty-eight South African Rands per person per month, has increased from 53.2 percent to 55.5 percent respectively, which translates into 30.4 million of the country's population. The same source maintained that approximately 62 percent of Black Africans, 29 percent of mixed race (Coloured) persons, 11 percent of Asians and 4 percent of Whites are living in poverty. Within this group, 13.8 million people, which increased from 11 million in 2011, live in extreme poverty, which is below the food

poverty line of five hundred and thirty-one South African Rands per person per month. These people lack adequate nutrition, health care and education, which makes it difficult for them to acquire the necessary skills to be gainfully employed.

Furthermore, the country's growth rate has been consistently declining and slowly moving into a recession, not only because of the global financial crisis of 2007/2008 (which affected most of the country's major trade partners, such as the United Kingdom and the US). But also due to other structural factors contributing towards a negative growth rate within the economy.

Nonetheless, even though the country compares well with its BRIC counterparts in terms of affordability and availability of capital, financial market sophistication, business tax rates and infrastructure, it fares poorly when it comes to public basic education and skills acquisitions (National Treasury, 2015). This has resulted in a significant shortage of skilled labour, despite reports ranking South Africa fourth in terms of its budget allocation to education (World Economic Forum Report, 2014). The same source mentioned that it also came eleventh in its use of technology and innovation, when compared to fourteen other developing economies. The slump in the mining, quarrying and manufacturing sectors has resulted to constant job losses for example, about 62 000 jobs were shed in the mining industry, 58 000 in the trade sector, 53 000 in community and social services and 10 000 in the manufacturing industry all in 2016 (Industrial Development Corporation Report, 2017). This has led to continuous decrease in productivity rate in the country; making it impossible for more employment opportunities to be created and has raised the level of unemployment to 27.7 percent by the second quarter of 2017, including the ongoing labour unrest among the country's workforce which has increased the level of social vices (high crime rates) in the country.

Furthermore, government revenue is significantly stretched as a result of over-dependency due to these problems. The dependency ratio does not only involve the South African citizens but also nationals from countries around South Africa, due to the porous nature of its borders. The immigrants also rely on grants, free medical care and other subsidised government initiatives.

In terms of the gross savings ratio in South Africa currently at about 16.4 percentage, it does not compare well with its BRIC counterparts; for example, China has a savings ratio

of about 46.5 percent and India about 28.9 percent. The negative effect of low savings in the economy has resulted into huge reliance on foreign capital and portfolio inflows whereby a significant portion of these inflows are used to finance consumption instead of investment which has not favoured growth well added to constant currency volatility (World Bank Newsletter, 2017).

The increased government debt due to the government's borrowing to finance its expenditure has also not done any good for the economy lately. The trade and current account deficit has increased from 1.7 percent in the fourth quarter of 2016 to 2.1 percent in the second quarter of 2017 (South African Reserve Bank Report, 2017). In addition, three international investment-rating agencies, namely Standard and Poor, Fitch and Moody have downgraded the country's investment rating to junk status and Baa3 respectively, and have given a negative economic outlook for the country due to political instability, uncertainty surrounding policies and the consistently low growth rate. The effect of the above mentioned problems is that South Africa has continued to operate at a low GDP growth rate, which currently stands at 0.7 percent in the second quarter of 2017. On the other hand, government expenditure has continued to increase, resulting in low confidence and, in turn, low private and foreign direct investment inflows into the economy. There is also a decrease in household consumption due to high unemployment rate, interest rate increases, inflation and exchange rate volatility, with a weak balance sheet in all state-owned sectors.

Unlike other emerging markets, the country is still struggling to recover from the late 2000's recession. For example, exports and private investments are yet to recover fully. When compared with other developing economies like Chile, Mexico, Korea and Russia, South Africa is still falling behind due to the structural and political constraints discussed above (World Bank Report, 2015).

The effect of these problems on the country, according to Statistics South Africa (2016), is that the country's three main problems have become increasingly high. Therefore, a look at how government allocates its outlays, as well as measuring their impacts on different components of economic growth will help to strengthen the policy framework in the economy.

1.3 Aim of the Study

The aim of this study is to examine the externality effect of government expenditure on the different components of the economic growth. Thus, a disaggregated impact analysis of government expenditure on economic growth in South Africa is followed. This is done by applying the vector error correction mechanism (VECM) as the econometric technique, with quarterly data from 1970Q1 to 2016Q4.

1.4 Objectives of the Study

The main objective of this study is to empirically evaluate the effectiveness of government spending and how they impact on different components of economic growth in the South African economy. Given this objective, the specific objectives of this study are:

- To examine the relationship between government expenditure and economic growth in South Africa.
- To analyse the impact of government expenditure on different components of economic growth in South Africa.
- To estimate the long-run equilibrium relationship and causality effect between government expenditure and economic growth in South Africa.
- To observe the short-run relationship and dynamics between government expenditure and different components of economic growth in South Africa.

1.5 Research Questions

The main research question addressed in this study is to determine of all government expenditure in South Africa, to what extent is their effect on different components of economic growth in South Africa. In order to address the main research question, three research sub-questions were formulated, as indicated in Table 1.1 below.

Table 1.1 Research sub-questions:

	Research Sub-Questions
RQ1	What is the relationship between government expenditures and economic growth in South Africa?
RQ2	Is there a need to redirect government expenditure in South Africa to those core areas where increased expenditure will most productively be employed, in order to curb the inefficiencies existing in the economy, as well as to achieve the appropriate implementation of those macroeconomic policies that will make it all-inclusive?
RQ3	How appropriate and effective is the proposed framework following RQ2?

1.6 Outline of the Study

The remainder of the study will be as follows:

Chapter two presents an overview of economic growth and related concepts. It also provides a detailed discussion of the South African economy, with a focus on the performance and achievements of the economy since independence. In addition, it investigates the country's economic prospects and various growth recovery plans introduced into the economy, while highlighting some of the challenges currently being faced. An analysis of the key variables used in the study is done using trend diagrams.

Chapter three includes a discussion on various growth models, as well as theoretical and empirical literature related to the study. Some of the models and theories discussed are the Harrod-Domar growth model, endogenous growth model, AK model, innovation-based model, Solow neoclassical growth model, Shumpeterian growth model, Keynesian theory, Wagner's hypothesis of increasing state activities, Peacock and Wiseman theory, Musgrave theory, Stanley Please hypothesis, and Colin Clark's critical limits hypothesis.

In addition, existing empirical literature, both globally and in Africa and South Africa, is reviewed and analysed in chapter four.

Chapter five introduces the preferred theoretical framework adopted for the study, together with an analysis of the data, and an explanation of the methodology employed in the study. The methodology section systematically defines steps taken in the empirical analysis. The topics covered include the following: stationarity tests, cointegration tests, Granger-causality tests, long-run and short-run estimates, the vector error correction mechanism, as well as the impulse response function.

Chapter six contains the empirical analysis based on the estimated results from the econometric analysis, which explains the nature of effects and relationship between government expenditure and economic growth in South Africa. Further diagnostic tests such as the Wald coefficient test, Breusch-Godfrey serial correlation LM test, variance decomposition and impulse response function, which were carried out to ensure the validity and efficiency of the previous estimated results, are also discussed in the chapter. Chapter seven presents the concluding remarks about the study, starting with a summary of the study, followed by a summary of the chapters and policy recommendations, as well as limitations of the study and areas for further research.

CHAPTER TWO

Government Expenditure and Economic Growth in South Africa

2.1 Introduction

This chapter discusses the concept and components of economic growth, and provides an overview of the South African economy, including economic performance within sectors and various growth recovery plans since the country's independence. An analysis will be carried out using trends of different components of economic growth in relation to GDP growth rate. The sections in this chapter are divided as follows: section 2.2 looks at the concept of economic growth, as well as the role of government expenditure in the economic growth process, while section 2.3 provides a background discussion of the South African economy, including various recovery policies designed since independence. Components and structures of government expenditure were explained in section 2.4, while the trends in government expenditure are discussed in section 2.5. Section 2.6 analyses GDP and economic growth in South Africa, and section 2.7 examines economic growth trends. Different components of economic growth discussed in this study were discussed in section 2.8, and section 2.9 concludes the chapter.

2.2 Concept of Economic Growth

Growth in any economy is associated with real output increases, sustainability and the ability of government to design policies that can keep economic activities in balance. Lucas (1988) suggests that the importance of human welfare attached to government's actions in the growth process provides a better understanding of economic growth. In the same way, all economic activities, both in private and public sectors, have a role to play in the process. The rate at which economies grow can be uneven, not only across time but also across countries, just like its determinants vary across countries, rather than across individuals within countries (Howitt, 2010).

However, the process can be short-term or long-term, and the growth rate within these periods can be actual growth or potential growth, while the difference between actual output and potential output can be referred to as output gap. The periods in the process

explain the level of interaction between various determinants of economic growth, which includes the following: the rate of capital accumulation- physical, human and natural capital, increase in productivity of resources, growth in population, and the rate of productivity growth. These determinants can be mathematically represented as:

$$y = f(k, A) \tag{2.1}$$

While y represents output per worker, the vector k represents capita that is physical, human and natural, and A is the productivity parameter. Therefore, for a country to attain its equilibrium rate, the growth rate of y (output per worker) will have to depend on the determinants of economic growth. In terms of this process, Howitt and Weil (2010) assume that countries can differ in their GDP growth rate, either because of differences in capital or in productivity.

2.3 Overview of the South African Economy

South Africa is a country located in the southern part of the African continent with a population of about 55.91 million (Statistics South Africa, 2016). The country is endowed with many natural resources, such as gold, diamonds, aluminum, coal, manganese and platinum, amongst other mineral resources, which has attracted different settlers and investors to the economy over the years. The economy has transformed from a primary to a secondary, and currently a tertiary economy, due to its advancement in terms of services.

Within the South Africa's population, the total working age group aged fifteen to sixty-four has grown by eleven million from 1994 to 2016, which represents sixty-five percent of the country's total population. The World Economic Forum report (2015) estimates that the workforce is expected to grow by another nine million in the next fifty years, and that given the rate of growth in the total workforce, the country could double its per capita income and eliminate extreme poverty by 2030, through generating jobs for its high and growing number of young workers. Since its independence in 1994, after a long history of apartheid, the country has successfully revived its economy. However, it has witnessed a series of changes in its growth process from the apartheid era, when the rest of the world imposed economic isolation and financial sanctions on the country. This contributed

to years of poor growth performance until the post-apartheid era, when its economic conditions began to improve.

As part of the process to eliminate the effects of the long apartheid history in the country, the country has targeted an all-inclusive economy by drawing on the energies of its people and given a voice through the creation of various macroeconomic policies to help in the process. The programmes are discussed in the following subsections to show how government expenditure on them has contributed to economic growth in South Africa. The subsections of section 2.3 discuss the policy framework as follows: subsection 2.3.1 looks at the Reconstruction and Development Programme (RDP) of 1994, while 2.3.2 deals with the Growth, Employment and Redistribution (GEAR) Programme of 1996. The Accelerated and Shared Growth Initiative for South Africa (ASGISA) of 2005 is contained in subsection 2.3.3 and the New Growth Path (NGP) of 2010 (including the Green Economy) in 2.3.4. Subsection 2.3.5 analyses the National Development Plan (NDP) of 2012. All these programmes, according to the researchers who studied each of them, were introduced after consultations and planning on ways to make the economy all-inclusive.

2.3.1 Reconstruction and Development Programme (RDP)

This programme was established in 1994 by the ANC-led administration at the end of the apartheid era in South Africa. The aim of the programme was to integrate every citizen into the nation-building process, improve the lives of ordinary citizens, and avail communities, especially the previously disadvantaged, the opportunity to participate in decision making, as well as implementing the project through various forms of empowerments. Chabangu (2006) suggests that the RDP contained a vision of an integrated citizenry working together with a government committed to human development, in order to end the social exclusion associated with apartheid, and to build a better life through employment, health, housing and everything else needed to ensure a brighter future. In line with RDP objectives, a five-year programme was developed, according to Mamburu (2004), which includes the following objectives:

a.) To link growth, development, reconstruction, redistribution and reconciliation to a broad infrastructural programme that will focus on meeting the basic needs of ordinary people in the community;
b.) To develop human resources in the country, by making education and training available from the cradle to the grave;
c.) To build the economy and make the country's economic strengths beneficial to all, and to further address the weaknesses created by the previous era;
d.) To democratise the state and society so that the resources and potentials will be available for a coherent programme of RDP;
e.) To implement RDP through establishing effective structures in government at a national, provincial and local level.

The implementation of RDP policies is considered a success because it showed progress in dealing with South Africa's most severe social problems, as contained in *The Reconstruction and Development Programme: A Policy Framework* (1994: 14- 57), which included the following:

Housing: within the period during which the programme was in place, about 1.1 million houses were built from 1994 to 2001 in townships and rural communities in South Africa

Clean water: the problem of clean water in rural areas was reduced through the installation of water pipes within 200 metres reach of 1.3 million rural people from 1994 to 1998.By 2000, about 236 water projects to supply clean water to 4.9 million people in the communities had been completed.

Electricity: rural electrification was achieved from 1994 to mid-2000, providing electricity to 1.75 million rural homes, which represented an increase from 12 percent to 45 percent during this period.

Land reform: the land reform policy contained in the RDP programme helped about 39,000 families to settle on 3.550 square kilometress of land by 1999.

Health care services: health care improvement led to the building of 500 new clinics in rural areas between 1994 and 1998. This provided an additional 5 million people with access to primary health care. For example, the polio-hepatitis vaccination programme,

which began in 1998, reached about 8 million people within two years from the start of the programme.

Public works programme: this helped to provide employment opportunities to about 250,000 people within five years through infrastructural development.

School nutrition programme: the primary school nutrition programme fed about 4.5 million learners during the period of the programme.

Although the RDP programme is believed to have been successful in several ways, there are some problems associated with the full implementation of the programme, which made it impossible to achieve the targets. In the view of Chabangu (2006), the shortcomings were as a result of lack of funds, insufficient staffing and poor coordination between institutions, as well as the lack of people-driven development on the ground. These problems led to the designing of another macroeconomic policy framework in 1996, in order to fill the gap in the RDP.

2.3.2 Growth, Employment and Redistribution (GEAR)

This programme was designed to correct the errors in the 1994 RDP programme, with the objectives of building state capacity that would deliver through spending on social programmes such as social grants, increasing economic growth, reducing national debt, stabilising inflation, providing basic services to the poor, and effecting socio-economic rights, as contained in the Constitution. The strategy employed by the programme in order to achieve the above was to link poverty reduction and neo-liberal economic policy in the form of reducing budget deficit and applying cautious monetary policy (Weeks, 1999). This strategy would help to enhance the credibility of the South African government, by signaling to the international investor community South Africa's commitment to a stable macro policy (OECD/AFDB, 2002: 270). The same source maintained that within the framework, government has undertaken a programme known as Spatial Development Initiatives (SDIs), with the aim of improving the infrastructure and institutional environment through the initiatives and industrial zones, in order to attract local and international investors. This tends to focus on economic growth that will

be driven mainly by private sector investments, which will help to create more employment opportunities. Despite several criticisms of the programme due to poor implementation, Weeks (1999) agrees that there are some benefits of GEAR, which include the following:

a.) Economic growth from 3 percent to 4 percent and 5 percent in 2004 and 2005 respectively;
b.) Reduction in high levels of government debts; and
c.) Stabilisation of inflation within the period of the policy.

Although the abovementioned achievements can be linked to GEAR, socio-economic problems, such as poverty and inequality as a result of the high unemployment rate in South Africa, continued to deepen, making it impossible for the programme to reach its full potential. Therefore, another programme that would counter the effects of South African socio-economic problems was considered in 2006, and ASGISA was introduced to replace GEAR.

2.3.3 Accelerated and Shared Growth Initiative for South Africa (ASGISA)

With contributions from the private sector and the academic community, the South African government believed that such collective ideas would proffer solutions to the main problems affecting the South African economy, namely poverty and unemployment. This is not to say that the programme contained a new macroeconomic policy, but it did introduce initiatives to sustain higher and shared growth, as well as to help address some distribution issues. Thus, in partnership with the Joint Initiative on Priority Skills Acquisition (JIPSA), a three-year initiative focusing on addressing skills challenges identified by ASGISA was implemented. According to Hirsch (2006), the following objectives were achieved:

- To halve poverty from one-third of households to less than one-sixth of households by 2010; and
- To halve unemployment from about 30 percent to 15 percent by 2014.

In terms of unemployment reduction, government's medium-term expenditure framework (MTEF) plan for infrastructure, which amounted to 370 billion South African Rands, was able to create sustainable job opportunities and attract new job opportunities within the period.

Economic growth was set to average 4.5 percent by 2009 and 6 percent by 2010. With improvement initiatives in mind, some problems were envisaged to be a drawback to the programme, as described by Boshoff (2008) and Moyo and Mamobolo (2014). These included the following:

- Inefficiency associated with state organisations, capacity building and strategic leadership, which affected the delivery of the programme.
- Regulatory problems and economic burden on SMMES.
- Over-costing of contracts and inefficiency of the national logistics system.
- Exchange rate volatility of South African Rands in relation to other currencies.
- Shortage of skills and disjointed spatial settlement patterns.
- Barriers to entry and competition in sectors of the economy.

Despite the envisaged problems, significant progress was recorded in the areas of macro and state capacity, infrastructure, education and skills, industrial policy, and regulation, amongst others. For example, in the Siyenza Manje Project at DBSA, investment as a percentage of GDP grew from 14 percent to 18.5 percent, Eskom power station approval and consideration of the CTL plant were achieved, and the King Shaka airport was completed in 2010. Furthermore, the Dube Trade port was constructed, FET capitalisation was achieved, and new bursary/loan programmes were introduced. The national industrial policy framework was also finalised (Moyo &Mamobolo, 2014).

2.3.4 The New Growth Path (NGP)

This was an initiative developed by the government in 2010, with the intention of creating more employment opportunities and reducing unemployment by 10 percent by 2020. The focus was on improving six selected areas of the economy, namely: infrastructure development, agriculture, mining, manufacturing, tourism, and creating a green economy, which were regarded as economic drivers. Zarenda (2013) assumes that the idea of

creating a lower-carbon economy can help to generate jobs and act as a spur for industrial development. In addition, the programme emphasised the possibility of social equity and competitiveness enhancing economic growth and socioeconomic change. It also encouraged the mobilization of domestic investment in sustainable industries and the direction of growth towards employment-creating activities.

Furthermore, in an attempt to minimise the problem of increased urbanisation and the abandonment of rural economy, the programme brought about a reduction in the cost of economic activities and living in rural areas. It also developed infrastructures and increased the number of housing projects, all directed towards improving economic conditions and making it conducive for dwellers to engage more in growing. This was an incentive on the part of government towards achieving the planned integrated economy. The programme continued until June 2011, when a report from the National Planning Committee highlighted the achievements of the programme, as well as its shortfalls, the latter being associated with the structural history of South Africa, which was regarded as an impediment to the plans. These challenges were as follows: chronic unemployment, poor education and infrastructure, resource-intensive unsustainability, inadequate and poor quality public health and general public services, high levels of corruption, and a racially divided society (National Planning Commission, 2011:15). Within the report, four new economic challenges were added to the existing ones, namely a focus on the rural economy, social protection, regional/world affairs and community. Based on the diagnostic report, the new strategic framework was released in December 2011 as the National Development Plan (NDP).

2.3.5 The National Development Plan (NDP)

This programme drew its policies from the New Growth Path (NGP) and added to its plan the four new challenges from the diagnostic report, as discussed above. The strategic perspective of the NDP offers a long-term vision for the country until 2030, while aiming to ensure that all South Africans attain a decent standard of living through the elimination of poverty and the reduction of inequality (SAGI-SoNA, 2013:1). The government aimed to achieve this by allocating resources to help in strengthening links to a faster-growing economy and reducing constraints to growth in various sectors. The core elements of the

decent standard of living mentioned in the NDP plan are the same as those contained in previous plans since 1994. However, there are four overriding implementation objectives of the NDP, as indicated by Zarenda (2013) and SAGI-SoNA (2013:1), which are the following:

- Providing overarching goals for what is to be achieved by 2030.
- Building consensus on the key obstacles to achieving these goals and identifying what needs to be done to overcome these obstacles.
- Providing a shared long-term strategic framework within which more planning can take place, in order to advance the long-term goals set out in the NDP.
- Creating a basis for making decisions regarding how best to use limited resources.

Although the first five-year building block plans of the NDP, based on the Medium Term Strategic Framework (MTSF), are still valid, Lopes (2013) outlined some envisaged challenges arising from what transpired in other developing countries, which might hinder progress, namely:

- Ensuring a credible consultation process;
- Prioritising funding in line with development aspirations;
- Coordinating donors; and
- Strengthening capacity to implement projects and programmes.

There is also the need for a comprehensive and effective monitoring and evaluation system that feeds back into the policy making process.

All the various development policies designed since 1994 constitute the determinants of government expenditure in South Africa, because government allocates its resources based on how the policies will be implemented on the ground.

2.4 Components and Structures of Government Expenditure

The level of a country's economic growth can be attributed to the vital role played by the government in using its expenditure to create a suitable environment for sustainable long-term growth. In this regard, the government's role can be in the form of financial incentives such as grants and subsides, infrastructural development (gross fixed capital formation), employment creation, research and development funding, as well as the provision of

defence to secure and attract more investments. The dominant views among economists and policymakers are based on the supposition that government has a significant role to play in moving the economy forward. To this end, Wentworth (2012) believed that government financial incentives are important for economic growth, because they lower investment costs, create employment opportunities and reduce initial project risks, which help to attract more local and foreign investors - one of the main drivers of economic growth.

Given the importance of government expenditure in the economic growth process, it will be useful to analyse the characteristics of government expenditure and how they relate to economic growth. According to Budget Review (2017), increased government expenditure can lead to the multiplier effect, such as employment opportunities, increased earnings, and more spending opportunities, which will ultimately result in further increases in aggregate demand, savings and investments, thereby enhancing economic performance. In instances where there are spare capacities in the economy, government expenditure can enhance the rate of GDP growth with suitable macroeconomic variables, which are more effective than any monetary injection (Jelilov & Musa, 2016).

Maingi (2007) and Ag'enor (2007) suggest that government expenditure on gross fixed capital formation can have a direct effect on economic growth, by increasing the economy's capital stock. Moreover, the externality effects of government investment on human capital development rubs off on the private sector, by increasing the marginal productivity of privately supplied factors of production and enhancing growth. They also assume that public spending on goods and services increases consumption, which leads to increases in aggregate demand and productivity levels. There are also increases in intersectoral productivity differentials, which helps some sectors to produce more than others.

Furthermore, these authors suggest that even when government uses the fiscal policy, for example taxation, its effects, depending on the phase of the economic at the time, might not shift the aggregate demand curve downwards when they are increased. The study by Ag'enor (2007) revealed that during a recession, consumers might reduce their spending rate, which will in turn lead to increased private sector savings and investments. This point was also raised by critics such as Mitchell (2005) amongst others that

government's financing of its expenditure through taxation can crowd-out the private sector, especially when the economy is at its full capacity which can lead to the absence of net increases in aggregate demand. There is also an argument against increased government expenditure through borrowing, which might result in inefficiency and a diminished effect on the economy. In addition, borrowing could result in high debt services and an increased tax rate, which will weaken the impact of rising government expenditure, while aggregate demand will remain unchanged or even decrease because of the impact (Riedl, 2008).

Considering the above, budgeting and government expenditure in South Africa occurs through the Medium-Term Expenditure Framework (MTEF), which follows a three-year projection of income and expenditure. The government developed this framework after the apartheid era and uses it to strengthen economic and political decisions. This has paid off through various policy proposal assessments and transparency in the handling of public projects. Since the start of the post-apartheid era in South Africa, the various developmental programmes designed by the government to curb the effects of apartheid on the black majority have formed the major part of government expenditure. These programmes include the following: Reconstruction and Development Programme (RDP) of 1994; Growth, Employment and Redistribution (GEAR) Programme of 1996; Accelerated and Shared Growth Initiative for South Africa (ASGISA) of 2005; the New Growth Path (NGP) of 2010; and the National Development Plan (NDP) of 2012).

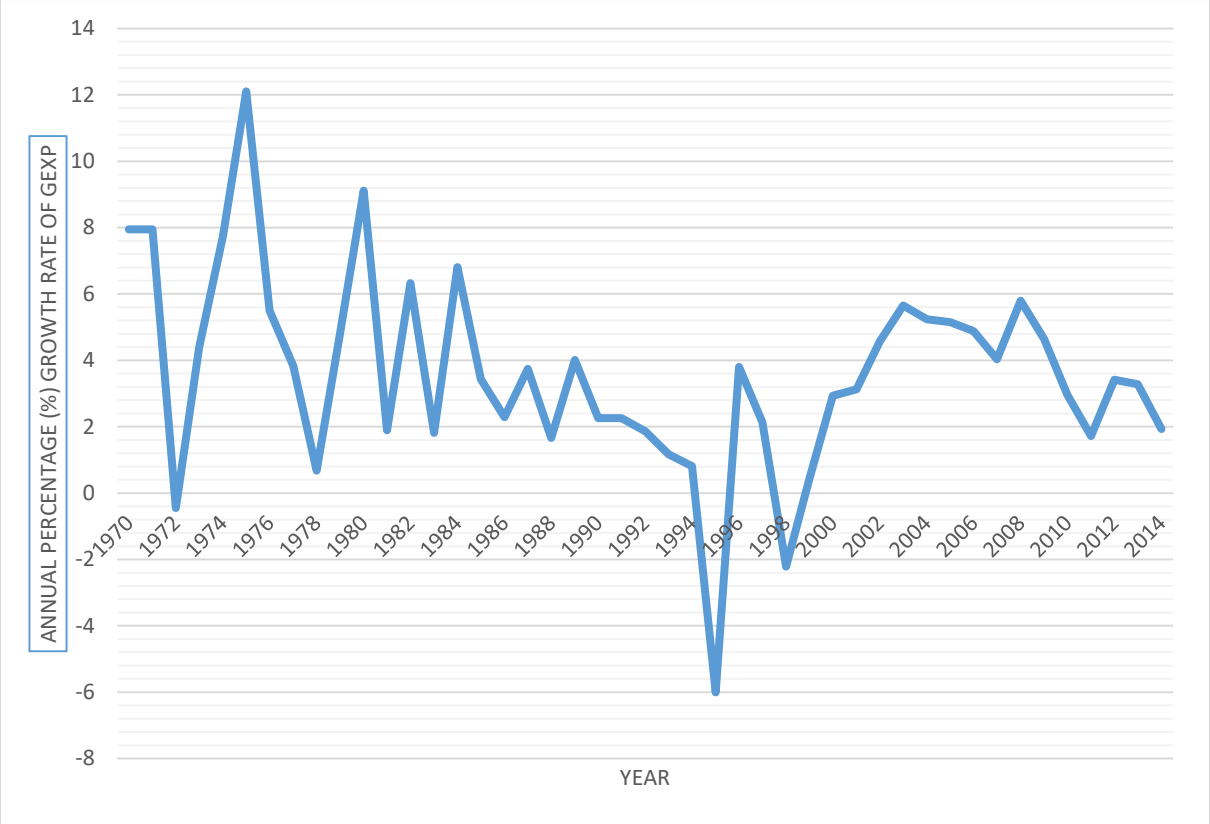
These macroeconomic policies are reflected in the country's budget plans, where allocations are made based on what needs to be achieved in terms of the development prospects. In other words, the priorities of government in South Africa currently include expenditure on education, health, nutrition, rural development, crime prevention, employment creation, and infrastructural development, amongst others. The main reason for this was that the composition of government expenditure prior to independence was not expanded to accommodate various economic advancement plans that would favour the black majority. Today, however, the focus has shifted to all-inclusive nation building.

2.5 Trends in Government Expenditure in South Africa

The trends in government final consumption expenditure can be measured using general government final consumption expenditure (annual percentage growth) and general government final consumption expenditure (percentage of GDP). While the general government final consumption expenditure (annual percentage growth) measures the annual percentage increases in government expenditure, general government final consumption expenditure (percentage of GDP) measures the percentage impact of government expenditure on the gross domestic product (GDP). In this section, the trends are measured from 1970 to 2016, which is the period being considered in this study.

Figure 2.1 below shows the trends in annual percentage growth rate of government expenditure from 1970 to 2016.

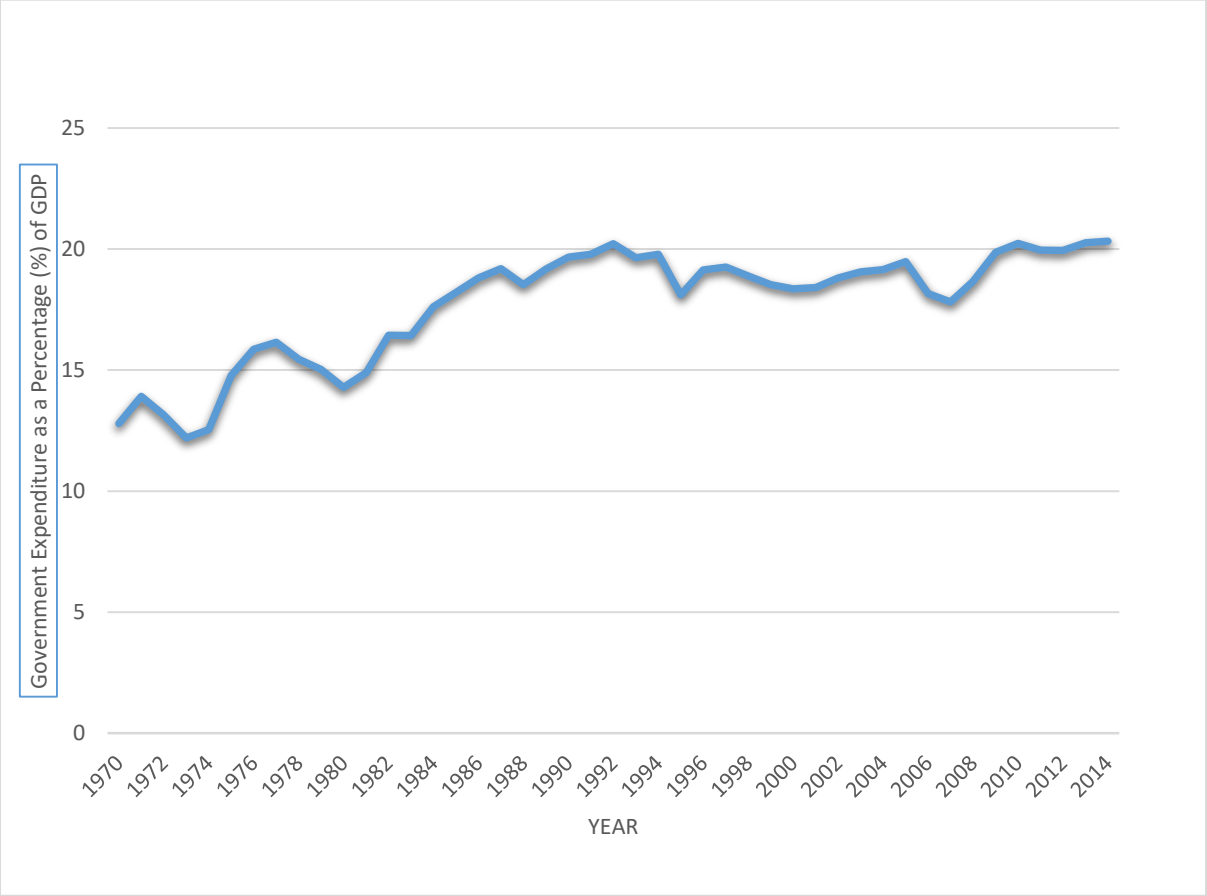
Figure 2.1: Government Expenditure as Annual Percentage Growth Rate: 1970 – 2016



Source: Author's Compilation: Adapted from World Development Indicators (2017)

As can be seen in the above figure, although the annual percentage growth rate of government expenditure to boost economic activities increased sharply to about 12.5 percent in 1972, it decreased to about -6.5 percent in 1995. The annual percentage growth rate picked up again in 1996 after independence, when the economy was re-integrated into the world economy. In addition, government's effort to improve the lives of the previously marginalised also contributed to the expenditure growth rate. South African government expenditure increased to R632428 million in the first quarter of 2016 from R630786 million in the fourth quarter of 2015. The average government spending from 1970 to 2016 is R304455 million, the highest being R632428 million in the first quarter of 2016, while the lowest was R65991 million in the first quarter of 1960 (National Treasury, 2016). Figure 2.2 below shows the trends in government expenditure in South Africa as a percentage of GDP from 1970 to 2016.

Figure 2.2: Government Expenditure as a Percentage of GDP: 1970 - 2016



Source: Author's calculations: Adapted from World Development Indicators (2017)

In terms of total government expenditure as a percentage of GDP, Figure 2.2 shows that in 1970, government expenditure as a percentage of GDP was 13 percent, which is the lowest for the period 1970-2016. From 1977 to 1979, government expenditure as a percentage of GDP was 15.2 percent, before it dropped to 14 percent between 1980 and 1981. In 1990, total government expenditure as a percentage of GDP was about 20 percent - the highest since 1960. Then in 1995, total government consumption expenditure decreased to 18 percent, and increased later to 19 percent from 1996 to 1998, after which it dropped to 18 percent in 1999, and stayed there until 2001. From 2002 to 2005, government expenditure was 19 percent, which changed to 20 percent in 2006. During the period 2007 to 2008, it decreased to 19 percent. The ratio of total

government expenditure to GDP reached 21 percent in 2009 - the highest recorded in the South African economy since 1960. Between 2011 and 2012, total government expenditure as a percentage of GDP was 20 percent, but increased to about 20.1 percent in 2014, with an expected increase of 7.5 percent within a three-year period, namely from 2016 to 2018.

The fluctuations between the late 1970s and 1980s could be linked to financial sanctioning and isolation by the world economy during the apartheid era. The increases in government expenditure from 1994 and changes in budget allocations can be attributed to the various macroeconomic framework as discussed at the beginning of this chapter, which were designed by government to address the socioeconomic problems created by the apartheid era. For example, public expenditure in 2013 was dedicated to restoring fiscal discipline, while shifting a greater proportion of the budget to infrastructural development (National budget, 2013). Within the fiscal years of 2013 and 2014, the overall budget rose to R1.15 trillion, with R682 billion allocated to social spending, which includes education, health, housing and social grants, amongst others. Therefore, with the increased number of social grant recipients, general government final consumption expenditure has managed to provide social grants to increased numbers of people, as well as to increase per-capita health expenditure. In addition, it constructed about 1.5 million free homes in the rural communities and provided free basic education to about 60 percent of learners across the country (Budget Speech, 2013; Odhiambo, 2015).

2.6 GDP and Economic Growth in South Africa

The South African economy has suffered from high levels of unemployment and income inequalities, which have disproportionately affected black South Africans. Therefore, economic growth has been identified as a prerequisite for sustainably decreasing the level of unemployment and increasing the economic involvement of previously disadvantaged citizens, as well as reducing income inequality (Patel, 2010; Jones, 2012).

Over the forty-six year period under consideration in this study, the economy has undergone significant changes in terms of its growth rate. The most notable of these changes were the democratic elections, which provided human rights to the black

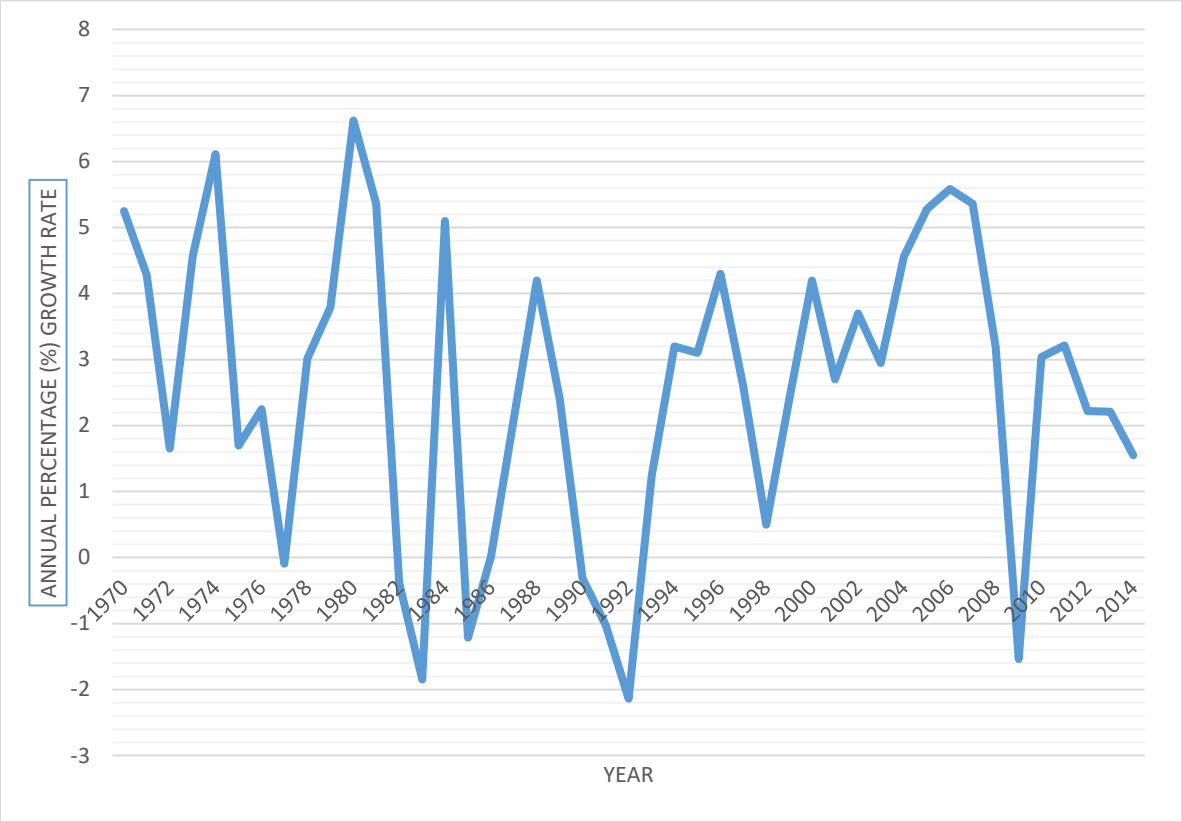
population, the country's re-entry into the world economy, and the impact of various development policies since 1994. The economy also witnessed the 2008 global financial crisis, and hosted the 2010 Soccer World Cup, which boosted economic growth at the time. Within ten years after democracy (1994 to 2004), the country's per capita income increased by 1.0 percent, overall domestic expenditure was 3.2 percent, and household consumption expenditure increased to 3.7 percent.

In terms of sectorial contributions, the South African Reserve Bank (2016) report showed that the largest sector of the economy is services, which accounts for around 73 percent of GDP. Within the services sector, the most important are finance, real estate and business services: 21.6 percent, government services: 17 percent, and wholesale, retail and motor trade, catering and accommodation: 15 percent. This is followed by transport, storage and communication at 9.3 percent. Manufacturing accounts for: 13.9 percent; mining and quarrying for around: 8.3 percent, and agriculture for only: 2.6 percent. The same report maintained that economic policies such as setting up budget targets, adjusting taxation, increasing public expenditure and public works are effective tools used by the country's government to adjust fluctuations and stabilise the economy, while working towards meeting the targets in each sector.

2.7 Trends in Economic Growth in South Africa

This section provides a graphical representation of the South African annual percentage GDP growth rate from 1970 to 2016, which is measured as the annual percentage growth rate of GDP at market prices, based on constant local currency (World Economic Indicators, 2017). Figure 2.3 below shows the trend in annual percentage GDP growth rate in South Africa from 1970 to 2016.

Figure 2.3: Annual percentage GDP growth rate: 1970 – 2016



Source: Author's Compilation: Adapted from World Development Indicators (2017)

The figure above shows the mixed performance of real GDP in South Africa, which was about 5.4 percent in 1970 and increased to 6.2% between 1972 and 1974. By 1977, the GDP decreased to 0.1 percent. The economy recorded another growth success, considered the highest since the 1970s, in 1980, which was about 6.6 percent. However, by late 1980 and 1981, the growth rate was 5.3 percent, which decreased to 0.3 percent in 1982 and -1.8 percent in 1983. There was a significant increase of about 5.1 percent in 1984, which later decreased to -1.2 percent in 1985. The negative growth rate of 1985 reversed from 0.2 percent in 1986 to 4.2 percent in 1988. The lowest GDP growth rate recorded in the South African economy since 1980 was 2.3 percent in 1989 and -2.1 percent in 1992. After the birth of democracy in 1994, the growth rate increased to 3.2 percent, but dropped to about 3.1 percent in 1995, which later increased to 4.3 percent in

1996. By the year 1998, the country's GDP growth rate was 0.5 percent and increased to 4.1 percent by 2000. However, it decreased again to 2.9 percent in 2003 and increased to 5.6 percent in 2006. In 2007 and 2009, the GDP growth rate was 5.5 percent and -1.5 percent respectively, which rose to 3.6 percent in 2011 and decreased again to 2.4 percent in 2012, and to 1.8 percent in 2013. In 2014-, 2015, 2016 and 2107, the GDP growth rate decreased to 1.7 percent, 1.3 percent, and 0.3 percent respectively. Currently, it stands at about 1.7 percent for the second quarter of 2017.

The expansion and contraction of the South African economy during the period under study can be attributed to both internal and external factors. During the 1970s and 1980s, the financial sanctions and isolation of the country by the world economy contributed to the poor growth rate at the time. However, when the country became independent in 1994, there was uncertainty surrounding its economy, which caused the actual output in the economy to be below the potential output, thereby resulting in the output gap being negative. The economy was thus operating below normal capacity utilisation. It later picked up as a result of the optimism surrounding the democratic transition of the country, which led to the removal of the financial sanctions placed on the economy, and its re-integration into the world economy. The government also came up with different macroeconomic policies, which allowed every individual to participate in the economy, thereby increasing productivity. There was a suggestion that the economy has been becoming increasingly dependent on foreign aggregate demand, which stems from the growing significance of international development, as South Africa became more integrated into the global economy following the end of apartheid. This is apparent from the country's membership of BRICs and the relaxing of foreign exchange controls (Jones, 2012: 48).

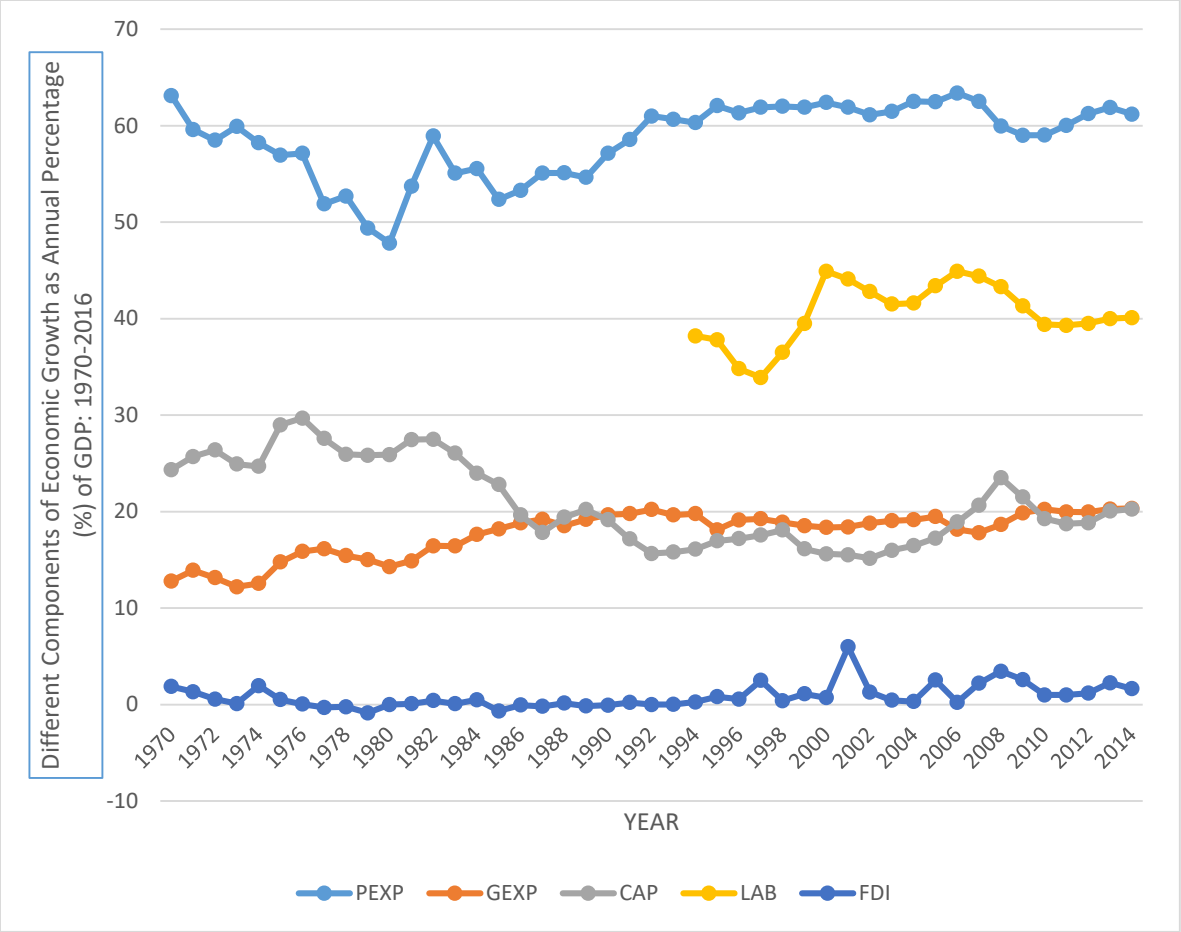
Although there were growth contractions in the 1990s, the developmental policies designed by the government to reduce apartheid effects on the economy helped to boost economic growth, but were also affected by the downturn of the global economy associated with the dot com crisis. The impacts of the September 9/11 tragedy in the USA, which affected other developing economies, was also felt by the South African economy, just as the ensuing Iraq war and oil price hike were. Despite the fact that the economy later picked up, factors such as increasing political instabilities, uncertainties

surrounding the country's policies, weak consumer demand, an acceleration in consumer price inflation, persistent subdued business and consumer confidence levels, consistently low growth, stagnant formal sector employment, excessive government borrowing to finance its expenditure, and an overdependence on public revenue due to high unemployment and poverty rates have not done the economy any good (SARB Quarterly Bulletin, 2017). These problems associated with the economy have reduced the investment rate, just as the effects of the global financial crisis of 2007/2008 have contributed to years of poor growth in the economy, as well as the drought, which negatively affected the already declining agricultural sector.

2.8 Trends on Components of Economic Growth as Percentage of GDP 1970 to 2016

The models employed to measure the trends includes the following: real gross domestic product (GDP) proxy for economic growth, aggregate private consumption expenditure (PEXP) proxy for household expenditure, gross government expenditure (GEXP) proxy for total government expenditure (recurrent and capital), gross fixed capital formation (CAP) proxy for physical capital stock, employment to population ratio (LAB) proxy for level of employment, and net inflows of foreign direct investment (FDI) proxy for technology transfer. These variables were selected for the study because they represent the structures or building blocks of the South Africa economy. Figure 2.4 below shows the trends in annual percentage of various components of economic growth from 1970 to 2016.

Figure 2.4 Different Components of Economic Growth as Annual Percentage of GDP: 1970 – 2016



Source: Author's Compilation: Adapted from World Development Indicators (2017)

The figure above shows the externality effect of government expenditure on different components of the South African economy. The employment ratio to GDP, as shown in the figure, has been on the downside, which means that the employment to population ratio has not contributed much to the GDP growth in South Africa from the pre-1994 period to date. It has always had a negative relationship with economic growth. This can be attributed to the marginalisation of the black population during this period, which did not allow them to acquire the necessary skills to help them become gainfully employed. In addition, the ripple effect of the past still affects the present employment situation in the country. For example, the Budget Review (2017) suggests that joblessness among the South African youth aged eighteen to twenty-nine averaged 43 percent in the fourth

quarter of 2016. The figure above indicates that while about 7 percent of them are university graduates, 27 percent have only completed matric. This put the total unemployment rate at 27.7 percent by the second quarter of 2017. The Budget Review (2017) also maintained that lack of opportunities to enter the workforce and gain the needed experience, coupled with poor school education and limited networks, has put many young job-seekers on the bench of long-term unemployment. Moreover, constant job losses with high levels of unskilled workers has continued to decrease productivity, making it impossible for more employment opportunities to be created.

In terms of the relationship between aggregate household consumption expenditure and GDP, as shown in Figure 2.4, although there was a slight increase after 1994, it has been consistently declining in recent years. In the SARB Quarterly Bulletin (2017), it was argued that slow employment growth in South Africa has been reducing the ratio of household consumption expenditure to GDP, while low levels of consumer confidence have made households reluctant to take on new debt. This has decreased the ratio of household debt to disposable income to 74 percent in the third quarter of 2016 from 76.9 percent in 2015. Therefore, the decrease in the debt ratio had caused a reduction of growth in aggregate household consumption expenditure to 0.9 percent by the first three quarter of 2016, from 1.7 percent over the same period in 2015. In addition, the interest rate and inflation rises, together with the exchange rate volatility, have continued to discourage consumers.

The rate of foreign direct investment inflows, though low in the economy, has continued to be affected by the ongoing political instability in the country. Investors are also worried about the low growth rate and policy uncertainty, as well as exchange rate volatility, which has made investing in the South African economy unattractive. This negative economic situation has created weak business confidence among foreign investors, and led to a reduction in investment inflows. As a result, investment in fixed capital has declined by 3.9 percent; where the largest number is from private businesses. In terms of the ratio of foreign direct investment to GDP, the level was a little over 20 percent in 2015, compared with other emerging markets like China, which has over 40 percent investment rate,

followed by Indonesia and India with over 30 percent (World Bank national accounts data, 2016).

The level of infrastructural development in South Africa is considered to be among the highest in the world, although much still needs to be done in terms of extending it to the second informal economy in the country, namely the rural areas, which has been the aim of government since independence. Due to political uncertainty, subdued economic growth and continued low business confidence, which are regarded as the major economic problems, there was a decline in the growth of real capital formation by government in 2016, which stood at about 3.9 percent, following an increase of 2.3 percent in 2015, as shown in Figure 2.4. Real fixed capital spending by both government and private business enterprises declined further within the same year and as a percentage of GDP, gross fixed capital formation decreased from 20.4 percent in 2015 to 19.6 percent in 2016. This was the first annual decrease since 2012, whilst aggregate real capital expenditure by the private sector decreased by 0.5 percent in 2015, and there was a 0.6 percent reduction in investment activities by the private sector in 2016. The cause of these reductions was attributed to a decline in expenditure on independent renewable energy projects (SARB Quarterly Review, 2017).

In the pre-1994 period in South Africa, not much was done to extend increased government expenditure to the black majority in the country. The figure above indicates that there was an increase in the level of government expenditure as a percentage of GDP during that period. However, after independence, government expenditure, both recurrent and capital, increased significantly due to various macroeconomic policies designed by government to make the economy all-inclusive. Also, in 1994, the government received a peace dividend which allowed them to reduce military expenditure and increase social expenditure. Resources were shifted from the white to black population without the level of government expenditure necessarily increasing. Higher expenditure on grants happened parallel with the reduction in interest expenditure before 2010. This means that there were increases in the level of general government final consumption expenditure in all sectors of the economy, but as the economy began to boom, followed by inconsistencies in the activities of the government, economic growth was negatively affected, as well as the level of government expenditure. Within the last

year (2016), though government expenditure increased by 2.0 percent more than the 0.5 percent in 2015, employees' compensation increased at a slower rate, combined with a decrease in spending on non-wage goods and services. The cause of the reduction in government spending, as discussed in the SARB Quarterly Bulletin (2017), was due to the elevated expenditure by the Independent Electoral Commission (IEC) during the municipal elections in 2016.

2.9 Conclusion

From the discussions in this chapter, it is obvious that government expenditure is inevitable in the growth process, considering its role in enhancing economic growth. However, the structure of the expenditure needs to align with those factors that can increase productivity, since it is not all forms of government expenditure that yield economic growth. This is evident in the successes and failures of the macroeconomic frameworks designed in South Africa since the end of apartheid.

The series of contractions and expansions witnessed in the economy, as shown in the trend graphs, were due to both internal and external factors. However, political instability is the major cause, because of the history of the country before independence, just as with the present democratic era. Overall, the findings in the chapter revealed that a lot still needs to be done to harness the country's economic potentials, and this has to come from the grassroots, where many of the unemployed, poor and economically marginalised South Africans dwell. This approach, if well applied, may place the economy in the desired position.

CHAPTER THREE

Growth Models and Theoretical Literature on Government Expenditure and Economic Growth

3.1 Introduction

The belief that public expenditure plays important role in raising economic performance just as economic growth responds to the structures of government involvement is rooted in the growth models proposed by early economists as well as the theoretical literature on the relationship between government expenditure and economic growth. This chapter discusses various growth models related to economic growth and the theories of government expenditure which provide evidence on the relationship between government expenditure and economic growth including how to measure their effects on economic growth.

Bearing the above in mind, the chapter is divided into two main sections with sub-sections: Section 3.2 reviews various economic growth models, while sections 3.3 and 3.4 explored the theoretical literature based on the relationship between government expenditure and economic growth with their causal links. Then, some concluding remarks are presented in section 3.5.

3.2 Economic Growth Models

Most economic policies are based on the models of economic growth, which helps to explain why these policies are created, and what government hopes to achieve by implementing them in the economy. Economic growth as contained in the models can be considered from the areas of capital formation and accumulation, the output ratio, national savings rate, innovations as a result of technology and other variables of economic growth. Despite conflicting ideas among the growth theorists, the content of their work is valid, depending on where and how they were applied. This section focuses on economic growth models, and contains the following subsections: 3.2.1 presents the Harrod-Domar growth model, while 3.2.2 reviews the Solow neoclassical growth model. The endogenous

growth theory is discussed in 3.2.3, and the Shumpeterian growth model is reviewed in 3.2.4.

3.2.1 The Harrod-Domar Growth Theory

The theory proposed to determine whether or not government expenditure promotes growth is the Harrod (1939) and Domar (1946) growth model, which was developed from Rostow's work on "The stages of economic growth". Their main argument was that the rate of growth of GDP is determined jointly by net national savings ratio and the national capital-output ratio, which means that in the absence of government, the growth rate of national income will be directly or positively related to savings ratio. A high level of savings in a given economy provides funds for firms to borrow and invest, which increases capital stock, as well as economic growth, through the increased production of goods and services.

Shaw (1992) argued that the Harrod-Domar growth model reduces the importance of capital accumulation in the quest for enhanced growth, but since budgetary surpluses can be substituted for domestic savings, fiscal policy will be identified as the primary instrument, thereby giving government a role to play.

In their explanation, Harrod and Domar supposed that capital output ratio measures the productivity of investment in the economy. If the capital output ratio decreases, the economy will be more productive, hence a higher volume of output is generated from fewer inputs, which leads to economic growth - that is, rate of growth (Y) = Savings (s)/Capital output ratio (K). This type of growth model is applicable to developing economies, because it points towards the need for the government in such economies to encourage savings using various types of incentives, such as removing taxes and supporting technological advancements, so as to decrease the economy's capital output ratio, in order to increase economic growth. This theory has formed part of an important influence on the economic policies which have been applied by some developing countries. For example, India had a five-year economic plan, which ran from 1951 to 1956.

3.2.2 The Solow Neoclassical Growth Model

Unlike the fixed-coefficient-constant-returns-to-scale assumptions of the Harrod-Domar model, the Solow growth model, which is regarded as an extension of the Harrod-Domar model, was developed in 1956 by Robert Solow and Trevor Swan. The theory maintained that all countries possess identical aggregate production functions, and that the three factors that drive economic growth in any economy are technology, capital accumulation and labour force. This means that economies will conditionally converge to the same level of income if they have the same rate of savings, depreciation, labour force growth and productivity growth (Durlauf et al., 2001). The assumptions of the theory differ because the authors added a second factor, namely labour, and also introduced a third independent variable, namely technology, to the growth equation. Thus, the equation for the neoclassical growth model is given as:

$$\Delta k = sf(k) - (\delta + n)k \qquad (3.1)$$

In the above equation, the growth of capital-labour ratio is represented by k, which is regarded as capital deepening in the model. It shows that the growth of k depends on savings $sf(k)$, after allowing for the amount of capital required to service depreciation, δk , and providing the existing amount of capital per worker to net new workers joining the labour force, nk.

According to Solow (1956) and Swan (1956), capital accumulation and labour force affect economic growth, in the sense that a rise in both of them will increase the economic growth rate, though only temporarily, because of diminishing returns that result from the prolonged use of both factors without replacement. For instance, if the economy has only one worker, an addition of one more worker will result in a significant increase in the level of output. On the other hand, if the economy has thousands of workers, adding one more will not cause output to increase as much. Eventually, the economy will grow at a steady rate, with GDP growing at the same rate as the increase in labour force and productivity. Technological progress and innovation, in this case, is the residual factor that explains

long-term growth, and their levels are determined independently of all other factors in the model.

Therefore, it is only through the two factors that economic growth can be increased, once the steady-state is reached and resources in a country are depleted. This highlights why the Solow model is sometimes regarded as an exogenous growth model.

According to (Todaro and Smith, 2011) policymakers are heavily dependent on this model because it predicts that countries with higher investment and capital levels per worker will enjoy higher levels of per capita output.

Many studies conducted to analyse the theory, such as Harrod (1939), Kaldor (1955), Hahn and Matthews (1964), Bliss (1968) and Lucas (1975), explained why the gap between rich and poor countries will narrow, by referring to a concept known as catch–up growth. These authors believed that poor countries have less capital to start with, so each additional unit of capital has a higher return than in a rich country.

This helps to explain why China's GDP grew at nine percent on average over the last three decades, while that of the United Kingdom only grew by around two percent. Though Robinson (1965) and Harcourt (1969) argued about the controversy surrounding the logical coherence of the theory in general, those in agreement further explained why countries like Germany and Japan, despite losing in the Second World War, managed to grow faster than the US and UK during the period 1950 to 1960. They maintained that the increased economic growth rate achieved in Germany and Japan at that time was due to the fact that many capital stocks in those countries were destroyed during the war. As a result, any new addition of capital would have a high return and significantly increase economic growth.

The neoclassical growth theory has some shortcomings, which include the following: it credits the bulk of economic growth to a completely independent process of technological progress, which fails to explain the large differences in residuals among countries with similar technologies. Furthermore, Duffy and Papageorgiou (1999) ascertained that the concept of identical Cobb-Douglas technology assumptions among countries is unsatisfactory, since heterogeneity exists and the goodness-of-fit of the model also differs between nations.

3.2.3 Endogenous Growth Theory

This theory, though it has some structural similarities with the neoclassical theory, opposes the neoclassical views by identifying means by which the rate of technological progress and long-run rate of economic growth can be influenced by internal economic factors, particularly those forces associated with the opportunities and incentives to create more technological knowledge.

Howitt (1999) pointed out that the theory originates from the observation that technological progress takes place through innovations in the form of new products, processes and markets, many of which are the result of economic activities. This is in line with the views of Romer (1986) and Lucas (1988).

Another suggestion regarding the theory came from Todaro and Smith (2011), who were of the opinion that the most interesting aspect of endogenous growth models is that they help to explain anomalous international flows of capital that exacerbate wealth disparities between developed and developing countries. The potentially high rates of return on investment offered by developing economies with low capital-labour ratios are significantly weakened by lower levels of complementary investments in human capital, such as education, infrastructure, research and development.

The endogenous growth theory has two versions, namely the AK theory and the innovation-based theory.

3.2.3.1 The AK Theory

Frankel (1962) presented the first version of the AK theory, where he argued that the aggregate production function can exhibit a constant or increasing marginal product of capital, because when firms accumulate more capital, this will eventually lead to increased intellectual capital. This intellectual capital can be applied to create more technological progress, and more technological progress is what offsets the tendency for the marginal product of capital to diminish. Moreover, when the marginal product of capital remains constant, aggregate output "Y" will be proportional to the aggregate stock of capital "K", therefore,

$$Y = AK \quad (3.2)$$

Where "A" represents a positive constant. Therefore, the AK theory postulates that an economy's long-run higher growth rate depends on an increase in savings rate. This argument is supported by Uzawa (1965), Romer (1986) and Lucas (1988).

3.2.3.2 The Innovation-based Theory

Another version of the endogenous growth theory is the innovation-based theory, which recognises that intellectual capital is the source of technological progress and grows through innovation, unlike the physical and human capital that are being accumulated through savings and schooling. Romer (1990) presented one version of the innovation-based theory with the Dixit-Stiglitz-Ethier production function, where final output is produced by labour and a series of intermediate products.

The theory believes that aggregate productivity is an increasing function of the degree of product variety, whereby innovation causes growth in productivity by creating new, though not necessarily improved, varieties of products.

The other version of the endogenous growth theory is the Shumpeterian theory, which will be discussed in detail in section 3.2.4.

In conclusion, the general implication of the endogenous theory is the need for government to direct its resources mostly towards human capital development, such as the improvement of health care and education sectors, and to provide incentives for individuals in the economy to acquire the necessary skills to contribute towards the economy. The government can achieve this by designing and financing macroeconomic policies that can help in this regard, since new knowledge enhances productivity and is available to other sectors at virtually zero marginal cost.

Shaw (1992) described research as a profit-maximizing behaviour that involves making current outlays in anticipation of future returns. This means that countries with a great stock of human capital will enjoy a faster rate of economic growth and wider participation in international trade than other countries, including the economic integration associated with it. The cases of low levels of human capital explain the comparative lack of growth in certain underdeveloped economies.

3.2.4 Shumpeterian Growth Theory

Another version of the endogenous growth theory is the Shumpeterian growth theory. This theory stipulates that economic growth comes from innovations that improve the productivity or quality of the input, which involve the force referred to by Shumpeter as creative destruction.

The Shumpeterian approach to economic growth is centered on three core ideas, namely that:

- growth is primarily driven by technological innovations
- innovations are produced by entrepreneurs who seek monopoly rents from them
- new technologies drive out old technologies.

This model, according to Aghion and Howitt (1992), was found to be important in explaining why, since the mid-1990s, the EU has been growing at a lower rate than the US, even though their economy caught up technologically with the US following the Second World War. The EU's growth began to slow down before they reached the gap with the US, because Europe did not adjust its institutions and policies to produce growth-maximising innovations. This acted as a force delaying their growth convergence with the US. Furthermore, their inability to benefit from the technological revolution placed them in a Shumpeterian steady-state condition.

Acemoglu et al. (2006) and Aghion et al. (2013) analysed the implications of the Shumpeterian growth theory, which proposed that faster growth generally implies a higher rate of firm turnover, because the process of creative destruction generates the entry of new innovators and exit of former innovators. Moreover, by taking into account the fact that innovations can interact with each other in different ways, countries, and at various distances from the frontier, Shumpeterian theory provides a framework that helps to analyse how a country's growth performance will vary according to its proximity to the technological frontier. Another aspect is the extent to which a country will converge with that frontier, and what kinds of policy changes are needed to sustain convergence as the country approaches the frontier.

Finally, they all believed that far from the frontier, a country will maximise growth by favouring institutions that facilitate implementation. However, as it catches up with the technological frontier to sustain a high growth rate, the country will have to shift from implementation-enhancing institutions to innovation-enhancing institutions, as the relative importance of leading-edge innovations for growth is also increasing.

3.3 Theoretical Framework on Government Expenditure

Theories related to government expenditure and its relationship with economic growth are wide in the field of economic research. These theories do not only dwell on the importance of the relationship, but also its implications because despite their importance in public economics, they all possess certain deficiencies, which might lead to an incorrect interpretation of government decisions and wrong choice of policy implementation. The purpose of this section is to discuss various theoretical frameworks on government expenditure, as well as some studies that applied these theories. Section 3.3.1 analyses the Keynesian theory of economic growth, while section 3.3.2 contains Adolph Wagner's theory of increasing state activities. Theoretical studies on Wagner's hypothesis are reviewed in 3.3.3, and the Peacock and Wiseman hypothesis is discussed in section 3.3.4. This is followed by the Musgrave theory of public expenditure in section 3.3.5., and the Stanley Please hypothesis in section 3.3.6 while Colin Clark's critical limits hypothesis is contained in section 3.3.7. Section 3.4 presented some arguments on the direction of causality between government expenditure and economic growth and 3.5 concludes the chapter.

3.3.1 Keynesian Theory of Economic Growth

John Maynard Keynes, one of the 20th century economists, proposed views regarding the mixed economy, whereby both public and private sectors are seen as the main economic drivers. In his debate, he argued that increases in government spending help to boost growth by injecting purchasing power into the economy. This increases aggregate demand, and government could reverse economic downturns by borrowing money from the private sector, and returning it to the private sector through various spending programmes (Keynes, 1936). According to Trotman (1997), the theory

promoted the failure of laissez-faire economic liberalism, which supports non-government intervention in the operations of the market and private sector.

Although the Keynesian proposition does not necessarily mean that government should be big; their view is based on the understanding that government spending, especially deficit expenditure, could provide a short-term stimulus to help end a recession. The main assumptions of Keynes (1936) theory are:

- that the economy is operating in the short-run, where prices and wages are fixed,
- the financial/money market is not considered in the economy,
- taxes as part of government revenue come in lump-sum forms, and
- planned consumption and savings are related to income.

The Keynesians maintained that government should be prepared to reduce the rate of expenditure once the economy recovers, in order to prevent inflation as a result of too much economic growth. It should also be ready to increase or decrease government spending to steer the economy away from too much of one or the other, since there is a tradeoff between inflation and unemployment.

Keynesians are sometimes associated with bigger government spending, but have no theoretical objection to small government spending, as long as it will be willing for injection to take place in order to boost the economy when depression is predicted. Gravelle et al. (2009) indicated that Keynes' theory has been one of the implicit rationales for the current government spending, due to its mandate to increase productivity and promote growth. Despite the theory's applicability to some economies, it also has some loopholes, according to critics. For instance, they argued that the theory tends to underestimate the influence of money on real variables, where it states that a change in money supply only affects national income due to its effects on interest rate. It underrates inflation as well. Another problem raised with regard to the theory is that there is no clear indication as to how to manage the expansion of aggregate demand increases in times of high unemployment, without creating inflationary pressure with the issue of injection and withdrawals, all in the short-run, which can make long-term economic growth impossible.

3.3.2 Wagner's Hypothesis of Increasing State Activities

Adolph Wagner (1958) proposed the theory of rising public expenditure by analyzing trends in growth and size of government expenditure. The law is regarded as one of the first models of government expenditure, and it stated that as the economy develops over time, the activities and functions of government increase. During the industrialisation phase in an economy, the share of government activities in the economy would increase at a greater rate than that of the national income, which implies that the expansion of government activity responds positively to changes in economic growth. Therefore, as a country's income increases, the size of its public sector relative to the whole economy also increases.

Wagner recognised the role of the state as a provider of social services in areas such as transport, education and infrastructure, while proposing that technology makes it easier for the state to produce efficiently and increase its demand than in the private sector. This explains the notion of the expansion of government activity being endogenously determined by economic growth and development.

3.3.2.1 Theoretical Studies on Wagner's Hypothesis

Some researchers in the field of economic policy have tried to interpret Wagner's law from their own point of view, and raised criticism regarding the fact that the law does not really relate to government expenditure, whereas others approve of it and recognise its applicability to government spending, and some disapprove of it. Musgrave (1969) and Peacock and Wiseman (1961) hypothesed on the relationship between government expenditure and economic growth, which emanated from their disagreement about Wagner's law. However, their assumptions will be discussed fully in sections 3.3.4 and 3.3.5 respectively. Another study that examined Wagner's law was Magableh (2006). Magableh proposed that Wagner's hypothesis was previously misinterpreted, both theoretically and empirically, to exclude developing economies. In this regard, the author proposed two sigmoid functions, namely logistics and Gompertz functions, that can be applied to capture the non-linear process of government growth, with the use of cross-sectional data obtained from eighty-eight countries, including developed and

developing countries. The results showed that contrary to the previous interpretations of the law, Wagner's hypothesis also provides an explanation for developing economies.

Another aspect of Wagner's assumptions that has been neglected in most of his translated literature is the regulation of state activities. Wagner recognised that regulation will be effective in fostering the expansion of state activities. In agreement with his view, Thorn (1972) believed that Wagner should be given credit for proposing state regulatory assumptions, which will help developing economies mainly where extensive mechanisms of regulation control and coordination are needed to increase the size of government expenditure faster than increases in national income.

Diamond (1977) supported Thorn's views and added that the requirement for greater regulation explains the growing share of the public sector in the national income within developing countries. This debate on regulation has attracted studies evaluating the importance of regulating economic activities based on privatisation and deregulation. For example, a study by Amann and Baer (2004) examined the effects of privatisation on the Brazilian economy, and found that it has helped to accelerate economic growth, but concluded that this positive relationship came about because the privatisation process was accompanied by greater state control and regulation.

However, some studies have opposed Wagner's assumptions on state regulation. For example, Seeber and Dockel (1978) examined how Wagner's law applies to real world situations, and concluded that the assumptions are subjective and normative in nature, instead of providing a positive theory. They also believed that the simple way in which Wagner expressed his opinion regarding what happens in industrialised nations renders his work weak when subjected to critical analysis.

Bird (1971) and Gemmell (1993) disapproved of the theory, arguing that it only applies to Germany (where rising income was observed as a result of industralisation at the end of the nineteenth century) and countries with similar circumstances. The underlying conditions, such as per capita income, technological and institutional change, as well as democratization, therefore limit the possibility of testing the law empirically. They also explained that the German origin of Wagner's hypothesis and the resulting limited access

for non-German speaking economists often contributed to misunderstandings and difficulties experienced by scientists while trying to apply the law.

Similarly, Pildes and Sustein (1995) criticised Wagner's state regulatory assumption, based on the view that the regulation of state activities is complex and difficult to measure, due to the relatively low visibility associated with the task.

Gleaser et al. (2003) highlighted that the effects of operating legal, political and regulatory institutions could be undermined by wealthy and highly influential politicians to their own advantage. This, according to Gleaser, explains why economic inequality is often associated with industrialisation.

In conclusion, results from the analyses of Wagner's law are mixed because while several studies are in favour of the theory, many disapprove of it. Any conclusion regarding whether it applies to a particular economy or not has to take into consideration, amongst other things, the country's economic outlook, including economic driving forces and determinants of government expenditure in the economy.

3.3.3 Peacock and Wiseman Hypothesis

The displacement effect hypothesis was proposed by Peacock and Wiseman (1961) as a result of their disapproval of Wagner's prediction that government expenditure may increase. This was after they adopted Wagner's historical approach to study the behaviour of British public expenditure, employing time series data and British history. In the findings of their study, they opposed the validity of Wagner's law in explaining the patterns of government expenditure growth. Instead, they proposed their own model based on a supply side time-pattern approach to public expenditure, due to the step-wise rather than gradual pattern of government growth in Britain.

Furthermore, they disapproved of Wagner's view that division of labour, science and technology, including transport and communication, would lead to increased government expenditure, by assuming that public expenditure should gradually but consistently increase at a rate higher than increases in a country's GDP. These increases in public expenditure, according to Peacock and Wiseman, came from changes in the demand for public services as a result of growth in income per capita and population.

The main argument in Peacock and Wiseman's hypothesis is the time-pattern of growth in government expenditure, as well as the importance of supply side crises such as wars, famine, disasters and depressions, amongst others. They view the roles of government as the key to tax burden tolerance, which is contrary to the smooth demand-led growth assumptions of Wagner. The reason, according to the hypothesis, is because the burden of taxation remains high even after a crisis, resulting in a high concentration of power at the national level. Therefore, the displacement effect hypothesis implies that public expenditure is flexible upwards during crises, but inflexible downwards after crises. Another part of the theory is the inspection effect which arises from people's eagerness to know how government will handle existing social problems. Government, on its side, tries to curb the situation through the expansion of its services, leading to higher levels of expenditure and increased taxation. The net result of these two effects is occasional short-term jumps in government expenditure within a rising long-term trend (Peacock & Wiseman, 1961). Bird (1992) opposed the views of Peacock and Wiseman, highlighting their failure to explain the sustained large increase in the role of the public sector after World War II in the UK, as well as other countries affected by the War. In a similar fashion, Brown et al. (1996) criticised the hypothesis based on the belief that if the period after crises is not well analysed, there will be a possibility of a change in the growth of government expenditure. Moreover, government has other sources of financing its expenditure, besides resorting to taxation, such as internal and external borrowing, financial aid, revenue from government products, and net income from abroad. The effects of political influences on the levels of government expenditure are not well represented in the theory.

Several studies have tested the validity of Wagner's law using Peacock and Wiseman's interpretation, and while some conclusions are in favour of their hypothesis, others support Wagner's law. For example, Thorn (1972) employed data for the period 1952-1962 from fifty-two countries to examine the validity of Wagner's law using the Peacock and Wiseman interpretation. The study indicated the presence of Wagner's law in those countries. Biswal et al. (1999) investigated Wagner's law in Canada from 1950 to 1995 based on Peacock and Wiseman's interpretation, but their findings revealed evidence against Wagner's law.

A similar study was conducted by Thornton (1999) in six developed countries from 1850 to 1913, and the findings supported the existence of Wagner's law during the selected period in those countries.

Nevertheless, regardless of Peacock and Wiseman's (1961) divergent views on Wagner's law, it can be argued that both theories are relevant in studying the direction of causality or the extent of the relationship between government expenditure and economic growth.

3.3.4 Musgrave Hypothesis

Musgrave (1969) criticised Wagner's law by observing the changing role of public sector during the development process, and therefore used structural factors to explain government growth (Gemmell, 1993). The idea contained in the theory is that economies in an early development stage are faced with a high demand for public capital formation, in order to install basic infrastructures. An examination of economic factors that might support the hypothesis of a rising share of public expenditure in GNP can be obtained by examining the development of a country from low to high per capita income in the course of economic growth.

Musgrave's version is different from Wagner's hypothesis in the following ways: the interpretation contained in the theory considers shares instead of absolute levels, which makes the theory susceptible to the problem of endogeneity. Furthermore, contrary to Wagner's choice of public expenditure categories, which include protection, general administration, economic administration and education, Musgrave considered the cause of particular types of public expenditure and accepted the distinction between defense and civilian functions. There is also the argument that all forms of civilian expenditure might be better examined in economic categories such as public capital formation, public consumption and transfers. In addition, the theory indicated that the rise of the public share in total capital formation will be relatively high in the early stages of development, with less predictable changes when the ratio of transfers declines with rising income.

The rationale behind Musgrave ideology is that the facilities for private capital formation are limited in the early stages of development, and public production of certain capital goods might be necessary at a later stage of development. When the institution for private

capital formation becomes more developed, such provision might be left for private sectors only. However, these stages of economic development, according to Musgrave, were only covered by Wagner's law in the early and middle phase, which does not apply to post-industrial states.

Several studies have adopted and tested the Musgrave hypothesis, but most conclusions are still aligned with Wagner's hypothesis. For example, Lin (1995) examined the relationship between government expenditure and economic growth in Mexico during two different economic periods: 1950 to 1980 and 1950 to 1990, based on the Musgrave hypothesis. The findings from the estimation supported Wagner's law instead. In the same way, Alleyne (1999) investigated the validity of the Musgrave hypothesis in four Caribbean countries (Jamaica 1955 to 1991, Guyana 1950 to 1990, Barbados 1960 to 1997, and Trinidad and Tobago 1950 to 1991) based on the relationship between government expenditure and economic growth. The results supported the applicability of Wagner's law.

In summary, though Musgrave's stages of economic development approach are believed to be applicable in the early developmental phase, the size of public expenditure can sometimes not be clearly predicted in later stages. Therefore, the issue should not be about the share of public sector decreases in later stages. This is because if there is a change in private consumption patterns due to rising per capita income during the late industrialisation stage, there is the possibility that the public share will rise again in order to meet the growing demand for public goods, such as education, infrastructure, social security and health services, amongst others. In this sense, the issue of whether public shares increase or decrease depend on the stages of income and individual needs.

Black et al. (1999) suggested that it is often impossible to define one single stage in the development of a particular economy, especially developing ones, because several stages of development can be taking place simultaneously. For instance, an urban economy might be at a later stage of development, whereas rural areas are still far behind and are at an early stage. This existence of several stages within one economy makes it difficult for one to predict the development of the public share.

Other theories related to government expenditure and economic growth are the Stanley Please hypothesis and Collin Clark's critical limits hypothesis. Though only a few empirical studies have been carried out on these theories, most findings have shown that their formulation has been successful in describing the relationship between government expenditure and economic growth.

3.3.5 Stanley Please Hypothesis

Stanley Please (1970) postulated a theory against government tax increases, known as the Please effect. The main argument contained in this hypothesis is that an attempt to increase domestic savings is frustrated by the growth of current government expenditure, which is usually related to tax increases. The implication of this ideology is that countries with a high tax ratio will have a low savings capacity. In other words, when government increases its level of taxation to reduce deficit and increase surplus, the outcome will be the reduction of the marginal propensity to save (MPS) in the private sector. Furthermore, Please reported on a study in Ethiopia, where the findings revealed that a two-thirds additional increase in government revenue from taxation was spent on defence and internal security. Except for education, only a marginal proportion of the funds was spent on other areas of the economy, such as agriculture and health care. According to the author, this serves as proof that most of the accrued revenue from taxation is not directed towards enhancing economic growth.

To test the validity of the Please hypothesis, studies were conducted by Vlatio (1967), Kirshnamurti (1968) and Morss (1969), who all reached different conclusions.

Vlatio (1967) investigated the relevance of the Please effect using twenty African countries, but concluded that increased taxation helps in mobilising revenue for growth. Therefore, it is positively related to economic growth, which implies that the Please effect is weak among the selected countries. In disagreement with Vlatio's conclusion, Kirshnamurti (1968) evaluated the relationship between savings and taxation with a cross-sectional analysis of thirty-five developing economies, and a time-series analysis of another twelve developing countries. The time series analysis indicated that there was no relationship between taxation and savings in the countries being studied, but the cross-

sectional analysis showed that taxation impacts private consumption negatively, thereby leading to a reduction in aggregate savings, which supports the Please hypothesis.
Similarly, Morss (1969) came to the same opposing conclusion as Vlatio (1967), using a sample of forty-six developing countries. The results revealed that on average, savings increased by sixty-four percent with any tax increase in the selected economies. Therefore, the Please hypothesis was not valid with the samples.
In summary, although the Please effect is not entirely against tax increases, it maintained that taxes should be at a minimal rate. Apart from this, tax revenues should mostly be directed towards enhancing economic growth.

3.3.6 Colin Clark's Critical Limits Hypothesis

The theory of two critical limits hypothesis, which includes taxes and expenditure, was proposed by Colin Clark (1945). This hypothesis assumes that through high taxation and credit restrictions, government might be able to reduce private sector spending and increase public expenditure, which will in turn increase private consumption. Therefore, as the tax rate increases, individuals are likely to become fed-up with government's inflationary means of financing its expenditure, which might affect aggregate government supply. The rationale behind the theory is that inflationary forces which occur as a result of the high employment of resources, which leads to disequilibrium between demand and supply, will come into play when the tax burden exceeds twenty-five percent of the national income. Clark drew this conclusion through the analysis carried out in different countries for different economic periods. The assumptions of the hypothesis can be summarised as follows:
Firstly, increased taxation affects the productivity rate and incentives to participate in economic activities, such as the reduction in consumers' purchasing power and aggregate demand, as well as decreases in the savings rate. Again, the economic effects of high taxes can encourage non-productive behaviour among workers.

Despite the possibility of the theory being applicable in some instances, critics presented some shortcomings of the theory and explained why it might be biased if employed in measuring the relationship between government expenditure and economic growth.

According to Perchman and Mayer (1952), who believed that these views are doubtful, the hypothesis showed that since elements of government expenditure, such as debt services and salaries, are fixed in monetary terms, public spending during inflation may rise less than the general price level and national income. This makes it possible for the real burden of government expenditure to be reduced during inflation. When inflation has reduced the burden of taxes sufficiently below the critical limit, government will apply economic policies to control it. They also offered their opinions on the grounds that it is still not clear whether the hypothesis is in terms of government expenditure or taxes, because it relies almost exclusively on the ratio of taxes to national income, instead of government expenditure. Another criticism is the case of using only one incident to draw conclusions, which they believe is part of the reason why Clark's views are not supported by the facts presented as evidence in the study. In addition, Perchman and Mayer believed that statistics alone, without any theoretical underpinning, cannot be used to prove that a tax burden in excess of twenty-five percent of the national income would lead to price increases.

3.4 Government Expenditure and Economic Growth: Direction of Causality

The relationship between government expenditure and economic growth has been a subject of unending debate, resulting in an increased number of studies being conducted on the topic. Although it has been established that government expenditure is crucial for economic growth, a large and growing body of empirical studies has emerged following the pioneering works of John Maynard Keynes (1936) and Adolph Wagner (1958), in an attempt to determine the direction of causality between government expenditure and economic growth but with little consensus. While some are in favour of the Keynesian hypothesis, which proposes that the causality runs from government expenditure to economic growth, others support Wagner's ideology that it is economic growth which Granger-causes government expenditure.

Empirical studies on the Keynesian theory highlight some agreements and disagreements with the theory. For example, Dandan (2011) examined the relationship between government expenditure and economic growth in Jordan from 1990 to 2006 at the aggregate level, based on the Keynesian hypothesis. The findings revealed that

government expenditure causes economic growth, which validates Keynesian theory in the country. A similar study was conducted by Ebaidalla (2013) in Sudan from 1970 to 2008, using the ECM and Granger-causality test to evaluate the direction of causality between government expenditure and national income. The estimation results indicated a causality from government expenditure to national income, thereby supporting the Keynesian hypothesis in Sudan. Using data for the period 1993 to 2006, Komain and Tantatape (2007) tested the relationship between government expenditure and economic growth in Thailand via the OLS method and Granger-causality test. The study supported Keynesian views, drawing the conclusion that there is a unidirectional causality from government expenditure to economic growth.

In contrast, Kamasa and Abebrese (2015) analysed the direction of causality between government expenditure and GDP growth in Ghana from 1980 to 2010. By employing VAR and Granger-causality tests, they found that causality only existed from GDP growth to government expenditure, which shows a lack of support for the Keynesian theory in Ghana.

Much research has also been carried out to test the validity of Wagner's law. However, a number of empirical studies revealed positive support for Wagner's hypothesis, which states that economic growth Granger-causes government expenditure. These studies include those conducted by Ram (1987), Mohammadi et al. (2008), Antonis et al. (2013), Aledejare (2013) and Masan (2015).

Ram (1987) conducted an econometric analysis based on Wagner's hypothesis in one hundred and fifteen countries, including developed, developing and less developed countries (LDC). Using individual country time-series data and inter-country cross-sectional data from 1950 to 1980, the findings from the analysis revealed that while sixty percent of the countries are in support of Wagner's law, forty percent of them are against it. This is because the signs and strength of the covariance between income and government expenditure from the time series vary greatly among different countries of the world for each variable. For the inter-country cross-sectional data, the results showed that the elasticities of government share with respect to GDP per capita are negatively related in a statistically significant sample, including the LDCs.

In a similar analysis, Mohammadi et al. (2008) evaluated the validity of Wagner's law in the Turkish economy against six alternative specifications of the hypothesis, namely Peacock and Wiseman, Peacock and Wiseman share, Musgrave, Gupta, Goffman and Pryor. Using data for the period 1951 to 2005 and the Pesaran's autoregressive bounds lag (ADRL) test, the empirical estimation results indicated a strong support for the validity of Wagner's hypothesis in Turkey, and also showed robust across lag length selection criteria in the six specifications of Wagner's law.

Antonis et al. (2013) explored the causal relationship between government spending and income growth for the period 1833 to 1938 in Greece, based on the Keynesian and Wagner hypotheses. The results from the estimation technique employed in the study-the ARDL, showed a positive and statistically significant long-run causal effect from economic growth to government expenditure, thereby giving support to the validity of Wagner's theory in Greece, but not the Keynesian hypothesis.

Aledejare (2013) examined the effectiveness of Wagner's theory in terms of the relationship between government capital and recurrent expenditure and economic growth in Nigeria from 1961 to 2010. Using the error correction model (ECM) of estimation and the Granger causality test, the findings revealed that the Wagnerian hypothesis is validated in the relationship between the fiscal variables used in the study.

Masan (2015) tested the Keynesian versus Wagnerian hypothesis on the long-run and short-run relationship between disaggregated government expenditure and economic growth in Oman from 1980 to 2005. Using the Engle-Grangers two-step cointegration analysis and Granger causality test, the analysis indicated that although most of the results did not show the existence of a long-run equilibrium relationship between government expenditure and economic growth, they supported unidirectional causality from economic growth to government expenditure. This implies that increases in national income may be causing the growth of government spending, as suggested by Wagner's law. With regard to the Keynesian hypothesis, the results do not support government expenditure causing economic growth, which shows that only Wagner's law applies to the Turkish economy.

In contrast, a separate line of research proceeded in the opposite direction, and comprised studies by Ram (1986), Bagdigen and Cetintas (2004), Wijeweera and Garis (2009) and Adil et al. (2017).

Before his work in 1987, which validated Wagner's law in one hundred and fifteen countries, Ram (1986) used conventional and internationally comparable data from thirty-four countries in 1975 to assess the relationship between general government expenditure and income level based on Wagner's law. Applying the correlation analysis, the findings with conventional data provided support for Wagner's law, but the evidence from the international comparison project (ICP) data suggested the opposite, and showed a decline in the relative size of general government expenditure in GDP as income per capita rises, which does not support Wagner's hypothesis. In view of the second result, Ram refuted the first analysis, with the claim that the earlier support for Wagner's law probably resulted from misinterpreting cross-country real price variations as quantity differentials.

Using cointegration and Granger causality tests, Bagdigen and Cetintas (2004) investigated the relationship between government expenditure and economic growth, as well as the validity of Wagner's law in Turkey from 1965 to 2000. The estimation results showed that there is no causality in either direction. The authors concluded that Wagner's hypothesis does not apply to the Turkish economy.

A similar study was conducted by Wijeweera and Garis (2009) to explain the direction of causality between public expenditure growth and economic growth, based on Wagner's hypothesis, in Saudi Arabia from 1969 to 2007. Employing the Engle and Granger two-step cointegration method, the results showed that out of four model specifications (income and real government expenditure, per capita income and government expenditure, per capita income and per capita government expenditure, and national income and government final consumption expenditure) used in the study, only two indicated the existence of a long-run positive relationship between government expenditure and economic growth. However, the income elasticities in these two are not large enough to suggest that growth in government spending exceeds growth in national

income. According to the author, therefore, the analysis does not support Wagner's law in Saudi Arabia.

In the same vein, Adil et al. (2017) explored the long-run and causal relationship between public expenditure and economic growth based on Wagner's law in India from 1970 to 2013. Using the autoregressive distributed lag (ARDL) model as the estimation technique; the analysis revealed that although cointegration exists between public expenditure and economic growth, support for Wagner's theory in India is weak.
On the other hand, some studies confirm the evidence of bi-directional causality between the two variables, such as Tang (2009) and Magazzino (2015).

Tang (2009) tested the existence of the Wagner and Keynesian hypotheses in Malaysia from 1960 to 2005, based on interrelationships between government spending and economic growth. The model of estimation was the vector error correction model (VECM) and Granger causality test. The results suggested that there is empirical support for both the Wagner and Keynesian hypotheses for the period under review in Malaysia.

Magazzino (2015) assessed the validity of Wagner's law and the Peacock and Wiseman hypothesis based on the relationship between government spending and economic growth in EU countries from 1980 to 2013. Using panel data methodologies, Granger causality and augmented Dickey-Fuller tests, the analysis revealed the existence of a long-run relationship with real aggregate income among EU countries, but the Granger causality test showed mixed results among the theories.

Table 3.1: Studies showing the Direction of Causality between Government Expenditure and Economic Growth

Author(s)	Title	Region/Country	Variables	Methodology	Direction of Causality
Dandan, 2011	Government expenditure and economic growth in Jordan.	Jordan	-Aggregate government expenditure -Real GDP	-Granger causality test	Government expenditure → Economic growth
Ebaidalla, 2013	Causality between government expenditure and national income: evidence from Sudan.	Sudan	−Government expenditure −National income	-Error Correction Mechanism (ECM) -Granger causality test	Government expenditure → Economic growth
Komain and Tantatape, 2007	The relationship between government expenditure and economic growth in Thailand.	Thailand	-Government expenditure -Real GDP	-Ordinary Least Square (OLS) model -Granger causality test	Government expenditure → Economic growth
Kamasa and Abebrese, 2015	Wagner's or Keynes for Ghana? Government expenditure and economic growth dynamics, a VAR approach.	Ghana	-Government expenditure -GDP growth	-Vector Autoregressive (VAR) model -Granger causality test	Economic growth → Government expenditure
Ram, 1987	Wagner's hypothesis in time series and cross section perspectives: evidence from real data for 115 countries.	115 Developed, Developing and Less developed countries (LDCs)	-Government expenditure -GDP	-Individual country time series data -Inter-country cross-sectional data	Economic growth → Government expenditure (in 60% of the 115 countries)

Author(s)	Title	Region/Country	Variables	Methodology	Direction of Causality
Mohammadi et al., 2008	Wagner's hypothesis; new evidence from Turkey, using the bounds testing approach.	Turkey	-Six alternative specifications of Wagner's law: -Peacock and Wiseman -Peacock and Wiseman share -Musgrave -Gupta -Goffman -Pryor	-Pesaran's auto regressive distributed bound lag (ARDL) model	Economic growth → Government expenditure
Antonis et al., 2013	Wagner's law versus Keynesian hypothesis: evidence from pre-WWII Greece.	Greece	-Government expenditure -Income growth	-Auto regressive distributed lag (ARDL) model	Economic growth → Government expenditure
Aledejare, 2013		Nigeria	-Government capital and recurrent expenditure -Real GDP	-Error Correction Mechanism (ECM) -Granger causality test	Economic growth → Government expenditure
Bagdigen and Centintas, 2004	Government spending in a simple model of endogenous growth	Turkey	-Government expenditure -Economic growth	-Time series data -Granger causality test	No causality in either direction

Author(s)	Title	Region/Country	Variables	Methodology	Direction of Causality
Wijeweera and Garis, 2009	Wagner's law and social welfare: The case of the Kingdom of Saudi Arabia.	Saudi Arabia	-Income and real government expenditure -Per capita income and government expenditure -Per capita income and per capita government expenditure -National income and government final consumption expenditure	-Time series data -Engle and Granger two-step cointegration method	Government expenditure → Economic growth
Tang, 2009	Wagner's law versus Keynesian hypothesis in Malaysia: an impressionistic view.	Malaysia	-Government expenditure -GDP	-Granger causality test -Vector Error Correction Mechanism (ECM)	Economic growth → Government expenditure
Magazzino, 2015	Wagner's law and Peacock and Wiseman's displacement effect in European union countries: a panel data study.	EU member countries	-Government expenditure -Real aggregate income	-Granger causality test -Augmented Dickey-Fuller test (ADF)	Economic growth ↔Government expenditure

Author(s)	Title	Region/Country	Variables	Methodology	Direction of Causality
Masan, (2015)	Testing Keynesian versus Wagner hypothesis on the linkage between government expenditure and economic growth in Oman.	Oman	-Disaggregated government short-run expenditure -Disaggregated government long-run expenditure -GDP	-Engel Granger two-step cointegration analysis -Granger causality test	Economic growth → Government expenditure
Ram, 1986	Comparing evidence on Wagner's hypothesis from conventional and 'real' data.	34 Countries	-Aggregate government expenditure -Income level	-Correlation analysis -International comparism project -Granger causality test	Economic growth → Government expenditure (with correlation analysis) Government expenditure → Economic growth (with international comparism)
Adil et al.,2017	Wagner's hypothesis: an empirical verification.	India	-Aggregate government expenditure -GDP	-Auto regressive distributed lag (ARDL)	Government expenditure → Economic growth

3.5 Conclusion

In conclusion, the ideas presented in the economic growth models and the theoretical literature offered insights on how the economy operates. The divergent views contained in the growth models did not dispute the fact that the models discussed are part of economic growth drivers. Their level of contributions can only be measured based on the macroeconomic policies obtainable in any economy and how they are implemented. The thoughts of the theorists in the theoretical literature reviewed showed that there exists some relationship between government expenditure and economic growth but the level and direction of this relationship can be determined through the appropriate means of the Granger-causality testing reviewed in section 3.4 of this chapter. In terms of the causality link, the views showed that although it is crucial to establish the direction of causality between government expenditure and economic growth because of the policy implications behind the causal flow, the causal relationship between the two variables remains unclear.

CHAPTER FOUR

Empirical Literature Review

4.1 Introduction

This chapter reviews the nature of the relationship between government expenditure and economic growth. To better understand this, focus was placed upon empirical evidence relating to the effects of government expenditure on economic growth globally, Africa and South Africa. The review placed emphasis on the methodologies, variables and the results from previous studies. Under the proposed argument, while some believe that increased government expenditure distorts economic activities and can lead to growth decline (Carter et al. 2013 and Hasnul 2015); others are of the opinion that increased government spending generally enhances economic growth (Jelilov and Musa 2016). There are also the views that selective government expenditure, if well directed towards the productive sectors of the economy, will help yield the desired growth rate; which supports a proposition to disaggregate government expenditure in order to be able to measure how each of them affects economic growth (Kurt 2016).

The literature review is structured as follows: section 4.2 will be devoted to global empirical studies, while 4.3 discusses literature on Africa. Studies on South Africa will be reviewed in section 4.4. The last section 4.5 concludes the chapter.

4.2 Global Empirical Studies

Much research has been conducted on the empirical front to analyse the effect of government expenditure on economic growth globally. Though there are some conflicting ideas arising from these studies, the fact remains that a relationship exists between government expenditure and economic growth. This relationship, whether positive or negative, depends on, amongst other factors, the ideology behind the theory employed in the study as well as the countries considered. Many cross-sectional studies have mixed conclusions. For example, one of the earlier studies carried out to assess this relationship was that of Landau (1983). The analysis was based on whether there is a relationship

between the shares of government consumption spending on education and health services in the GDP and the rate of growth at which real per capita GDP might reduce investment in conventional capital. The purpose of the study was to determine if private consumption is more desirable than for government to reduce its spending and increase private consumption, which is believed to be an incentive for labour supply, savings and investment. Using a sample of one hundred and four countries for the periods 1961-1970, 1962-1972, 1961-1974 and 1961-1976, the findings revealed that the share of government consumption expenditure was negatively related to economic growth, which is in line with the views of early economists. However, it was indicated that there is a significant positive relationship between increased government expenditure on education and long-run economic growth.

In a later study, Landau (1986) extended the analysis to include capital, both human and physical, as well as political and international conditions, with a three-year lag on government expenditure on GDP. Government expenditure was disaggregated to include investment, transfers, education, defense and other consumption expenditure. The results supported Landau's previous findings, in that general government consumption was significant and had a negative influence on growth, while spending on education was positive but not statistically significant. The shortcoming of the second analysis is that it did not clearly explain why lagged variables were included, given that the channels through which government influences growth suggest a contemporaneous relationship.

Using data from forty-three developing countries for the period 1970 to 1990, Devarajan et al. (1996) employed the model of Ordinary Least Squares (OLS) to empirically investigate how the steady-state growth performance of these countries over time was affected by the composition of their public expenditure. The study concluded that an increase in the share of recurrent expenditure has positive and statistically significant growth effects, but that the relationship between the capital components of public expenditure and per capita income growth is negative. Their conclusion was that developing country governments have been misallocating public expenditure in favour of capital expenditure, at the expense of current expenditure.

A similar study was conducted by Guseh (1997) with fifty-one middle income developing countries from 1960 to 1985, in order to analyse the relationship between government spending and economic growth among these countries. Results from the ordinary least squares (OLS) method used for estimation showed that growth in government spending has negative effects on economic growth. The implication of these findings, according to the author, is that resources in most developing economies have been unproductively allocated, and therefore do not contribute to the growth of GDP.

Gupta et al. (2002) examined the effects of government expenditure composition and fiscal adjustment on economic growth in a sample of thirty-nine low-income countries from 1990-2000. Using a feasible generalised least squares estimator (FGLS), their analysis indicated that there is a strong link between public expenditure reform and per capita growth. This is because fiscal adjustments and consolidations achieved through curtailing current expenditures are more conducive to growth, especially when they lead to a reduction in the domestic borrowing requirements of the government. They concluded that a reduction in the average deficit in low-income countries from about four percent of GDP to two percent of GDP could boost per capita growth by one percentage point per annum.

A disaggregated analysis of thirty developing countries was carried out by Bose et al. (2007) using time series data on both capital and recurrent expenditure for the period 1970 to 1990, in order to review the effects of public expenditure on economic growth. Based on the belief that some omitted variables can result in spurious regression and biased estimates between the variables, they employed the three-stage least squares (3SLS) method. The empirical findings can be summarised as follows: the share of government capital expenditure in GDP is positively and significantly correlated with economic growth, while the growth effect of recurrent expenditure is significant for the group of countries used in their study. Secondly, at the disaggregated level, government total expenditure on education is the only expenditure that is significantly associated with growth throughout the analysis.

Wu et al. (2010) used samples from one hundred and eighty-two countries for the period 1950 to 2004, and re-examined the causal relationship between government expenditure and economic growth. Applying the panel Granger-causality test developed by Hurlin (2004, 2005), their estimates showed strong support for Wagner's hypothesis that economic growth is helpful for increased government expenditure. However, when countries are disaggregated by income level and degree of corruption, except for low-income countries, there is a bi-directional link between government expenditure and economic growth for the different sub-samples of countries.

Agostino et al. (2016) measured the effects of government expenditure and corruption on economic growth in a sample of one hundred and six countries from 1996 to 2010. Employing the generalised methods of moments (GMM) model, their findings conform to the theoretical predictions that government investment spending relates positively to economic growth. The study also concluded that while large military burden, recurrent government spending and high levels of corruption might have negative effects on growth, further estimation revealed complementarity between corruption and military spending, which makes the negative effects of military burden on growth rate stronger. The authors believed that combating corruption would directly increase aggregate economic performance, and may indirectly reduce the negative impact of military burden.

Table 4.1: Studies Showing the Nature of Relationship between Government Expenditure and Economic Growth in a Cross-Country Analysis.

Author(s)	Title	Region/Country	Variables	Methodology	Positive/Negative Relationship
Landau, 1983	Government expenditure and economic growth: a cross-country study.	104 countries	- Education -Health services and -Other consumption expenditure -Real per capita GDP	-Cross country regressions analysis	Negative relationship (with other government consumption expenditure) Positive relationship (with government expenditure on education)
Landau, 1986	Government expenditure and economic growth in less developed countries: an empirical study for 1960-1980.	104 countries	-Investment transfers -Human capital -Physical capital -Education -Defense -GDP	-Cross country regressions analysis	Positive relationship with education
Devarajan et al., 1996	The composition of public expenditure and economic growth.	43 developing countries	-Recurrent government expenditure -Capital government expenditure -per capita income	-Ordinary Least Squares (OLS) method	Positive relationship (with recurrent government expenditure) Negative relationship (with capital government expenditure)

Author(s)	Title	Region/Country	Variables	Methodology	Positive/Negative Relationship
Guseh, 1997	Government size and economic growth in developing countries: a political economy framework.	51 Middle income developing countries	-Aggregate government expenditure -GDP	-Ordinary Least Square (OLS) method	Negative relationship
Gupta et al., 2002	Transition economies: how appropriate is the size and scope of government.	39 Low-income countries	-Government expenditure -Fiscal adjustments -Per capita growth	-Feasible Generalised Least Square (FGLS) Estimator	Positive relationship (with fiscal adjustments and consolidation)
Bose et al., 2007	Public expenditure and economic growth: disaggregated analysis for developing countries.	30 Developing countries	-Capital expenditure -Recurrent expenditure -GDP	-Three Stage Least Square (3SLS) method	Positive relationship (with capital expenditure)
Agostino et al., 2016	Government spending, corruption and economic growth.	106 Countries	-Aggregate government expenditure -Recurrent expenditure -Military expenditure -Corruption -GDP	Generalised Methods of Moments (GMM) model	Negative relationship

Author(s)	Title	Region/Country	Variables	Methodology	Positive/Negative Relationship
Wu et al., 2010	The impact of government expenditure on economic growth: how sensitive to the level of development.	182 countries	-Aggregate government expenditure -Disaggregated government expenditure -GDP	Hurlin (2004, 2005) Granger causality test	Positive relationship

In developed economies such as the USA, studies were conducted to analyse the level of this relationship using both aggregate and disaggregated forms of government expenditure, as well as various estimation models. For instance, Aschauer (1989) employed aggregate USA national income time-series data from 1949 to 1985 to investigate the linkages between public expenditure and economic growth, and found that government expenditure on main infrastructures such as streets, highways, water and electricity, amongst others, has a significant positive relationship with economic growth. Meanwhile, another set of infrastructural expenditure on police stations, fire stations, court houses and office buildings was found to have little positive effect on economic growth. Government expenditure on education, which involves the building of classrooms and other educational expenditure, was not found to be positively related to economic growth.

Cullison (1993) employed twenty-one categories of government expenditure to examine the level of their relationship with economic growth in the USA, all classified as public investment, for the period 1955 to 1992. Using the Granger-causality test and simulations from a vector autoregressive (VAR) model, the findings indicated that amongst all the categories of government expenditure that were studied, only education and labour training were positively related to economic growth.

Munnell (1999) reported a lower effect of public capital on output with USA panel data from 1970 to 1986 in 48 states. Using the Coub-Douglas production function model, the findings revealed a positive and significant relationship between the elasticity of gross state products (GSP) to public and highway capital stocks.

In contrast to the views of Munnell (1999), an investigation of the link between government expenditure and economic growth by Mitchell (2005) concluded that a large and growing government expenditure is not conducive to better economic performance. According to the author, the USA economy, for example, can grow much faster if government curtails unnecessary expenditure that can distort the economy. This argument is based on the view that government spending undermines economic growth by imposing various unreasonable costs, such as heavy extraction and displacement costs, on the productive sector. This can even crowd-out the private sector, as well as reduce incentives and

general aggregate demands, which in turn affects economic growth negatively, as suggested by other research related to this relationship reviewed by the author. The case of EU member countries was used to exemplify situations where high government spending consumes almost half of these countries' economic output. The increased non-productive expenditure in these countries has decreased total per-capita output, real economic growth, job creation and living standards by more than fifteen percent compared to the USA. This implies that the living standards of the Euro-zone countries are equivalent to those of the poorest states in America, such as Arkansas and Montana. Therefore, shrinking the size of government expenditure should be a major goal for policymakers within these countries, as concluded by Mitchell.

In agreement with Mitchell's conclusions, Riedl (2008) presented a comparative analysis of studies measuring the impact of government expenditure on economic growth in the USA, and reported the same findings as Mitchell (2005). The analysis showed that economic growth can only be determined by the effectiveness of government policies on labour productivity and supply, which requires increasing the amount of net capital in relation to the amount of labour employed. According to the author, this form of capital can reasonably be provided by the private sector, and government can only intervene in rare cases where they are in short supply, or by monitoring the process. In this respect, further government stimulus packages will be unproductive and could be regarded as the mere redistribution of money from savers to spenders, which will not enhance economic growth.

To validate the views of previous economic researchers on the relationship between government expenditure and economic growth in the USA, Knoop (2009) evaluated the same relationship by employing the ordinary least squares (OLS) method, and based his theoretical model on the endogenous growth theory. The study confirmed that the USA government has to reduce its spending in order to increase the country's growth opportunities.

Glass (2009) investigated the aggregate and disaggregated forms of government expenditure, and the causal relationship between government investment, total expenditure on public order and safety, and USA economic growth from 1959 to 2003.

The Granger causality test from the aggregate analysis suggested that there is a unidirectional causality running from changes in output and investment to changes in spending on public order and safety. In addition, the study revealed that when total spending is disaggregated, there is evidence of unidirectional causality from changes in investment to changes in spending on law courts, and from changes in output to changes in expenditure on police forces, as well as evidence of bi-directional causality between changes in spending on law courts and changes in output. There is also an indication that spending on police forces does not Granger-cause changes in output within the aggregate analysis, which shows that the reinforcement of property rights, which follows an increase in spending on police forces, will not increase economic growth.

Furthermore, an article on the American Recovery and Reinvestment Act 2009 (ARRA) reported that a bill was passed to authorise the use of seven hundred and eighty-seven billion US dollars to promote job creation and improve economic activities related to increased earnings, as well as savings for future investments. The USA government achieved a positive result through a sharp rise in the GDP to nearly thirty percent within two years of passing the bill, which supports the argument by Mitchell (2005) and Riedl (2008).

In addition, Stratmann and Okolski (2010) assessed various studies on the link between government expenditure and economic growth in the USA. Their review suggests that in practice, government outlays designed to stimulate the economy may fall short of this goal, due to increased government expenditures and transfers that are not significant to economic growth. For example, transfers in the form of social security, Medicare, Medicaid, transitional assistance to needy families, food stamps, retirement grants and unemployment insurance affect the economic decisions of the recipients, because the availability, amount and possibility of receiving them can encourage behaviour that makes people eligible for this. In the same way, government tax increases to raise revenue also affect economic decisions of consumers and firms, through the reduction in earnings and savings, as well as decreases in production and job losses. They believed that even in a time of crisis in the USA, government spending could not be an automatic boom for economic growth, unless such spending was productively introduced to the economy.

Finally, Roy (2012) examined the extent of the relationship between two different types of government expenditure, namely consumption and investment, and USA economic growth from 1950 to 2007. Using simultaneous equations as the model of estimation in the study, the findings showed that an increase in government consumption expenditure slows economic growth, while a rise in government investment enhances growth. However, the author still believed that excessive government investment crowds-out private investment.

In relation to the comparisons drawn with several studies in the USA, European countries were also considered. Nevertheless, the zone is mixed with developed and developing economies based on each country's real gross domestic product and income per capita. In this regard, Bairam (1988) conducted a study to measure the impact of government expenditure on economic growth in New Zealand, based on Ram's (1986) two production function model for analysing the effects of government expenditure on economic growth. The ordinary least squares method (OLS) was used as an estimation method for data from 1960 to 1980, and the results suggested that an increase in government expenditure has no adverse effect on consumption. Therefore, it increases private investment, which in turn enhances economic growth.

Yildirim and Sezgin (2002) conducted a study to evaluate the possible trade-off between Turkish government expenditure on defense, education and health during the Turkish republican era from 1924 to 1996. Using the seemingly unrelated regression estimation method, their findings revealed that while military spending occurs independently of health and education expenditure, there are trade-offs between defense and welfare spending. For defense and health, the trade-off is negative, but it is positive between defense and education.

Loizides and Vamvoukas (2005) employed both bivariate and trivariate systems based on cointegration analysis, error correction model (ECM) and Granger-causality tests to evaluate the impact of government expenditure on three European countries, namely the United Kingdom, Ireland and Greece. Using time-series data from 1950 to 1995, the countries were divided into a developed country, which is the United Kingdom, and

developing countries, namely Ireland and Greece. The estimation results indicated that within these three countries, public expenditure causes growth in national income, both in the short- and long-run. However, in terms of the causality link, Greece and the UK's economies validated Wagner's hypothesis, while Ireland's economy did not indicate the existence of Wagner's law.

Based on a cross-country analysis allowing for dynamic specifications, Arapia and Turrini (2008) investigated the relationship between government expenditure and potential output in fifteen EU member countries. This study used both cross-sectional and time-series data from 1970 to 2003, and applied panel unit root test, the panel cointegration test, error correction mechanism (ECM) and pooled mean group estimator (PMG). Their aim was to determine by how much government expenditure changes with GDP in the short- and long-run, if the relationship between government expenditure and GDP was robust over time, and whether or not it differed significantly across countries.
Through the analysis, they concluded that government expenditure and potential output are linked by a long-run relationship, such that government spending grows roughly in proportion to potential output, which helps to explain the EU debate on public finance sustainability. Their results also suggested that on average, increased rates of potential growth would leave the share of government expenditure on potential output roughly unaffected, though the impact would differ considerably across countries. There is also evidence that the speed of adjustment from government expenditure to potential output might have implications for budgetary surveillance, particularly in the EU context where national budgetary policies are subject to a common framework for fiscal policy in the EU treaty and the Stability and Growth Pact (SGP).

By using both fixed effect and random effect techniques, Alexiou (2009) sought to determine how the impact of five variables would condition economic growth for seven countries in Southern Europe from 1995 to 2005. His findings indicated that among the five variables which were estimated; government spending on capital formation, development assistance, private investment and a proxy for trade-openness all showed a positive and significant effect on growth, but population growth was insignificant. The author concluded by making recommendations for increased spending on capital

formation and the creation of a favourable economic environment for the government of these countries.

Considering the views on public spending, which assume that most goods and services that are not productively directed are underutilised, an article in the ECB Monthly Bulletin (2009), published for European countries, also supported the argument that since public resources are scarce, government should learn how to redirect them to yield the desired growth rate. The article went further to explain that expenditure programmes, if not effectively and efficiently pursued to improve long-term growth prospects, will doom the economy.

Magazzino and Valeri (2012) studied the impact of capital stock, total labour force and total factor productivity on economic growth in the Italian transport sector. The Granger causality test was found to be important in explaining the causal relationship among these variables, and the vector error correction model (VECM) was applied to time-series data from 1970 to 2007. Their findings indicated that there is a long-run relationship between the three variables, and while productivity Granger causes labour force, there is a bi-directional relationship between real public capital and labour force, as well as public capital and productivity. This implies that government investment in public capital can be a powerful instrument to stimulate economic growth in the long-run, since it promotes both employment and productivity, which in turn affects aggregate income.

Adopting a different estimation approach, Kurt (2015) examined the direct and indirect relationship between government expenditure on health services and economic growth in Turkey. The Feder-Ram model was used on data from 2006 to 2013. His findings revealed that the direct impact of government expenditure on health is generally positive and significant, while the indirect impact is negative but significant. According to him, this supports the economic belief that increased government expenditure in the health sector also increases productivity.

Countries in the Middle-East and Asia were also evaluated to measure how government spending has impacted their growth. For instance, Koeda and Kamarenko (2008) examined the impact of oil revenue expenditure on economic growth in Azerbaijan. Their

evaluation was based on the assumption of the scaling-up of expenditure, to be followed by its rapid scaling-down in the context of Azerbaijan's current temporary oil production boom. The relevant experiences of Nigeria and Saudi-Arabia were reviewed by means of a simulated general equilibrium neoclassical growth model, whose distinguished features complied with Azerbaijan's economic conditions, is the chosen model of economic growth for their study. The conclusion of both analyses suggested that the evaluated fiscal scenario posed significant risks to growth sustainability, and the historical experiences of the two countries reviewed indicated that the initial growth performance largely depended on the efficiency of scaled-up expenditure. They also explained the risks associated with a sudden scaling-down of expenditure, and concluded that the results obtained from the simulations of the Azerbaijan specific models complied with the results from the two countries that were reviewed.

To test for the validity of the Keynesian economic growth theory, Al Bataineh (2012) investigated the effect of public expenditure on economic growth in Jordan using time-series data from 1990 to 2010. The Johasen cointegration estimation technique employed in the study revealed that government expenditure at the aggregate level had a positive impact on economic growth in Jordan, which supports the Keynesian economic growth theory.

A positive relationship was also shown in the study conducted by Alshahrani and Alsadiq (2014). They estimated the effects of different components of government expenditures on economic growth in Saudi Arabia, as well as the short- and long-run effects of government expenditures on growth from 1969 to 2010. Using the vector autoregressive model (VAR) and the vector error correction model (VECM), their findings revealed that private domestic and public investment, as well as healthcare expenditure, stimulates growth in the long-run, while openness to trade and spending in the housing sector boost the economy in the short-run.

To analyse the effect of government expenditure on economic growth in Pakistan, Muhammad et al. (2015) applied the Granger causality and cointegration tests on time-series data from 1972 to 2013. Their results indicated that a positive and significant

relationship exists between government expenditure and economic growth in the long-run.

With cross-cultural samples from nine Asian countries and data from 1970 to 2013, Lahirushan and Gunasekara (2015) explored the long-run equilibrium relationship between government expenditure and economic growth within the nine selected economies. With cointegration, panel fixed effects models and the Granger causality test as their estimation techniques, these authors drew the following conclusions: firstly, that there is a large positive impact as well as a long-run relationship between government expenditure and the GDP of these countries. In addition, unidirectional causality exists from economic growth to government expenditure and from government expenditure to economic growth, thereby validating their findings in terms of the Keynesian theory and Wagner's law.

Suanin (2015) applied the vector autoregressive model (VAR) and vector error correction model (VECM) to study the impact of three different types of government expenditure, namely budgetary expenditure, extra-budgetary expenditure and quasi-fiscal expenditure, on economic growth in Thailand. Using quarterly data from 1993 to 2014, the results indicated that budgetary expenditure has the ability to promote economic growth in the long-run, while extra-budgetary expenditure and quasi-fiscal expenditure can stimulate growth in the short-run.

Building on the hypothesis of the Keynesian theory and Wagner's Law, Samudram et al. (2009) empirically examined the applicability of these hypotheses to a developing economy such as Malaysia in terms of the role of public expenditure and economic growth. Using data from 1970 to 2004, and applying the auto-regressive distributed lag (ARDL) model technique with bound-test, as developed by Pesaran et al. (2001), they concluded that the empirical analysis supports Wagner's Law for all government total expenditure, including education, defense, development, administration, health and agriculture. However, a relationship exists between government spending on administration and health services and the Keynesian theory on the effects of government spending. There is also an indication that the structural break of 1998 in Malaysia exhibited a bi-directional long-run causality.

Furthermore, Hasnul (2015) applied the ordinary least squares method (OLS) to time-series data from 1970 to 2014, in order to evaluate the impact of different components of government expenditure on economic growth in Malaysia. The findings from the classification of government expenditure showed that expenditure in the housing and development sectors had a weaker effect on economic growth, while government spending on education, defense, healthcare, and operational spending did not contribute to economic growth.

In addition, some studies combined countries from America, Europe and Asia to measure the extent of the relationship between government expenditure and economic growth in those countries.

Kolluri et al. (2010) examined whether Wagner's law of public expenditure was applicable in relation to certain key components of government expenditure and the national income. Using time-series data drawn from the G7 industrialised countries (Canada, France, Italy, Japan, United Kingdom, Germany and the United States of America) over the period 1960 to 1993, they used the cointegration test, Granger causality test and error correction model to determine the short- and long-run effects of growth in national income on government expenditure. Their findings revealed that there was a significant long-run equilibrium relationship between government spending and national income, which supports Wagner's law. Furthermore, there was a short-run adjustment to the long-run equilibrium. In addition, through estimates of the long-run elasticity of government expenditure with respect to national income, their study indicated that government spending, whether in aggregate or type, is income-elastic in the majority of G7 nations.

A related study on thirty OECD countries investigated the relationship between government expenditure and economic growth for the period 1970-2005. The findings showed the existence of a long-run relationship between government expenditure and economic growth. Moreover, the study observed a unidirectional causality from government expenditure to growth in sixteen of the thirty countries included in the study, thereby supporting the Keynesian hypothesis. However, there was a causal relationship between economic growth and government spending in ten of the countries, which agrees with Wagner's Law. Owoye (2007) concluded the study by maintaining that among the

thirty countries studied, there was feedback on the relationship between government expenditure and economic growth for a group of four countries.

In contrast to the positive relationship between government spending on health and economic growth, a disaggregated approach was employed in Barbados, a small open economy, as classified by Carter et al. (2013). They used the dynamic ordinary least square (DOLS) and the unrestricted error correction model (UECM) to analyse government expenditure and economic growth with time series data from 1976 to 2011. Their results indicated that increasing government outlays in health, education and social security may reduce economic prosperity, both in the short- and long-run. However, there was weak evidence that a rise in total expenditure or reallocation of expenditure from one component to another may have some marginal positive relationship with per capita output.

Table 4.1.2: Studies showing the Nature of Relationship between Government Expenditure and Economic Growth in the Global Empirical Studies

Author(s)	Title	Region/Country	Variables	Methodology	Positive/Negative Relationship
Aschauer, 1989	Public capital and economic growth: issues of quantity, finance and efficiency.	USA	-Main infrastructural expenditure: Streets High ways Water Electricity -Other forms of infrastructural expenditure: Police Stations Fire stations Court houses Office buildings	Time series data	Positive relationship (main infrastructural expenditure) Negative relationship (other forms of government expenditure)
Cullison, 1993	Public investment and economic growth.	USA	-21 Different categories of government expenditure	-Granger causality test -Simulations from VAR model	Positive relationship (with education and labour training)
Munnell, 1999	Infrastructure investment and economic growth.	48 states in the USA	-Capital expenditure -Gross state products (GSP) -Capital stocks	-Panel data -Coub-douglas production function model	Positive relationship
Mitchell, 2005	The impact of government expenditure on economic growth.	USA, EU member countries	-Aggregate government expenditure -Total per capital output	-Meta analysis	Negative relationship

Author(s)	Title	Region/Country	Variables	Methodology	Positive/Negative Relationship
Riedl, 2008	Why government spending does not stimulate economic growth.	USA	-net capital expenditure -Labour productivity -Labour supply -GDP	-Qualitative analysis	Negative relationship
Knoop, 2009	Growth welfare and the size of government.	USA	-Aggregated government expenditure -GDP	-Endogenous growth theory -Ordinary Least Square (OLS) method	Negative relationship
Glass, 2009	Government expenditure on public order and safety, economic growth and private investment: empirical evidence from the United States.	USA	-Aggregate government expenditure -Disaggregated government expenditure -Public order and safety -Private investment -GDP	-Time series data -Granger causality test	Negative relationship
American Recovery and Reinvestment Act (ARRA) 2009	American Recovery and Reinvestment Act.	USA	-Expenditure on employment creation -GDP	-Qualitative analysis	Positive relationship
Stratmann and Okolski, 2010	Does government spending affect economic growth?	USA	-Transfers: Social security Food stamps Retirement grants Unemployment insurance -GDP	-Qualitative analysis	Negative relationship

Author(s)	Title	Region/Country	Variables	Methodology	Positive/Negative Relationship
Roy, 2012	Effects of government consumption and investment expenditure on economic growth in the USA.	USA	-Consumption expenditure -Investment expenditure -GDP	-Time series data -Model of simultaneous equation	Negative relationship (with consumption expenditure) Positive relationship (with investment expenditure)
Bairam, 1988	Government expenditure and economic growth some evidence from New Zealand time series data.	New Zealand	-General government consumption expenditure -GDP	-Ram's (1986) model -Time series data -Ordinary Least Square (OLS)	Positive relationship
Yildrim and Sezgin, 2002	Defence, education and health expenditures in Turkey, 1924-1996.	Turkey	-Defense expenditure -Education -Health services -GDP	-Time series data -Seemingly unrelated regression estimation method	Negative relationship (with defense and health) Positive relationship (defense and education)
Loizides and Vamvoukas, 2005	Government expenditure and economic growth: evidence from trivariate causality testing.	UK, Ireland and Greece	-Aggregate government expenditure -GDP	-Cointegration test -Error Correction Model (ECM) -Granger causality test	Positive relationship
Arapia and Turrini, 2008	Government expenditure and economic growth in the EU: long-run tendencies and short-run adjustment.	15 EU member countries	-Expenditure on the short-run potential output -Expenditure on the long-run potential output -GDP	-Cross sectional data -Panel unit root test -Panel cointegration test -ECM -Pooled Mean Group Estimator (PMG)	Positive relationship (in the long-run)

Author(s)	Title	Region/Country	Variables	Methodology	Positive/Negative Relationship
Alexiou, 2009	Government spending and economic growth: econometric evidence from the South Eastern Europe.	Southern European Countries	-capital formation -Development assistance -Private investment -Trade openness -Population growth -GDP	-Panel data -Fixed effect model -Random effect model	Positive relationship
Kurt, 2015	Government health expenditure and economic growth: a Feder-Ram approach for the case of Turkey.	Turkey	-Direct expenditure on health services -Indirect expenditure on health services	-Time series data -Feder Ram model	Positive relationship (direct expenditure on health services) Negative relationship (indirect expenditure on health services)
Al Bataineh, 2012	The impact of government expenditure on economic growth in Jordan.	Jordan	-Aggregate government expenditure -GDP	-Time series data -Johansen cointegration	Positive relationship
ECB monthly bulletin, 2009	The functional composition of government spending in the European Union.	EU member countries	-Aggregate government expenditure -GDP	-Qualitative analysis	Positive relationship
Magazzino and Valeri, 2012	Wagner's law in Italy: empirical evidence from 1970 to 2007.	Italy	-Capital stock -Total labour force -Total factor productivity	-Granger causality test -Vector Error Correction Model (VECM)	Positive relationship

Author(s)	Title	Region/Country	Variables	Methodology	Positive/Negative Relationship
Koeda and Kamarenko, 2008	Impact of government expenditure on growth: the case of Azerbaijan.	Azerbaijan	-oil revenue expenditure -GDP	-Scaling-up of expenditure -Rapid scaling down in the context of current temporary production boom -Simulated general equilibrium neoclassical growth model	Negative relationship
Muhammed et al, 2015	Inflation, economic growth and government expenditure of Pakinstan: 1980-2010.	Pakistan	-Aggregate government expenditure -GDP	-Time series data -Cointegration test -Granger causality test	Positive relationship (in the long-run)
Alshahrani and Alsadiq, 2014	Economic growth and government spending in Saudi Arabia: an empirical investigation.	Saudi-Arabia	-Private domestic investment -Public investment -Openness to trade -Expenditure on housing -Expenditure on health care	-Time series data -Vector autoregressive model -Vector Error Correction Model	Positive relationship (in the long-run and short-run)
Lahirushan and Gunasekara, 2015	The impact of government expenditure on economic growth: a study of Asian countries.	9 Asian countries	-Aggregate government expenditure -GDP	-Panel data -Cointegration model -Fixed effect model -Granger causality test	Positive relationship

Author(s)	Title	Region/Country	Variables	Methodology	Positive/Negative Relationship
Samudram et al., 2009	Keynes and Wagner hypothesis on government expenditure and economic development: the case of developing economy.	Malaysia	-Education expenditure -Defense expenditure -Development administration -Health care expenditure -Agricultural expenditure -GDP	-Pesaran et al., (2001) autor regressive distributed lag (ARDL) model	Positive relationship
Hasnul, 2015	The effects of government expenditure on economic growth: the case of Malaysia.	Malaysia	-Education expenditure -Defense expenditure -Health care expenditure -GDP	-Time series data -Ordinary Least Square (OLS) model	Negative relationship
Kolluri et al., 2010	Government expenditure and economic growth: evidence from G7 countries.	G7-Industralised countries	-Disaggregated government expenditure -GDP	-Cointegration test -Granger causality test -Error Correction Model (ECM)	Positive relationship
Owoye, 2007	Public expenditure and economic growth: new evidence from OECD countries.	OECD countries	-Aggregate government expenditure -GDP	-Ordinary Least Square (OLS)	Positive relationship

Author(s)	Title	Region/Country	Variables	Methodology	Positive/Negative Relationship
Suanin, 2015	The impact of government expenditure on economic growth in Thailand.	Thailand	-Budgetary expenditure -Extra budgetary expenditure -Quasi-fiscal expenditure	-Quarterly data -Vector autoregressive model -Vector Error Correction Model (VECM)	Positive relationship (in the long-run and short-run)
Carter, 2013	Government expenditure and economic growth in a small open economy: a disaggregated approach.	Barbados	-Health expenditure -Education expenditure -Expenditure on social security -GDP	-Time series data -Dynamic Ordinary Least Squares (DOLS) -Unrestricted Error Correction Model (UECM)	Negative relationship (both in the short-run and long-run)

4.3 Studies on African Economies

The empirical literature on developed economies does not necessarily describe the relevance of understanding how public expenditure will enhance economic growth in developing or less developed countries. Since there are differences in the composition of government spending and needs of different categories of countries, a review of the literature on African economies will provide insight into how this relationship works on the continent. For example, Nurudeen and Usman (2012) examined different categories of government expenditure, namely total capital expenditure, total recurrent expenditure and expenditure on education, and their effects on economic growth in Nigeria from 1979 to 2008. Using the error correction model as the estimation technique, their report showed that these three types of spending had a negative effect on economic growth. However, they maintained that increases in government spending on transport, communication and health would in turn increase productivity and economic growth.

Similarly, Inuwa (2012) Efobi and Osabuohien (2012), Ebiringa and Charles (2012), and Chude and Chude (2013) examined the same relationship in Nigeria, using the cointegration model technique with data from 1961- 2010, 1970 - 2014, 1977 - 2011 and 1977 - 2012 respectively. They all found that only two categories of government spending, namely education and capital investment, had a statistically significant effect on economic growth.

In addition, a disaggregated study was conducted in Nigeria using data from 1970 to 2012. Applying the ordinary least square method (OLS), Ebong et al. (2016) showed how important it is for government to structure its expenditure with growth prospects in mind. They agreed that government investment directed towards education and infrastructure in Nigeria will not only be highly significant, but the magnitude of the impacts arising from the externalities of these investments in raising the productivity of both human and physical capital will be huge for the economy.

Jelilov and Musa (2016) applied the OLS technique to examine the impact of government expenditure on economic growth in Nigeria using data from 1981 to 2012. The main argument of their study was that despite Nigeria being a mono-crop economy that derives

huge revenue from its booming oil sector, there is a mismatch between the performance of the Nigerian economy and the massive increase in government total expenditure over the years. Their analysis revealed that government expenditure has a significant impact on the growth rate of GDP. They also concluded that since other variables such as interest rate, exchange rate and inflation rate have an impact on economic growth, in light of the position of the relationship between the rate of inflation and economic growth, some level of inflation is desirable for effective economic growth.

Kaakunga (2006) conducted a study to survey the conceptual and empirical relationship between mix government spending, taxation and the long-term growth of the Namibian economy. Using the cointegration estimation technique, his findings indicated that there is a positive relationship between capital expenditure, the sum of exports and imports of goods and services, including effective mobilisation of government tax revenue, and economic growth.

Ghura (1995) carried out similar research to examine this relationship in 33 sub-Saharan African countries, by using pooled time series and cross-sectional data from 1970 to 1990. His approach revealed the existence of a negative relationship between government spending and economic growth.

In support of disaggregated studies, Muthui et al. (2013) employed the vector error correction model (VECM) to analyse the impact of various components of government expenditure, namely education, health, defense, infrastructure, and public order and security, on economic growth in Kenya. Using data from 1964 to 2011, their results showed that there is a positive significant relationship between government expenditure on education, public order and security, and infrastructure and economic growth, but that expenditure on defense and health are negatively related to economic growth. The conclusion of the study was that public law and order, research and development, and social and economic infrastructure can lead to the creation of positive externalities, which will in turn improve the productivity of private investment, which is often seen as the engine that drives a country's economy.

Salih (2012) used the cointegration model, Granger causality test and error correction model (ECM) to test Wagner's theory of increasing state activities in Sudan for the period

1970 to 2010. The results showed that the growth of per capita real GDP had a unidirectional relationship with the share of government spending to GDP, which implies that Wagner's theory applies to Sudan.

Using the Autoregressive Distributed Lag (ARDL) bounds testing approach, Altaf and Khan (2011) examined the effect of total government expenditure and its broad components, namely revenue expenditure and capital expenditure, on the growth rate of real per capita (GSDP) in Assam for the period 1981-1982 and 2006–2007. Their findings revealed that the share of total government expenditure and revenue expenditure in Gross State Domestic Product were positively and significantly related to the growth rate of real per capita GSDP in Assam in the long-run, but not in the short-run.

In a similar vein, Olopade and Olopade (2010), Fasoranti (2012), Ebere and Osundina (2012) and Adewara and Oloni (2012) presented their findings, which confirmed the importance of governments of developing economies, such as Nigeria, diverting their resources towards the productive sector of the economy. By employing the cointegration test, they all agreed that there are circumstances under which lower levels of government spending, such as subsidies, will enhance economic growth. There are also circumstances in which higher levels of government spending will serve as the best option for sustainable long-run growth. For instance, expenditure on education, capital investment and improved healthcare delivery can boost productivity.

Table 4.2: Studies showing the Nature of Relationship between Government Expenditure and Economic Growth in the African economies

Author(s)	Title	Region/Country	Variables	Methodology	Positive /Negative Relationship
Nurudeen and Usman, 2012	Government expenditure and economic growth in Nigeria, 1970-2008: a disaggregated analysis.	Nigeria	-Total capital expenditure -Total recurrent expenditure -Expenditure on education -GDP	-Time series data -Error Correction Mechanism (ECM)	Negative relationship
Inuwa (2012), Efobi and Osabuohien (2012), Ebiringa and Charles (2012) and Chude and Chude (2013)	Government expenditure and economic growth in Nigeria: cointegration analysis and causality testing.	Nigeria	-Capital investment -Expenditure on education -GDP	-Time series data -Cointegration analysis	Positive relationship
Ebong et al., 2016h	Impact of government expenditure and economic growth in Nigeria: a disaggregated analysis.	Nigeria	-Expenditure on education -Infrastructural development -GDP	-Time series data -Ordinary Least Squares (OLS) model	Positive relationship

Author(s)	Title	Region/Country	Variables	Methodology	Positive /Negative Relationship
Ghura, 1995	Macro policies, external forces and economic growth in Sub-Saharan Africa.	33 Sub-Saharan African countries	-Aggregate government expenditure -GDP	-Pooled time series data -Cross sectional data	Negative relationship
Muthui et al., 2013	The impact of public expenditure components on economic growth in Kenya 1964-2011.	Kenya	-Expenditure on education -Expenditure on health -Expenditure on defense -Infrastructural development -Expenditure on public order -GDP	-Time series data -Vector Error Correction Model (VECM)	Positive relationship (with education, infrastructure, public order and security) Negative relationship (with defense and health)
Salih, 2012	The relationship between economic growth and government expenditure: evidence from Sudan.	Sudan	-Aggregate government expenditure -Per capita real GDP	-Time series data -Cointegration test -Granger causality test -Error Correction model (ECM)	Positive relationship
Altaf and Khan, 2011	Impact of government expenditure on economic growth in Assam: an econometric study.	Assam	-Revenue expenditure -Capital expenditure -Real per capita gross state domestic product (GSDP)	-Auto regressive distributed lag (ARDL) model	Positive relationship (in the long-run) Negative relationship (in the short-run)

Author(s)	Title	Region/Country	Variables	Methodology	Positive/Negative Relationship
Olapade and Olapade (2010), Fasoranti (2012), Ebere and Osundina (2012) and Adewara and Oloni (2012)	Impact of government expenditure on economic growth in Nigeria.	Nigeria	-Government subsidies -Expenditure on education -Infrastucture -Capital investment -Expenditure on health care services -GDP	-Time series data -Cointegration test	Positive relationship
Jelilov and Musa, 2016	The impact of government expenditure on economic growth in Nigeria.	Nigeria	-Total government expenditure -Interest rate -Inflation rate -Exchange rate	-Time series data -Ordinary Least Square (OLS) model	Positive relationship (some level of the variables desirable for effective economic growth)
Kaakunga, 2006	The impact of fiscal policy on economic growth in Namibia.	Namibia	-Fiscal consolidation -Taxation -Capital government expenditure -GDP	-Cointegration model	Positive relationship

4.4 Studies on the South African Economy

With reference to case studies in the South African context, Dunne et al. (1999) investigated the economic effect of government military expenditure in South Africa based on the Keynesian supply and demand theoretical model. Using a different estimation approach, namely the three stage least square (3SLS), on a sample from 1961 to 1997, they found that military spending had a negative impact on economic growth in South Africa.

A combined study was conducted by Betrand and Mamatzakis (2001) to explore the impact of infrastructural spending on long-run economic growth in South Africa and Chile. They concluded that there is a positive relationship between government spending on infrastructure and economic growth in both countries.

With a large sample size, Fedderke et al. (2006) carried out research on the relationship between economic infrastructural investment, such as roads, transportation and housing, and economic growth in South Africa. Applying the vector error correction model (VECM) to time series data from 1875 to 2001, they concluded that investment in infrastructure in South Africa not only leads to economic growth, but that the growth impact is robust, both in the use of the parsimonious growth model and fuller specification. Their results also showed that the impact of infrastructure on output is direct through its effects on raising the marginal productivity of capital.

A recent paper by Odhiambo (2015) applied the ARDL bound testing approach to examine the relationship between government expenditure and economic growth. His study concluded that although both government expenditure and economic growth Granger-causes each other in the short-run, it is economic growth that Granger-causes government expenditure in the long-run.

In support of this, the study conducted by Nhlapo (2013) examined how government spending on construction contributes to economic growth in South Africa. Analysing statistical data for the period 1969-2011, and using Construction Value Added (CVA), Gross Domestic Product (GDP) and Gross Fixed Capital Formation (GFCF), his findings

indicated that there is evidence of a very strong relationship between government spending on construction activities and economic growth.

Marinkov (2013) explored whether South African provinces, district municipalities and metropolitan municipalities play significant roles in promoting economic growth, by assessing the impact of revenue and expenditure assignments within the three divisions. Based on the endogenous growth model by Zhang and Zou (1996) and Davoodi and Zou (1998), the study applied pure and pooled cross-sectional growth regression and panel growth regressions on provincial data from 1999 to 2009, district municipalities from 2006 to 2009, and metropolitan municipalities from 2006 to 2009. The findings revealed that economic growth powers are mostly situated at the provincial level, instead of encouraging the municipal level, particularly non-metropolitan municipalities, to play a more direct role in growing the economy. The can be achieved through investments in physical and human capital, which will in turn address the issue of weak capacity within local administrators, leading to effective management, accountability and improved revenue collection efforts.

Chipaumire et al. (2014) investigated the validity of the Keynesian macroeconomic framework, the classical perspective of a long-run relationship and causality between government expenditure and economic growth in South Africa, using quarterly data from 1990-2010. He applied Johansen maximum likelihood test techniques, both the trace technique and the more powerful Eigen maximum value test, and found that a long-run relationship exists between government spending and economic growth in South Africa. However, this has not led to the meaningful development of the economy, which is inconsistent with the Keynesian theory.

Mosikari and Matlwa (2014) also estimated an econometric model of South African military expenditure, by considering pure economic factors for the period 1988-2012. Using the Johansen co-integration and Engel-Granger models, their study concluded that there is a long-run relationship between military expenditure and economic growth. In terms of the causal analysis, military expenditure seems to Granger-cause gross domestic product per capita at five percent significance level.

Considering the value of government expenditure on productive sectors of the economy, Marinkov (2014) estimated the effects of social spending on education, health and social development on economic activities in nine South Africa provinces. The estimation technique used was the vector error correction model (VECM), which was applied to data from 1995 to 2012. The results showed that although social spending contributes to economic growth in the short-run; when decomposed into compensation and non-compensation, non-compensation expenditure contributes significantly to short-run economic growth, while compensation expenditure has no effect on economic growth in the short-run. Moreover, the evidence of a long-run relationship between social expenditure and economic growth is limited.

Table 4.3: Studies showing the Nature of Relationship between Government Expenditure and Economic Growth in the South African Economy

Author(s)	Title	Region/Country	Variables	Methodology	Positive/Negative Relationship
Dunne et al., 1999	Military expenditure and economic growth in South Africa.	South Africa	-Government military expenditure -GDP	-3 Stage Least Square (3SLS) model	Negative relationship
Betrand and Mamatzakis, 2001	Is public infrastructure productive?" Evidence from South Africa and Chile.	South Africa and Chile	-Government infrastructural expenditure -GDP	-Pooled time series data	Positive relationship
Fedderke et al., 2006	Infrastructural investment in the long-run economic growth: South Africa 1875-2001.	South Africa	-Expenditure roads -Expenditure on housing -Expenditure on transportation -GDP	-Cointegration test -Granger causality test -Vector Error Correction Model (VECM)	Positive relationship
Odhiambo, 2015	Government expenditure and economic growth in South Africa: an empirical investigation.	South Africa	-Aggregate government expenditure -GDP	-Time series data -Auto Regressive Distributed Lag (ARDL) model	Positive relationship
Chipaumire et al, 2014	The impact of government spending on economic growth: case of South Africa.	South Africa	-Aggregate government expenditure -GDP	-Keynesian macroeconomic framework -Johansen maximum likelihood test	Positive relationship

Author (s)	Title	Region/Country	Variables	Methodology	Positive/Negative Relationship
Marinkov, 2013	The impact of aggregate revenue and expenditure assignments on economic growth: the case of provinces and municipalities in South Africa.	South Africa	-Provincial expenditure -Expenditure on district municipalities -Expenditure on metropolitan municipalities -GDP	-Zang and Zou (1996) and Davoodi and Zou (1998) endogenous growth model -Pure and pooled cross-sectional growth regression -Panel growth regression	Positive relationship (only with provincial expenditure)
Mosikari and Matlwa, 2014	An analysis of defense expenditure and economic growth in South Africa.	South Africa	-Government military expenditure -GDP	-Time series data -Johansen Cointegration test -Engel-Granger models	Positive relationship
Marinkov, 2014	The effects of social spending on economic activity in South African provinces.	9 Provinces on South Africa	-Expenditure on health -Expenditure on education -Expenditure for social development -GDP	-Vector Error Correction Mechanism (VECM)	Limited relationship with all the variables
Nhlapo, 2013	The potential long and short-term benefits of major infrastructure projects to the South African economy.	South Africa	-Construction Value Added (CVA) -Gross Fixed Capital Formation (GFCF) -GDP	-Qualitative analysis	Positive relationship

4.5 Conclusion

Although a body of literature exists on the impact of government expenditure on economic growth, there is no consensus on the direction and strength of the relationship between government expenditure and economic growth. Therefore, arguments on whether government expenditure benefits or hinders economic growth continue. In support of the notion of a relationship between government expenditure and economic growth, empirical studies on developed and African countries present the significant, positive or negative impact of government expenditure on economic growth within countries. These studies examined the impact of aggregate and disaggregated government expenditure where various econometric techniques were used. Most of the findings either agreed or disagreed that increased government spending can increase productivity. Some concluded that when the effects of government expenditure is being considered, it is evident that while some government expenditure distorts the growth of the economy, other expenditure can yield increases in economic growth. Therefore, there is a need for studies to be conducted on disaggregated government expenditure. This will help government to locate those core areas that can yield greater productivity in the economy, and redirect its resources towards them.

Finally, from the studies that were reviewed in this chapter, existing evidence indicates that the relationship between government expenditure and economic growth varies depending on the proxy used to measure the level of expenditure and economic growth, level of development of the sampled countries, data sets and methodology used, as well as the use of control variables, amongst others. This explains why the study is inconclusive.

CHAPTER FIVE

Theoretical Framework, Methodology and Data

5.1 Introduction

This chapter deals with the theoretical framework adopted in this study, as well as the methodology and data analysis. There are four different sections contained in this chapter, which are arranged as follows: Section 5.2 discusses Ram's (1986) model as the theoretical framework for the study, the equation of the model, as well as a description of the selected models; section 5.3 presents a review of the theoretical and empirical underpinnings of the chosen models; while section 5.4 deals with the methodology employed in the study, namely the vector error correction mechanism (VECM), as well as the processes involved in using the technique to evaluate the impacts of government expenditure on economic growth. The data used in this study are described in section 5.5, together with the data sources and process of cleaning the data. Section 5.6 concludes the chapter.

5.2 Theoretical Framework of the Study

The theoretical framework used in the study is the modified version of Ram's (1986) model, which includes specifications derived from production function modeling in government and non-government sectors of the economy. The theoretical framework is suitable because it captures most components of economic growth that can be tested empirically and measure how government expenditure affects them. It further explains how externality from government expenditure affects productivity in other sectors of the economy, thereby giving insights into how this expenditure can enhance growth, as well as the intersectoral differentials. Moreover, considering South Africa's economic and political past, and the results of several macroeconomic policies adopted to change the effects of the past, some variables might represent the economy better than others. The main feature of this model is that it recognises the important roles of capital and labour in the economic growth process. Ram designed the model and applied it to evaluate the role of government size in economic growth in seventy developed and under-developed

countries. Several other studies have also employed this model, such as Bairam (1988), Alexiou (2000); Yasin (2000), Hasnul (2015), and Alshahrani and Sadiq (2014), amongst others, in order to study the relationship between government expenditure and economic growth.

The formulae for Ram's model can be derived by considering that the production function in this regard consists of public and private sectors, represented by $P\ and\ G$, with the factor capital (K) and labour (L) in both sectors. Therefore, the total capital in both sectors is represented as: $K = K_P + K_G\ and\ L = L_P\ and\ L_G$.

The production function for government and non-government sectors can be given as:

$$P = P\ (K_P, L_P, G_P) \tag{5.1}$$

Equation (5.1) shows private sector's production as a function of private sector capital (K_p), private sector labour (L_P) and government externalities (G_P) in the form of infrastructure, taxes and other government interventions.

$$G = G\ (K_G, L_G\ ) \tag{5.2}$$

The equation above indicates that public sector's production is a function of capital (K_G) and labour (L_G). Therefore, combining equation (5.1) and (5.2) will form equation (5.3), where a country's economic production equals production in the public sector, as well as production in the private sector.

$$So\ if\ Y = P + G,\ \ Y = P\left(K_{P,}\ L_{P,}\ G\right) + G(K_G, L_G) \tag{5.3}$$

When equation (5.3) is differentiated, it will yield equation (5.4)

$$dY = P_K dK_P + G_K dK_G + P_L dL_P + G_L dL_G + P_G dG \tag{5.4}$$

Equation (5.4) shows that marginal product of capital (K) in the private sector is represented by P_K and that of the public sector as G_K. The marginal product of labour in the two sectors is represented by $P_L\ and\ G_{L\ ,}$ while P_G is the marginal externality effect of the public sector on the private sector.

In any economy, labour in two different sectors has different degrees of productivity, hence assuming the constant productivity differential of labour in both sectors, which can be represented by δ. Therefore, when $\delta > 0$, labour productivity in the public sector is higher, but when $\delta < 0$, labour productivity in the private sector is higher, while $\delta \neq 0$ means that:

$$\frac{G_L}{P_L} = (1+0) that\ is\ \ G_L = P_L = (1+\delta) \tag{5.5}$$

G_K can be denoted as the growth rate of the relevant variables in the public sector, and P_K as the growth rate of relevant variables in the private sector; and δ denotes the productivity rate in both sectors.

Differentiating (5.1) and (5.2) further, given that national income is a function of $= P + G$, equation 5.6 will be in the following form:

$$dY = P_K dK_P + G_K dK_G + P_L dL_P + G_L dL_G + P_G dG \tag{5.6}$$

Where P_K and G_K are marginal products of capital (K) in both public and private sectors, and P_L and G_L represent marginal product of labour(L). Moreover, P_G is the marginal externality effect from the public sector to the private sector. Thus, equation (5.5) will be rewritten as:

$$G_L = (1+\delta) P_L \tag{5.7}$$

Substituting equation (4.5) into (4.4) will give equation (5.8):

$$dY = P_K\, dK_P + G_K dK_G + P_L dL_P + P_L dL_G + (1+\delta)\, P_L dL_G + P_G dG \tag{5.8}$$

Rearranging equation (5.8) will give equation (5.9):

$$dY = P_K dK_P + G_K dK_G + P_L\,(dL_P + dL_G) + \delta P_L dL_G + P_G dG \tag{5.9}$$

Rewriting equation (5.5) gives:

$$dG = G_K dK_G + (1+\delta) P_L dL_G \tag{5.10}$$

Which implies that:

$$\frac{dG}{(1+\delta)} - \frac{G_K}{(1+\delta)}\, dK_G = P_L dL_G \tag{5.11}$$

It is important to remember that the total labour force in the economy equals the sum of private and public sector labour forces, as shown in equation (5.12) below:

$$L_G + L_P = L \; that \; is \; dL_G + \; dL_P = dL \qquad (5.12)$$

Substituting equation (5.12) into (5.9) will yield equation (5.13) below

$$dY = P_{\mathrm{K}}\, dK_P + \; G_{\mathrm{K}} dK_{\mathrm{G}} + \; P_{\mathrm{L}} dL_P + \; P_{\mathrm{L}} dL + \; \delta \, P_{\mathrm{L}} dL_{\mathrm{G}} + \; P_G dG \qquad (5.13)$$

Differentiating equation (5.2) totally will result in equation (5.14):

$$dG = \; G_K dK_G + \; G_L dL_G \qquad = \; G_K dK_G + (1 + \; \delta) \, P_L dL_G$$

$$G_K dK_G + (1 + \; \delta) \, P_L dL_G, \text{ Therefore } \frac{dG}{1+\delta} - \frac{G_{K dK_G}}{1+\delta} = \; P_L dL_G \qquad (5.14)$$

Substituting equation (5.14) into (5.13) and dividing by Y, will yield equation (5.15):

$$dY = \; P_K dK_P + \; G_K dK_G + \; P_L dL_P + \; \delta \left[\frac{dG - G_K dK_G}{(1+\delta)}\right] + P_G dG$$

$$dY = \; P_K dK_P + \; P_L dL + G_K dK_G \; - \; \frac{\delta G_K dK_G}{(1+\delta)} + \frac{\delta dG}{1+\delta} + \; P_G dG$$

$$dY = \; P_K dK_P + \; P_L dL + G_K dK_G + \left[1 - \frac{\delta}{1+\delta}\right] + dG \left[P_G \frac{\delta}{1+\delta}\right]$$

$$\frac{dY}{Y} = P_K \frac{I_P}{Y} + \; G_K \left[1 - \frac{\delta}{1+\delta}\right] \frac{I_G}{Y} + P_L \; \frac{dL}{L} + \left[P_G + \frac{\delta}{1+\delta}\right] \frac{dG}{Y} \qquad (5.15)$$

Since the marginal product of labour in each sector and the average output per unit of labour is shown as:

$$P_L \; = \; \frac{Y}{L}$$

Assuming that $\propto = P_{k,} \, \beta = \; G_K \left[1 - \frac{\delta}{(1+\delta)}\right], \varphi = \; P_{L\,,} \, and \, \lambda = \; \left[P_G \frac{\delta}{(1+\delta)}\right]$ with a coefficient for $\frac{dL}{L}$ variable, equation (5.18) will therefore be as follows:

$$\frac{dY}{Y} = \propto \frac{I_P}{Y} + \; \beta \frac{I_G}{Y} + \frac{dL}{L} + \lambda \frac{dG}{Y} \qquad (5.16)$$

The variables in Ram's model can be described as:

I_P = Private investment represented by gross private fixed capital formation

I_G = Government investment represented by government capital expenditure

$\frac{dL}{L}$ = Human capital development expenditure on health and education

dG = Government consumption expenditure

Equation (5.16) above represents Ram's production model, where λ is the rate of technological change. Therefore, the parameter estimates in equation (5.16) refer to $\lambda = 0, \propto and\ \beta$, which converts into elasticities when the natural logarithm (log) of both government and non-government sectors are computed. The implication of Ram's (1986) model is that growth $\left(\frac{dY}{Y}\right)$ responds to the ratio of gross investment (I) to GDP, while the growth of labour force $\frac{dL_D}{L}$ responds to the ratio of government consumption to GDP$\left(\frac{C_g}{Y}\right)$. For the purpose of this study, the modified version of Ram's model was used and the choice about variables included in the empirical model of this study was guided by the National Development Plan (NDP) designed by government to improve various aspects of the South African economy. These variables apply to the structure of the South African economy in terms of its economic history and growth level. The reason for this is that over time, things have changed and variables that were not considered by Ram as one of economic growth drivers in the nineteenth century are currently the major contributors to economic growth.

In addition to choosing economic variables related to the South African economy, the models were selected in such a way that representing the same variable more than once could be avoided. This approach can help to minimise the problems of multicollinearity and heterogeneity during the estimation process. For a better understanding of the relationship between these variables and economic growth, section 5.3 discusses the theoretical and empirical underpinnings of the chosen variables.

5.3 Empirical Model

5.3.1 Empirical Model specification

Given the modified version of Ram's (1986) model discussed above, the model for the study is thus specified as:

$$GDP = f(PEXP, GEXP, CAP, LAB, FDI) \quad (5.17)$$

Equation (5.17) above implies that economic growth is a function of aggregate private consumption expenditure, gross government

t expenditure, gross fixed capital formation, employment-to-population ratio and net inflows of foreign direct investment. To represent all those factors that affect economic growth, but were not explicitly taken into account, the error term is introduced into the model. From equation (5.16), the model specification is given as:

$$\frac{dY}{Y} = \beta_0 + \beta_1 GEXP + \beta_2 PEXP + \beta_3 CAP + \beta_4 LAB + \beta_5 FDI + \varepsilon_t \quad (5.18)$$

The above equation is the Ram's (1986) model equation, modified to include PEXP, LAB and FDI, which are factors related to the structure of the South African economy.
In the light of the modified Ram's model discussed above, the variables used in this study are as follows:

GDP = real gross domestic product proxy for economic growth

PEXP = aggregate private consumption expenditure proxy for household consumption expenditure

GEXP = gross government expenditure proxy for total government expenditure (recurrent and capital)

CAP = gross fixed capital formation proxy for physical capital stock

LAB = employment to population ratio proxy for level of employment

FDI = net inflows of foreign direct investment proxy for technology transfer

To control for huge disparities among the series, all the variables were transformed into logarithm form. Therefore, the model will be a log-linear model and equation (5.18) is expressed as follows:

$$LN\_GDP_t = \beta_0 + \beta_1 LN\_PEXP_t + \beta_2 LN\_GEXP_t + \beta_3 LN\_CAP_t + \beta_4 LN\_LAB_t + \beta_5 FDI_t + \varepsilon_t \quad (5.19)$$

Where GDP_t is the growth rate of the real GDP in time t as a measure of economic growth, $PEXP_t$ represents the aggregate private consumption expenditure at time t, $GEXP_t$ is the gross government expenditure at time t, CAP_t is the gross fixed capital formation at time t, LAB_t is the employment-to-population ratio at time t, FDI_t represents the net inflows of foreign direct investment at time t, and ε_t is the error term of the stochastic variable, which considers inexact relationships between economic variables. $\beta_0, \beta_1, \beta_2, \beta_3, \beta_4 \; and \; \beta_5$ are the unknown parameters to be estimated.

Equation (5.19) is in log linear form and will be used for the econometric estimation in this study.

5.4 Definition of Variables

The variables used in this study are defined as thus:

Real gross domestic products (GDP): it is the total value of all final goods and services produced within the economy usually a year.

Aggregate private consumption expenditure (PEXP): refers to final consumption expenditure by households which measures the sum of expenditure on new goods and services by resident households including private non-profit organisations (Industrial Development Corporation, 2017).

Gross government expenditure (GEXP): it represents final consumption expenditure by general government which includes spending on individual goods and services. For example, government expenditure on education, housing, health and social services as well as expenditure on collective goods and services to the benefit of the community as a whole which can be for maintenance of law and order, public administration and defence (Industrial Development Corporation, 2017).

Gross fixed capital formation (CAP): it is the total spending by both the private and public sectors on tangible and intangible assets which have been produced and are

themselves used continuously in product processes for more than a year. For example, investment goods or articles which yield future benefits (Industrial Development Corporation, 2017).

Employment to population ratio (LAB): is a macroeconomic statistic that indicates the ratio of the labour force currently employed to the total working-age population of a country. The employment to population ratio can be calculated by dividing the number of people employed by the total number of people of working age (Industrial Development Corporation, 2017).

Net inflows of foreign direct investment (FDI): FDI is proxied by technology transfer which can be defined as a flow between owner/holder and technology buyer/seller. The transfer enables developing countries to close gaps related to accessing technology in different ways through buying, renting, lending or licensing (Gurbiel, 2002:3).

5.5 Theoretical and Empirical underpinnings of the chosen Variables

This section contains the theoretical and empirical analysis of the variables used in this study except for the two main variables under study; real gross domestic products (GDP) and gross government expenditure that have been discussed extensively in the previous chapters.

The Vernon (1993) product life cycle theory assumes that technological advantage is part of the main reasons for foreign trade or foreign direct investment since technological transfer is considered to be a key factor for economic growth. In Vernon's views the process of transfer can be made possible depending on the innovation capabilities of the receiving country which can be described as the sum of macro and microeconomic factors that encourage the process of innovation like income per capita, research and development as well as technology infrastructure. Borensztein et al. (1998) examined the effects of on economic growth in a cross-country regression framework. Using a data on FDI flows from industrial countries to sixty-nine developing countries over the last two decades, their findings revealed that FDI is an important avenue for the transfer of technology. Their study concludes that technology contributes relatively more to economic growth than domestic investment.

Gurbiel (2002) conducted a research on the impact of innovation and technology transfer on economic growth in the Central and Eastern Europe countries. Considering FDI as a significant channel for technology transfer, the study revealed that the success of the transition process in the Central and Eastern Europe was possible due to FDI inflows which represents the highest form of international production cooperation involving capital, technology/knowledge and skilled workforce in the regions. The author also suggests that the transitional cooperation did not only enforce competitions among countries but it encouraged local companies to restructure their production process as a result of the technology and innovation spill-overs from foreign countries.

The findings of Almfraji and Almsafir (2014) appeared not to be fully in consistent with other studies which concluded that a positive relationship exists between FDI and economic growth. The authors reviewed several studies carried out to examine the effects of FDI on economic growth as well as the relationship between the two variables from the period 1994 to 2012. Their results showed that based on adequate levels of human capital, a well-developed financial markets, complementary between domestic and foreign investment and open trade regimes; some studies revealed that the relationship is significantly positive but a good number of the studies also suggest a negative or null relationship between FDI and economic growth.

In order for developing economies to meet up with developed ones, there is the need for developing countries to invest substantial percentage of their GDP to fixed capital for further increases in productivity which is measured by gross fixed capital formation (GFCF). For example in developing countries like China, their rate of economic growth can be attributed to its high investment rate which increases aggregate demand and future productive capacity. Pavelescu (2007) investigated the correlation between the GFCF and GDP in fifteen countries of the EU and twelve NMS from 1999 to 2006. Considering evaluation on demand side which accounts for GFCF dynamic structure and the GDP dynamic with the supply side which accounts for the capital accumulation efficiency through modified Domar's economic growth model. The findings indicate that the effects of GFCF has increased economic growth significantly faster in the twelve NMS than in the EU fifteen countries. This according to the author was because the NMS

increased their level of investment and that has helped to reduce the gap separating them from the developed Western European states. In a similar study, Gibeseu (2010) analysed the relationship between GFCF and economic growth in five Central and Eastern Europe countries namely: Romania, Bulgaria, Czech Republic, Poland and Hungary for the period 2003 to 2009. Applying the method of correlation analysis as the model for measurement, the study revealed that apart from Hungary; there is a direct and strong positive connection between economic growth and GFCF in the other four countries studied. This implies that GFCF can enhance economic growth.

To measure the direction of causality between GFCF and economic growth, Uneze (2013) accessed the causal relationship between GFCF and economic growth in Sub-Saharan African countries using the recent panel cointegration and causality testing techniques. The study indicates a homogenous bi-directional causality between capital formation and economic growth both in the short-run and long-run. The results also showed a cointegration relationship between the two variables irrespective of whether capital formation is measured with either private fixed capital formation or gross fixed capital formation. The implication of the findings according to the author is that any autonomous growth of the GDP as a result of substantial rise in prices of the countries' export for a number of years could boost capital formation.

In the economic growth process, human factor intervenes by increasing the volume of work at the macroeconomic level and the quality of its synthetic is expressed by labour productivity (Gibeseu, 2010:2). Employment increases play important role in the economy in the sense that the factors of production requires human capital in either the process of manufacturing products or providing services to meet aggregate demand which in turn increase economic growth. In order to analyse the effects of employment to economic growth, Lo (2007) examined the impact of labour employment and GFCF on economic growth in China considering the formal and informal sectors of the Chinese industry with two different periods from 1978 to 1990 and from 1991 to 2005. Using the correlation regression approach, the findings revealed that from 1978 to 1990, the correlation between total employments, GFCF and economic growth is statistically significant for both sectors but from 1991 to 2005, the level of correlation became less significant. The author

therefore concludes that within both sectors, China industry have followed a capital-deepening growth path instead of employment. Further analysis was carried out by the author through dividing the economy into Eastern, Central and Western provinces based on the pattern of specialised division of labour which are manufacturing and specialty on primary products and the regression results conform to the previous one.

In a similar research, Pleic and Berry (2009) reviewed how employment elasticities in developing economies like Thailand, Brazil, Chile and Argentina has helped to enhance economic growth in those countries in comparison with the South African economy. Considering that the experience of other countries and the recipes for successes achieved can be a key input into effective policy design to produce the number of good jobs needed (Pleic and Berry, 2009:12). The study covered the from 1976 to 2005 for Thailand, 1970 to 2005 for Brazil, 1980 to 2005 for Chile and 1989 to 2005 for Argentina using the sectoral employment growth elasticities. The findings revealed that high employment elasticity of 0.5 percent or more when growth has been in the range of 0.67 percent per year has been reasonably common among the countries considered which indicates that they are frequently attainable under certain circumstances and for periods of a decade or more. The authors therefore recommends for South Africa that since there is a natural tendency for the rate of employment growth and employment elasticity level to fall over time in successfully developing countries due to falling growth of working age population as well as the eventual exhaustion of any initial labour supply surplus. The contribution of rising employment to economic growth can gradually be taken over by rising labour productivity which in turn is important for wage rise (Pleic and Berry, 2009:7).

A recent study of that regard by Ajakaiye et al. (2016) where the relationship between employment and economic growth in Nigeria from 2005 to 2014 was analysed did not yield similar results like the previous studies discussed. Just like the rising poverty and inequality in the country informed the research which applied the method of Shapley decomposition complemented with econometric estimation of the country's employment intensity of growth. The study found that Nigeria's economic growth over the last decade is not as a result of its employment increases in other words the country has not created much employment opportunities but has been sustained largely by factor reallocation

from agriculture and manufacturing to low productive services sector. The study concludes therefore that employment elasticity to economic growth was positive and quite low which reflects the economy's overall poor employment generation records.

In the views of Keynes (1936), aggregate household consumption expenditure can boost aggregate demands and production increase in the short-term with the possibility of the effects reflecting in the long-term if well managed. Karim et al. (2010) conducted a test on the dynamic linkages between aggregate household consumption expenditure, fixed investment and economic growth in Malaysia using structural vector error correction model (SVECM). The findings showed that household consumption expenditure and fixed investment can only significantly increase economic growth in the short-run but in the long-run there is no significant effects from fixed investment and household consumption expenditure on economic growth at the period under study in Malaysia. However, the analysis showed that in the long-run, economic growth causes increases in household consumption and fixed investment. The implication of these findings is that increase aggregate demand led by increased household consumption expenditure and fixed investment do not stimulate economic growth in Malaysia.

Nasir (2012) investigated the causal relationship between aggregate household consumption expenditure and economic growth and economic growth in Malaysia from 1961 to 2009. The study applied the Johansen cointegration test, VECM and the Granger causality tests and the results indicate that there is an existence of cointegration between the variables with a short-run and long-run relationship while the causality test revealed a bi-directional causality between aggregate household consumption expenditure and economic growth in the economy. This implies that aggregate household consumption expenditure and economic growth impacts on each other in Malaysia.

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5.6 Data Description and Analysis

5.6.1 Sources and Description of Data

This section provides a description of the data, time period, data sources, and the variables used for estimation in this study.

The empirical analysis carried out in this study employed six datasets, which consist of quarterly time series data based on the availability of data. The estimation covers the period 1970Q1 to 2016Q4, giving 184 quarterly observations. This will help to measure how government expenditure has affected economic growth during the apartheid and post-apartheid periods in South Africa. More so, it is evident from statistics that not much has changed in terms of bridging the economic gap between the previously disadvantaged and advantaged people in South Africa since its independence. Therefore, to address the question as to whether government expenditure is effective in curbing the economic problems, this study attempts to analyse the impact of government expenditure on different components of economic growth in South Africa. The data for this study is sourced from the South African Reserve Bank (SARB) database and the variables analysed are: real gross domestic products (GDP), aggregate private consumption expenditure (PEXP), gross government expenditure (GEXP), gross fixed capital formation (CAP), employment- to-population ratio (LAB), and net inflows of foreign direct investments (FDI). The dependent variable for the study is real gross domestic product (GDP), while the independent variables are aggregate private consumption expenditure (PEXP), gross government expenditure (GEXP), gross fixed capital formation (CAP), employment-to- population ratio (LAB), and net inflows of foreign direct investments (FDI). In addition, the method of extrapolation and interpolation was applied to generate the missing values in the series, since the series for net inflows of foreign direct investment (FDI) is available from 1985 to 2016, whereas the study covered the period from 1970Q1 to 2016Q4. To generate the missing data, the process of backward extrapolation from 1970Q1 to 1960Q1 was employed, and later interpolated the same series from the fourth quarter of 1984Q4 to the second quarter of 1970Q2.

5.6.2 Procedure for using Extrapolation and Interpolation Methods

The data for net inflows of foreign direct investments (FDI) in South Africa has missing values from the first quarter of 1960 to the first quarter of 1985, as a result of the country's isolation from the rest of the world during the apartheid regime. Therefore, there is no consistent record for FDI during this period. The process of interpolation and extrapolation is as follows: to fill in the missing values in the case of FDI in South Africa from the fourth quarter of 1984 to the second quarter of 1970, interpolation, which is used to calculate values for the years that have missing values, was applied. The formula for interpolating missing data in the case of FDI in the South African economy is:

$$FDI_{1970Q2} = FDI_{1969Q4} + \frac{FDI_{1985Q1} - FDI_{1969Q4}}{64} \quad (5.20)$$

While FDI_{1970Q2} is the beginning of the intervening years, FDI_{1969Q4} represents the year before the intervening years, FDI_{1985Q1} is the end of the intervening years, and 64 is the total observations in the missing values.

The same approach in equation (4.20) is applied to other intervening years, until all the values that need to be interpolated are complete.

In terms of extrapolation, which is estimating beyond the original observation range, there are different techniques involved. The extrapolation could be linear, exponential or regression. For this study, the linear extrapolation method was used to generate the net inflows of foreign direct investment in South Africa from the first quarter of 1970 to the first quarter of 1960. This method has been applied by Tsonis and Austin (1981), and Smith and Sincich (1988), amongst others. The extrapolation carried out in this study is based on the previous period, and applying the terminologies used by Smith and Sincich (1988), the base year and the launch year are the opposite of what they would have been in forward extrapolation. The terminologies are expressed in the following way:

Base year: the year of the latest observed net inflows of foreign direct investment (FDI) size used for the projection.

Launch year: the year of the earliest observed net inflows of foreign direct investment (FDI) size used for the projection.

Target year: the year for which net inflows of foreign direct investment (FDI) is projected.

Base period: the interval between the base year and launch year.

Projection horizon: the interval between the launch year and target year.

The linear extrapolation method assumes that net inflows of foreign direct investment (FDI) will increase (decrease) by the same magnitude in each future (previous) year as the average annual increase (decrease) during the base period (Sunde, 2015). The formula for linear extrapolation is:

$$P_t = P_t + \frac{x}{y}\left(P_t - P_b\right) \quad (5.21)$$

Where P_t = net inflows of foreign direct investment (FDI) extrapolation for the target year, P_t = net inflows of foreign direct investment in the launch year, P_b = net inflows of foreign direct investment in the base year, x = number of years in the extrapolation horizon, and y = number of years in the base period. In this study, data from the first quarter of 1985 to the fourth quarter of 2016 is available. Therefore, the study wants to do backward extrapolation for the missing values from the fourth quarter of 1970 to the first quarter of 1960. Thus, the base year is 2016, the launch year is 1985, the first target year is 1970, the base period is 2016 to 1985, and the extrapolation horizon is 1970 to 1960.

Although the process of interpolation and extrapolation grants researchers the opportunity to expand sample size, produce a large number of consistent interpolations or extrapolations that are comparable over time, or increase little base data, the process of introducing artificiality into the variables might differ from reality. Again, researchers may be introducing some degree of measurement error or increasing the risk of producing meaningless results.

5.7 Methodology

5.7.1 Estimating Techniques

This study adopted the restricted vector autoregressive (restricted-VAR) that is the vector error correction mechanism (VECM) presented by Johansen (1995). The reason for choosing the technique is that the relationship between government expenditure and economic growth goes beyond the short-term period since it takes time before government outlays becomes effective on the economy. So in order to differentiate

between the short-run and long-run analysis of these effects, the VECM is used in estimating equation (5.19). More so, the method is efficiently suitable for large samples and allows for possibility of simultaneously estimating both the long-run and the short-run relationship.

5.7.1.1 VECM Test Procedure

Since the objective of the study is to analyse the externality effect of government expenditure on the different components of economic growth in South Africa as well as the direction of causality between the two main variables. The estimation procedure starts with unit root tests, the cointegration test, causality test, long-run and short-run equilibrium estimations and the diagnostic tests.

5.7.1.1.2 Unit Root Test

Applying empirical technique to a time series data requires an analysis of the time series properties of the variables in order to determine the order of integration for multivariate series. Several models for unit root testing can be used depending on which suits the series better. Stationarity of a time series data occurs when its mean and variance do not vary over time and the value of the covariance between two periods depends only on the distance between the two periods and not the actual time at which the covariance is computed (Gujarati, 2003:797). A non-stationary time series have a time varying mean, variance or both and employing it for estimation may result into spurious regression. There are different types of tests for stationarity and for this study the Augmented Dickey-Fuller test (ADF) (1979, 1981) and Philips-Perron test (PP) (1988) will be applied.

5.7.1.1.2.1 Augmented Dickey Fuller Test

This approach is mostly employed when testing for stationarity in empirical studies. The approach is employed in higher order and models where the error terms are serially correlated. The first step when using the Augmented Dickey Fuller test is to determine the order of integration of each variable since the model of cointegration requires all variables to be integrated of the same order. The ADF (1979) unit root testing procedure used in this study requires the size of the coefficient λ to determine the equation below:

$$\Delta Z_t = \propto_0 + \mu t + \lambda Z_{t-1} + \propto i \sum_{i=1}^{n} \Delta Z_{t-i} + \varepsilon_t \quad 5.22$$

Where t denotes the time trend and$Z$ represents the variable being test. So if the hypothesis is accepted, it means that [λ] = 0, which explains that the time series is non-stationary. The unit root is experimented under the hypothesis that:

H_0: series contain a unit root

H_1: series is stationary

If the null hypothesis is rejected that is if the coefficient of the lag of Z [λ] is significantly different from zero, then the series is non-stationary.

5.7.1.1.2.2 Philip Perron Test

The method was developed by Philip and Perron (1988) as an alternative to control for serial correlation when testing for unit root. It estimates the non-augmented Dickey Fuller test and modifies the t-ratio of the α coefficient in that the serial correlation may not affect the asymptotic distribution of the test statistic. The equation for Philip- Perron test can be written as:

$$Y_t = \mu + \alpha^* Y_{t-1} + v_t \quad 5.23$$

$$Y_t = \mu + \beta\left(1 - \frac{T}{2}\right) + \alpha^{\sim} Y_{t-1} + v_t \quad 5.24$$

In equation 5.23 and 5.24 above, Y_t denotes variables under test while T is the number of observation and μ is the non-zero mean term then β represents the linear trend term. An estimation involving The Philip-Perron unit root test requires prior decision on the inclusion of a constant, a constant and a linear trend or non in the estimation. With the shortcomings of standard ADF being that it is not suitable for variables that may have gone through structural changes which is illustrated in the work of Perron (1989).

5.7.1.1.3 Lag Length Selection

The relationship between the dependent say X and the explanatory variable say Y in economics does not happen instantaneously. Sometimes, it takes time before Y responds to X and such lapse of time is called a lag (Gujarati, 2013: 628). Before the process of cointegration testing can be employed in an estimation, it helps to first conduct the lag length selection criterion. This approach is important for VAR specification because choosing too few lags might result to misspecification of the variables while too many lags could lead to unnecessary loss of degrees of freedom. This process in this study is carried out the modified Likelihood Ratio (LR) test, Akaike Information Criterion (AIC), Schwartz Information Criterion (SIC), Hannan-Quinn Information Criterion and Final Prediction Error (FPE).

In the case of Akaike Information Criterion (1974), the equation can be given as:

$$AIC = Tlog\ L + 2N \qquad 5.25$$

Whereas the Schwartz Information Criterion (1978) is:

$$SIC = TlogL + NlogT \qquad 5.26$$

In both equation 5.25 and 5.26, while L represents the sum of squared errors, N is thenumber of parameters in the estimation models and T refers to the number of observations in the series.

5.7.1.1.4 Johansen and Juselius Cointegration Test

The cointegration process was first introduced by Granger (1981) and Engle and Granger (1987) and then Johansen and Juselius (1988). The model assumes that if two integrated variables share a common stochastic trend such that a linear combination of these variables are stationary then there is the presence of cointegration (Kilian and Lutkepohl, 2016). The concept can also be applied to linear combination of more than two variables and the process begins with expressing the concept into a mathematical formulation: for

K – dimensional process, y_t will be seen as cointegrated if the components are 1(d) and there exists a linear combination:

$$Z_t = \beta^1 y_t \; with \; \beta = \left(\beta_{1\,,\ldots\ldots}\, \beta_k\right)^1 \neq 0 \; such \; that \; Z_t \; is \; 1(d^*) \; with \; d^* < d \qquad 5.27$$

The cointegrating vector in the above formulae is β which is normalized with respect to the variable included in the models. The y_t is the restricted vector autoregressive (VAR) involving up to $K-$ lags of y_t, that makes it easy to verify the short-run dynamics of a variable. In a situation whereby the variables under consideration are cointegrated, the vector error correction model (VECM) will be applied.

This test is only valid if there is non-stationarity in the series. The purpose of cointegration is to determine whether several non-stationary time series are cointegrated or not. More so, the model helps to separate the long-run and short-run relationship among variables as well as be used to improve long-run forecast accuracy. Cointegration between two variables implies the existence of long-run causality for at least one direction (Lin, 2008). This procedure uses two tests to determine the number of cointegration vectors: the maximum eigenvalue statistic test and the trace test.

5.7.1.1.4.1 Maximum Eigenvalue Test

The Maximum Eigenvalue statistics tests the null-hypothesis of r cointegrating relations against the alternative of r+1 cointegrating relations for r = 0, 1, 2……n -1. The test statistics are computed as:

$$LRmax\left(\frac{r}{n}+1\right) = -T * \log(1-\lambda) \qquad 5.28$$

Where λ is the maximum eigenvalue and T is the sample size.

5.7.1.1.4.2 Trace Test

The trace test investigates the null-hypothesis of r cointegrating relations against the alternative of n cointegrating relations in equation (5.28), where n is the number of variables in the system for r = 0, 1, 2 ……..n -1. The trace test equation can be written as:

$$LRtr\left(\frac{r}{n}\right) = T * \sum_{i-r+1}^{n} 0 \qquad 5.29$$

When the trace and maximum eigenvalue statistics yield different results, the result from trace test is preferred. So to get rid of seasonality while carrying out the test, Johansen suggests using orthogonalised seasonal dummy variables which shift the mean without contributing to the trend (Johansen and Juselius, 1990).

5.7.1.1.5 Granger Causality Test

Although regression analysis deals with the dependence of one variable on other variables, it does not necessarily imply causation. In other words, the existence of a relationship between variables does not prove causality or the direction of influence. Therefore the Granger causality test assumes that the information relevant to the prediction variables say X and Y is contained only in the time series data on the variables (Gujarati, 2013:662). The assumptions are based on:

- The future cannot cause the past but the past causes the present or future.
- A cause contains unique information about an effect not available elsewhere (Lin, 2008:1).

The test for two stationary variables x and y can be written in the following formulation:

$$Y_t = \alpha 0 + \alpha 1\, Y_t - 1 + \cdots \ldots \ldots + \alpha \mathrm{i}\, Y_t - \mathrm{i} + \beta 1\, X_t - 1 + \cdots \ldots \ldots \ldots \beta \mathrm{i} X_t - \mathrm{i} + \mu 1_t \qquad 5.30$$

$$\mathrm{Xt} = \lambda 0 + \alpha 1 X_t - 1 + \cdots \ldots \ldots + \alpha \mathrm{i} X_t - \mathrm{i} + \delta 1 Y_t - 1 + \cdots \ldots \ldots \ldots \beta \mathrm{i} Y_t - \mathrm{i} + \mu 2_t \qquad 5.31$$

Where the subscripts t denotes time periods, $\mu 1_t \; and \; \mu 2_t$ in equations 5.30 and 5.31 are the error terms assumed to be uncorrelated. The constant parameter 0 represents the constant growth rate of Y in equation 5.30 and X in equation 5.31. The trend in the variables can be interpreted as general movements of cointegration between X and Y. While equation 5.30 shows that current Y is related to past values of itself and that of X, equation 5.31 postulates that current X is related to past values of itself and that of Y. The four possible causal directions between x and y are:

1.) Feedback or bilateral causality occurs when the sets of $X \; and \; Y$ coefficients are statistically significantly different from zero in both regressions. That is H_0: $X \leftrightarrow Y$

$$H_0 = \begin{pmatrix} A_{11} & A_{12} \\ A_{21} & A_{22} \end{pmatrix} \qquad 5.32$$

2.) Independent causality shows when the sets of $X \; and \; Y$ coefficients are not statistically significant in either of the regressions. That is H_1: $X \perp Y$

$$H_1 = \begin{pmatrix} A_{11} & 0 \\ 0 & A_{22} \end{pmatrix} \qquad 5.33$$

3.) Unidirectional causality from $x \; to \; y$ exists if the set of lagged x coefficients in equation 5.30 is not statistically different from zero and the set of the lagged y coefficients in equation 5.31 is statistically different from zero. That is x causes y but y does not cause x, $H_2, \; y \nrightarrow x$

$$H_2 = \begin{pmatrix} A_{11} & A_{12} \\ 0 & A_{22} \end{pmatrix} \quad 5.34$$

4.) Unidirectional causality from y to x is indicated if the estimated coefficients on the lagged y in equation 5.30 are statistically different from zero as a group and the set of estimated coefficients on the lagged x in equation 5.31 are not statistically different from zero. That is y causes x but x does not cause y, H_3, $x \nrightarrow y$

$$H_3 = \begin{pmatrix} A_{11} & 0 \\ A_{21} & A_{22} \end{pmatrix} \quad 5.35$$

5.7.1.1.6 Long-run Estimates

The long-run relationship in a regression analysis is determined by the cointegration relation. When cointegration is detected between series, the assumption of the model is that there is a long-run equilibrium relationship that exists between the variables which prevents the residuals from becoming larger in the long-run. The long-run relationship described by cointegration can be given by the following formulation by Philips and Ouliaris (1990):

$$\Delta X_{t-1} = \pi X_{t-1} + \sum_{i=1}^{p-1} \emptyset_i^* \Delta X_{t-i} \varepsilon_t \quad 5.36$$

In the equation above, if $\pi = 0$, then there is no cointegration, therefore the long-run equilibrium relationship does not exist between the variables under consideration and non-stationarity of 1(1) type vanishes by taking differences. When π has full rank K, then $X's$ cannot be 1(1) but stationary, which can be written as:

$$\pi^{-1} \Delta X_t = X_{t-1} + \cdots \ldots \pi^{-1} \varepsilon_t \quad 5.37$$

The interesting case about equation 5.37 is that the Rank:

$$(\pi) = m, 0 < m < k \quad 5.38$$

The equation above shows that there is adjustment to the equilibrium X that is the long-run relation described by the cointegration relation. The long-run equation can therefore be written as:

$$\pi X^* = \alpha (\beta^1 X^*) = 0 \quad 5.39$$

The long-run relationship does not hold perfectly in $(t-1)$ due to an error written as:

$$\beta^1 X_{t-1} = \sum_{t-1} \neq 0 \quad 5.40$$

When there is disequilibrium in the model, the adjustment coefficient in α multiplied by the errors $\beta^1 X_{t-1}$ helps to induce adjustment which also determines Δ_{xt} so that the $X's$ move in the right direction and as well bring the system back to equilibrium.

5.7.1.1.7 Vector Error Correction Model (VECM)

The VEC model is a multivariate generalization of error correction model (ECM) which can also be seen as a form of restricted VAR model designed for use with non-stationary time series also known to be cointegrated. In estimating VAR models, some of the variables that are individually non-stationary maybe cointegrated: two or more variables may have common underlying stochastic trends along which they move together on a non-stationary path. When cointegration is detected between series, the assumption is that long-run equilibrium relationship exists between them so VECM will be applied in order to evaluate the short-run properties of the cointegrated series but if there is no cointegration, VECM will not be required. The technique is considered to be useful in some ways. For example, the VECM facilitate the imposition of restrictions on the long-run effects of structural shocks in the VAR model which extends the range of identifying assumptions used for structural impulse analysis (Kilian and Lutkepohl, 2016:102). To understand the concept of cointegration in the VAR framework; suppose the individual variables are:

$$y_t = A_l y_{t-1} + \cdots \ldots \ldots A_p y_{t-p} + \mu_t \quad 5.41$$

If y_{t-1} is subtracted from both sides of the equation and rearranged, the VEC model equation can be written as:

$$\Delta y_t = \pi y_{t-1} + \boldsymbol{\Gamma_1}\Delta\boldsymbol{y_{t-1}} + \cdots \ldots \ldots + \boldsymbol{\Gamma_{p-1}}\Delta\boldsymbol{y_{t-p+1}} + \boldsymbol{u_t} \quad 5.42$$

The only non-stationary variable among the regressors in equation (5.42) is y_{t-1}. Since the left-hand side in equation 5.42 is 1(0), the right-hand side also has to be nonstationary which requires πy_{t-1} to be 1(0). Suppose the above matrix has rank r, then there r linearly independent cointegration relationships and the rank of π is called the cointegration rank. If any $K \times K$ matrix rank of r can be decomposed as a product of two $K \times r$ matrices of full column rank. Assuming $\alpha \; and \; \beta$ are taken to be two $K \times r$ matrices of rank r such that $\pi = \alpha\beta^t$. The matrix of β^t is called the cointegrating matrix and the matrix α can be referred to as the loading matrix. Substituting the matrix $\alpha\beta^t$ for π in equation (5.42) will give the VECM equation formulation as:

$$\Delta y_t = \alpha\beta^t y_{t-1} + \boldsymbol{\Gamma_1}\Delta\boldsymbol{y_{t-1}} + \cdots \ldots \ldots \boldsymbol{\Gamma_{p-t}}\Delta\boldsymbol{y_{t-p+1}} + \boldsymbol{u_t} \quad 5.43$$

The equation above is regarded as the VECM model because it explicitly includes the lagged error correction term (ECM) that is: $\alpha\beta^t y_{t-1}$. The two main features of the VEC model arises:

- When $r = k$ where the process is stable in levels and all variables are 1(0) in levels, then there is no need to consider a VECM and
- when $r = 0$ whereby the EC term is zero and $\Delta\boldsymbol{y_t}$ has a stable VAR$(p-1)$ representation in differences.

To estimate VECM, since the VECM specification only applies to cointegrated variables the first test to employ should be the Johansen and Juselius (1988) cointegration test to be able to determine the number of cointegration relations.

A negative and significant coefficient of ECM indicates that any short-term fluctuations between the independent variables and the dependent variable will give rise to a stable long-run relationship between the variables.

5.7.1.1.8 Diagnostic Tests

The diagnostic tests in a regression model are conducted in order to examine the robustness of the specified model. It can also help to resolve problems associated with the residuals and goodness of fit for the estimated model. The Wald coefficient test, Breusch Godfrey serial correlation test, variance decomposition and the impulse response function are the diagnostic tests employed in this study and they will be discussed in the subsections.

5.7.1.1.8.1 Wald Coefficient Test

This is a way of testing the significance of particular explanatory variables in a statistical model. It could be seen in logistic regressions where there is a binary outcome variable with one or more explanatory variables and associated parameter (Kyngas and Rissanen, 2001). According to Agresti (1990) and Polit (1996), if for a particular explanatory variable or group of explanatory variable; the Wald test is significant; then it will be concluded that the parameters associated with these variables are not zero and could be included in the model. If the Wald test is not significant, then the explanatory variable can be omitted from the model. The Wald test involves two different regression in the view of Agresti 1990 and Polit 1996 and they are:

- Restricted regression that reflects H_0: the regression enforces the theory and imposes the restriction specified by the null hypothesis whereby the null hypothesis requires the elasticities sum to equal 0.
- Unrestricted regression that reflects H_1: this type of regression does not force the model to enforce the theory. In this case, the unrestricted regression considers the model that reflects the alternative hypothesis allowing the parameter estimates to take on any values.

5.7.1.1.8.2 Breusch Godfrey Serial correlation LM Test

The Breusch Godfrey serial correlation LM test is used to verify the validity of some of the modelling assumptions associated with regression like models to observe data series (Breusch 1978 and Godfrey 1978). This type of test can be applied in cases where lagged

values of the dependent variables are used as independent variables in the model's representation for later observations. The model uses residuals from the models being considered in a regression analysis to derive a test statistic to test for autocorrelation in the errors in a regression model. This implies that if the presence of serial correlation which was not detected in previous regression is picked with Breusch-Godfrey test, there is the possibility that the previous regression has drawn an incorrect conclusion or the sub-optimal estimates of model parameters are obtained if it is not taken into account (Baum, 2006). The null hypothesis is that there is no serial correlation of any order up to p. Although, other forms of estimation can be applied to test for the presence of autocorrelation in econometric models like the Durbin-Watson and the LJung-Box tests, the Breusch Godfrey test is regarded more to be general than them. This is as a result of the former being only valid for non-stochastic regressors and testing for the possibility of a first order autocorrelation more that is AR(1) for the regression errors. The latter does not have any restrictions and can be considered to be more powerful than Durbin's h statistic (Asteriou and Hall, 2011).

5.7.1.1.8.3 Variance Decomposition

In any given model of econometric estimation, there are two variables in a models as assumed by the law of total variance. The variables can be dependent as the Y variable or independent as the X variable and their relationship could be shown with a linear equation as:

$$Y = a + bX + c \qquad 5.44$$

The linear equation above indicates that for every change in X variable, there is also a corresponding change in Y variable. This implies that variance decomposition focuses on the dependent variable Y where its variance can be given by:

$$Var(Y) = E\left(Var\left[\frac{Y}{X}\right]\right) + Var(E\left[\frac{Y}{X}\right]) \qquad 5.45$$

While $E\left(Var\left[\frac{Y}{X}\right]\right)$ represents the explained variation directly due to changes in X, $Var(E\left[\frac{Y}{X}\right]$ shows that the unexplained variation comes from somewhere other than from

the variable X. Therefore, the equation above shows that the variance of the dependent variable Y within the relationship among the variables $X\ and\ Y$ includes:

- The expected variance of Y with respect to X and
- The expected variance of the expected variance of Y with respect to X.

The variance decomposition can be introduced into a model when dealing with dynamic stochastic system and the equation can be rewritten in terms of $Y(t)Y\ and\ H(it)X$ as:

$$Var[Y(t)] = E(Var\left[\frac{Y(t)}{H(it)}, H(2t, \dots\dots, H(c-1,t)\right]) + sum(E\left[\frac{Var(Y(t)]}{H(it)}\ H(2t, \dots\dots\dots, H(j-1,t)\right]) + Var(\frac{E[Y(t)]}{H(it)}) \quad 5.46$$

Equation 5.46 shows the explained and unexplained variations. The results from variance decomposition helps to understand that the response in Y has variations which comprises of two components and when these components are decomposed; one part is explained by changes in the independent variable (X) another unexplained variable caused by something other than the changes in (X).

5.7.1.1.8.4 Impulse Response Function

Sims (1980) introduced the impulse response function (IRF) technique in a VAR modelling where he argued that the exogeneity assumptions for some of the variables in a classical simultaneous equation models are often problematic. The author advocated the use of IRF as an alternative to trace out the response of the dependent variable in the VAR system to shocks in the error terms (Gujarati, 2013:801). In a VAR model equation where:

$$y_t = A_I y_{t-1} + \cdots\dots\dots + A_P y_{t-p} + u_t \quad 5.47$$

Where $y_t = y_{It}, \dots\dots\dots, y_{kt}$ is the vector of K observed variable of interest, A_i represents the parameter matrices, P is the lag order and u_t is the error process assumed to be white noise with zero mean which is also serially uncorrelated. Since the relationship between the variables in a VAR model are difficult to see directly from the parameter matrices, IRF was introduced as a tool for interpreting VAR models.

The IRF analysis may be based on counterfactual experiment of tracing the marginal

effects of a shock to one variable through the system by setting one component of u_t to one and all other components to zero. It also evaluate the responses of the y_t to such an impulse in the future (Durlauf et al. 2010). Although that aspect of experiment could be achieved, the same authors suggested also that such a counterfactual experiment may not properly reflect the actual responses of an economic system of interest because the components of u_t in equation (5.47) are instantaneously correlated which might make forecast error impulse impractical. An impulse in one variable can be accompanied by an impulse in another variable so the effects should not be considered in isolation which is the orthogonalised impulse is usually considered. The orthogonalised impulse responses can be obtained by choosing the matrix B such that $BB^t = \sum_u or$ such that $B^{-1}\sum_u B^{t-1}$ is a diagonal matrix. So to define $\varepsilon_t = B^{-1}u_t$ the equation for orthogonalised impulse responses can be formulated as:

$$y_t = B\varepsilon_t + \sum_{i=1}^{\infty}\theta_i\,\varepsilon_t - i \qquad 5.48$$

Where $\theta_i = \emptyset_i B, i = 1,2, \ldots \ldots$ The ε_t has a diagonal or even a unit covariance matrix and are contemporaneously uncorrelated that is orthogonal. More so, the shocks from ε_t may give a clear understanding of the reactions in the system (Durlauf et al., 2010:146).

5.8 Conclusion

This chapter discussed the theoretical framework employed in the study including the data sources, analysis and the procedure used to extrapolate and interpolate the missing data. The theoretical and empirical background of the variables chosen were analysed as well as the various estimation techniques applied in the study. More so, the models and variables chosen will help in realizing the aim and objectives of this study. Likewise, all the steps involved in the chosen methodology were analysed to explain the relationships and how the results will affect this study. The estimation with the methodology explained in this chapter will be carried out and interpreted in chapter six; to assess the nature of the relationship between government expenditure and economic growth in South Africa from 1970Q1 to 2016Q4.

CHAPTER SIX
Empirical Results and Analysis

6.1 Introduction

This chapter presents the analyses of the estimations measuring the effects of government expenditure on the different components of economic growth in South Africa. This was achieved by employing the most effective methodology that will best suit the aim of the study and possibly rectify any bias that might arise from the models. The stages of the estimation includes: the unit root test to check the stationarity of variables used followed by the cointegration test, Granger causality test, long-run estimate, vector error correction mechanism (VECM) and diagnostic tests to validate other tests in the study.

The first step in carrying the estimation was to find out if the series are integrated of order 1[1] in other words if they are stationary. The unit root test is important when applying econometric technique to variables because conducting an estimation with non-stationary variables will result into spurious regression. Since the objective of the study is to measure the impact of government expenditure on different components of economic growth, there is the need to establish whether a relationship exists between the variables under consideration as well as the nature of the relationship which will be determined using the cointegration model. The result from the cointegration test helped to determine the next approach to follow in the regression method as the presence of cointegration leads to employing the VECM (restricted VAR) while the absence of cointegration between the variables will require the use of unrestricted VAR model. In addition Granger causality test was applied to the two main variables under consideration: real gross domestic products and gross government expenditure. The series consist of quarterly data from 1970Q1 to 2016Q4 due to availability of data. The dependent variables are the real gross domestic product (GDP) proxy for economic growth while the independent variables are aggregate private consumption expenditure (PEXP) proxy for household expenditure, gross government expenditure (GEXP) proxy for total government expenditure (recurrent and capital), gross fixed capital formation (CAP) proxy for physical capital stock, employment to population ratio (LAB) proxy for level of employment and net inflows of

foreign direct investment (FDI) proxy for technology transfer though gross government expenditure was treated as a dependent variable at some point in the study. These variables were examined over a forty-six year period producing a total of one hundred and eighty-four observations. It will be important to note that in the cause of analyzing the estimations, both dependent and independent variables were expressed in their natural logarithm form and their coefficient estimators should be interpreted as the elasticity or the approximated percentage change when each of the independents variables under consideration rises by one percent. The high R^2 obtained in some of the estimates might be as a result of generated data and the nature of the models applied in the study.

The rest of the chapter will be arranged as follows: section 6.2 contains the results from the unit root estimation using the Augmented Dickey-Fuller (ADF) and Phillip-Perron (PP) tests followed by the lag length selection with the modified likelihood ratio (LR), final prediction error (FPE), Akaike information criterion (AIC), Schwarz information criterion (SIC) and Hannan-Quinn information criterion (HIC). The cointegration test used the trace statistics and the maximum Eigen statistics to establish the level of relationship among the variables, Granger causality test, long-run estimates and the vector error correction model (VECM). Section 6.3 compares and validates results in section 6.2 with diagnostic tests like: the Wald coefficient test, Breusch-Godfrey serial correlation LM and variance decomposition tests while section 6.4 presents results from the impulse response function (IRF) which measured the unit shocks applied to each series and its effects on restricted VAR system. The conclusion of the chapter was done in section 6.5.

6.2 Results based on unit root test, lag length selection, cointegration test, Granger causality test, long-run estimates and VECM

The results from the unit root test, lag length selection, cointegration test, Granger causality test, long-run estimates (disaggregated analysis) and the vector error correction mechanism are presented in tables 6.1, 6.2, 6.3, 6.4, 6.5 and 6.6 of this section.

6.2.1 Unit Root

Since this study intends to use time series data for its analysis, it will be proper to analyse the time series properties of the data in order to avoid problems associated with spurious regression. However in terms of using the ADF test for unit root, Perron (1988) pointed out that an existence of structural changes biases the standard ADF tests towards the non-rejection of the null hypothesis of a unit root. Therefore, this study conducted the unit root test using both the Augmented Dickey Fuller (ADF) (1971, 1981) approach as well as the Philips-Perron (PP) (1988) approach.

Table 6.1: Estimated results for the unit root test

		ADF		PP		Order of integration I(d)
Series	Model	Level	First difference	Level	First difference	
GDP	None	4.314276 (1.0000)	-4.997578*** (0.0000)	4.355800 (1.0000)	-8.672438*** (0.0000)	I(1)
	Constant	-0.412420 (0.9033)	-10.35813*** (0.0000)	-0.592723 (0.8681)	-10.61092*** (0.0000)	I(1)
	Constant and trend	-1.553294 (0.8075)	-10.33125*** (0.0000)	-1.734960 (0.7319)	-10.58704*** (0.0000)	I(1)
PEXP	None	-2.029204** (0.0410)	-1.180606 (0.2169)	-5.464660*** (0.0000)	-3.123529*** (0.0019)	I(1)
	Constant	-6.065199*** (0.0000)	-4.171983*** (0.0010)	-4.033385*** (0.0016)	-11.83457*** (0.0000)	I(1)
	Constant and trend	2.127086 (1.0000)	-11.80735*** (0.0000)	1.213280 (1.0000)	-12.62323*** (0.0000)	I(1)
GEXP	None	-3.962626*** (0.0001)	-2.290501** (0.0216)	-9.916996*** (0.0000)	-11.19561*** (0.0000)	I(1)
	Constant	-4.476359*** (0.0003)	-5.223749*** (0.0000)	-4.150595*** (0.0010)	-15.16693*** (0.0000)	I(1)
	Constant and trend	0.496655 (0.9993)	-13.03684*** (0.0000)	0.159997 (0.9976)	-16.53575*** (0.0000)	I(1)
CAP	None	-4.874861*** (0.0000)	-3.216789*** (0.0014)	-7.475165*** (0.0000)	-9.279811*** (0.0000)	I(1)
	Constant	-1.812439 (0.3736)	-7.184414*** (0.0000)	-2.226990 (0.1975)	-12.52570*** (0.0000)	I(1)
	Constant and trend	-2.756556 (0.2155)	-7.393234*** (0.0000)	-2.405193 (0.3757)	-12.65194*** (0.0000)	I(1)
LAB	None	2.574725 (0.9977)	-5.034397*** (0.0000)	3.324823 (0.9998)	-8.305290*** (0.0000)	I(1)
	Constant	-3.261152** (0.0182)	-5.797297*** (0.0000)	-4.217216*** (0.0008)	-9.414036*** (0.0000)	I(1)
	Constant and trend	-2.303753 (0.4294)	-6.363741*** (0.0000)	-2.623896 (0.2703)	-9.998850*** (0.0000)	I(1)
FDI	None	-2.615975***	-12.04296***	-9.880227***	-95.28429***	I(1)

	(0.0090)	(0.0000)	(0.0000)	(0.0001)	
Constant	-6.450786***	-12.01347***	-10.84343***	-104.1280***	I(1)
	(0.0000)	(0.0000)	(0.0000)	(0.0001)	
Constant and trend	-12.25480***	-11.97953***	-12.27131***	-102.9827***	I(1)
	(0.0000)	(0.0000)	(0.0000)	(0.0001)	

Notes: **Null: Unit root (Automatic - based on SIC, maxlag=14): ADF (t-statistic)**
Null: Unit root (Newey-West automatic using Bartlett kernel): PP (adjusted t-statistic)
*****, ** and * are 1%, 5% and 10% significance level respectively**
Source: Author's calculation from Eviews 7.

The procedure in the table above was applied to analyse if the series for this study are stationary or non-stationary that is whether they integrated of order 1[1] or 1[0] using the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP). The variables used are as explained in section 6.1. These tests were conducted at constant and trend models, constant only models and neither constant nor trend (none) models for all the series, though constant and trend models are the selected equations for unit root test in this research work due to its robustness.

The empirical results from ADF and PP unit root tests revealed that real gross domestic product (GDP), aggregate private consumption expenditure (PEXP), gross government expenditure (GEXP), gross fixed capital formation (CAP) and employment to population ratio (LAB) are not stationary at level but net inflows of foreign direct investment (FDI) is stationary at level in both ADF and PP unit root tests. These results imply that there is presence of random walk stochastic components in real gross domestic product, aggregate private consumption expenditure, gross government expenditure, gross fixed capital formation and employment to population ratio, and an attempt to use them for estimation at level would lead to spurious and inefficient estimations. Further unit root tests at first difference showed that the series are stationary at first difference with 99 percent confidence level. This implies that real gross domestic product, aggregate private consumption expenditure, gross government expenditure, gross fixed capital formation and employment to population ratio are integrated of order one[I(1)]. Though, net inflows of foreign direct investment (FDI) is stationary at level and at first difference, this study therefore concludes that net inflows of foreign direct investment (FDI) is also integrated of order one [I(1)] which suggests possible existence of long-run equilibrium among the series used so the regression of one on the other will not be spurious.

6.2.2 Lag Length Selection Criterion

Since results from the unit root tests revealed the possibility of a long-run equilibrium among the series. The process of selecting the optimal lag length is useful before proceeding with the cointegration tests to avoid the problem of choosing too many lags that might result into unnecessary loss of degrees of freedom or few lags selection that could lead to misspecification of results.

Table 6.2 Lag length criterion results

Lag	LR	FPE	AIC	SIC	HIQ
1	NA	3.49e-23	-34.68146	-34.05245*	-34.42651*
2	91.04683*	3.05e-23*	-34.81949*	-33.56147	-34.30960
3	49.58142	3.35e-23	-34.72687	-32.83984	-33.96204
4	48.20590	3.69e-23	-34.63685	-32.12082	-33.61707

Note: * indicates lag order selected by the criterion; LR: sequential modified LR test statistic (each test at 5% level), FPE: Final prediction error, AIC: Akaike information criterion, SIC: Schwarz information criterion and HIQ: Hannan-Quinn information criterion

Source: Author's calculation from Eviews 7.

Table 6.2 shows the result of the lag length selection procedure using sequential modified likelihood ratio (LR), final prediction error (FPE), Akaike information criterion (AIC), Schwarz information criterion (SC) and Hannan-Quinn information criterion (HIQ) techniques to determine the most efficient lag at 5 percent significance level. These tests were applied to the variables used in the study which are: real gross domestic product, aggregate private consumption expenditure, gross government expenditure, gross fixed capital formation, employment to population ratio and net inflows of foreign direct investment and the results from the sequential modified likelihood ratio (LR), final prediction error (FPE) and Akaike information criterion (AIC) indicated lag 2 as the most efficient while results of Schwarz information criterion (SIC) and Hannan-Quinn information criterion (HIQ) suggested lag 1 as the most efficient. Following the bases for lag length selection, five tests were conducted. Of the five tests carried out, three suggest lag 2 as the most efficient. This study therefore adopts lag 2 for estimations and the next approach will be to determine whether or not there is an existence of long-run equilibrium relationship between the variables.

6.2.3 Cointegration Test

The cointegration analysis deals with the relationship among a group of variables where unconditionally each has a unit root (Gujarati, 2013). Since the objectives of this study include estimating the relationship between government expenditure and economic growth, applying cointegration test can assist to detect the type of relationship that exist among the variables. This step will help to determine whether the VECM or the VAR model is to be adopted moving forward.

Table 6.3: Cointegration test result

Trace test				**Maximum Eigen value test**			
H_0	**H_1**	**λ-trace statistic**	**p-value**	**H_0**	**H_1**	**λ-max statistic**	**p-value**
GDP, PEXP, GEXP, CAP, LAB and FDI							
r=0	$r \geq 1$	202.9419	0.0000*	r=0	$r \geq 1$	68.39722	0.0000*
$r \leq 1$	$r \geq 2$	134.5446	0.0000*	$r \leq 1$	$r \geq 2$	64.34618	0.0000*
$r \leq 2$	$r \geq 3$	70.19847	0.0014*	$r \leq 2$	$r \geq 3$	37.83343	0.0059*
$r \leq 3$	$r \geq 4$	32.36504	0.0934*	$r \leq 1$	$r \geq 2$	18.01199	0.2690
$r \leq 4$	$r \geq 5$	14.35305	0.1680	$r \leq 2$	$r \geq 3$	14.12117	0.1308
$r \leq 5$	$r \geq 6$	0.231877	0.6301	$r \leq 2$	$r \geq 3$	0.231877	0.6301

Notes: *Rejection of the null hypothesis of no cointegration at least at 10% level of significance.
Source: Author's calculation from Eviews 7.

Table 6.3 shows the maximum likelihood based cointegration procedure introduced by Johansen and Juselius (1988) and the empirical findings revealed that at least three cointegrating vectors of real gross domestic products, aggregate private consumption expenditure, gross government expenditure, gross fixed capital formation, employment to population ratio and net inflows of foreign direct investment have the presence of cointegration. The trace statistic and maximum Eigen statistic showed that seven out of the twelve equations are statistically significant from at least 10 percent significance level and the study do not accept the null hypothesis that there is no cointegration. This

indicates that allowing for linear trend, there is a long-run equilibrium relationship among real gross domestic product, aggregate private consumption expenditure, gross government expenditure, gross fixed capital formation, employment to population ratio and net inflows of foreign direct investment in South Africa from 1970Q1 to 2016Q4. The implication of the findings from the cointegration test is that the variables are closely related and have the ability to assert either negative or positive forces on the economy in the long-run.

6.2.4 Granger Causality Test

In light of the position of the relationship between government expenditure and economic growth in South Africa, some level of analyses are required to determine which of the two causes the other to increase. Since there is a mismatch between the performance of the economy and the constant increases in the total government expenditure over the years, this study therefore applies causality test which could be beneficial for policy purposes.

Table 6.4: Result on Granger causality test

Null hypothesis	Observations	F-statistic	p-value	Direction of relationship observed
GDP does not Granger cause GEXP	174	2.67111	0.0017***	GDP ⇔ GEXP
GEXP does not Granger cause GDP		1.80668	0.0426**	

Notes: *, ** and * are 1%, 5% and 10% significance level respectively**
Source: Author's calculation from Eviews 7.

The causality test was between the two key variables of this study as presented in table 6.4 that is: real gross domestic product (GDP) and gross government expenditure (GEXP) in South Africa. This was done to determine the direction of causality between them and the test was evaluated via F-statistic at 1 percent, 5 percent and 10 percent significance level as shown in the table above. The Granger-causality results revealed that there is a bi-directional causality between real gross domestic products (GDP) and gross government expenditure (GEXP) in South Africa from 1970Q1 to 2016Q4. Although considering the percentage, more causality runs from real gross domestic product (GDP)

to gross government expenditure (GEXP) in South Africa at 99 percent confidence level and less causality runs from gross government expenditure (GEXP) to real gross domestic product (GDP) within same period in South Africa at 95 percent confidence level. Therefore, this study concludes that there is a bi-directional relationship between real gross domestic product (GDP)-economic growth and gross government expenditure (GEXP) in South Africa. Therefore, the need for bivariate regressions are suggested for long-run and short-run equilibrium estimations.

6.2.5 Long-Run Estimates

Considering that the main aim of this study is to evaluate how government expenditure impacts on different components of economic growth in South Africa. The long-run estimates was applied to measure the long-run equilibrium relationship between the variables bearing in mind that findings from cointegration test have suggested that there exists a long-run equilibrium relationship among the variables.

Table 6.5: Results on the long-run estimates

	Dependent variable	
Independent variable	**GDP;**	**GEXP**
Constant	3.444707*** [15.75018]*** (0.0000)	-5.431860*** [-10.47536] *** (0.0000)
GDP	-	0.293111** [2.048234] (0.0420)
PEXP	-0.240941*** [-6.138515] (0.0000)	1.057884*** [34.47250] (0.0000)
GEXP	0.076870** [2.048234] (0.0420)	-
CAP	0.421039*** [37.10637] (0.0000)	-0.135198*** [-2.110272] (0.0362)
LAB	-0.426755*** [-10.81166] (0.0000)	0.828773*** [10.71513] (0.0000)
FDI	0.204929 [0.745349] (0.4570)	-0.613498 [-1.145063] (0.2537)

R-squared	0.993455	0.999319
F-statistic	5524.826	53433.48
	(0.000000)	(0.000000)

Notes: Values in parentheses [ ] and ( ) are t-statistics and p-value.
*****, ** and * are 1%, 5% and 10% significance level respectively**
Source: Author's calculation from Eviews 7.

Table 6.5 shows the long-run equilibrium relationships between the regressands (real gross domestic product and gross government expenditure) and regressors (aggregate private consumption expenditure, gross fixed capital formation, employment to population ratio and net inflows of foreign direct investment) though at some point real gross domestic product and gross government expenditure are also explanatory variables.

The empirical results for economic growth (real gross domestic product) showed that gross government expenditure, gross fixed capital formation and net inflows of foreign direct investment have positive impact on real gross domestic product but aggregate private consumption expenditure and employment to population ratio have negative impact on real gross domestic products in South Africa from 1970Q1 to 2016Q4. The results further revealed that a one percentage decrease in aggregate private consumption expenditure leads to 0.241 percentage decrease in real gross domestic product in the economy. Although, private consumption expenditure is short-term in nature, the result can be attributed to rising living costs in the country, high levels of indebtedness and difficulty in accessing new credit as a result of higher interest rate, high unemployment rate and poor employment creation in the economy. The result from the coefficient of gross government expenditure shows that a one percentage rise in gross government expenditure leads to 0.077 percentage increase in real gross domestic product and a one percentage increase in gross fixed capital formation causes 0.421 percentage increase on real gross domestic products. The increased job losses in the mining, manufacturing and agricultural sectors due to unfavourable business conditions while the economy is struggling to create new employment opportunities at a fast enough pace that can reduce high unemployment rate have not done any good to the economy. As can be seen from the results, a one percentage decrease in employment to population ratio leads to 0.427 percentage fall in real gross domestic product. On the other hand, a one percentage rise in the net inflows of foreign direct investment causes 0.204 percentage increase in real

gross domestic product in South Africa. This implies that South Africa needs to attract more foreign direct investors in order to increase productivity.

The individual significance test of the regressors (aggregate private consumption expenditure, gross government expenditure, gross fixed capital formation, employment to population ratio and net inflows of foreign direct investment) for economic growth model revealed that aggregate private consumption expenditure, gross fixed capital formation and employment to population ratio are statistically significant to real gross domestic product at one percentage level and gross government expenditure is statistically significant at five percentage level to real gross domestic product. But, net inflows of foreign direct investment is not statistically significant at ten percentage significance level to real gross domestic product. This is not in agreement with the theoretical expectation which holds that FDI helps to increased productivity in the host country. The implication is that government expenditure needs to be monitored, since excessive public capital expenditure might reduce the positive impact of foreign direct investment on economic growth. Again, there has been an accelerated economic growth in South Africa especially after its independence which was more than five percentage in 2006. This increased the country's domestic market boom, therefore, the productivity increase together with the local market boom could have reduced the rate of foreign direct investment inflows to the country.

The joint significance test of the explanatory variables (aggregate private consumption expenditure, gross government expenditure, gross fixed capital formation, employment to population ratio and net inflows of foreign direct investment) shows that the regressors are jointly and statistically significance at one percentage level to real gross domestic product which corresponds with the apriori expectation. The coefficient of determination revealed that the explanatory variables caused 99.346 percent variations in real gross domestic product but stochastic components caused 0.654 percentage (that is $100 - R^2 = 100 - 99.346 = 0.654$) variations in real gross domestic product and this represents a goodness of fit for the model. In other words, they have a strong effect on economic growth as they play a significant role in explaining the rate of increases in South Africa's economy.

The results of the gross government expenditure revealed that real gross domestic product, aggregate private consumption expenditure and employment to population ratio are positively and statistically significant at five percentage significant level on gross government expenditure. While the gross fixed capital formation is statistically significant at one percentage level but negatively related to gross government expenditure. The net inflows of foreign direct investment is negatively related and statistically insignificant to gross government expenditure within the period considered.

The empirical findings show that a one percentage increase in real gross domestic product, aggregate private consumption expenditure and employment to population ratio causes 0.293, 1.058 and 0.829 percentage increase in gross government expenditure respectively within the period measured. More so, a one percentage increase in gross fixed capital formation and net inflows of foreign direct investment, respectively leads to 0.135 and 0.613 percentage decrease in gross government expenditure. This result indicates a strong coherent with Ram's (1986) production model as explained in equation 5.16 that acknowledges the importance of capital and labour in enhancing economic growth.

The joint significance test of the explanatory variables revealed that real gross domestic product, aggregate private consumption expenditure, gross fixed capital formation, employment to population ratio and net inflows of foreign direct investment are jointly and statistically significant at one percentage significance level to gross government expenditure in South Africa. The goodness of fit test of the model revealed that real gross domestic product, aggregate private consumption expenditure, gross fixed capital formation, employment to population ratio and net inflows of foreign direct investment cause 99.932 percent variations in gross government expenditure but error term causes 0.068 percent (that is $100 - R^2 = 100 - 99.932 = 0.068$) variations in gross government expenditure in South Africa. The results are in conformity with the underlying theories and comply favourably with studies by Lai (1994), Kweka and Morirssey (1999) amongst others. In addition, the model has a good fit since the value of the coefficient of determination is high.

In conclusion, all the results analysed in this chapter correspond to the current economic situation in South Africa which is the declining state of the economy. The results also

showed how the three main challenges-unemployment, poverty and inequality facing the economy are related and has the ability to affect each other if not addressed.

6.2.6 Vector Error Correction Mechanism (VECM)

In estimating VAR models, some of the variables that are individually non-stationary maybe cointegrated that is, two or more variables may have common underlying stochastic trends along which they move together on a non-stationary path. When cointegration is detected between series, it shows that there exists a long-term equilibrium relationship between them as the case in this study. The VECM will thus be applied in the model to evaluate the properties of the cointegrated series as done in the table below.

Table 6.6: Results on VECM

Independent variable	**Dependent variable**	
	GDP	**GEXP**
Constant	0.000763	0.049341
	[0.31499]	[5.14604]
	(0.7532)	(0.0000)
GDP_{t-1}	0.129393	0.103791
	[1.77540]	[0.35961]
	(0.0776)	(0.7196)
GDP_{t-2}	0.059087	0.463801
	[0.80793]	[1.60139]
	(0.4203)	(0.1111)
$hPEXP_{t-1}$	0.070380	0.226684
	[1.39192]	[1.13206]
	(0.1658)	(0.2592)
$PEXP_{t-2}$	0.029792	-0.061330
	[0.58663]	[-0.30495]
	(0.5582)	(0.7608)
$GEXP_{t-1}$	0.007369	-0.338007
	[0.39251]	[-4.54613]
	(0.6952)	(0.0000)
$GEXP_{t-2}$	-0.022894	-0.341943
	[-1.22465]	[-4.61880]
	(0.2224)	(0.0000)
CAP_{t-1}	-0.013328	-0.060139
	[-0.68810]	[-0.78403]
	(0.4923)	(0.4341)
CAP_{t-2}	0.000763	-0.042407
	[0.04087]	[-0.57358]
	(0.9675)	(0.5670)
LAB_{t-1}	0.353851	0.492042
	[4.04601]	[1.42067]
	(0.0001)	(0.1572)
LAB_{t-2}	0.115661	0.165991
	[1.24314]	[0.45051]

	(0.2155)	(0.6529)
FDI_{t-1}	0.056469	0.017421
	[0.80793]	[0.06294]
	(0.4203)	(0.9499)
$llFDI_{t-2}$	0.043021	0.126404
	[0.61043]	[0.45289]
	(0.5424)	(0.6512)
ECM_{t-1}	-0.049393	0.223108
	[-3.47179]***	[3.95990]***
	(0.0007)	(0.0001)
R-squared	0.259728	0.244751
F-statistic	4.615094	4.262725
	(0.000001)	(0.000004)

Notes: Values in parentheses [ ] and ( ) are t-statistics and p-value.
*****, ** and * are 1%, 5% and 10% significance level respectively**
Source: Author's calculation from Eviews 7.

The VECM estimation was used to evaluate the cointegration model results and the speed of adjustment of equilibriums. Thus, if the VECM is negative and significant, there is a long-run equilibrium and causality running from regressors to regressand but if otherwise, there is no long-run equilibrium and causality.

The empirical results of economic growth (real gross domestic product) show that the VECM is statistically significant at one percentage significance level and negative. Therefore, there is long-run equilibrium relationship and causality running from the regressors: aggregate private consumption expenditure, gross government expenditure, gross fixed capital formation, employment to population ratio and net inflows of foreign direct investment to the regressand: real gross domestic product in South Africa from 1970Q1 to 2016Q4.

The gross government expenditure model estimations show that the VECM is positive and statistically significant, therefore, there is no long-run causality running from real gross domestic product, aggregate private consumption expenditure, gross fixed capital formation, employment to population ratio and net inflows of foreign direct investment to gross government expenditure in South Africa under the period. Though, bivariate causality analysis suggested strong influence of real gross domestic product on gross government expenditure. Thus, there is need to test the short-run causality of the regressors to the regressand which lead to the diagnostic tests.

6.3 Diagnostic Tests

In order to validate results obtained from section 6.2 and consider the short-run dynamics of the variables with the possibility of disequilibrium; various diagnostics tests were applied to the model. The results presented in this sections are in the following order: 6.3.1 presented the Wald coefficient test, 6.3.2 contained the analysis of Breusch-Godfrey serial correlation LM test while 6.3.3 presented results from the variance decomposition test and 6.3.4 showed the impulse response function (IRF) analysis.

6.3.1 The Wald Coefficient Test

This test can be employed to test for hypothesis on parameters that have been estimated by maximum likelihood using the chi-square distribution. This study applied the Wald coefficient test at this stage because the sample and the likelihood function estimated previously satisfy some set of conditions that are sufficient to guarantee consistency and asymptotic normality of the models.

Table 6.7: Result of the Wald coefficient test

Independent variable	**Dependent variable**			
	GDP		**GEXP**	
	F-statistic	Chi-square	F-statistic	Chi-square
GDP	-	-	1.437246	2.874492
			(0.2404)	(0.2376)
PEXP	1.036898	2.073796	0.761760	1.523520
	(0.3568)	(0.3546)	(0.4684)	(0.4668)
GEXP	1.023349	2.046698	-	-
	(0.3616)	(0.3594)		
CAP	0.241175	0.482350	0.439783	0.879567
	(0.7860)	(0.7857)	(0.6449)	(0.6442)
LAB	9.905357	19.81071	1.230560	2.461120
	(0.0001)	(0.0000)	(0.2947)	(0.2921)
FDI	0.358343	0.716686	0.118185	0.236370
	(0.6994)	(0.6988)	(0.8886)	(0.8885)

Notes: *, ** and * are 1%, 5% and 10% significance level respectively**
Source: Author's calculation from Eviews 7.

The Wald coefficient test shown in the table above evaluates the joint significance of the lag of independent variables individually with the null hypothesis that if the coefficient of lag 1 and lag 2 are equal to zero, there is no short-run equilibrium.

The Chi-square result in the test for economic growth (real gross domestic product) model revealed that there is no short-run causality running from aggregate private consumption expenditure, gross government expenditure, gross fixed capital formation and net inflows of foreign direct investment to real gross domestic product since the null hypothesis is not rejected and Chi-square of the Wald coefficient tests are statistically insignificant at least at ten percentage significance level. Although, the employment to population ratio is statistically significant at one percentage significance level. This implies that there is short-run causality running from employment to population ratio (level of employment) to economic growth in South Africa within the period considered. The Chi-square Wald coefficient tests for gross government expenditure revealed also that there is no short-run causality running from real gross domestic product, aggregate private consumption expenditure, gross fixed capital formation, employment to population ratio and net inflows of foreign direct investment to gross government expenditure in South Africa from 1970Q1 to 2016Q4.

6.3.2 Breusch-Godfrey Serial Correlation LM Test

This approach uses residuals from the models being considered in a regression analysis to derive a test statistic from testing for autocorrelation in the errors of a regression model. This implies that if the presence of a serial correlation that was not detected in previous regression was picked with Breusch-Godfrey test, there is the possibility that the previous regression has drawn an incorrect conclusion or the sub-optimal estimates of model parameters are obtained if it is not taken into account.

Table 6.8: Results of Breusch-Godfrey serial correlation LM test

Test	GDP	GEXP
F-statistic	2.101159	1.279381
	(0.1255)	(0.2809)
Observed R-square	4.488560	2.759235
(Chi-square)	(0.1060)	(0.2517)

Notes: Null hypothesis: No serial correlation
*****, ** and * are 1%, 5% and 10% significance level respectively**
Source: Author's calculations from Eviews 7.

The Breusch-Godfrey diagnostic test for economic growth (real gross domestic product) and government expenditure (gross government expenditure) models in table 6.8 above is based on the null hypothesis that there will be no serial correlation if p-value of observed R-square is more than 0.05 (5 percent) and otherwise if less than 0.05.

The results from the table indicate that the p-value of observed R-square for economic growth (real gross domestic product) and government expenditure (gross government expenditure) models are more than 0.05 with 0.1060 and 0.2517 respectively, thus, the study uphold the null hypotheses that there is no serial correlation in the models. This implies that no incorrect conclusions were made in previous regressions in this study.

6.3.3 Variance Decomposition

The variance decomposition analysis helps in assessing the pass-through of external shocks in each economic variables under study thereby interpreting the vector auto-regression (VAR) model which had already been fitted in this study. The analysis is presented in table 6.9 below.

Table 6.9: Results on variance decomposition

	Variables		
Period	**SE**	**GDP**	**GEXP**
Panel A: Variance Decomposition of GDP			
1	0.008868	100.0000	0.000000
2	0.014318	99.98004	0.019955
3	0.018589	99.97286	0.027144
4	0.022121	99.96783	0.032170
5	0.025165	99.96403	0.035970
6	0.027866	99.96078	0.039222
7	0.030313	99.95781	0.042190
8	0.032562	99.95499	0.045009
9	0.034651	99.95225	0.047751
10	0.036609	99.94954	0.050458
15	0.044983	99.93590	0.064100
16	0.046448	99.93309	0.066908
17	0.047858	99.93025	0.069752
18	0.049219	99.92737	0.072634
19	0.050534	99.92445	0.075554
20	0.051807	99.92149	0.078513
21	0.053042	99.91849	0.081513
22	0.054240	99.91545	0.084553

Panel B: Variance Decomposition of GEXP

1	0.034183	1.114707	98.88529
2	0.044233	1.883203	98.11680
3	0.052950	2.304714	97.69529
4	0.060263	2.601541	97.39846
5	0.066735	2.824754	97.17525
6	0.072573	3.008202	96.99180
7	0.077925	3.167746	96.83225
8	0.082883	3.312296	96.68770
9	0.087517	3.446999	96.55300
10	0.091875	3.575032	96.42497
15	0.110629	4.168158	95.83184
16	0.113916	4.282726	95.71727
17	0.117081	4.396884	95.60312
18	0.120135	4.510853	95.48915
19	0.123086	4.624806	95.37519
20	0.125942	4.738875	95.26112
21	0.128709	4.853169	95.14683
22	0.131394	4.967772	95.03223

Note: Orthogonalised Cholesky ordering used
Source: Author's calculation from Eviews 7.

The degree of causal-effect between economic growth (real gross domestic product) and government expenditure (gross government expenditure) is further tested by variance decomposition. Table 6.9 shows the variance decomposition of economic growth (real gross domestic product) and government expenditure (gross government expenditure) for 22 periods in which one tenth of the periods are assumed to be the short-run period and the other is the long-run period. In panel A of the table, the response of economic growth to shocks in itself shows that at period 10, in the short-run, own shocks cause 99.949 percent fluctuations and 99.915 percent fluctuations in the long-run to economic growth in South Africa. In the short-run, shocks in gross government expenditure causes 0.050 percent fluctuations to economic growth while in the long-run, shocks in gross government expenditure causes 0.085 percent variations in economic growth. These results imply that own shocks of economic growth contributed larger portion of variations in economic growth in both short-run and long-run periods in South Africa from 1970Q1 to 2016Q4.

The panel B of table 6.9 shows the fluctuations in gross government expenditure and the empirical results revealed that in the short-run, own shocks contributes 96.425 percent

variations in gross government expenditure and in the long-run contributes 95.032 percent. The innovations in economic growth causes 3.575 percent fluctuations in gross government expenditure and in the long-run contributes 4.968 percent variations. The results show that own shocks of gross government expenditure contributes higher proportion of variations in gross government expenditure in South Africa in the short-run as well as the long-run.

The implication of these findings is that shocks in economic growth to variations in gross government expenditure is larger than shocks in gross government expenditure to variations in economic growth in South Africa in the years considered. This validates the findings from Granger causality test that economic growth has higher impact on gross government expenditure than otherwise in South Africa from 1970Q1 to 2016Q4.

6.4 Impulse Response Function

This is considered to be the best method of quantifying a significant relationship where there is evidence of Granger causality because with the VECM, the lags of the variables are often highly correlated. Therefore, an estimate involving the impulse response analysis of restricted VAR (VECM) estimation process using orthogonalised cholesky ordering technique captures the dynamic behaviour as it traces the effect of an exogenous shock to a variable on current and future values of another variable while taking into account that variables have common component (Glass, 2009:31). So to ensure that a shock is uncorrelated with other variables, the cholesky transformation was employed to orthogonalise the impulses.

Table 6.10: Results on Impulse response function

	Variables	
Period	**GDP**	**GEXP**
Panel A: Response of GDP		
1	0.008868	0.000000
2	0.011240	0.000202
3	0.011853	0.000230
4	0.011988	0.000252
5	0.011994	0.000265
6	0.011966	0.000277
7	0.011928	0.000288

8	0.011888	0.000299
9	0.011847	0.000310
10	0.011806	0.000321
15	0.011605	0.000373
16	0.011565	0.000383
17	0.011525	0.000393
18	0.011486	0.000402
19	0.011447	0.000412
20	0.011408	0.000422
21	0.011369	0.000431
22	0.011330	0.000441

Panel B: Response of GEXP

1	0.003609	0.033992
2	0.004881	0.027645
3	0.005270	0.028625
4	0.005464	0.028249
5	0.005597	0.028118
6	0.005713	0.027942
7	0.005824	0.027775
8	0.005932	0.027608
9	0.006039	0.027442
10	0.006145	0.027278
15	0.006656	0.026472
16	0.006755	0.026314
17	0.006853	0.026158
18	0.006950	0.026002
19	0.007046	0.025847
20	0.007140	0.025694
21	0.007234	0.025541
22	0.007326	0.025390

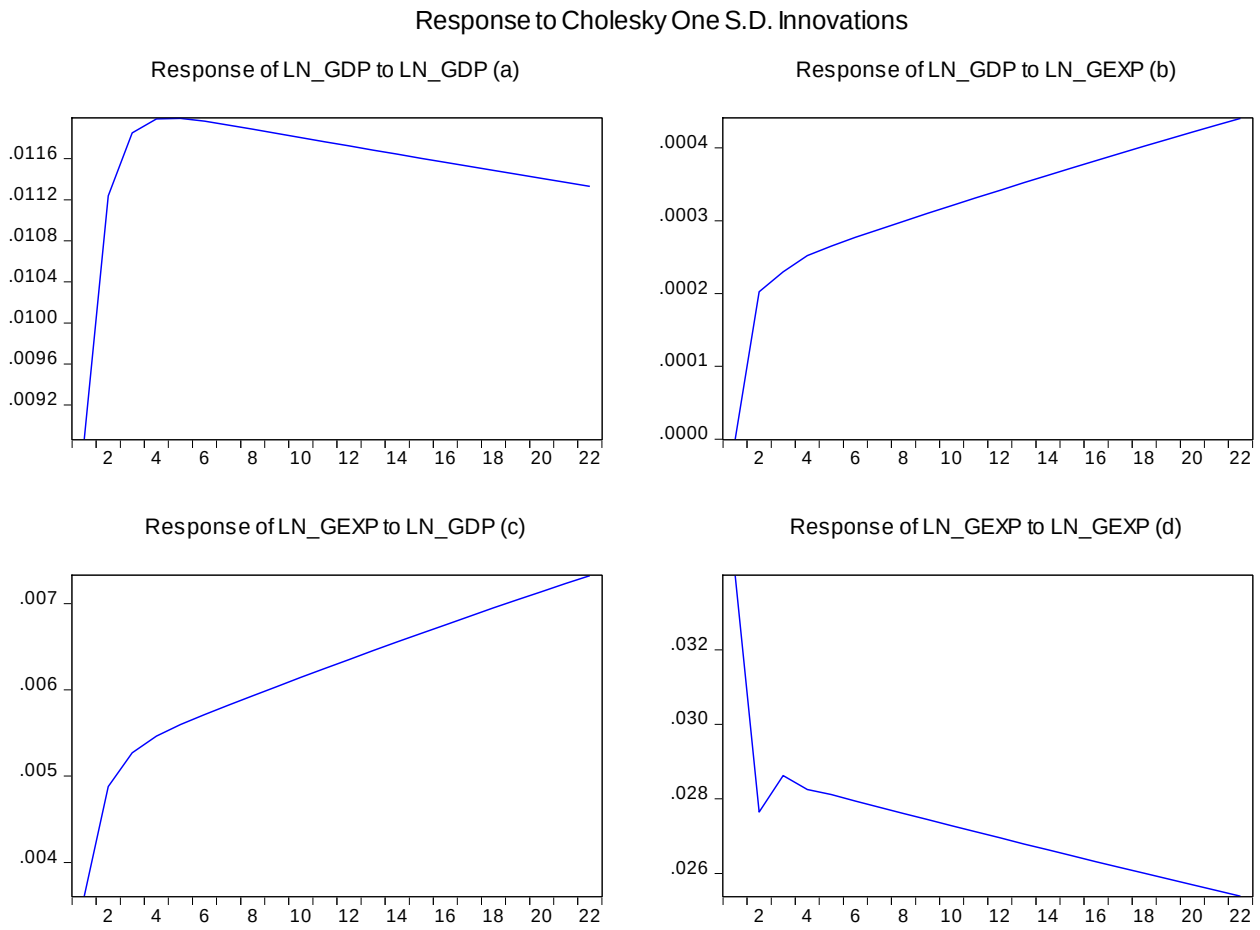
Note: Orthogonalised Cholesky ordering used
Source: Author's calculation from Eviews 7.

The outcomes of the tests for impulse response conducted in table 6.10 to measure the unit shock applied to each series and its effect on the restricted VAR system. This identifies the degree of reaction of the endogenous variables in the restricted VAR system to shocks or innovations that is the stochastic components as well as helps to detect time path of various shocks and how restricted VAR system reacted to the shocks. The results in table 6.10 and figure 6.1 show the reactions of the restricted VAR system to standard deviation shocks and innovations in this study.

In panel A of table 6.10, the results revealed that economic growth reacted to own one standard shock positively in the short-run but negatively in the long-run and declined steadily from period 6 to period 22 but positive all through as shown in panel A of table 6.10 and figure 6.1(a). Then, economic growth reacted positively to one standard deviation shock in gross government expenditure from period 1 to period 22 in the short-run and long-run periods.

The panel B of table 6.10 shows the reaction of gross government expenditure to one standard deviation shock in own shocks and economic growth. The empirical findings revealed that gross government expenditure reacted negatively to one own standard deviation shock in both the short-run and long-run periods as shown in figure 6.1(d). The one standard deviation shock in economic growth in the short-run and long-run causes positive reactions to gross government expenditure in the short-run and long-run as shown in panel B of table 6.10 and figure 6.1(c)

Figure 6.1: Impulse Response Function



6.5 Conclusion

This chapter contains the empirical results and analysis conducted to investigate the impacts of government expenditure on different components of economic growth in South Africa using quarterly time series data that covered from 1970Q1 to 2016Q4 which gives a total of 184 observations. Questions needed to be answered on whether government expenditure in the economy are positively or negatively related to economic growth. The reason can be found in the challenging economic situations in the country ranging from increasing unemployment, high poverty rate and increasing inequality; which has created other social problems that have made the South African economy unattractive for investment inflows. Nonetheless, the above statement does

not imply that nothing has changed within the economy since the country regained its independence. Evidence of a strong economic growth has reduced poverty in South Africa although at a slow-non-significant rate. Hence, the need to embark on this research.

In terms of the empirical evaluations, variables chosen were considered to be integrated of order 1[1] with the unit root tests which is a necessary condition that needs to be fulfilled before the cointegration analysis can be done. The cointegration results suggests that all the series have a long-run equilibrium relationship which is in line with the a priori expectation.

For the estimation to proceed in line with the vector error correction mechanism (VECM), the Granger causality test was used to analyse the assumption that government expenditure causes economic growth. In the real world, this assumption may not hold because government expenditure and economic growth change all the time therefore causality could run in either direction and that needs to be tested. Results in this regard, indicated a bi-directional causality between government expenditure and economic growth though economic growth causes government expenditure more at 99 percent confidence level. The long-run relationship estimated showed the true picture of the South African economy in relation to its high unemployment rate which leads to consistent decline in household consumption and increase in poverty rate among other economic problems. Other tests were conducted like the VECM and the diagnostic tests to validate previous findings in this study.

In light of the conclusion above, it will be imperative for government to conduct a cost-benefit analysis before carrying out its expenditure. Also, those variables that are significant and support labour and capital increases such as expenditure on education need to be considered more by government for enhanced economic growth in South Africa.

CHAPTER SEVEN

Conclusion, Policy Recommendations and Areas for Further Research

7.1 Introduction

This chapter concludes the study, presents possible policy recommendation based on the empirical results obtained in chapter six, and suggests areas for further research. Section 7.2 contains a general summary of the study, while section 7.3 briefly discusses the empirical findings and conclusion of the study. Section 7.4 presents the policy recommendations and 7.5 discusses the limitations of the study and suggests possible areas for further research.

7.2 Summary of the Study

The main purpose of this study was to analyse the externality effect of government expenditure on the different components of economic growth in South Africa from the period 1970Q1 to 2016Q4. Existing literature on this topic focused mainly on aggregate government expenditure or the direction of causality between government expenditure and economic growth. But none has included variables that are related to the structure of the country's economy derived from its macroeconomic frameworks designed since independence together with the Ram's production model. This study contributes to previous knowledge by providing government with information on the precise effects of government expenditure on different components of economic growth. This will benefit the economy well in that the widening economic problems despite continuous government interventions will be curbed. It will also help government to focus on those areas of the economy where increased government expenditure will be most productively employed. In addition, the analysis will assist policymakers to design appropriate macroeconomic policies that will best suit the structure of the South African economy.

To achieve the main objective of the study, three other specific objectives were investigated and they are: to evaluate the level of relationship between the selected

variables, estimate the long-run and the short-run effects of the variables used on economic growth, and to determine the causality effect between government expenditure and economic growth.

In chapter two of the study, an overview was provided of the South African economy, which was analysed in terms of its economic performance from 1970 to 2016, economic achievements since independence, the development plans as well as problems facing the economy. From the statistics and literature that were reviewed, it is evident that South Africa has done well in terms of improving its economic outlook. Most of its macroeconomic policies have been geared towards bridging the socioeconomic gap, poverty reduction and creating an enabling environment for inclusive growth. Hence the economy has achieved the following after apartheid: having one of the top stock exchange markets in the world; sophisticated financial institutions; becoming a member of BRICs; having well-developed legal, energy, communications and transport systems; being rated as an upper middle income country; and earning its place as the second largest economy in Africa, with investment opportunities for foreign investors. Despite the above achievements and yearly increases in its expenditure, the structural problems associated with the country's political and economic history are still deepening. As a result, the sophisticated and industrial economy discussed above is growing alongside an under-developed informal economy characterised by mass poverty, high unemployment and inequality rate, amongst others, which explains why it is necessary to reconsider the effects of government expenditure on different components of economic growth in the economy.

For a better understanding of the relationship between government expenditure and economic growth, various growth models, as well as theoretical and empirical studies, were reviewed and evaluated in chapter three. The growth models gave insight into how various models of economic growth contribute to an increase in economic growth rate. The Harrod-Domar (1956) growth model believes that the growth of the economy is dependent on the net-national savings ratio and national capital output ratio, while the neoclassicists argue that the three factors that drive economic growth are technology, capital accumulation and labour force. On the other hand, the endogenous and Shumpeterian models assume that technological progress and the

long-run rate of economic factors, especially forces associated with innovation and incentives to create more technological knowledge, are what contributes to economic growth.

In terms of the theoretical literature related to the effects of government expenditure and economic growth, Wagner (1883) suggests that it is economic growth as a result of industralisation that causes a rise in government expenditure. Keynes (1936) countered this ideology with the view that high levels of government expenditure, especially during economic downturns, can spur economic growth by increasing aggregate demand in the short-run. This implies that in Keynes' view, it is government expenditure that Granger-causes economic growth. The empirical studies reviewed in chapter four also have mixed results, in the sense that while many indicated that there is a negative link between government expenditure and economic growth, some have provided evidence of a positive relationship. Surprisingly, some research revealed that there is no significant relationship between government expenditure and economic growth. However, other studies have analysed the level of the relationship by disaggregating government expenditure, in order to study its relationship with economic growth.

With reference to chapter five, the Ram (1986) two sector production model was chosen as the preferred theoretical framework among other theories related to the study as discussed in chapter three. This is because not only does the model provide an assessment of the overall effect of government size on economic growth, but it also helps to determine if the marginal externality effect of government size on the rest of the economy is positive or negative. The model can also be used to check if input productivity in the government is higher or lower in the non-government sector. The application of the model is also justified by other studies that employed it - for example: Grossman (1988), Yasin (2000), Alexiou (2009), Alshahrani and Sadiq (2014), amongst others. The outcomes of these studies indicated that the model theoretically fits the topic.

The vector error correction mechanism (VECM) is the econometric methodology used to analyse the variables in this study. This approach helps to evaluate short-run dynamic properties of the cointegrated variables when a long-run equilibrium

relationship between variables is identified. Long-run estimates, Granger-causality tests and diagnostic tests were also applied in accordance with the methodology. In order to achieve the objective of the study, the chosen variables were based on the structure of the South African economy and included the following: real gross domestic product (GDP) proxy for economic growth, aggregate private consumption expenditure (PEXP) proxy for household expenditure, gross government expenditure (GEXP) proxy for total government expenditure (recurrent and capital), gross fixed capital formation (CAP) proxy for physical capital stock, employment to population ratio (LAB) proxy for level of employment, and net inflows of foreign direct investment (FDI) proxy for technology transfer. The sample period ranged from 1970Q1 to 2016Q4, due to the availability of data.

The results from the regression analysis presented in chapter six conform to the current economic situation in South Africa. The cointegration analysis revealed that in the trace and Eigen statistics tests that were conducted, seven out of the twelve equations are statistically significant at the 10 percent level. Therefore, the null hypothesis of no cointegration is rejected. This implies that all the above-mentioned variables will have a long-run equilibrium impact amongst themselves.

As a result of this long-run equilibrium relationship, the restricted vector autoregressive (VAR) model, otherwise known as the vector error correction mechanism (VECM), was employed in the study, instead of the unrestricted VAR, in order to further validate the short-run dynamics and long-run equilibrium, as well as the speed of adjustment among the variables. The VECM results from real GDP indicate that all the other variables increased the real GDP rate in South Africa from 1970Q1 to 2016Q4, while the VECM results from the gross government expenditure (GEXP) model estimation show that one of the other five variables increased the gross government expenditure (GEXP) rate within the same period in South Africa. The outcome of the VECM estimation is similar to the result from the Granger-causality test, which suggests that although there is bi-directional causality between government expenditure and economic growth in South Africa; real GDP has a strong influence on gross government expenditure. These results are in line with previous studies, such as Odhiambo (2015).

The long-run estimation results between the regressands and the regressors revealed that shocks from the country's economic and political past, such as high unemployment rates, poverty and inequality, are still deepening. This is because while gross government expenditure, gross fixed capital formation and net inflows of foreign direct investment had a positive impact on real gross domestic product, aggregate private consumption expenditure and the employment to population ratio had a negative impact on real gross domestic products in South Africa within the years considered. Various diagnostic tests done in chapter six to validate previous results in the study complied with their outcomes.

7.3 Policy Recommendations

With regard to the econometric results presented in chapter six, as well as the literature and analyses reviewed in this study, it is evident that South Africa continues to lag behind in terms of its growth rate, despite increasing government expenditure. Therefore, the problem lies with the direction of government expenditure not its level and the need to conduct appropriate cost-benefit analysis before government can embark on any form of expenditure.

The findings from the long-run estimate suggest that employment to population ratio (LAB) and aggregate private consumption expenditure (PEXP) are negatively related to economic growth in South Africa from 1970Q1 to 2016Q4. This study therefore concludes that increasing government expenditure in sectors where increased production cannot be achieved does not yield economic growth. According to the economic growth models discussed in this study, one of the main drivers of economic growth is capital, which can be divided into physical, human and natural capital. South Africa is rich in natural resources and its infrastructural development is among the tops in the world. As already indicated in this study, the main cause of unemployment in South Africa is the huge shortage of human capital or skills, due to lack of proper education as a result of the quality of education in place during the apartheid regime especially for the black majority-the Bantu system. The ripple effects of this system continue to affect the country's current educational system, because the majority of teachers in rural and township areas, which has the largest rates of unemployment and poverty, were educated by this sub-standard system. As a result, this has

transferred to the inadequacy of learners, who were unable to cope with advanced levels resulting in lack of adequate skills and increasing number of school dropouts in the country. Considering the above, government needs to allocate most of its resources to the rural-township educational system, in order to retrain teachers in these areas and introduce incentives that will encourage learners to attend school. There is also the need for capital expenditure as part of gross fixed capital formation such as infrastructure to be given priority in the area.

In addition, functionality and various individual contributions need more encouragement through checking various forms of transferred payments in South Africa. For example, Mexico adopted a programme called Progresa, now known as Oportunidades, in the 1990s, with the aim of combatting child labour, poor education and individual health by ensuring that parents provide their children with good nutrition and take them to school, while government provides financial incentives to parents through conditional cash transfer (CCT). The process offers a model for providing health and educational enhancement to poor families, as well as opportunities for their permanent escape from poverty (Todaro and Smith, 2011:404). The authors maintained that by 2007, this programme had grown to cover some five million poor rural and urban households in Mexico, and was adopted by twenty-nine other countries by 2009.

Currently, there has been an increase in enrollment from 3.5 million students in 1950 to 36.3 million by year 2015 to 2016 for primary level, from 54 percent in 1991 to 90% in 2014 for secondary level, and from 15% in 1991 to approximately 31.2 % in 2016 for tertiary education (World Bank Newsletter, 2016). In Mexico, the outcomes of improving education and reducing formality are increased benefits from foreign direct investment inflows, diversification of exports, strengthening of geographical linkages and integration of global value chains, amongst other economic advantages (World Bank Newsletter, 2014).

Another approach is promoting policies that will encourage increased productivity at all levels, mostly among the rural and township dwellers, where the vast majority of the unemployed, poor and previously disadvantaged are found in South Africa. This implies that macroeconomic policies in South Africa, which seem to be more urban-

centered, need to change to all-inclusive policies as listed in the national development programme (NDP) with strict regulations for better implementation. This approach will help to transform the nature of rural and township economies, which are characterised by spaza shops, car washes, taverns and loan sharks, to a more integrated, cluster and vibrant economy that encourages more participation and can attract foreign investors. Nevertheless, this does not mean that townships and rural businesses should be excluded, but that there needs to be a balance in the economy. This would make it possible for people to move from one level of employment to another and help reduce the level of labour unrest in South Africa, thereby increasing productivity and reducing social vices.

The Granger causality test also suggests that economic growth due to increased industralisation in South Africa causes government expenditure to increase, more than government expenditure causes economic growth. This implies that South Africa needs more involvement of the private sector and foreign direct investment inflows in building the economy. Moreover, agricultural development and expansion, which has been used by other developed economies as one of the effective approaches to tackle poverty and inequality, should be encouraged by creating an enabling environment for agriculture to thrive through regulation and coordination.

7.4 Limitations of the Study and Areas for Further Research

The policy recommendations mentioned above should be applied with caution, because like any other empirical study, this study has a few limitations.

Firstly, part of the data used in this study was generated due to shortage of data because the series for net inflows of foreign direct investment (FDI) was only available from 1985 to 2016, whereas the study covered the period 1970Q1 to 2016Q4. The effect of generating data reflected in the cointegration estimation when all other variables show evidence of a long-run equilibrium relationship, apart from FDI, this implies that there is an element of artificiality and the result may be at variance with reality. Given this, future research could reduce the number of years under study, in order to avoid the problems associated with generating unavailable data. Reducing the number of years may also make the findings more reliable, since this study included a significant number of years

during the apartheid era. There is a possibility that the shocks from that period would have reflected in the findings of this study. It would also be interesting for future researchers to employ annual data instead of quarterly data, with the same variables used in this study, in order to compare the outcomes.

Secondly, using the coefficients from VECM to quantify a relationship where there is evidence of Granger causality, as done in this study, (has been disapproved by some economic researchers) is considered not to be the best way of quantifying a significant relationship (Glass, 2009:31). This is because lags of variables are often highly correlated. It would be interesting to employ other forms of econometric techniques, such as ARDL or OLS models, in this type of study in the future, in order to compare their outcomes with the present results.

Again, merging variable such as gross government expenditure (recurrent and capital), though done in this study to avoid the problems of multicollinearity and heterogeneity, might not bring out the real effect of other economic growth variables that they represent. Therefore, splitting government expenditure and specifically testing their effects on different components of economic growth might give results that are more reliable.

Although the above limitations might have affected the results in this study, it is assumed that their impact is nominal but not significant, especially with regard to the theoretical and empirical findings of this study.

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