

**THE CAUSAL AND COINTEGRATION RELATIONSHIP BETWEEN  
GOVERNMENT REVENUE AND GOVERNMENT EXPENDITURE:**

**A CASE OF SOUTH AFRICA FROM 1980-2015**

**BY**

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**A FULL DISSERTATION SUBMITTED IN PARTIAL FULFILLMENT FOR THE  
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## DECLARATION

I, the undersigned, Kebitsamang Sere hereby declare that this dissertation has not been submitted to any other institutions of higher learning but is solely submitted to the North West University.

**Signature:** .....

**Date:** ...../...../.....

## **DEDICATION**

*“TO MY GRANDPARENTS”*

*MAY THEIR SOULS REST IN PEACE*

## ACKNOWLEDGEMENTS

The writing of this dissertation would have not been possible had it not been for the love, support and guidance that I have received from the magnificent people in my life and the ones around me.

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## **ABSTRACT**

Government is an important institution in every country because it can assist in stabilising the economy by implementing proper economic policies. One of these policies is the fiscal policy that consists of government revenue and government expenditure. When government expenditure exceeds government revenue this causes a budget deficit to be realised. However, it is in understanding the direction of causality between government revenue and government expenditure that has a major impact on the budget deficit. Therefore, the main objective of this study was to determine the causal relationship that exists between government revenue and government expenditure in South Africa. The study employed annual time series data from the year 1980 to 2015 taken from the South African Reserve Bank. The Johansen multivariate method was employed to test for cointegration and the Vector Error Correction/Granger causality test was employed to test for causality. The empirical results found suggest that there is a long run relationship between government revenue and government expenditure. Findings from the causality test suggest that in the short run there is no evidence of causality between government revenue and government expenditure in South Africa. Thus, policy makers in the short run should determine government revenue and government expenditure of South Africa independently in an attempt to reducing the budget deficit.

Keywords: Government revenue, Government expenditure, Cointegration, Causality, South Africa

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## LIST OF ACRONYMS

ADF	Augmented Dickey Fuller
AGISA	Accelerated, Shared Growth initiative South Africa
ECM	Error Correction Model
GEAR	Growth, Employment and Redistribution
GDEBT	Government Debt
GDP	Gross Domestic Product
GEXP	Government Expenditure
GNP	Gross National Product
GREV	Government Revenue
IDC	Industrial Development Cooperation
IRFs	Impulse Response Functions
LM	Langrange Multiplier
MTEF	Medium Term Expenditure Framework
PP	Phillips Perron
SARB	South African Reserve Bank
SARS	South African Revenue Services
StatsSA	Statistics South Africa
VAT	Value Added Taxation
VAR	Vector AutoRegression
VECM	Vector Error Correction Model

# CHAPTER ONE

## INTRODUCTION

### 1.1 Background of the study

Government is an important institution in every country because it can assist in stabilising the economy by implementing proper economic policies (Black, Calitz and Steenekamp, 2011). One of these policies is the fiscal policy that is reflected in the government's annual budget plan. Although, Carneiro, Faria, and Barry (2005) consider fiscal policy to be a short – run policy. It is an important component because it can assist in developing the economy (Gounder, Narayan and Prasad, 2007).

Fiscal policy consists of government revenue and government expenditure. Carneiro *et al* (2005) believe that changes in the fiscal policy can affect the budget deficit either from the expenditure side, revenue side or from both sides. When there is more demand for government to spend and the government revenue is less it will cause the government to lend or borrow resulting in a budget deficit (Antwi, Zhao and Mills, 2013). According to Alensina and Tabellini, (1989) the accumulation of debt and the budget deficit have two objectives: to redistribute income across generations as time goes and reduce the burden of taxation that will be as a result from providing public goods and services.

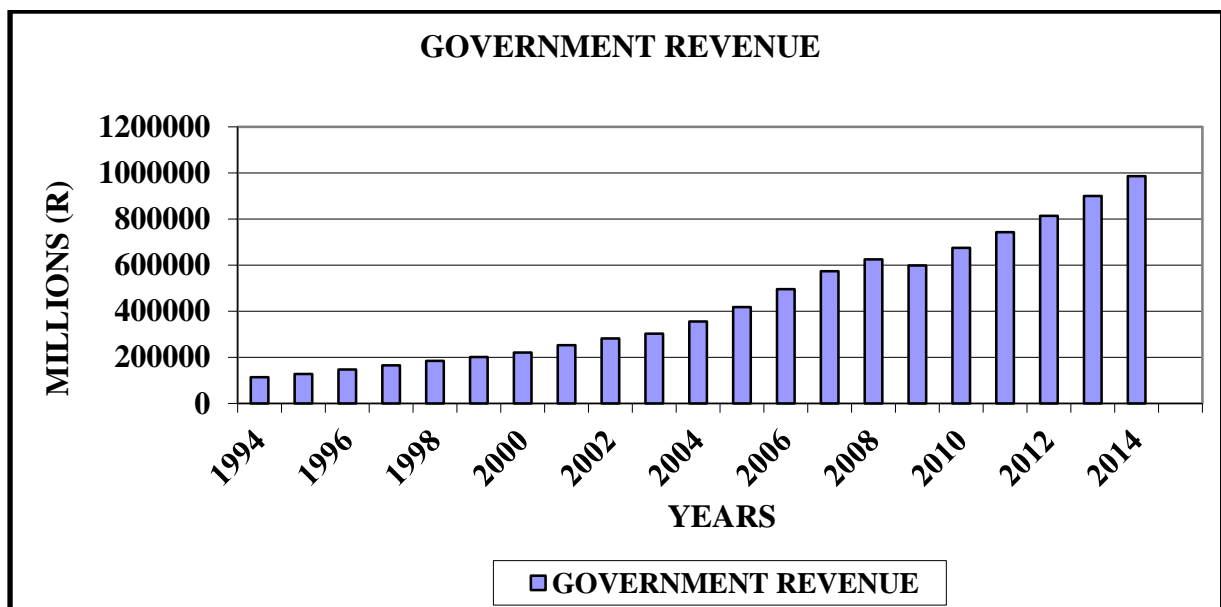
However, it is the causal relationship between government revenue and government expenditure that has a major impact on the budget deficit (Mehrara, Pahlavani and Elyasi, 2011). Hence, there is need to determine exactly the variable between government revenue and government expenditure that needs to be changed so that a reduction in the budget deficit may be realised.

From a policy point of view, there are three reasons that explain the importance of the causal relationship between government revenue and government expenditure (Narayan and Narayan, 2006). Firstly, if there is a unidirectional causality from government revenue to government expenditure then the budget deficit can be addressed by government implementing policies that will stimulate government revenue (Narayan and Narayan, 2006). Secondly, if there is a unidirectional causality from government expenditure to government

revenue then the budget deficit can be addressed by the government implementing policies that will increase taxation (Gounder *et al*, 2007). Thirdly, if there is a bi – directional causality between government revenue and expenditure then the budget deficit can be addressed by simultaneously implementing policies that can increase/decrease government revenue or increase/decrease government expenditure whenever the budget deficit becomes serious.

Since 1994, the main purpose of the South African government has been to keep the debt level sustained and reduce the debt service cost (Kearney and Odusola, 2011). Over the period 1981 to 1992 government debt averaged below 30 per cent of GDP whilst the period from 1993 to 2001 marked high levels of public debt when debt to GDP averaged above 40 per cent. Evidence from the SARB (2016) reveals that in 1993 government debt was 45.6 per cent whilst in 2001 it was 40.6 per cent with the highest government debt being 46.8 per cent in 1997. In addition the debt level experienced an upward trend from the year 2008. On the other hand, it was only in the year 2007 and 2008 when the South African government recorded a budget surplus of approximately 0.7 and 0.9 per cent of GDP. According to National Treasury (2008) this surplus was due to the large revenue base collected which boosted economic growth. This indicates that the South African government has been recording budget deficits from 1980 to 2015 except for the two periods where a surplus was realised (SARB, 2016).

**Figure 1:1 National government revenue (1994 - 2014)**



Source: Statistics South Africa; Gross domestic Product (GDP) Quarter 2-2015

The unsustainable budget deficit might be due to the low levels of government revenue and excessive levels of government expenditure. In 1980, the mining tax contributed 26 per cent to the revenue base compared to any other taxes. Figure 1.1 graphically indicates that government revenue in real terms reached a minimum of R113775 billion in 1994. This is as a result of the good performance of personal income tax realised in 1994. The bulk of personal income tax contributed 40 per cent to the revenue base resulting to an increase of R625100 billion in 2008. There was a slight decline in the year 2009 where revenue decreased to R598705 billion, however, the period between 2010 to 2014 revenue increased from R674183 billion to R986295 (SARB, 2016). This is opposite to the expenditure trend.

Government expenditure in South Africa has been on an increasing trend from 1980 to 2015. Government expenditure was at a minimum of R59590 million in 1980 to a maximum of R419016 billion in 1993 (SARB, 2016). According to Seekings (2013) the period before 1994 government expenditure favoured and privileged the white minority. However, when the apartheid government ended, public spending incorporated the black South Africans into the system (Seekings, 2013). Furthermore, the country had to transform from the massive racial favouritism and the economy had to be developed. This resulted in government expenditure increasing to a further 4031394 trillion in 2015. The next section discusses the problem statement.

## **1.2 Statement of the problem**

South Africa's approach towards revenue forecasting and performance is a fairly technical one. The approach takes into consideration the global economic trends such as the strength of commodity prices, tax revenue collections, government policies and many others (Quist *et al*, 2008). It is these factors that enable the South African government to exceed the revenue budget estimates. On the other hand, the medium term expenditure framework (MTEF) has provided a three year basis of successful implementation of the fiscal framework (Quist *et al*, 2008). Aggregate expenditure by the government should follow this strict three year fiscal discipline outlined in the framework.

However, in South Africa the problem is that the actual government revenue collected exceeds the estimated government expenditure exceeds and as a result the government relies on debt to finance expenditure. Therefore, in an attempt to reduce the debt to GDP ratio the government has to increase future revenues and decrease expenditure. Hence, in the 2015

budget speech the Minister of finance, Mr. Nene increased personal income taxation and decided to reduce government expenditure so that the government can be able to lower the 3.9 per cent of GDP deficit and to also be able to fund other government programmes (National Treasury, 2015).

The tax proposal increased in the 2015 budget speech was as follows: “the personal income taxation was raised by one point decimal from 40% to 41%. The people earning less than R181 900 a year will be exempted from the increase in taxation, and those that earn more than R181 900 per annum will be affected by the increase. The people that earn an income of R200 000 a year will be paying R21 more every month and the people earning an income of R500 000 will be paying R271 a month” (National Treasury, 2015).

In reducing government expenditure, the government planned on the following: “reduction in the current spending by the national departments of R2.3 billion in 2015/16 and R3.9 billion in 2016/17, reduction in capital spending of national departments by R280 million in 2015/16 and R911 million in 2016/17, reduction in allocations to public entities of R2.4 billion in 2015/16 and R2.6 billion 2016/17 and a reduction in the conditional allocations to local government of R921 million in 2015/16 and R1.4 billion in 2016/17”. All this reduction in expenditure would pave a way for on new projects and will also help in narrowing the budget deficit to 3.6% (National Treasury, 2015).

### **1.3 Objectives of the study**

The main objective of this study is to determine the causal relationship that exists between government revenue and government expenditure. The specific objectives are as follows:

- To determine trends of government revenue and government expenditure in South Africa.
- To analyse literature on government revenue and government expenditure
- To determine the long run and short run relationship between government revenue and government expenditure in South Africa.
- To determine the direction of causality between government revenue and government expenditure.
- To make policy recommendations.

#### **1.4 Hypothesis of the study**

H<sub>0</sub>: The increase in government revenue and a decrease in government expenditure will influence the budget deficit positively

H<sub>1</sub>: The increase in government revenue and a decrease in government expenditure will influence the budget deficit negatively

#### **1.5 Significance of the study**

This study is significant in several respects. Firstly, the study contributes empirically on the direction of causality between government expenditure and government revenue in South Africa. Secondly, the study adds to the existing literature on the relationship between government expenditure and government revenue in South Africa. Thirdly, the study assists government in making better effective policy choices when analysing ways to reduce the budget deficit in South Africa.

Fourthly, this study equips policy makers with the relevant and necessary information with reference to the implementation of either a new government expenditure or government revenue policy. Fifthly, the study is also be useful to other researchers as well as individuals that are interested in knowing more about the topic, especially scholars that are pursuing a comparative study with other countries. Furthermore, South Africa is a developing country that has a deficit problem like many other developing countries. Therefore, this study at an international level may be informative and serve other developing countries with the relevant information that may be useful to assist in reducing their budget deficit.

#### **1.6 Organisation of the study**

This study consists of six chapters. This chapter served as the introductory chapter and chapter two highlights the pattern and trends of government revenue and government expenditure in South Africa from 1980 to 2015. Chapter three reviews the theoretical and empirical literature that relates to government revenue and government expenditure. Chapter four estimates and presents the methodology that the study employs. Chapter five presents findings and interpretation of results of the relationship between government revenue and government expenditure in South Africa, while chapter six concludes and provides policy recommendations.

## **CHAPTER TWO**

### **AN OVERVIEW OF GOVERNMENT REVENUE AND GOVERNMENT EXPENDITURE**

#### **2.1 Introduction**

This chapter discusses the patterns and trends of government revenue and government expenditure in South Africa. This chapter is divided into 11 sections. The first section discusses fiscal policy. Section 2.3 provides an overview of government revenue in developing countries. Section 2.4 of this chapter gives the pattern and trend of government revenue in South Africa. Section 2.5 discusses the trend and pattern of tax revenue, Section 2.6 explains the trends and pattern of government expenditure in developing countries. Section 2.7 discusses government expenditure in South Africa. Section 2.8 discusses the pattern and trends of government revenue and government expenditure. Section 2.9 discusses the pattern and trend of economic growth. Section 2.10 discusses the overview of the deficit trend and the last section concludes the chapter.

#### **2.2 Fiscal policy**

Government revenue and government expenditure are two main primary fiscal tools used by the government. According to Jha (2007) fiscal policy has four main components being revenue, expenditure, deficit containment and fiscal transfer from national government to local government. Taxes have an indirect impact on disposable income, wealth and consumption (SARB, 2013). Government spending has a direct impact on final consumption expenditure and fixed investment expenditure. Therefore, this study considers fiscal policy by analysing the main fiscal aggregates: total revenue, spending and the budget deficit or surplus. Government revenue and government expenditure have an influence on economic growth. The increase in government spending and a decrease in the tax rates can result in expansionary fiscal policy while contractionary fiscal policy is the decrease in government spending and increase in taxation. Expansionary fiscal policy is implemented when the government aims to increase employment and grow the economy. Contractionary fiscal policy is implemented when the government has objective of slowing the growth of the economy.

### 2.3. An overview of government revenue in developing countries

This section begins by examining government revenue in other selected developing countries compare to South Africa. Data is taken from the OECD (2015) for an interval of 5 years and for some of the other countries data was not available for some years. In developing countries the level of revenue collected is essential as it assists in achieving key development in these countries. The revenue is collected as percentage of GDP for these countries.

**Table 2:1 Government tax revenue of developing countries as a percentage of GDP**

	1990	1995	2000	2005	2010	2014
South Africa	23.9	21.6	22.4	25.2	25.6	27.8
	<b>Selected developing countries</b>					
Cameroon	-	10.6	12.8	13.5	14.0	16.1
Ivory Coast	21.7	16.9	15.4	15.7	16.8	17.8
Mauritius	21.4	16.9	19.1	18.8	19.8	20
Morroco	-	-	23.6	24.8	27.1	28.5
Rwanda	-	-	10.2	12.1	13.3	16.1
Senegal	-	-	16.8	19.3	19.8	20.1

**Source: OECD (2015)**

Table 1.1 indicates that South Africa compared to other countries manages to collect higher tax revenue. According to OECD (2015) tax revenue ranged from 16.1 per cent to 31.3 per cent. From the table it is evident that since the year 2000 all of the countries experienced increases in their tax-to-GDP ratios. From 2000-14, Morocco and South Africa displayed the highest increases whilst the lowest countries were Cameroon, Ivory Coast, Mauritius, Rwanda and Senegal. This shows that in tax revenue South Africa collects more revenue from taxation.

### 2.4 An overview of government revenue South Africa (1980 – 2015)

National government revenue in South Africa is mainly dependent on the tax system. Tax revenue is an important source of revenue for the government, as it is used as a tool for transformation and the eradication of poverty through the redistribution of wealth. According to National Treasury (2014) the tax system should raise revenue without placing a higher burden on individuals and businesses.

**Table 2:2 Tax revenue as a percentage of GDP (1994/95 - 2014/15)**

Years	Tax Revenue (R) Million	Nominal GDP (R) Millions	Tax Revenue as (%) of GDP
1994/95	113 775	497 189	22.9
1995/96	127 278	580 155	21.9
1996/97	147 332	652 065	22.6
1997/98	165 327	717 535	23.0
1998/99	184 786	776 801	23.8
1999/00	201 266	858 945	23.4
2000/01	220 119	976 573	22.5
2001/02	252 295	1 079 625	23.4
2002/03	281 939	1 251 137	22.5
2003/04	302 443	1 357 971	22.3
2004/04	354 979	1 510 452	23.5
2005/06	417 196	1 682 271	24.8
2006/07	495 549	1 911 151	25.9
2007/08	572 815	2 171 014	26.4
2008/09	625 100	2 408 661	26.0
2009/10	598 705	2 551 316	23.5
2010/11	674 183	2 826 072	23.9
2011/12	742 650	3 080 887	24.1
2012/13	813 826	3 327 627	24.5
2013/14	900 015	3 609 824	24.9
2014/15	986 295	3 843 778	25.7

**Source: Statistics South Africa; Gross domestic Product (GDP) Quarter 2-2015**

Table 2.2 shows that total tax revenue for the period 1994/95 amounted to R113.8 billion and in 2014/15 revenue grew to R986.2 billion. The tax revenue as percentage of GDP has increased from an average of 22 per cent during the 1980s to an average of 25 per cent after 1994 (National Treasury, 2014).

In 2009/10 tax revenue growth decreased to R598 705 or to 23.5 as per cent of GDP. The decrease in this period was due to the global financial crisis. Although tax revenue remained stable after the recession, the weak economy has resulted in stable revenue growth. The period between 2010/11 to 2014/15 national tax revenue increased due to tax revenue collections from corporate profits, resilient consumption and the strong performance of import taxes (SARB, 2013).

## **2.5 An overview of taxation trends (1980 – 2015)**

Taxes are an important source of government revenue and as such, taxes are levied in every country in the world (South Africa inclusive) to raise revenue for expenditure. The South African government is always seeking ways to raise revenue despite the economic

challenges. As a result, national government revenue as a percentage of GDP grew from 19.6 in 1980 to 24.7 per cent in 2015 (SARB, 2016). This growth was due to the increase in direct and indirect taxes.

### 2.5.1 Direct taxation

Two main sources of direct taxation in South Africa are personal income tax and company income tax. The contribution of the two taxes to the revenue base is analysed using data from the South African Reserve Bank database and South African Revenue Services database.

#### 2.5.1.1 Personal income tax and company income tax

The main objective of personal income tax is to raise revenue and ensure that there is equity (Steenekamp, 2012). In South Africa, personal income tax is levied on persons and individuals as the unit of taxation excluding child rebates. When levying taxes on individuals, the South African Revenue Services (SARS) makes use of equal marginal sacrifice principle (Black *et al*, 2011: 206). Under this principle a higher tax rate is levied to the high income bracket and it is only applicable to that specific tax bracket. Basically, a higher tax rate is applicable to the taxable amount within that relevant bracket (Black *et al*, 2011: 206). This is to increase the progressivity of income tax rates. Company income tax is an important but fluctuating source of revenue (Black *et al*, 2011: 220). According to Steenekamp (2012) personal income tax and company income portray a scissor – like behaviour. When personal income tax increases, company income tax decreases. Table 2.3 shows the personal income and company income tax rates from 1980/01 to 2015/6.

**Table 2:3 Personal income and company income tax rates (1980/1 to 2015/6)**

Year	Minimum marginal tax rate	Maximum marginal tax rate	Company tax rate
1980/1	9.6	50	40
1985/6	16	50	50
1990/1	15	44	50
1995/6	19	45	35
2000/1	18	42	30
2005/6	18	40	29
2010/1	18	40	35
2015/6	18	41	28

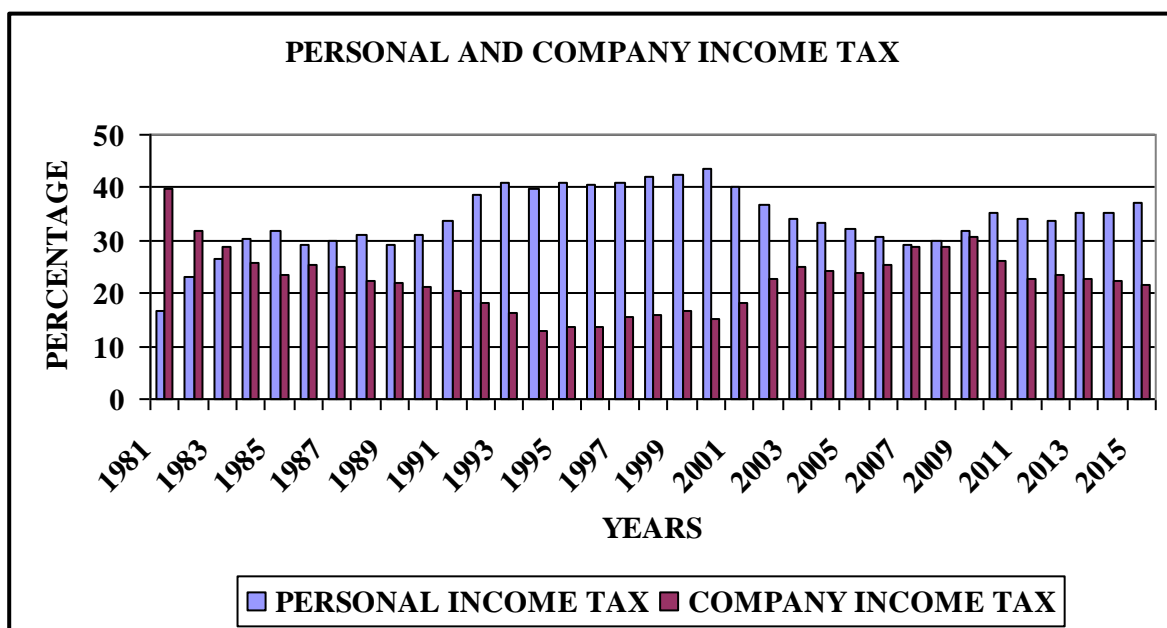
**Source: South Africa Revenue Services (2016)**

Before the government underwent a transformation in 1994, the individual marginal tax rate was fluctuating from time to time and the tax system incorporated a company income tax where a tax on dividends with a small portion was excluded. In 1993/94 the marginal rate was at a minimum and maximum of 17 and 43 per cent as a result of marital and gender status (Heerden and Schoeman, 2013). In 1995/96 the marginal rate reached a high of 45 per cent as gender differentiation was excluded.

In 2000/01 the marginal rate decreased to 42 per cent. It was in 2002/03 until 2013/14 that the marginal tax rate reached a minimum and maximum rate of 18 and 40 per cent (Heerden and Schoeman, 2013). However, in the year 2015, the marginal tax rate was increased to a minimum and maximum of 18 and 41 per cent in order to increase the revenue base in South Africa (National Treasury, 2015). On the other hand, company income taxes are classified as proportional taxes. In 1993, the dual tax rate was introduced in an effort to reduce tax rates and to enable companies to finance their operations.

Table 2.3 indicates that prior 1990, company tax rates was more than 48 per cent and were reduced to less than 40 per cent in 1993 to a further 30 per cent in 1999 (Black *et al*, 2011: 222). Between 2002/03 and 2004/05 companies were taxed at a rate of 30 per cent (National Treasury, 2008). Between 2005/06 and 2007/08 the rate was further reduced to 29 per cent and in 2008/09 to 28 per cent.

**Figure 2:1 Contribution of personal and company income tax (1981 to 2015)**



Source: South African Reserve Bank (2016)

The contribution of personal and company income tax to the revenue base is shown by Figure 2.5. Annual time series data is available from 1981 to 2015. Figure 2.1 shows that the period between 1981 and 1982 company income tax contributed more to the revenue base than personal income tax. Personal income tax averaged from 16.6 per cent to 26.6 per cent whilst company income tax average from 39 per cent to 31.7 per cent. However, the period from 1984 to 2015 indicates that personal income tax became the dominant contributor to the revenue base. Personal income tax contributed an average of 30.2 per cent in 1984 to 37 per cent in 2015. Company income tax contributed an average of 25.8 per cent in 1984 to 21.7 per cent in 2015. The increase in the personal income tax contribution was due to the decrease of the maximum marginal tax brackets from 44 per cent in 1990 to 40 per cent in 2014.

The decrease in the tax rates was because of the Karl Commission that was tasked in 1994 to review the tax system of South Africa (Steenekamp, 2012). The Karl Commission recognised that reducing the personal income tax rate can assist with the high fiscal deficit and improve revenue collection. The lowering of company income tax rates from 35 per cent in 1995 to 30 per cent in the year 2000 was to attract domestic and foreign investors and develop the economy through job creation (National Treasury, 1999).

## **2.6 An overview of government expenditure in developing countries**

Government expenditure in developing countries is an important element as it contributes towards an enhanced economic growth through expenditure (Shonchoy, 2010). This section reviews the countries that spend more in comparison to South Africa for the year 2014. This year is reviewed as data for other years was not available from the World Bank.

**Table 2:4 Government expenditure of developing countries as a percentage of GDP**

<b>Country</b>	<b>(%) of GDP</b>
South Africa	33.8
Namibia	35.7
Mauritius	21.5
Malawi	20.5
Rwanda	16.8
Ivory Coast	13.2

**Source: World Bank (2017)**

According to Fan and Rao (2003) government expenditure as a percentage of GDP measures the expenditure of a country in relation to the GDP. The selected countries as shown by Table 2.4 indicate that government expenditure for the year 2014, Namibia has high government expenditure as a percentage of GDP at 35.7 whilst South Africa is the second highest at 33.8 per cent. Mauritius is the third highest with 21.5 per cent and Malawi is 20.5 per cent.

## **2.7 An overview of government expenditure South Africa (1980 – 2015)**

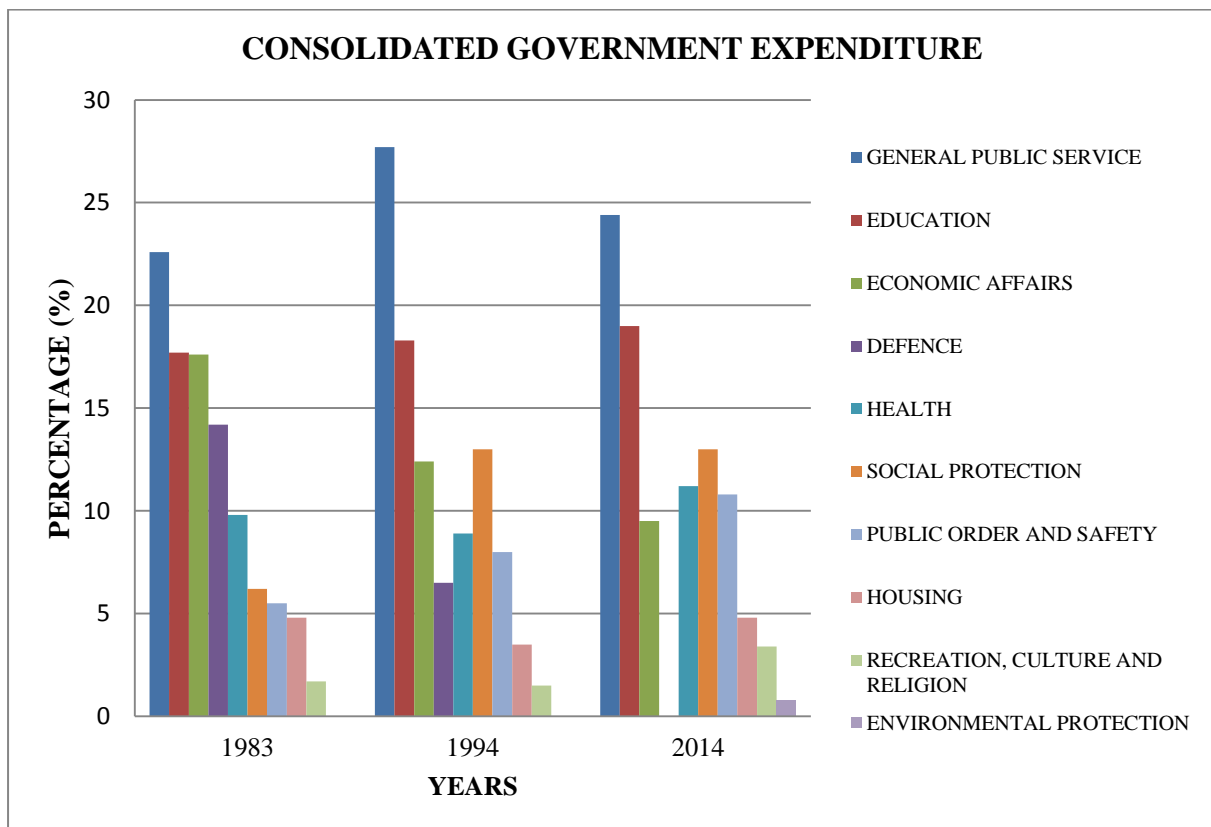
Every year in the annual budget the South African government announces how the revenue collected is going to be spent. Government expenditure in South Africa continues to increase due to the government improving the lives of its citizens. Government expenditure from 1980 to 2015 has shown an increasing pattern from R59590 million to R4031394 billion (SARB, 2016). Over the years this increase can be attributed to the difference in the distribution of expenditure by the government. However, the South African economy under apartheid implemented policies that favoured the white minority (Seekings, 2013).

Policies such as distribution through the labour market and redistribution through education and health care amongst others resulted in the level of spending by the government to favour mainly the white majority. Total spending by government between for the period 1980 was at a minimum of R59590 to a maximum of R419016 billion in 1993 (SARB, 2016). When the apartheid government ended, public spending by government needed to be transformed from the massive racial favouritism that privileged the white minority to incorporate the black South Africans into the system (Seekings, 2013). This resulted in government expenditure increasing from the period 1994 to 2015. The study analyses further the distribution of government expenditure pre and post 1994, government final consumption expenditure and government final investment expenditure.

### **2.7.1 Distribution of government expenditure (1983 to 2014)**

The South African government redistributes the revenue collected through public spending. An in-depth understanding of public spending is done by analysing consolidated government expenditure of South Africa. Data is taken from the South African Reserve Bank and is available from 1983 to 2014. The distribution of consolidated government expenditure of South Africa for the year 1983, 1994 and 2014 are shown by Figure 2.2

**Figure 2:2 Consolidated government expenditure (1983, 1994 and 2014)**



**Source: South African Reserve Bank (2016)**

The consolidated government expenditure for the period 1983 to 1994 indicates that general public service increase from (22.6% to 27.7%), Education from (17.7% to 18.3%), Social protection from (6.2% to 13%) and Public order and safety from (5.5% to 8%) accounted for most of the expenditure increases. Consolidated expenditure on economic affairs accounted a decrease from (17.6% to 12.4%), Defence from (14.2% to 8.9%), health also decreased from 9.8% in 1983 to 8.9% in 1994.

According to the Financial and Fiscal Commission report (1998) the reason for changes in government expenditure since 1983 can be due to the following: the increased access of quality social services such as education, health and social protection. The distribution of social grants equally across all other races, the increase of internal and external security by the country, higher interest rates had to be paid by the state because of the debts cost that were high and the shift towards a more outward orientated economic growth amongst others.

National Treasury (2010) the South African government public expenditure sector from 1994 underwent a structure change and several reforms. The government introduced the medium term expenditure framework (MTEF) where a three year government expenditure plan is put in

place. This system is transparent and it brings certainty to the budget process because it links the long term plans of government with the policies. The statutory budget council and other committees were established to oversee the budget process on the national, provincial and local government. Furthermore, the Financial and Fiscal Commission was also established to review and advise government intergovernmental financial relations.

Figure 2.2 indicates that majority of government expenditure was allocated to general public service (24.4%) in 2014 although there was a decrease of 3.3 per cent from 1994. The second highest expenditure was education with an average of 19 per cent. Expenditure on social protection remained stagnant at 13 per cent due to the expansion of the social grants programme whilst expenditure on health increased to 11.2 per cent due to increase in employment of nurses (National Treasury, 2014). With the end of apartheid and the end of cold wars' expenditure on defence declined by an average of 3.3 per cent from an average of 6.5 per cent in 1994 to 3.2 per cent in 2014 (Batchelor, 2002). Expenditure on environmental policies was allocated funds after 1994 to support environmental fiscal reform in South Africa.

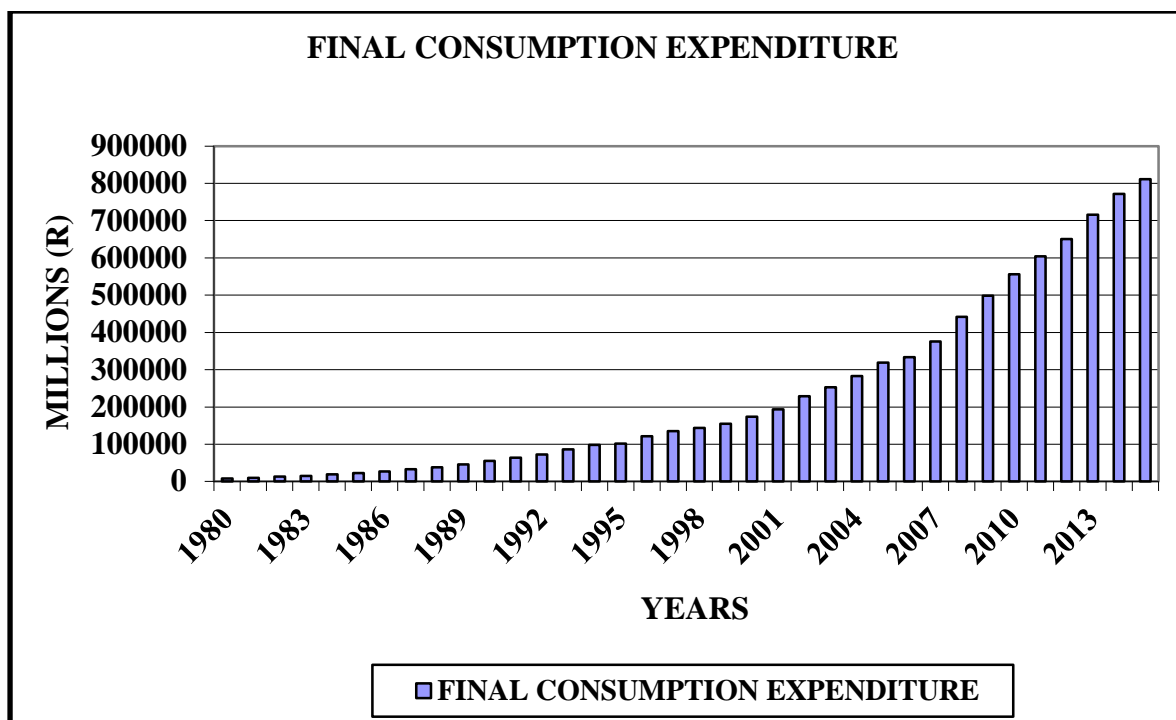
### **2.7.2 Final consumption expenditure and final investment expenditure**

Final consumption expenditure and final investment expenditure are two types of expenditures that are important because they form a major component of Gross Domestic Product (GDP). Government final consumption expenditure consists of government goods and services for current use whilst government final investment expenditure consists of goods and services intended to develop and build the economy of the country. Data for final consumption expenditure and final investment expenditure is taken from the South African Reserve Bank database from 1980 to 2015.

Figure 2.3 shows the final consumption expenditure by government for the periods 1980 to 2015. The period 1980 to 1993 final consumption expenditure by government was at a minimum of R8381 billion and increased to a maximum of R86202 billion. After democracy, government final consumption continued to rise from R98247 billion to 810929 billion between 1994 until 2015. According to Hanival and Maia (n.d) during the period between 1994 and 2005 there was strong economic growth, improved taxes and a widening fiscal base allowed general government consumption spending to grow.

Final consumption spending by government further accelerated to 3.1 per cent in 2006 and 3.4 per cent in 2007. The period from 2006 to 2015 expenditure by government continued to grow even with the low economic growth rate that has impacted on the revenue base by limiting tax revenue. This has also limited the ability of government to sustain the anti-cyclical spending levels. According to IDC (2015) growth in 2015 decelerated to 0.3 per cent since 1998. In 2015 spending on social services remains to be the largest expenditure area by the government with education being allocated (20.3%), social protection receiving (15.6%) and health (12%) accounting for less than 50 per cent of the budget.

**Figure 2:3 Final consumption expenditure (1980 - 2015)**

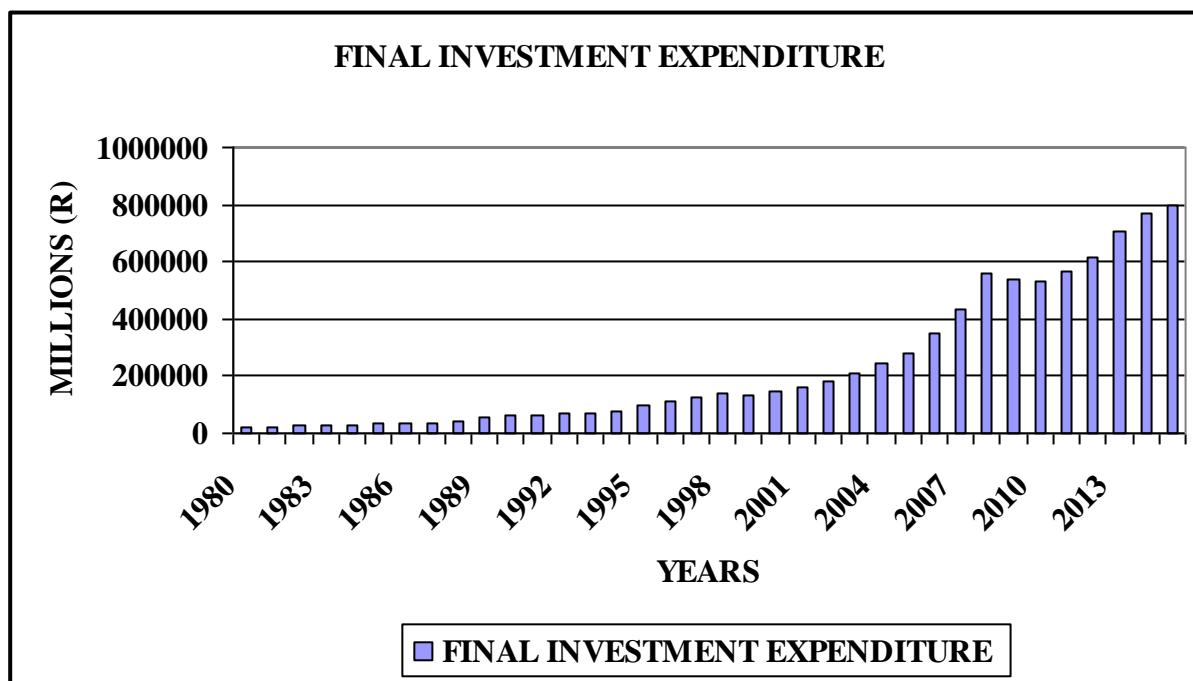


Source: South African Reserve Bank (2016)

Government investment expenditure has been on an increasing trend. Figure 2.4 indicates that final investment expenditure by government was R17962 billion in 1980 and in 1993 it was at R69368 billion. The period 1994 investment spending increased as there was an improvement in spending on machinery and other components (Du Plessis and Smit, 2006). The period between 2003 and 2008 witnessed high levels of fixed investment expenditure averaging 12.2 per cent of GDP. This was R211877 billion in 2003 and R556997 in 2008. The period between 2006 to 2010 most of government’s expenditure was directed towards the 2010 FIFA world cup (National Treasury, 2010).The period between 2014 and 2015 saw growth in fixed investment spending slowing down from 1.6 per cent to 0.8 per cent (IDC, 2015). The contributing factors that caused the investment spending by government to

decrease are low levels of economic activity nationally and the large capital projects nearing completion.

**Figure 2:4 Final investment expenditure (1980 - 2015)**



**Source: South African Reserve Bank (2016)**

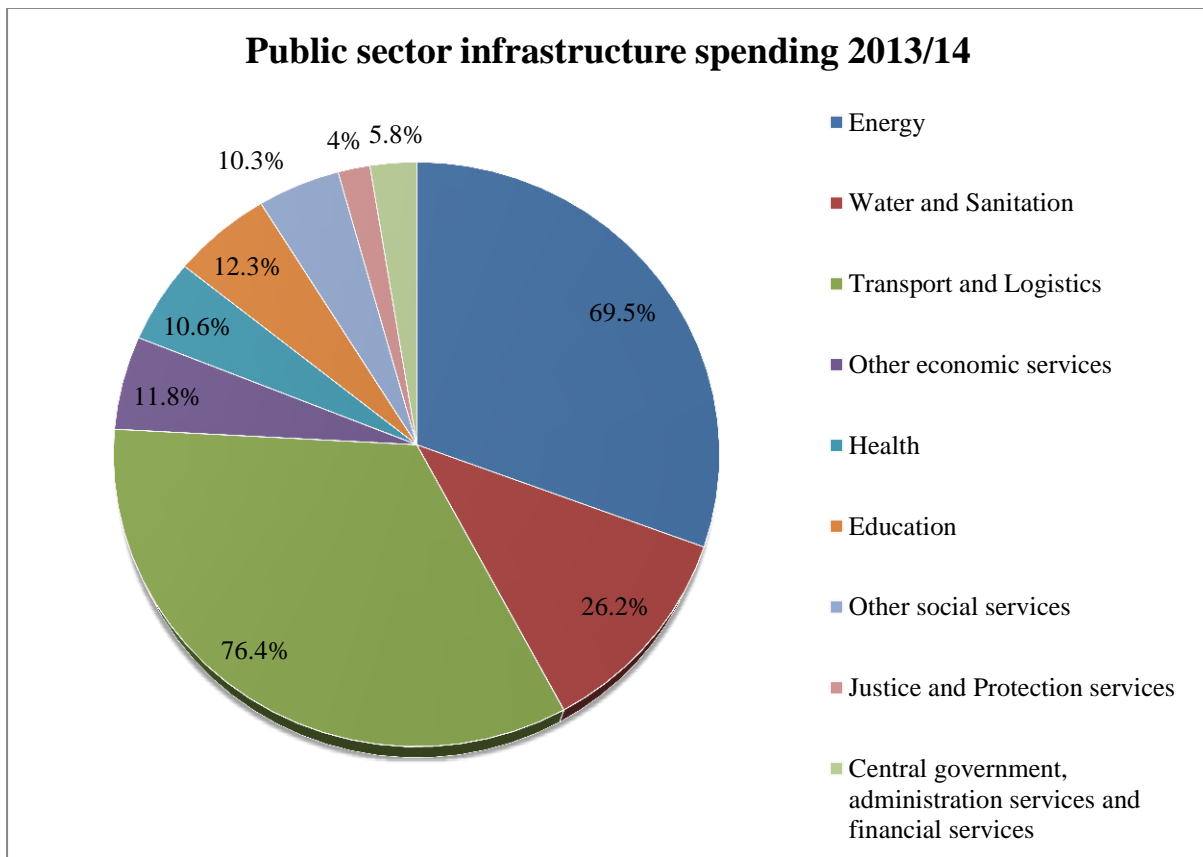
Table 2.5 indicates that state owned entities contribute more to the public sector financing infrastructure spending followed by local government and provincial departments. According to National Treasury (2015) State owned entities invest approximately 362 billion in infrastructure and this contributes significantly to gross capital formation. Since the year 2008/09 state owned companies contribute towards large capital investments in transport and logistics, and energy. This is because these programmes expand productive capacity of the economy (National Treasury, 2015).

**Table 2:5 Public infrastructure spending financed at different government levels 2013/14**

National departments	10.6
Provincial departments	39.5
Local government	47.1
Public entities	13.0
State owned entities	113.7

**Source: National Treasury (2015)**

**Figure 2:5 Public sector infrastructure spending (2013/14)**



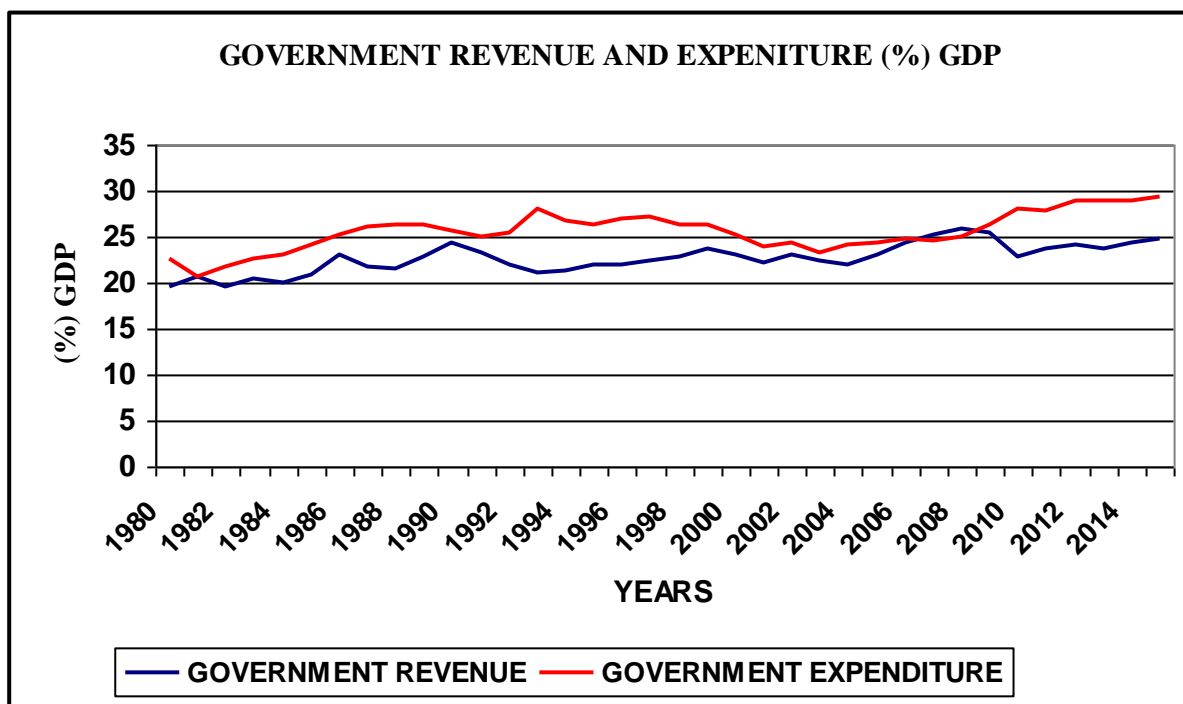
**Source: National Treasury (2015)**

Shown in Figure 2.5 is the public sector government programmes that are financed more are energy, water and sanitation, and transport and logistics. These are the government programmes that account for most of the government expenditure.

### **2.8 An overview of government expenditure and government revenue (1980 – 2015)**

The relationship between government revenue and government expenditure determines the budget balance (Fourie and Burger, 2009: 398). If the revenue collected by government is exceeded by the expenditure then a budget deficit will emerge. From the period 1980 to 2015, total revenue has been exceeded by total expenditure except in 2006 and 2007 when the government recorded a budget surplus. This was attained by the government introducing policies to sustain expenditure and revenue levels as percentage of GDP. The Growth, Employment and Redistribution (GEAR) introduced in 1996 helped the government to improve its tax collection and widen the tax base while keeping the expenditure in control. This resulted in the economy sustaining positive performance in economic growth.

**Figure 2:6 Government revenue and expenditure (1980 - 2015)**



**Source: South African Reserve Bank (2016)**

Figure 2.6 depicts that the fiscal period 1980/81 to 1993/94 government expenditure as percentage of GDP continued to rise from 19.6 per cent to 21.3 per cent (SARB, 2013). The period between 1989/90 and 1992/93 government revenue as percentage of GDP remained between 25.1 and 27.9 per cent while expenditure peaked to 28.9 per cent in the fiscal year 1992/93. The period 1994/95 expenditure was restricted causing the ratio to remain stable. The fiscal period 1996/97 the GEAR strategy was introduced and this saw government revenue as percentage of GDP increasing to 23 per cent compared to the two periods before the implementation of the strategy. Government revenue on the other hand continued to increase from 22.5 per cent to 24.2 per cent grow between 1994/95 to 1998/99 due to the consolidation and restructuring of government finances that resulted in improved compliance and tax collections (SARB, 2013). The period between 2003/04 and 2009/10 the government regained confidence that sustainable development can be made without increasing taxation as revenue averaged around 25 per cent of GDP.

The highest revenue recorded as a percentage of GDP was in 2007/08 when revenue amounted to 27 per cent meeting the GEAR strategy target (SARB, 2013). The 2010/11 period was affected by the recession and revenue fell to 24.5 per cent of GDP. Over the 5 year period from 2010/11 to 2014/15 revenue has remained slightly slow averaging at 24.7

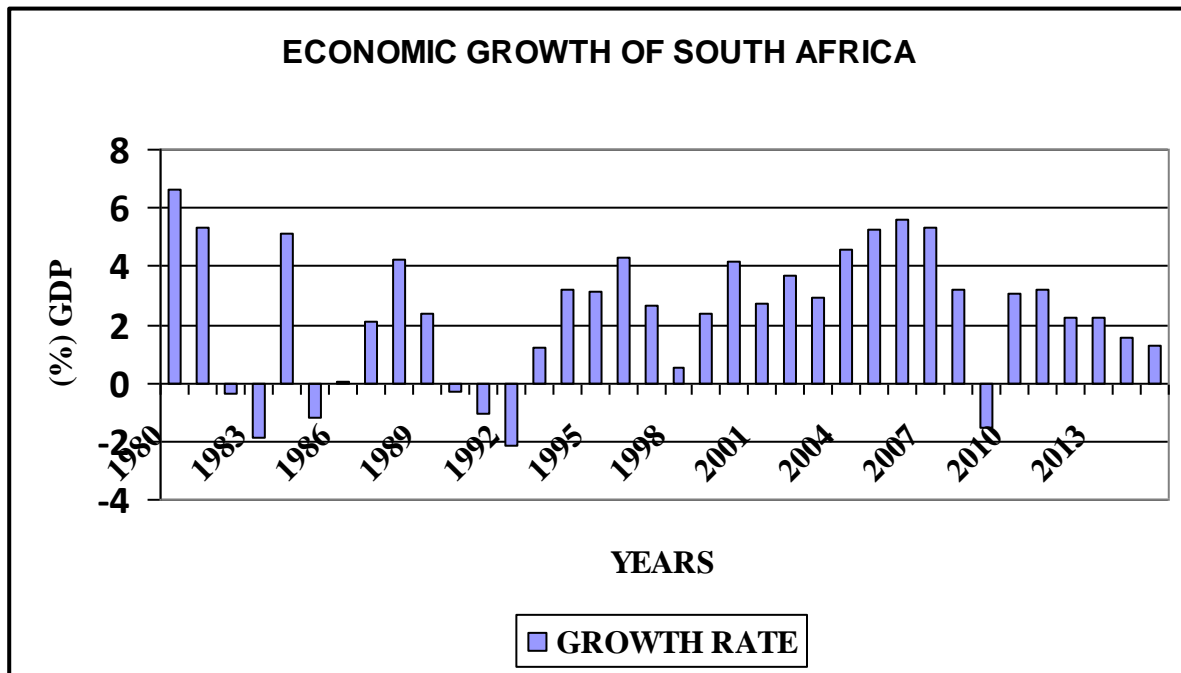
per cent in the fiscal year of 2014/15. The fiscal year 2000/01 the GEAR strategy adopted by government caused the ratio of GDP to average between 27.2 per cent between 2004/05 until 2014/15.

## **2.9 An overview of economic growth (1980 – 2015)**

The South African economy under apartheid was dependent on foreign investment and technology. Inward economic policies including protectionist policies were imposed with the aim of promoting white businesses and limiting the impact of sanctions (Knight, 2004). Hence, the economic and political crisis resulted in a stagnant GDP growth. The economic growth of South Africa between 1980 and 1994 was 6.62 and 3.23 per cent of real GDP (SARB, 2016). At the dawn of democracy the South African government abandoned the inward policies (Knight, 2004).

Since, 1994 the government launched two major policies focusing on growth. In 1996 the Growth, Employment and Redistribution (GEAR) programme was launched followed by the Accelerated and Shared Growth Initiative South Africa (ASGISA) in 2006 (Fourie and Burger, 2009: 382). According to Knight (2004) these policies came to power in order to stabilise the economic situation. The implementation of these two policies has resulted in attaining positive economic growth on the economy of South Africa since 1994. The economy recorded an average annual growth rate of 3.3 per cent since the dawn of democracy (Van der Byl, n.d). The world economy at large averages at 3.6 per cent when compared to the South African economy.

**Figure 2:7 Gross domestic Product (GDP) of South Africa (1980 - 2015)**



**Source: South African Reserve Bank (2016)**

As shown in Figure 2.7 growth in South Africa came close to 7 per cent in 1980, when gold price reached \$800 per fine ounce (Chetty *et al*, 2005). The period from 1980 to 1993 economic growth averaged at 1.4 per cent annual growth while the period between 1994 to 2012 growth improved averaging at 3.3 per cent per annum in real terms (IDC, 2013). The economic growth rate was strong except for the year 1998 when growth led to a slowdown of 0.52 per cent as a result of the Asian financial crisis in the world economy (IDC, 2013).

GDP growth rates between the period 2005 and 2007 represented the economy’s successful period as growth exceeded 5 per cent in each successive year (Bhorat, Hirsch, Kanbur and Ncube, 2014). According to IDC (2013) these 3 periods was due to booming commodities and strong bull market. However, in 2008 and 2009 period, the global economic crisis made the economy to suffer resulting in growth being negative on average for the year 2009 (Bhorat *et al*, 2014). Since the recession the economy of South Africa has grown by 2.2 per cent (Van der Byl, n.d).

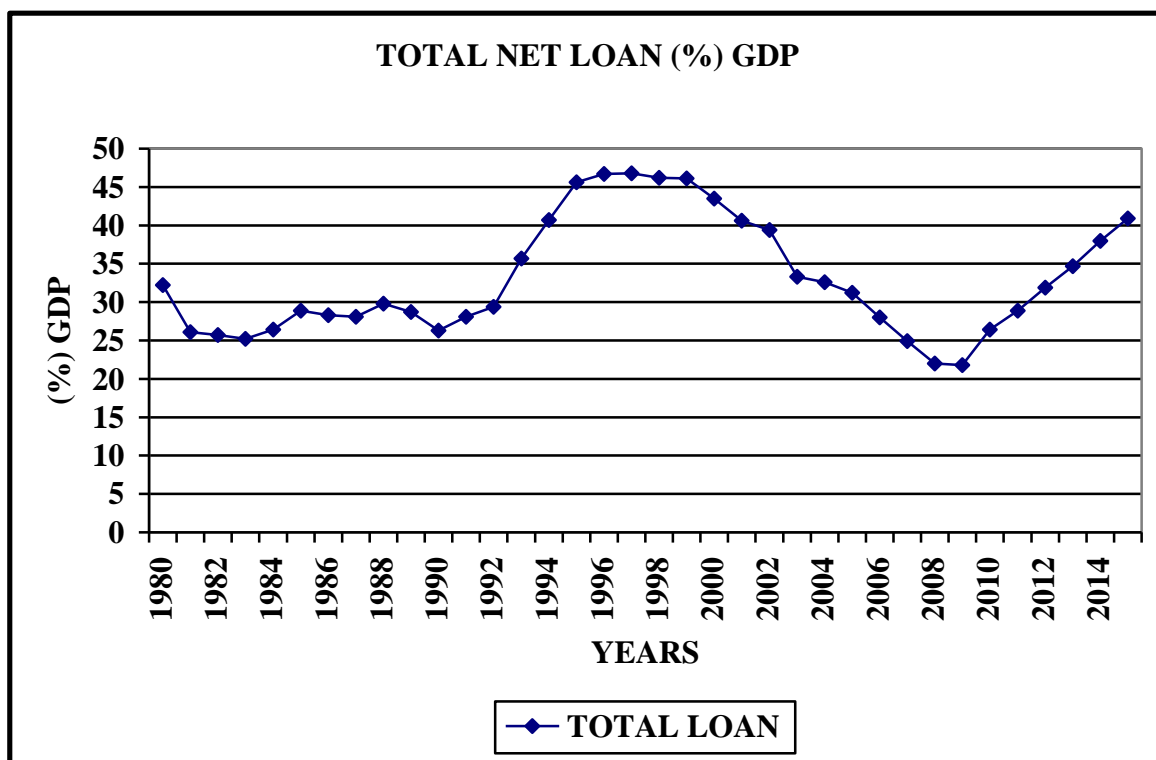
## **2.10 An overview of deficit trend (1980 – 2015)**

The South African government is always increasing expenditure so that socio-economic objectives are realised (IDC, 2013). However, the revenue collected does not always meet the level of expenditure causing the deficit to arise. The South African government has been recording negative budget balance except for the period 2006 and 2007 when a positive budget balance was realised.

Since 1980 the budget deficit averaged at 2.7 per cent of GDP and in 1994 the deficit exceeded 7 per cent of GDP (Fourie and Burger, 2009: 400). When, the South African government transitioned into democracy in the year 1994 it inherited the budget deficit from the previous years. This was the year when the highest deficit budget of 48 per cent of GDP was recorded as shown by figure 2.10. However, the budget balance between 1994 and 2005 improved from 4.8 per cent to 0.5 per cent of GDP. This decrease enabled the government to record a budget surplus for two consecutive periods 2005/06 and 2007/08 allowing the government to increase expenditure without increasing borrowing. The fiscal years 2006 /07 and 2007/08 the surplus amounted to R17.8 billion and R 30.6 billion (SARB, 2013). The surplus was due to the high tax revenue collected for these two periods.

Thereafter, due to the global financial crises that led South Africa to a recession the surplus changed to a deficit in the fiscal 2008/09 of 14.5 billion (SARB, 2013). The increased government spending during the global financial crisis contributed to the widening of the budget deficit in the fiscal years 2009/10. The impact of the recession resulted in lower tax collections causing a revenue shortfall and widened the budget deficit to an estimated 5.4 per cent of the GDP (IDC, 2011). The government recorded a cash deficit of R118 billion for the fiscal 2009/10. The fiscal year 2010/11 the economy began to recover and tax revenue also rose. However, the budget deficit remained wide with an estimated 5.1 per cent of GDP in the 2010 (IDC, 2011). The budget deficit continued to widen in the fiscal years 2011/12 amounting to R124 billion due to a weak budget balance (SARB, 2013). The un-sustainable budget deficit has resulted in increased borrowing costs for the government as shown in Figure 2.8.

**Figure 2:8 Total net loan (1980 - 2015)**



**Source: South African Reserve Bank (2016)**

The first period from 1980 to 1995: South Africa’s net load was above 30 per cent of GDP in 1980 due to the highly available loan capital in the country. However, this changed due to the decline in the foreign investments which were also relative to the value of foreign loan debt. This caused the loan debt to decrease from 32.2 per cent to less than 30 per cent in 1984. In 1985, South Africa was in a major foreign debt crisis when their credit line was withdrawn by groups of banks led by the Manhattan. The period from 1986 to 1990 South Africa had no external borrowings there was no external. This gave South Africa a chance to reduce its net loan by 1994.

The period from 1996/97 to 2008/09 the government’s net loan debt as a percentage of GDP declined from 48 per cent to 22.8 per cent. However, the period after 2008/09 the budget balance began to record a budget deficit and the debt to GDP ratio increased to 40.9 in 2014/15. Although the debt to GDP ratio has increased to 40.9 in 2014/15, it still remains low compared to the 1996/97 debt ratio of 46.8 that was recorded. The government has responded to the debt by reducing expenditure growth, reducing contingency reserves and trimming the departmental budgets (National Treasury, 2014). According to National Treasury (2015) the economy is expected to grow by 3 per cent by 2017. Increase in growth and reduction in expenditure will result in the deficit reduction. The budget deficit is expected to narrow from

4.7 per cent to 2.8 per cent of GDP by 2016/17. This will result in the net debt to stabilise and is projected to be at 44.3 per cent of GDP in the fiscal year 2016/17 (National Treasury, 2014).

## **2.11 Conclusion**

This chapter highlighted the trends and patterns of economic growth, government revenue, government expenditure and the budget balance from the period 1980 to 2015. The chapter has discovered that for the period under study economic growth as a percentage GDP of has been positive over many years despite the tough economic challenges that faced South Africa. Government revenue has also remained buoyant over many periods and tax revenue has also remained sustainable due to the sources that have contributed to government revenue. The government expenditure trend over the period 1980 to 2015 has been on an increasing trend as a result of the different distribution of expenditure by government over the years. The budget balance of South Africa depicts that government expenditure exceeds government revenue and as a result the government continues to deal with a wider budget deficit. The widening budget deficit has made the government to continually fund its expenditure on debt (borrowing).

## **CHAPTER THREE**

### **LITERATURE REVIEW**

#### **3.1 Introduction**

This chapter reviews both theoretical and empirical literature in support of the causal relationship between government revenue and government expenditure. The chapter consists of six sections. Section 3.2 reviews the theoretical literature and is divided as follows: Wagner's law of increasing state activity and Peacock and Wiseman's theory of public expenditure. This is followed by the three major hypotheses being: the tax and spend hypothesis, fiscal synchronisation and fiscal neutrality hypothesis followed by a summary in section 3.3. Section 3.4 analyses empirical literature that is from different countries and it is divided as follows: literature from developed countries, literature from developing countries and literature from South Africa followed by a summary in section 3.5. The last section concludes the chapter.

#### **3.2 Theoretical Framework**

This study makes use of theoretical literature as a foundation base in understanding the direction of causality between government revenue and government expenditure. It also reviews theory in order to have a logical explanation of the behaviour between government revenue and government expenditure. The section reviews two theories: Wagner's law of increasing state activity and Peacock and Wiseman's theory of public expenditure. In addition to these two theories, the study discussed the following three hypotheses: tax and spend hypothesis, fiscal synchronization hypothesis and fiscal neutrality hypothesis.

##### **3.2.1 Wagner's law of increasing state activity**

Wagner (1883) conducted an empirical study in Germany in the 18<sup>th</sup> century focusing on the increasing government expenditure. This study gave birth to the development of a law known as the "law of increasing state activity". Wagner (1883) when comparing different countries and the different time or development amongst societies that are showing progress, it was realised that the central and the local government levels are the ones where the increase in activities will normally take place from. This is due to the constant undertaking of new

functions, while simultaneously performing both the old and the new functions resourcefully and entirely in the economy. Hence, when the expenditure of different countries were compared the results demonstrate that an upward trend in the slope pattern is realised. This shows that there is a constant rise in government expenditure. Wagner's law states that "as the economy develops over time, the activities and functions of the government increase". Therefore, the central and the local governments are needed in the economy to cater for the needs of people in the society in a satisfactory manner.

Wagner (1883) further states that in developed societies, the central and local government's activities will continue to rise on a regular basis. The objective of the government is to meet the economic needs of the people in the society. There will be new function undertakings in the interest of the society. There is a wide-ranging and demanding increase in the activities of government. The new and new functions are performed completely and resourcefully than before. The increase in public expenditure will be as a result of development and strengthening of the government functions and activities.

Wagner (1883) argues that an increase in industrialisation and economic development is a function of economic growth. This is because when there is an increase in real income per capita of a nation then public expenditure in relation to expenditure will increase as the industrialisation process takes place. Wagner's law cites that "the advent of modern industrial society will result in increasing political pressure for social progress and increase allowance for social consideration by industry".

Wagner (1883) stated three reasons that may be able to explain why there is an increase in state activity. Firstly, as the industrialisation process takes place then the public sector activities replaces the private sector activities. This means that it is the responsibility of the government to provide the basics that the society and the people in the society will need in order to progress. Things such as infrastructure are needed and provided by the government. Basically, the state functions such as protectiveness and administration functions rises. Secondly, as the economy develops then the government will be needed to provide welfare services to its people in the society and these services are education, old age pension insurance, food security and many others. At this stage Wagner (1883) believes that as the necessary functions will be put in place by the government then the expenditure starts to decrease slowly and the private sector will start to take place.

Thirdly, the improving industrialisation results in technological change and large firms monopolises turning into the private sector. However, this does not mean that the function or the role of the government ends but rather government will still be responsible to provide the social and merit goods through the use of an efficient budget. The third stage merely means that the government has developed the necessary functions in the economy but its role does not end as it needs to keep on maintaining the economy to develop it further.

Wagner (1883) believes that government spending is an endogenous factor of national income as spending is dependent on the growth of the national income. Hence, national income is the one that causes public expenditure. Although, the study conducted was for Germany, Wagner (1983) states that the law could be applied to both the developed and developing countries.

The challenge that this law faces is that although it can be applied to both developing and developed countries, the countries may not yield the same results in terms of public expenditure and national income. This is because different countries have different patterns of public expenditure. Another challenge is that for the results to be realised the law needs to be applied over a long run period in the economy for the law to have an effect. Even though the law was developed in the year 1883, it is still relevant and applicable in most of the developed and developing countries.

### **3.2.2 Peacock and Wiseman growth of public expenditure**

Peacock and Wiseman (1961) like Wagner (1883) conducted an empirical study of public expenditure in the United Kingdom using Wagner's law. Although Peacock and Wiseman (1961) acknowledged that it was difficult to find theories that could explain the facts about public expenditure except that of Wagner they found the Wagner's approach to be rather productive.

Peacock and Wiseman (1961) studied the British government expenditure behaviour and aimed at presenting the facts from the year 1980. The duration of the study was at a time when the British government recognised significant economic growth and social change complemented by government spending. The study argued that the theory presented by Wagner cannot be equally applied to different societies and the upward trend of public expenditure that Wagner found can be as a result of other factors that contribute to the development of public expenditure, such as the time pattern of expenditure growth.

Basically, Peacock and Wiseman (1961) believe that citizens in societies do not like to pay additional taxes while the government keeps spending the money. As a result the government needs to take into consideration the needs of the citizens. Peacock and Wiseman (1961) further believed that citizens can also have appropriate ideas about public expenditure such as when the taxation is not so high that it turns to being a burden to the society, and then it will be viewed as a reasonable rate of taxation by the society.

However, when there is a displacement in public expenditure as a result of wars in the country then it will cause the displacement effect to take place. This will result in the shifting of expenditures and public revenues to a new level. As the new level goes through the acceptance stage then the tolerable level of tax will emerge and in terms of government expenditure then a new higher level will be reached. Peacock and Wiseman (1961) state that the displacement effect has two traits: people accept the new levels of taxation as a form of raising revenue when the country is in a crisis mode and after the disturbance has disappeared they accept the new level of taxation. This makes it possible for the government to spend.

In testing the framework, Peacock and Wiseman (1961) began firstly looking at the factors that contribute to public spending during the period and those that Wagner suggested. Then continue to eliminate those factors from the total expenditure series and furthermore, deal with the expenditure behaviour that is classified by the concentration effect or responsible authority together with national industries expenditures. The study demonstrates that government expenditure curve reveals a rising pattern at the peak, proposing that the expenditures in growth have about as an upward displacement in the war periods.

The study further investigated the possibilities of permanent influences that can affect the level of government expenditure. These two permanent influences are changes in price and population. When these two factors were added the results attained suggests that they do not have any influence on government expenditure. As a result, Price and population were eliminated from the study.

The study further included the business cycle changes as another factor that can influence expenditure levels. Changes in the business cycle revealed that there can be short term changes of government expenditure in relation to the GNP when the unemployment index is at a rise. Therefore; there is no upward shift in government expenditure that can be as result of the business cycle. The great depression was also examined as a possible contributing factor to the permanent shift of public expenditure relating to the periods of unemployment

but it was found not to contribute. Consequently, concluding that government expenditure cannot be influenced by the “permanent factors” and cannot also explain the patterns of growth.

Peacock and Wiseman (1967) acknowledged that the displacement effect relating to government expenditure became realised after two major wars. However, if the expenditures relating to the war cannot explain the displacement effect then the war cannot provide a complete explanation for the increasing pattern that the government expenditure is following.

With their theory Peacock and Wiseman (1967) state that their aim is not to develop a new law which will govern public expenditure. They acknowledge rather that their concentration effect and their displacement effect will be equally important at all times, for all countries and comparative to the permanent influences of government expenditure as a guide that will serve to the evolution of public expenditure.

### **3.2.3 Tax – spend hypothesis**

Friedman (1978) developed the tax – spend hypothesis after the approved adjustment that the California Constitution made about the tax limitation in 1978. The proposition made about tax was that there needs to be a limit on the actual level of government expenditure to the expected level of growth of the government’s economy. However, Friedman (1978) argues that the cutting of taxes would raise difficulties in increasing government expenditure. Therefore, the citizens of that country should have the ability to limit the budget of their government by deciding how much they are willing to give back to their government. Hence, the tax limitation proposition has a purpose of ensuring that the money received by government from its people is spent in an effective way.

Friedman (1978) advised that what is needed on the state, federal and local level of government is not the adjustment of balancing the budget but rather to limit the expenditure of the government to the portion of income received. According to Friedman every plan to cut taxes predicts a level of spending that is lower in the next year and this consequently causes a result in a higher level of taxes to be attained in the long run. Therefore, fiscal traditionalists need to focus on total government spending and not the deficit. This is because when the fiscal traditionalists make laws that are to increase government spending as a result there will be an increase in the budget deficit. When the deficit problem arises then the traditionalists will have to increase taxes to cover the emerged deficit. Friedman (1978) if the

government spends more than it receives in taxes this will result in the negative budget balance that will be compensated for by the citizens of the country.

Therefore to finance the deficit, Friedman (1978) advises that the government should resort to creating or borrowing money from the public. If the government chooses to finance the deficit by borrowing, instead of the private sector this in future may result in the government imposing and passing higher taxes because there will be additional costs such as interest to pay back on that debt. However, if the government then chooses to finance the deficit by printing its own money, that causes a hidden tax called inflation to the already existing tax. This therefore, confirms that there are two types of taxes that have an effect in the future and they are the open, explicit taxes and the hidden taxes. The deficit is referred to as the hidden tax in Friedman's view.

Therefore the government needs to pay close attention on what the country's revenue is spent on. Friedman (1978) had a view that the government will always spend what the tax system will raise and more. The tax system needs to be strengthened by either getting people to accept the payroll taxes or by making people pay higher income taxes so that the higher level of government expenditure can be maintained. It is because of this positive relationship between taxation and government spending that Friedman is in favour of cutting taxes under any reason and any circumstance.

This tax – spend hypothesis by Friedman clearly explains the relationship that government revenue and government expenditure share. The hypothesis serves not as a solution but rather as a stoppage to the increase of taxes because this results in the government spending more and increasing the deficit. Rather, Friedman (1978) argues against the increase in taxation because it will result in government expenditure to increase. Friedman (1978) further argues that the government should not increase taxes as a way of reducing the budget deficit but rather cut the taxes so that government expenditure can also be decreased. This results in the budget deficit to be kept under control.

On the contrary, Buchanan and Wagner (1978) studied the behaviour of politics by applying the traditional economic assumptions. The study argues that in politics the programme of spending often receives the vote compared to the vote for expenditure to be paid by the tax legislation. Basically, this is because government expenditure increases political support and votes while voting for taxes will reduce the political support.

If the fiscal rule can be acknowledged by politicians that the government budgets must be balanced, then there would be more support and voting for government programmes politically rather than raising taxes. This is because if taxes are raised then this results in the political support being lost. However, if politicians do not keep the budget balanced this will result in the opportunity of spending more than what the government has collected through taxes. This is because expenditure will resort to boosting political support without the damage that a raise in tax increase may bring. Therefore, politicians will be pushed into accepting the budget deficit that they would otherwise not agree to include the ones that are opposed to the deficit balance.

In the process of developing a surplus, politicians have to vote for a reduction of government expenditure which will not be balanced by tax declines or they can vote for taxes that are not balanced by declining expenditure programmes. This will result in a surplus and a surplus will cause a loss of political support. Therefore, showing the negative relationship that taxes and government expenditure have when it comes to the political support.

When politicians are in the process of creating political support then the budget deficit will be favoured as that allows the direct benefits of spending, in comparison to the budget balance of a surplus that will not allow the luxury of spending but rather that of reducing their expenditure. Buchanan and Wagner (1978) advise that if politicians continue to raise the budget deficit in order to gain political support then this will result in inflation for the government compared to surpluses that will reduce the political support but at the same time reducing the inflation in the economy.

### **3.2.4 Fiscal synchronisation hypothesis**

Meltzer and Richard (1981) base their theory of the size of government's share on the rational choices of utility maximising that are fully informed about the state of the economy and have knowledge about the consequences of taxation and income distribution. Meltzer and Richard (1981) in an economy believe that voters do not suffer from fiscal misconception and note that for redistribution to take place the government must extract the resources elsewhere. The study concentrates on the demand redistribution and the size of the government that is influenced by two factors being taxes and spending.

The hypothesis of the study implies that the size of government is influenced by the median voter that earns a medium income. The majority rule and the median voter are taken as the

decisive voter in the economy. The study takes into account the income distribution that is skewed to the right to determine their median voter. The median voter in the study is the important voter because nothing restricts the median voter from equalising their income, the size of government can be increased when one includes more median voters that agree to redistribution and higher taxes and redistribution will reduce the incentive to work resulting in earning a lower income.

The study developed a general equilibrium model where Meltzer and Richard (1981) believed to be the combination of leisure and consumption are chosen on the individual's productivity level and earned income. The tax rate and the amount of income redistributed is as a result of the distribution of income and voting rule. This is because individual productivity cannot be observed directly therefore making taxes to be levied against earned income.

The politicians in the economy are the ones who determine the share of national income taxed and redistributed. The study implements two examples being dictatorship and the right to vote in political elections with majority rule. With majority rule the voter that has a median income and is the decisive voter however under dictatorship the dictator will make the tax decision on their own. The median or decisive voter will choose the tax rate that increases their utility. In making this decision the median voter is aware that the choice made can affect everyone's decision to work and consume.

When the tax rate increases it has two effects: income received increases revenue but at the same time the income received will be reduced because people would rather spend their income on leisure and others will choose redistribution as their survival mode. Whether the tax levels are high or they are lower they have an influence when it comes to labour, leisure and the income earned. However, under universal suffrage (adults voting in political elections) the median voter is the decisive voter and the one earning a higher income will prefer the level of taxes that are lower. The study concluded that in an economy it is mostly the decisive voter that will have the power of choosing the appropriate tax levels. Meltzer and Richard (1981) state that it does not matter whether the tax levels are low or they are high, individuals in the economy will always prefer the lower rate of taxation.

### **3.2.5 Fiscal neutrality hypothesis**

Hoover and Sheffrin (1994) studied the causal relationship using historical background of taxes and spending to review the pattern of expenditure and revenue. The study realised after

making the comparison that there were some periods that were not accounted for in terms of spending and revenue. These periods are divided into two tranquil and they are from 1954 to 1963 and 1974 to 1979.

The study therefore, employed four tests of structural breaks in order to verify the periods understudy. However, structural breaks may be a problem to identify. The study employs the general-to-specific modeling technique of Hendry and Richard to obtain well-specified regressions. Where possible, data is taken from the National Income and Product Accounts. Taxes are represented by total federal government receipts. Expenditures are total federal outlays net of interest payments.

The results found suggest that the periods before 1960 there was a unidirectional causal relationship from taxes to government expenditure and the period after 1960 found that there was no causal relationship between taxes and spending. This suggests that at the beginning because taxes were as a result of major wars and spending was due to foreign wars as time passed and the wars came to an end there was no longer a need for taxes and spending to influence each other. This implies that there is institutional separation among taxes and spending in the long run.

Motivated by the question of whether the increase in the size of the federal government budget is due to the changes in expenditure accompanied by revenue or changes in revenue accompanied by expenditure or there is causality running in both directions. On the other hand, Baghesti and McNown (1994) conducted an investigation on the budgetary process in the United States by looking at the three alternative hypotheses as the theories that govern the study.

In their analyses Baghesti and McNown (1994) focused on the formation of budgetary policy under contemporary institutions by making use of quarterly data from 1955/01 to 1989/04. Baghesti and McNown (1994) criticized the study of Hoover and Sheffrin (1994). Baghesti and McNown (1994) stated that Hoover and Sheffrin (1994) failed to point the relationship of a number of diverse interests in the context of non-parliamentary U.S institutions and they failed to identify the period of taxation or expenditure policy changes and they also segregate two fixed policy regime periods. As a result, Baghesti and McNown (1994) examined a political economy regarding the adjustment of expenditure and revenues to the budgetary disequilibria.

Therefore, Baghesti and McNown (1994) study did not take into effect fiscal policies or the sustainability of deficits into account but it rather takes into account the interest of politicians for the budgetary process. The model included the variable GNP as a variable because they believed that it is neither revenue nor expenditure that can influence each other but rather the economic growth. This makes variables such as total revenues, total expenditure, depreciation value of the debt and many more of be of high interest. Employing the cointegration of Engle – Granger, Johansen and the ECM Granger-causality test the results found provide evidence that when the relationship between revenue and expenditure was examine there was evidence of long run relationship but neither revenue nor expenditure adjust to the budgetary disequilibrium correctly. In the long run there was no evidence to support the tax – spend or spend – tax view but rather when analysed in relation to the GNP the revenue and expenditure adjust correctly to the GNP.

Basically, neither revenues nor expenditures responded to the budgetary disequilibrium but rather they both respond to the variable GNP concluding that there was institutional separation when it comes to the allocation and taxation functions. The expenditure and revenue are each determined separately by the long run economic growth.

### **3.3 Summary**

The theories reviewed have a strong background when it comes to explaining the relationship between government revenue and government expenditure. The years in which these theories were developed also shows their significance. Wagner’s law of increasing state activity highlighted that there are three stages of development within a country. As a country develops it will increase the level of expenditure on state activity. However, these stages of development may be attained differently for each country due to time constraints, progress of development and others factors. Peacock and Wiseman (1961, 1967) acknowledge that the level of expenditure in a country is influenced by the upward displacement effect that may take place within the country. War periods, business cycles amongst others can result in an increase in government expenditure first and taxation revenue lagging behind.

The tax-spend hypothesis states that there is a positive relationship between government revenue and government expenditure. If taxes are cut then the level of government expenditure will decrease. The fiscal synchronisation hypothesis states that with a county the level of government revenue and expenditure are simultaneously determined. The fiscal neutral hypothesis indicates that there is no relationship between revenue and expenditure.

### **3.4 Empirical Literature**

Empirical literature on the direction of causality between government expenditure and government revenue has revealed contradictory findings. Some studies suggest that there is a unidirectional relationship from government revenue to government expenditure or a unidirectional relationship from government expenditure to government revenue. Other studies have found evidence of bi – directional relationship between government revenue and government expenditure while others have found no relationship between government expenditure and government revenue. These results vary from country to country. Therefore, this section analyses the empirical literature looking more specifically at the purpose of the study, data used, methodology, results found and the theory proven. The empirical literature is categorized as follows: Literature from developed countries, literature from developing countries and literature from South Africa.

#### **3.4.1 Literature from developed countries**

Empirical studies done in developed countries do not provide a clear understanding of the relationship between government revenue and government expenditure. The studies reviewed have produced mixed findings. This is as a result of government revenue and government expenditure varying in these developed countries. Studies done by: (Al-Qudair (2005), Khalaf (2008), Mehrara, Pahlavani and Elyasi (2011), Apergis, Payne and Saunoris (2012) and Al-Khulaifi (2012)) amongst many others will be reviewed.

Al-Qudair (2005) examined the relationship between government expenditure and government revenue covering the period from 1964 to 2001. The Johansen (1988) test of cointegration based on the  $t$  – test, Error Correction Model (ECM) to test the short run relationship based on the  $F$  – test and the Granger causality were applied to the study. The results confirm that the variables were cointegrated in the long run and there is evidence of bi– directional causality in the long run as well as in the short run. In conclusion, the study states that the bi – directional causality found may either be a solution for the Kingdom of Saudi Arabia or it may be a problem. This might be because when oil revenues fluctuate over time it affects the growth and expenditure of the country while on the other hand, the increase in government expenditure can motivate economic activities causing revenue that are not related oil to be increased.

The Johansen cointegration test, Granger causality test based on Vector Auto-Regressive (VAR) and several diagnostics tests were performed by Khalaf (2008) to test the direction of causality between government revenue and government expenditure in Sweden. The study used a whole sample consisting of monthly and two sub period samples. The study focused on the new European Countries (EU). This was because controlling the budget deficit was the prerequisite to gaining EU membership and the key criteria of European Monetary Union (EMU). Using annual data taken from the Swedish statistics and the same technique of testing it allowed Khalaf (2008) to cover the entire sample from 1957 to 2006 together with the two sub periods 1957 to 1990 and 1990 to 2006. The two sub periods are tested in order to check the validity of results. As a result the variables proved cointegration in the long run and the whole sample gave evidence of unidirectional causality from spending to revenue. The entire sample proved a unidirectional causality from spending to revenue. The first period from 1957 to 2006 proved no direction of causality between government revenue and government expenditure and the second period from 1990 to 2006 proved that there was a unidirectional relationship from spending to revenue. This proved that Sweden as a member country of EU, the government spending tends to exceed the government revenues. This study suggested that the spending and revenue relationship in Sweden resulted in the creation of EMU in the future. Findings in this paper are important as they fit together with the hypothesis that this study attempted to prove.

Mehrara, Pahlavani and Elyasi (2011) using annual data covering the period 1995 to 2008 taken from World Development Indicators (WDI), researched on the inter-temporal relationship between government revenue and government expenditure for 40 Asian countries. In the study the panel cointegration test by Kao (1999) to test for the long run relationship and the panel Granger causality test to determine the direction of causality as well as the short run relationship were employed. Empirical findings for 40 Asian countries indicate that causality is bi – directional between government revenue and government expenditure. This study acknowledged that although Asian countries were suffering from continuous deficits, finding the correct hypothesis can help to reduce the deficit problem for 40 Asian countries. In conclusion the government should determine revenue and expenditure simultaneously. This states that when revenue increases then expenditure should be decreased at the same time. This study is consistent with the hypothesis of fiscal synchronisation.

Apergis, Payne and Saunoris (2012) acknowledges that Greece is a country that is drowning in debt due to the high levels of expenditure patterns and low revenue turnover causing

investors to lose confidence in the country. Furthermore, if Greece continued with this pattern then it will face a debt crisis in the country. However, due to various possibilities of asymmetries in the adjustment process, this study investigated the likelihood of asymmetries in the budgetary adjustment process. Apergis *et al* (2012) applied the Dynamic Ordinary Least Squares (DOLS) and the method of Enders and Granger (1998) and Enders and Silkos (2001) of TAR (threshold autoregressive and MTAR (momentum threshold autoregressive) models. Annual data covering the period 1957 to 2009 was understudy and the data was obtained from the international financial statistics (IFS). The causality results suggested that there was a unidirectional relationship running from government revenue to government expenditure. Furthermore, the TAR and MTAR models reveal that there was evidence asymmetry in the budgetary adjustment process and the asymmetric error correction model shows that in the short run there was a unidirectional relationship from government revenue to government expenditure. This proved that the short run relationship has a speed of adjustment that is slower when the budget is worse but faster when the budget is improving. The results clearly demonstrated that policy makers in Greece should increase the revenue levels.

The work of Al-Khulaifi (2012) supports the study of Al-Qudair (2005) as these two countries depend on Oil prices as a source of revenue. Al-Khulaifi (2012) studied and emphasised the significance that fiscal policy plays on the economy of Qatar. Qatar used fiscal policy as a way of achieving the country's macroeconomic goals. Hence, the state budget of Qatar was used to achieve and promote economic goals through expenditure. Al-Khulaifi (2012) carried out a time series analyses of the relationship between revenue and expenditure covering the period 1980 to 2011. The method of Engle – Granger cointegration test, Granger causality test and the Error Correction Model (ECM) were used. The causality test revealed that there was evidence of causality running from government revenue to government expenditure for the periods under study. Although Qatar relied on expenditure to achieve its goals, the study supports a tax – spend hypothesis. The results found on this study are however not consistent with that of Al-Qudair (2005).

The studies reviewed from the developed countries have demonstrated that each country determines the impact that the relationship between government revenue and government expenditure has on their own. This is because countries have differences in policies, economic performances, economic development and many others. Therefore, this has made it

difficult for countries to have a common fiscal policy that can be adopted by many developed nations to reduce the large and increasing budget deficits.

### **3.4.2 Literature from developing countries**

In developing countries the relationship between government revenue and government expenditure has received much attention. This is because the important sources of development for these countries are revenue and expenditure from the government. Mainly, the simultaneous relationship of increasing government expenditure and low economic growth that is realised by developing countries results in a disappointing economic performance. As a result rising government deficits are always realised because government expenditure plays an important role in these economies.

This study reviews literature from these countries to view their performance. It reviews studies done by: (Carneiro, Faria, and Barry (2005), Eita and Mbazima (2008), Al-Zeaud (2012), Aregbeyen and Insah (2013), Nanthakumar, Kogid, Sukemi and Muhamad (2011), Gounder, Narayan and Prasad (2007), Elyasi and Rahimi (2012), Antwi, Zhao and Mills (2013), Dogan (2013), Demirhan and Demirhan (2013), Dada (2013), Saysombath and Kyophilavong (2013), and Takumah (2014)).

Carneiro, Faria, and Barry (2005) investigated the possibility of a long run relationship between government revenue and government expenditure for Guinea – Bissau a Low Income Country Under Stress (LICUS) in Africa. This is because LICUS are countries that are usually developing and domestically they are limited to borrowing money however they have to rely on expenditure to reach their needs. From 1981 to 2002 the study devised a simple macroeconomic model by looking at the primary sector of production (Y) and exports (X) that Guinea – Bissau's economy specialises in. The technique of Granger causality and the simple error correction model were employed. The results found suggest that while there is a long and short run relationship between government revenue and government expenditure in Guinea – Bissau, there is also evidence of a unidirectional causality from government expenditure to government revenue. Although the study highlighted the tendency that low income or developing countries experience in terms of expenditure it advises that the country should rather develop a pattern of raising revenue first followed by expenditure, so that there can be fiscal discipline and controlled spending so that in the short run the size of the public deficit can be reduced.

Eita and Mbazima (2008) stated that Namibia as a developing country uses a MTEF (Medium Term Expenditure Framework) and it relies on the revenue collected as well as the expected growth of the economy. This study examined the causal relationship between government revenue and government expenditure. The study used annual data covering the period 1980 to 2007 sourced from the Cornwell, Leistner and Esterhuysen and other sources such as the budget statement of the Ministry of Namibia and the Bank of Namibia's annual report. Using Johansen cointegration (VAR analysis) and Granger causality test, the study found that there are two cointegrating vectors and that causality runs from government revenue to government expenditure in the case of Namibia. This supports the MTEF by the government of revenues being the ones to lead expenditure. This study proves the tax – spend hypothesis holds in Namibia concluding that this positive outcome encouraged investors in the country and that the weak deficit can be addressed through policies.

Al-Zeaud (2012) carried out a time series analyses for Jordan using data covering the period 1990 to 2011. This assisted to examine causality between government revenue and government expenditure so that the sources may be realised and understood in order to provide solutions to reducing the deficit. The study used the following techniques: Engle – Granger two steps, Johansen – Juselius test of cointegration, Granger causality test and Vector Error Correction Model (VECM). The results obtained showed evidence of bi – directional causality between government revenue and government expenditure. This study reported that the bi – directional relationship found for Jordan might possibly complicate the government in controlling the budget deficit. This was because revenues can either be influenced by expenditure in the current year and then when another year comes expenditures may influence revenues. This may contribute to the high national debt budget.

Based on the Dynamic Ordinary Least Squares (DOLS) proposed by Stock and Watson (1993), Aregbeyen and Insah (2013) explored the connection between government revenue and government expenditure in Nigeria and Ghana covering the period 1980 to 2010. Within the framework of the model the variables were not cointegrated and the short run dynamics revealed that the speed of adjustment is high for Nigeria than for Ghana. Even though there was evidence supporting fiscal synchronisation hypothesis for both countries the study showed that changes in revenue have a higher impact on Nigeria because it was a larger economy compared to Ghana. Changes in expenditure also have a negative impact on the revenue of Nigeria compared to Ghana that has a positive impact. These results suggested that when it comes to government revenue and government expenditure for both countries,

there was a negative link as the results favour the Nigeria economy more than the Ghanaian economy.

Nanthakumar, Kogid, Sukemi and Muhamad (2011) searched the response between tax revenue and government spending in Malaysia. This is because Malaysia as a country has been suffering from a recorded budget deficit since the Asian Financial crisis in 1997. The study used annual data covering the period 1970 to 2009 taken from the department of statistics and Economic Planning Unit (EPU) of Malaysia. The ADLM estimation technique used the F – statistics to determine the long run relationship, the Yoda – Yamamoto MWALD causality test and the ADLM – ECM approach were applied. The result based on the causality test gives evidence of a unidirectional causality from tax revenue to government spending in the short run. Nanthakumar *et al* (2005) advised that if this trend of causality continued for the period under study then the Malaysian government should pay more attention on the tax revenue so that the revenue can increase in the future to be able to fund expenditure.

Gounder, Narayan and Prasad (2007) examined the relationship between government revenue and government expenditure in Fiji. Gounder *et al* (2007) undertook a different approach of modelling government revenue and expenditure as an entire sample then after in an aggregate manner. The study regressed government expenditure with various components of revenue and government revenue with various components of expenditure. Using quarterly data covering the period 1968/01 to 2003/04 taken from the Fiji Islands Bureau of statistics, the study employed the Johansen's (1988) and Johansen and Juselius (1990) approach and the Granger causality test to test the bivariate model of the relationship between government revenue and government expenditure. The models were as follows: government revenue was contrasted against departmental expenditure (DE) and public debt charges (PD). The second model comprised of government expenditure being contrasted against custom duties (CP) and income tax (IT) and estate duties. The results suggested that the variables cointegrate in the long run and the short run and causality test showed evidence of unidirectional causality running from government expenditure and government revenue providing evidence for the spend – tax hypothesis as Peacock and Wiseman (1961, 1979). The study further revealed evidence that in the second model that contrast government revenue and the departmental expenditure and public debt charges the study found that departmental expenditure cause government revenue and public debt in the short run. In the third model where government expenditure is contrasted against customs duties, income tax and estate duties the study found that there is a bi – directional causality in the short run. As a result of these mixed results

Gounder *et al* (2007) recommended that policy makers need to make a policy that improves expenditure in Fiji.

The main source of government revenue in Iran comes from oil exportation and huge percentage of government expenditure is financed mostly from this revenue. Elyasi and Rahimi (2012) conducted a study to examine the relationship between revenue and expenditure based on the bounds testing approach advocated by Pesaran *et al* (2001) and the error correction model for causality. Time series data covering the period 1963 to 2007 taken from the central bank of Iran was used. Results found based on the causality test suggested that there was a bi – directional relationship between government revenue and government expenditure. Therefore, to maintain the budget deficit in Iran, the government should increase the oil revenue complimented by a reduction in expenditure.

Antwi, Zhao and Mills (2013) assessed the sustainability of the budget deficit in Ghana. The motivation of this study comes from the fact that government expenditure always exceeds government revenue in the Ghanaian economy. Annual data covering the period 1960 to 2010 taken from World Bank indicators CD – ROM was employed. In analysing the data, the study time series method of Engle – Granger two steps for the long run cointegration between government expenditure – GDP and government revenue – GDP. The vector error correction model (VECM) of Engle-Granger was also employed for the short run relationship. The results revealed evidence of cointegration among the variables of interest and that there was a bi – directional causality between government revenue to government expenditure. These results are consistent with that of Aregbeyen and Insah (2013) as they also found a bi – directional causality in the study. The study acknowledged that the tax base of Ghana is becoming narrow due to high rate of tax evasion and corruption in the country. The results found suggested that there needs to be an increase in the revenue base and keep constant or decrease the expenditure of the country.

Dogan (2013) stated that Turkey has a tendency of increasing government expenditure ever since the year 1924 and this was a result of many factors. However, it is not the expenditure but rather the revenue of Turkey that have caused Dogan (2013) to analyse the link of causality between these two variables. The study used annual time series data covering the period 1924 to 2012 taken from an official website of Turkey. Having employed the Granger causality test, the results proved that there was a unidirectional causality running from government expenditure to government revenue. These results are in line with the

expenditure trend that is being followed in Turkey, of spending first then financing the expenditure later.

Demirhan and Demirhan (2013) applied the Toda – Yamamoto (1995) method and generalised impulse response analysis to re–investigate causality between government revenue and government expenditure in Turkey. The significance of this study was to add to the existing literature of the relationship between government revenue and government expenditure. The study used monthly data from January 2004 to September 2010 taken from the electronic data system calculated by the central bank of Turkish republic and it was deflated using consumer price index taken from the Turkish statistical institute. The results indicated that there was proof of causality running from government revenue to government expenditure supporting the tax – spend hypothesis of Friedman (1978). These results are contradictory to the ones found by Dogan (2013).

Dada (2013) attempted to find the relationship between government revenue and government expenditure in Nigeria. The study used annual data covering the period from 1961 to 2010. The uniqueness of this study is that the author used the real output growth using error correction modelling technique which was scarce for Nigerian literature. Data was taken from then CNB statistical bulletin 2010 edition Augmented with CBN annual report and statements of accounts of various years and World development indicators (WDI) of the World Bank’s CD – ROM. The study employed the following time series method: the Engle – Granger and Johansen cointegration tests, the Error correction model (ECM) test and lastly the Granger causality test. The findings indicated that with the cointegration tests of Engle – Granger and Johansen there was no long run relationship between the variables (government revenue and government expenditure). The results of the ECM further provided evidence of no relationship in the short run between the variables and there was also no one way or two ways causality between government revenue and government expenditure when the Granger causality test was employed. The periods under study revealed evidence of no causality implying that in Nigeria the revenue and expenditure decision are made separately to each other. Contrary to the study of Aregbeyen and Insah (2013) that found that there was bi – directional causality amongst the variables. The hypothesis found is that of fiscal neutrality in line with the work of Hoover and Sheffrin (1992) and Baghestani and McNown (1994).

Lao PDR is a country that depends on natural resources as the revenue base in their country. However, the ever recurring budget deficit that finances expenditure has been the main

downfall of the country. Because of this dynamic relationship Saysombath and Kyophilavong (2013) resorted to examining the connection between government revenue and government expenditure and its effects in managing the budget deficit. Annual data covering the period 1980 to 2010 was used and it was taken from the World Development Indicators (WDI). The study employed the ARDL cointegration approach using the F – test, Granger causality and the Vector Error Correction Model (VECM) to determine the short and the long run relationship using the F – test. The results indicated that in the long and short run there was evidence of a relationship between government revenue and government expenditure. Furthermore, the causality test revealed that there was a unidirectional relationship running from government expenditure to government revenue in Laos in the long run and in the short run there was evidence of no causality. In conclusion, the study recommended that expenditure should take preference then later be compensated by a raise in taxes.

Takumah (2014) confirmed the budget deficit, the taxation and expenditure structure and the government size of the economy of Ghana. To achieve this, the study explored the relationship between government revenue and government expenditure and to also determine the direction of causality in the case of Ghana. The study made use of annual time series data covering the period 1986 to 2012 sourced from the World Development Indicators (WDI) compiled by World Bank. Different to other studies, Takumah (2014) employed the time series technique of ARDL bounds testing procedure using the F – test suggested by Pesaran and Shin (1999) for cointegration of three different equations as it has better finite sample properties. The Granger causality and the ECM version of ARDL for the short run using the Wald test (F – test) were also employed. The results proved that cointegration was realised for two equations only being government expenditure, government revenue and economic growth. The causality results of these two equations suggested evidence of bi –directional causality and unidirectional causality from government expenditure to economic growth.

The literature reviewed from developing countries has further demonstrated that government expenditure continues to be the source of budget deficits that are realised by the developing countries. The revenue base also for these countries continues to be at a depreciation rate. Although the results on the relationship between government revenue and government expenditure has not been a clear, it is worth noting that all have the same pattern of expenditure and revenue. However, this study will look furthermore at the literature from South Africa below to gain more depth about the behaviour of these variables in this particular country.

### 3.4.3 Literature from South Africa

South Africa is one of the developing countries and because of this, it resorts to government expenditure an important tool in the economy for development to be realised. Hence, the country has an increasing deficit that is due to government expenditure while government revenue and economic growth do not meet the government targets. Therefore, studies in South Africa have studied government revenue and government expenditure utilising different data and econometric techniques. Studies done by: (Nyamonga, Sichei and Schoeman (2007), Lusinyan and Thornton (2007) and Ziramba (2008)) amongst many others.

Nyamonga, Sichei and Schoeman (2007) acknowledged that work on the relationship between government revenue and government expenditure has received significant attention from different countries using different econometric methodologies. However, empirically there are mixed results obtained about the direction of causality remains to be a challenge. This study employed the modified hylleberg for unit root testing, Johansen cointegration test and the Vector Error Correction Model (VECM) using monthly data from October 1994 to June 2004 taken from the South African Reserve Bank (SARB). The results demonstrated that the variables cointegrate with bi – directional causality in the long run and no causality in the short run. The study reported that in the short run, the revenue and expenditure decisions are adjusted separately by the national treasury in order to meet the government targets from various departments. These results fit realistically with economic theory. Government decisions of revenue and expenditure are not made separately in South Africa and the expenditure and revenue are adjusted monthly to release reports therefore expenditure should not exceed revenue as this will endanger the deficit problem.

Lusinyan and Thornton (2007) investigated the historical relationship between government revenue and government expenditure. Using annual data for the period 1895 to 2005 including structural breaks, the study employed the residual based test of Gregory and Hansen, the trace test and the Johansen cointegration test. The results of causality suggested that there was bi-directional causal relationship between government revenue and government expenditure. For more recent periods, however, there was some evidence of unidirectional causality from expenditure to revenue, consistent with the “displacement effect” hypothesis and with a fiscal consolidation effort that should stress was expenditure-led.

Ziramba (2008) in an appealing paper set about the weakness of Wagner's law in South Africa. The study used annual data from 1960 to 2006. The data was taken from the work of Singh and Sahni (1984:633). Singh and Sahni (1984: 633) argued that seasonal and cyclical fluctuations do not affect public expenditure and that periods below a year may not be able to give the proper response between public expenditure and national income. Therefore, the study used Wagner's law as a theoretical base in establishing the in-depth understanding of the relationship between government revenue and government expenditure. The time series technique employed by the study was proposed by Pesaran *et al.* (2001). Ziramba (2008) applied the Ng-Peron unit root tests, the autoregressive distributive lag approach of cointegration and the Granger non-causality tests proposed by Toda and Yamamoto (1995) using a modified Wald (MWALD) test. The results suggested that the variables move along together in the long run and the causality test revealed evidence of bi – directional causality between national income and expenditure. These results were contradictory to the law of Wagner which states that national income influences expenditure. Therefore, Wagner's law does not hold and receive support in South Africa.

Literature reviewed from South Africa under different techniques, data source and theories has shown that there was a long run relationship between government revenue and government and that there direction of causality was bi – directional. This demonstrates that the revenue and expenditure decisions are made simultaneously, thus to reduce the budget deficit policy makers must up the revenue base and decrease expenditure at the same time.

### **3.5 Summary**

This subsequent section is an additional part from the theoretical framework and it looks into the work of other scholars on the topic of government revenue and government expenditure in developed, developing and South Africa. The studies reviewed showed different econometric methods and data from different sources that other authors have used in order to determine their results in developed, developing countries as well and South Africa in particular. Most of the studies have revealed that indeed government revenue and government expenditure react in a different manner in different countries making it difficult to find the exact direction of causality for policy makers. Studies such as (Apergis, Payne and Saunoris (2012), Al-Khulaifi (2012), Eita and Mbazima (2008), Nanthakumar, Kogid, Sukemi and Muhamad (2011), Demirhan and Demirhan (2013)) support the unidirectional relationship from revenue to expenditure whilst studies such (Khalaf (2008), Carneiro, Faria, Barry

(2005), Gounder, Narayan and Prasad (2007), Dogan (2013), Saysombath and Kyophilavong (2013), Lukovic and Grbic (2014) support a unidirectional relationship from expenditure to revenue.

On the other hand, studies supporting the bi-directional relationship are (Al-Qudair (2005), Mehrara, Pahlavani and Elyasi (2011), Al-Zeaud (2012), Aregbeyen and Insah (2013), Antwi, Zhao and Mills (2013), Takumah (2014)) and a study done by Dada (2013) has found no direction of causality between the variables of interest. However, in South Africa, different studies using different methodologies have found the same results being that there is bi-directional causality holds.

### **3.6 Conclusion**

Reviewed literature of the relationship between government revenue and government expenditure from the theoretical and empirical literature has resulted in extensive studies. However, all the different econometric analyses and the different findings have proven inconclusive results. Therefore, the lack of connection of the causal relationship between government revenue and government expenditure has served as the motivation of this study. The next chapter discusses the methodology the study adopts.

## CHAPTER FOUR

### METHODOLOGY

#### 4.1 Introduction

This chapter provides the research method employed in this study. The chapter consists of seven sections which are divided as follows: section 4.2 discusses the theoretical view that the study adopts. Subsequent to this, section 4.3 specifies the analytical model and defines the variables included in the model. Section 4.4 discusses the expected signs that may be realised when the results are tested. Section 4.5 describes the data source. Section 4.6 discusses the technique of estimation and section 4.7 concludes the chapter.

#### 4.2 Theoretical Framework

The tax spend hypothesis is developed by Friedman (1978) together with Buchanan and Wagner (1978). This hypothesis has two views and they are as follows: Friedman (1978) argues that there the causal relation between revenue and expenditure is positive. Friedman (1978) explains that when tax revenue is increased it results in expenditure being increased and the budget deficit being higher than before. In other words, government will spend its revenue with the anticipation of increasing taxes. However, the revenue that will be realised with the increase in taxation will not result in government spending less but rather, the government will increase spending hence, there is a positive relationship between revenue and expenditure. Therefore, Friedman (1978) argues against the increase in taxes as a way of reducing the budget deficit.

#### 4.3 Model specification

The model adopted is taken from the theoretical framework of Friedman (1978) and is presented by equation 4.1:

$$GREV = \beta_0 + \beta_1 GEXP + \beta_2 GDEBT + \mu_t \quad (4.1)$$

Where GREV represents the natural logarithm of government revenue, GEXP is logarithm of government expenditure and GDEBT is logarithm of government debt. The constant is represented by  $\beta_0$ , while  $\beta_1$  represents the coefficient of government expenditure and  $\beta_2$  is the coefficient of government debt. The error disturbance is shown as  $\mu_t$ .

#### **4.3.1 Definition of variables**

**Government revenue (GREV)** in this study is income received by government. It is raised by the government mainly through taxation, duties and many other sources.

**Government expenditure (GEXP)** in this study is the use of funds that government has collected in the form of revenue and is distributed within the economy, to meet the needs of economic construction and other various activities.

**Government debt (GDEBT)** in this study is when the total expenditure exceeds total revenue of the government.

#### **4.4 Expected signs**

The relationship between government revenue and government expenditure is expected to be positive. This is because the increase in government expenditure results in an increase of the government revenue. This follows the hypothesis of Friedman (1978) that suggests the increase in government expenditure should be determined by the level of government revenue. Therefore, a positive coefficient sign is expected when it comes to these two variables.

The relationship between government revenue and government debt is expected to be negative. When government debt or borrowing becomes less, it results in the level of government revenue being positive. This means that government revenue is able to fund expenditure levels of government and not depend on borrowing. Therefore, a negative coefficient sign is expected between government expenditure and government debt.

#### **4.5 Data source**

Annual time series data covering the period 1980 to 2015 taken from the South African Reserve Bank is used for empirical analyses. From the South African Reserve Bank government revenue (GREV) was obtained as national government revenue, government expenditure (GEXP) was obtained as national government expenditure and government debt

(GDEBT) was obtained as total loan debt of national government. All the variables are taken in their natural logarithm form and are measured as a percentage of Gross Domestic Product.

#### 4.6 Estimation technique

The study employs the Johansen multivariate procedure and it begins by testing the variables of interest for stationarity because when variables are non-stationarity it can lead to spurious results. To achieve this, the study employs the Augmented Dickey – Fuller test (1979) and the Phillip-Perron test (1988) for unit root testing. Once variables are stationary, the study proceeds to test the variables for cointegration. The cointegration test is conducted using the Johansen multivariate method based on unrestricted Vector Autoregression (VAR). Furthermore, the Vector Error Correction Model (VECM) is employed to determine the long and short run relationship while the VEC/Granger causality test is used to determine causality between the variables.

##### 4.6.1 Stationarity and unit root tests

A necessary condition for cointegration is that the individual series should portray a common order of integration for stationarity to be realised. A time series variable is known to be stationary when the mean, variance and covariances are stationary over a period of time (Thomas, 1997). According to Brooks (2008: 318) a series that is stationary has the power to influence its behaviour and properties. The widely used form of stationarity is known as weak stationarity where the conditions of constant mean, variance and covariances are constant over time:

$$E(Y_t) = \text{Constant over time} \quad (4.2)$$

$$Var(Y_t) = \text{Constant over time} \quad (4.3)$$

$$Cov[(Y_t)(Y_{t+k})] = \text{Constant over time with no correlation to other covariances} \quad (4.4)$$

When a time series variable does not possess any of the characteristics above then it is said to be a non – stationary series. A non – stationary time series will have its own mean, variance and co-variances that keep changing as time changes. It is therefore, problematic to work with a non-stationary time series because the different trends can lead to spurious results. If two stationary variables in an independent random series are generated, when one variable is regressed on the other, this results in the expectation of the slope coefficient not to be

significantly different from zero and the value of  $R^2$  to be low. However, in a regression equation, if the series continues to trend then the level of significance of the regression coefficients and the values of  $R^2$  will be high (Duan and Yusupov, 2010).

Furthermore, if non – stationary variables are employed in a regression, the validity of the standard assumptions for asymptotic analysis will not hold. As the F – statistic will not follow the F – distribution and the usual t – ratios will not follow the t – distribution. One of the non-stationary models that is mostly used and is of particular interest for this study is the random walk with drift:

$$Y_t = \gamma + Y_{t-1} + \varepsilon_t \quad (4.5)$$

The non-stationary time series in equation (4.5) can be made stationary through differencing the model by using the first order autoregressive (AR) process

$$Y_t = \theta Y_{t-1} + \varepsilon_t \quad (4.6)$$

If  $\theta$  is between 1 and -1 then equation (4.6) will be stationary. However, if  $\theta$  is greater than one or less than -1 the equation will be non-stationary. Nonetheless, a special case may arise where the time series will need to be differenced further in order for the variable to prove stationarity to the  $k^{th}$  order autoregressive (AR) process as follows:

$$Y_t = \theta Y_{t-1} + \theta_1 Y_{t-2} + \dots + \theta_k Y_{t-k} + \varepsilon_t \quad (4.7)$$

In other words, if a series is non – stationary at levels I (0) then it needs to be differenced to the  $k^{th}$  order of integration. The  $k^{th}$  order of integration can either be at first difference I (1) or at second difference I (2) as can be seen in equation (4.7). In order to prove stationarity in the series, this study employs the Augmented Dickey – Fuller (1979) test and the Phillip – Perron (1988) test discussed below.

### **Augmented Dickey – Fuller (ADF) test**

There are numerous ways in which non-stationary time series variables can be tested to detect their univariate characteristics. The initial work on unit root testing was founded by Dickey and Fuller (1979). The main objective of the DF test is to examine the null hypothesis that the estimated  $\phi$  is statistically equal to 1 or not. The DF test equation given below as:

$$\Delta Y_t = \varphi Y_{t-1} + \mu_t \quad (4.8)$$

Where  $\Delta$  is the first difference and  $\varphi$  is  $(\varphi - 1)$

Equation (4.8) tests for the null hypothesis:

**H<sub>0</sub>**: The series has a unit root (non-stationarity)

**H<sub>1</sub>**: The series has no unit root (stationarity)

If  $\varphi = 0$ , then there is a unit root problem resulting in the series being non-stationary. This is because under the null hypothesis, the estimated coefficient  $Y_{t-1}$  has a t-value that does not follow the t-distribution even in large samples. This portrays that the t-value does not have an asymptotic normal distribution. Therefore, DF critical values of the tau ( $\tau$ ) statistic are used when deciding to reject or not to reject the null hypothesis.

One of the classical linear regression model assumptions is that the errors of term  $\mu_t$  are uncorrelated and the DF test is grounded on that assumption. However, the DF test usually violates this assumption by showing evidence of serial correlation (Ssekuma, 2011). Therefore to remedy this problem, Dickey and Fuller developed the Augmented Dickey – Fuller (ADF) test. The ADF test includes lags of differenced terms in a regression equation to make the error term ( $\mu_t$ ) white noise. The equation of the augmented Dickey – Fuller test is taken from Al-Khulaifi (2012) and is given as follows:

$$\Delta X_t = \varphi_0 + \varphi_1 t + \varphi_2 X_{t-1} + \sum_{i=1}^n p_i \Delta X_{t-1} + \mu_t \quad (4.9)$$

Where  $\Delta X_t$  the first difference representation of the series being tested, n is the number of lagged difference and t is the trend of the series. The null hypothesis of the ADF test can be tested under three possible cases: the first case is known as a random walk without a drift, the second case is a random walk with a drift and the last case is a deterministic trend with a drift.

### **Phillip-Perron test**

Phillip and Perron (1988) established a wide-ranging concept of unit root for non-stationarity. The PP test is a follow up of the ADF test. However, contrary to the ADF test the Phillip-Perron test uses nonparametric method to solve serial correlation that often occurs among error terms with no inclusion of the lagged terms (Al-Khulaifi, 2012). Although there maybe

differences the PP test has similar characteristics as the ADF test. Therefore, these two tests often give the same results and simultaneously share the same weakness traits ((Duan and Yusupov, 2010). The PP equation is given below as:

$$\Delta Y_t = \gamma + \beta t + \delta Y_{t-1} + \mu_t \quad (4.10)$$

Where  $\Delta Y_t$  is the first difference representation of the series being tested,  $\gamma$  is the constant,  $\beta$  is the coefficient of  $t$  and  $\delta$  is the lag order.

The hypothesis to be tested is as follows:

**H<sub>0</sub>**: The series has a unit root (non-stationarity)

**H<sub>1</sub>**: The series has no unit root (stationarity)

These two tests have a common problem of having very low power to differentiate between the unit root processes. They have a tendency to accept a null hypothesis of a unit root where there is none. The problem is greater when the sample being used is smaller. Thus, these two tests have difficulty in identifying a false null hypothesis. Brooks (2008: 330) asserts that these tests are weak when deciding to either accept or reject their null hypothesis.

#### **4.6.2 Cointegration**

The cointegration of variables defined by Engle and Granger (1987) points out that two or more variables in a linear regression should move together at the same wavelength with errors that are in disequilibrium, then these variables are cointegrated. However, a cointegration relationship may be realised as an equilibrium occurrence or long term occurrence. This is because cointegrating variables in the short run may portray a tendency to deviate from their relationship but in the long run the variables can return to equilibrium.

Thus, a non-stationary time series variables will be stationary when they cointegrate. In most cases, two variables cointegrate when they share a common order of integration  $I(d)$ . When variables are cointegrated after differencing then the cointegrating parameters are called the cointegrating vectors (Verbeek, 2000).

When two series are cointegrated it leads to a VECM among them at some point. This is because the Vector Error Correction Model (VECM) is a way of combining the short run relationship with the long run relationship. Furthermore, the error correction model includes

both the long and the short run relationship that determine the behaviour of the relationship over time. This is because when variables are cointegrated then the errors of disequilibrium are stationary; implying that the error term will always pull back to zero without them increasing.

There are several advantages of the ECM approach and they are as follows: The error correction model can be easily fitted into the general-to-specific approach. The ECM gives a clear distinction between the short run and long run effects. Furthermore, it always reduces the problem of multicollinearity amongst the variables. There are many ways to detect the existence of cointegration in a series. Amongst many, the Engle – Granger univariate approach or the Johansen and Juselius multivariate test can be applied.

#### **4.6.2.1 Johansen multivariate cointegration test**

The methodology of Johansen (1988) is a mere extension of the Engle – Granger (1987) procedure. However, Johansen (1991) introduced a multivariate procedure because the Engle – Granger method is univariate or single equation model. A multivariate procedure can accommodate economic variables that often contain more than two variables.

The **first step** in the Johansen methodology is to test the variables for stationarity. When variables are tested for unit root in a univariate case and they are integrated of the same order  $I(d)$ , this explains that there is a linear combination that exists among the series. The linear combination establishes a long run equilibrium relationship and cointegration test can be implemented thereafter.

The **second step** is to determine the appropriate number of lag length and to determine the rank of (II). When estimating VAR the lagged terms should be chosen properly because the inclusion of too many lagged terms will result in not only the introduction of possible multicollinearity but it will also result in the consumption of the degrees of freedom. On the contrary, the inclusion of a few lagged terms will result in the specification errors. The correct lag length is significant at a later stage for the Gaussian residuals as they will be implemented in the error correction model. Johansen and Juselius (1990) introduced the criterion that is mostly used to assist in choosing the correct number of lagged terms in either the Akaike or the Schwarz information criterion.

The rank ( $\Pi$ ) has to be stationary so that the residual can be white noise. It is significant to note that there are three possible cases that can determine the rank of ( $\Pi$ ). Eita and Mbazima (2008) note the following:

- i. When the time series is non-stationary and there is no cointegration or long run relationship among the variables then the rank ( $\Pi$ ) is zero. In this case the variables can be differenced and the study can employ VAR in first difference  $I(1)$ .
- ii. When the time series are individually stationary at first difference then there are (n-1) cointegrating vectors. The rank ( $\Pi$ ) will be reduced. In this case the VECM can be applied.
- iii. When the time series variables are all stationary at levels then the rank ( $\Pi$ ) is full. In this case the VAR in levels can be applied.

The **third step** is to analyse the number of cointegrating vectors in the long run and the speed of adjustment. In determining the number of cointegrating vectors there are two hypothesis tests are used. These tests are the trace statistic and the max statistic. The trace statistic test as given in Masenyetse and Motelle (2012) is as follows:

$$\lambda_{trace} = -2 \log(Q) = -T \sum_{i=r+1}^p \log(1 - \tilde{\lambda}_i) \quad (4.11)$$

$$r = 0, 1, 2, 3, \dots, n-2, n-1$$

Where, Q represents the ratio of restricted maximum likelihood to the unrestricted maximum likelihood. The null hypothesis states that the cointegrating vectors is ( $\leq r$ ) and the alternative states that the number of the cointegration vectors ( $=r$ ).

The max statistic as given in Masenyetse and Motelle (2012) can be represented as follows:

$$\lambda_{max} = -T \log(1 - \tilde{\lambda}_{r+1}) \quad (4.12)$$

This represents the unrestricted maximised likelihood. The null hypothesis states that the number of the cointegration vectors ( $=r$ ) and the alternative states ( $r+1$ ).

The **fourth step** is to determine the number of cointegrating vectors. After the cointegration in the long run has been analysed, the error correction model can be adapted and modified as a multivariate approach. It will then be known as a vector error correction model.

#### 4.6.3 Vector Error Correction Model (VECM)

When the condition of cointegration has been satisfied then the vector error correction model (VECM) can be estimated. The VECM is estimated as a restrictive vector error correction model because it includes the vectors from the long run relationship. Furthermore, the study employs the VECM as it incorporates the information about the short run dynamics. The VECM equation as taken from Mukherjee and Naka (1995) is given as follows:

$$\Delta Y_t = \sum_{l=1}^k \Phi_l + \delta \beta (Y_{t-l} + Y_{\Phi t-k}) + \varepsilon_t \quad (4.13)$$

The error correction model (VECM) is given as  $(Y_{t-l} + Y_{\Phi t-k})$ . The  $\Delta$  represents the first difference notation and  $Y_t$  is differenced to the order one. The lag length is represented by  $k$  and  $\varepsilon_t$  is the Gaussian white noise residual vector. The short term adjustment between variables is indicated as  $\Phi_l$ . Matrices  $\delta$  and  $\beta$  represent the speed of adjustment to equilibrium and the cointegration vectors. The relationship between  $Y$  and  $\Phi_l$  from  $Y_{\Phi t-k}$  suggests that there is a long run relationship between the variables. The error correction  $(Y_{t-l} + Y_{\Phi t-k})$  shows that  $y$  is expected to change  $t-l$  and  $t-k$  is expected to change also when the independent variables  $\Phi$  changes in values. The error correction corrects any disequilibrium that may have occurred in the previous year.

#### 4.6.4 VEC Granger causality test

One advantage about a VAR model is that it can capture the relationship of two variables and this enables one to test for causality between the variables. This study makes use of the work of Granger (1969). The Granger causality test is based on the idea that the future cannot predict the past but it is rather the past that determines the future. The Vector Autoregressive model proposed by Granger (1969) of two variables  $Y_t, X_t$  is as follows:

$$Y_t = \alpha_{01} + \sum_{j=1}^k \alpha_1 Y_{t-j} + \sum_{j=1}^k \beta_1 X_{t-j} + \varepsilon_t \quad (4.14)$$

$$X_t = \alpha_{02} + \sum_{j=1}^k \alpha_2 X_{t-j} + \sum_{j=1}^k \beta_2 Y_{t-j} + \varepsilon_{t2} \quad (4.15)$$

In a regression where Y is the dependent variable and it is regressed against other explanatory variables (X), if the explanatory variable can meaningfully improve the prediction of Y. It can be said that X (Granger causes Y).

However, if variable X (Granger) causes Y then this means that the changes in the variable X will lead the changes in the variable Y to take place. This is not only the case of causality that can be realised but there are other three cases and they are as follows: there can be a unidirectional causality from variable Y to variable X or there can be a feedback or otherwise known as the bi – directional causality and lastly no causality between the two variables. Brooks (2008: 298) explains that causality is a correlation of the current value of a variable to the past value of other variables. Therefore, causality in this study is taken in this context.

#### **4.6.5 Diagnostics tests**

When a model is not correctly specified and is not stable in a regression, it will result in the effects that are not good for estimation. Therefore, diagnostic checks are employed to ensure the adequacy of the chosen model. It is due to this that different diagnostic tests are designed to detect a particular form of model inadequacy. This study employs a range of diagnostic tests such as normality, heteroscedasticity and autocorrelation tests to detect model inadequacy and to also ensure that wrongful rejection of the null hypothesis is limited. These multivariate tests are briefly discussed below.

##### **4.6.5.1. Langrage Multiplier (LM) tests**

Auxiliary regressions can be tested using two different approaches and one of these approaches is the Langrage Multiplier (LM) test. The Langrage Multiplier (LM) test analyses auxiliary regressions focusing specifically on the value of  $R^2$ . In an equation when one or more coefficients of a variable are statistically insignificant this results in a fairly low  $R^2$ . However, if one or more coefficients are statistically significant then  $R^2$  will be fairly high. Therefore, the LM test can be operated by attaining the value of  $R^2$  from the auxiliary regression and multiplying it by the number of observations.

#### **4.6.5.2. Jarque-Bera residual test**

One test that is frequently used to detect normality is the popular Jarque-Bera (1987) test. This test uses the property of a normally distributed random variable that the entire distribution is characterised by the first two moments being the mean and the variance. The test also takes into account the skewness and kurtosis when assessing distribution. When the model is normally distributed then the values of Skewness and Kurtosis will be 0 and 3. The Jarque-Bera (1987) static follows the null hypothesis that there is symmetry and mesokurtic in series distribution. Therefore, the null hypothesis of normality can be rejected if the residuals from the series are either leptokurtic/platykurtic or skewed.

#### **4.6.5.3. Heteroskedasticity test**

Gujarati and Porter (2010) suggest that there are a number of ways in which one can test for heteroscedasticity in a model. One of the tests is White's (1980) general heteroscedasticity test. The study employs the popular white test in determining if the variances are all equal. This test is suitable as it makes the following assumptions: the regression model that is to be tested should be in a standard form and that from the regression residuals will be obtained. These residuals are then regressed so that the joint significance of the regressed model can be obtained. The variance of the residuals or ( $e_i$ ) should be constant or homoscedastic. The White heteroscedasticity test is tested using the null hypothesis which states that there is no heteroscedasticity. This means that if we fail to reject the null hypothesis, the study concludes that there is homoscedasticity in the sample.

#### **4.6.6 Impulse response and variance decomposition**

Impulse response functions (IRFs) are used to demonstrate how government revenue reacts to its own shock and the shocks of its independent variables. IRFs are significant as they show the shock in the variable and the average period that it takes for the variable to be restored to equilibrium after a shock has taken place. Brooks (2008: 298) an examination of VAR causality and the block F- tests are the ones that suggest in the model which variables have statistically significant impacts on the future values of each of the variables in the system. Nonetheless, the result of the F-test is not able to explain the sign of the relationship. Basically, it is not obvious whether changes in the value of a variable will result in a negative or positive effect to the other variables in the system, neither does it give an indication as to

how long the effect lasts within the system. To provide this information other applications of multivariate time series analysis such as, an examination of VAR's impulse response by Lütkepohl and Reimers (1992) and variance decompositions by Mellander *et al* (1992) will be analysed to detail below:

#### **4.6.6.1. Impulse response**

Impulse response analysis traces out the responsiveness of the dependent variables in the VAR to shocks to each of the other variables. This means that a shock to a variable in a model will not only directly affect that specific variable, but it will also affect other endogenous variables because it gets transmitted through the system in a dynamic structure of the VAR. Therefore, for each variable in a separate equation, when a unit shock is applied to the forecast error then the effects on the VAR system is noticed over time. Thus, if there are  $(h)$  variables within the system then the impulse response generated will be  $(h)^2$ . The impulse response analysis from the VAR model can be expressed as vector moving average (VMA) model. In the system the shock will gradually die away when stability is achieved. The same effects will be realised when there are more equations in a VAR system. This study employs the Cholesky orthogonalisation approach to impulse response analysis.

#### **4.6.6.2. Variance decomposition**

Variance decompositions are slightly different from impulse responses as they measure the percentage of forecast error variance of a variable that is explained by exogenous shocks (impulses) to other variables in the system. A shock to a specific variable will affect that variable directly and it will also affect other variables in the system as it will be transmitted through the dynamic structure of the VAR. Fundamentally, variance decomposition gives the percentage of movement in the dependent variable due to its own shock against the shocks of other variables (Brooks, 2008: 300). Furthermore, within a shocked variable, variance decomposition can determine and explain forecast error variance by innovations to each independent variable in a VAR system. The same technique adopted when estimating impulse responses can be applied to variance decompositions. This is because these two approaches have the ability to offer similar information.

## **4.7 Conclusion**

This chapter consisted of six sections detailing the method that this study employs when testing and analysing data. It began by mainly outlining the theoretical framework that was laid by Friedman (1978) which states that the direction of causality runs from the revenue side to the expenditure side. The third section outlined a summary of the signs that are expected and the data source. The study sample makes use of annual time series data for the period 1980 to 2015 taken from South African Reserve Bank (SARB).

The fourth section provides the technique that is employed to answer the problem this study posed. The ADF and PP tests are implemented for unit root testing. Once stationarity is satisfied, the Johansen multivariate methodology based on Vector Autoregression (VAR) is the test for cointegration that is adopted. Furthermore, the Vector Error Correction Model (VECM) and the work developed by Granger (1969) to determine causality between the variables are employed. The following diagnostic checks are employed to ensure the adequacy of the chosen model: Jarque-Bera residual test, white heteroscedasticity test, Lagrange Multiplier (LM) tests. The fifth section covered the impulse response and variance decomposition.

## CHAPTER FIVE

### PRESENTATION OF FINDINGS AND INTERPRETATION OF RESULTS

#### 5.1 Introduction

In this chapter, results of the relationship between government expenditure and government revenue are presented. The results are analysed and are interpreted under eight sections. Section 5.2 discusses stationarity results while section 5.3 presents the cointegration results. Section 5.4 discusses the Vector Error Correction Model (VECM) results followed by diagnostics results are presented in section 5.5. Section 5.6 presents the causality results and section 5.7 discusses the impulse response and variance decomposition results. Section 5.8 concludes the chapter.

#### 5.2 Unit root/Stationarity results

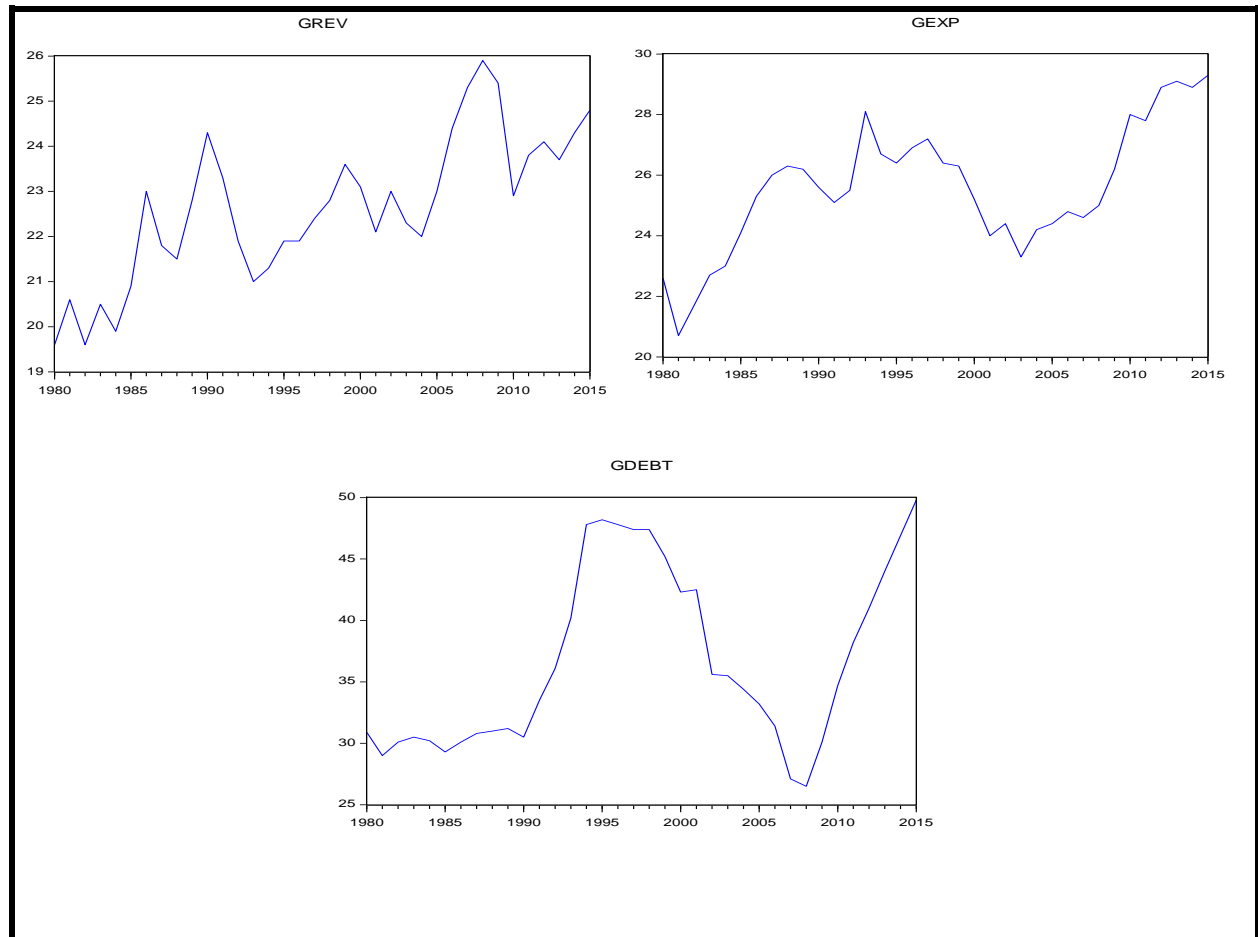
The starting point is to test for unit root stationarity among the time series variables. This is done first by performing the visual inspection test on the variables before performing the Augmented Dickey Fuller and Phillips – Perron tests that are known as the formal testing procedure of stationarity. The visual inspection of the variables provides an idea of the trends and the stationarity of the data. Therefore, graphical analyses of the variables of interest are presented in Figure 5.1 which shows the time series of variables in levels form and Figure 5.2 indicates the time series of variables in differenced form.

The visual inspection of the plotted variables in Figure 5.1 shows that government revenue (GREV), government expenditure (GEXP) and government debt (GDEBT) are non-stationary in levels. This is due to the trendy behaviour portrayed by the variables. The graphs are on an increasing trend proving that the mean, variance and co-variance are not constant. To remedy the problem, differencing is employed to the variables and the results are presented by Figure 5.2.

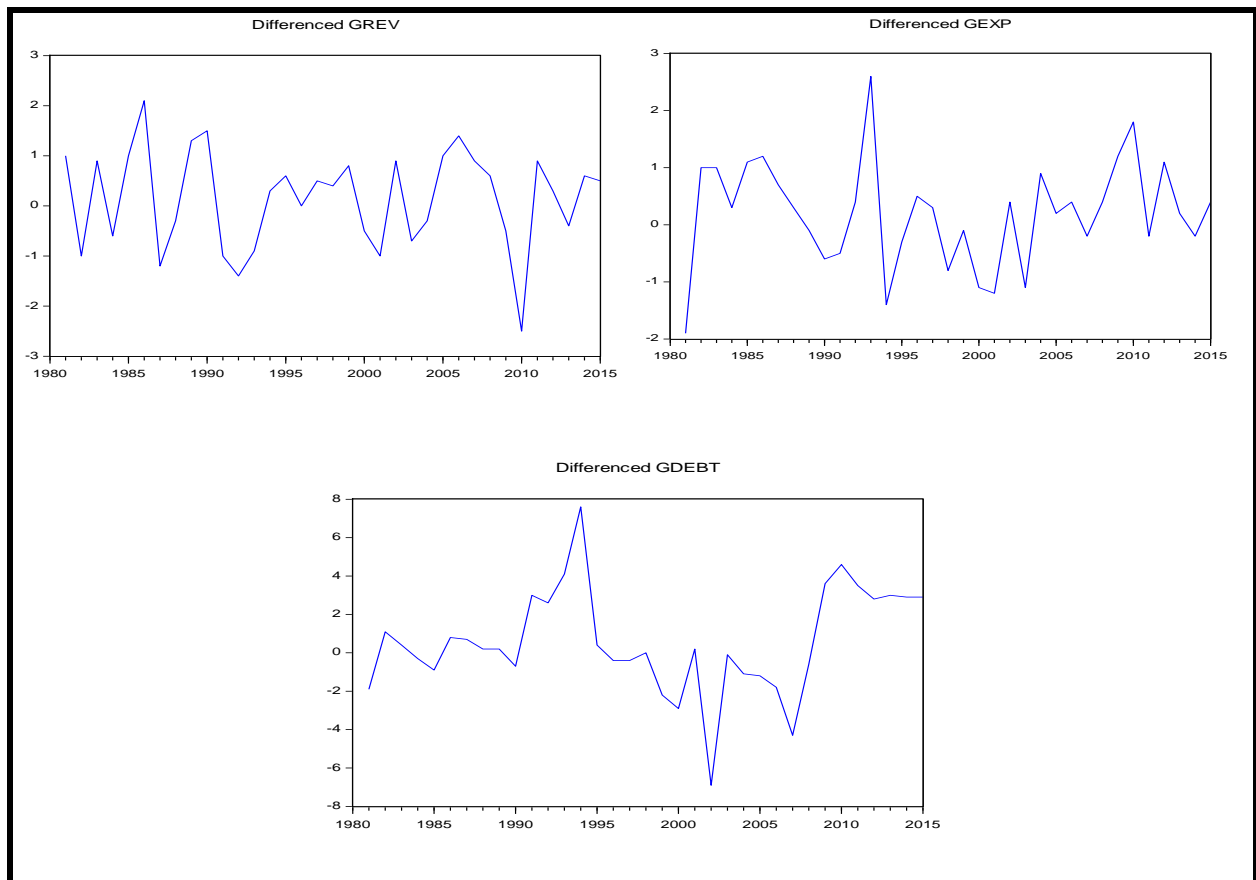
The visual inspection of the differenced variables shows that there is evidence of stationarity amongst the variables. This is because the differenced variables have shown a tendency to converge and fluctuate around the mean. This proves that the mean, variance and co-variance are constant over time. Although, graphically the variables show evidence of stationarity, the

formal tests of stationarity will be conducted to confirm the results of the visual inspection. The results of the Augmented Dickey Fuller and Phillips – Perron tests are shown in Table 5.1 and 5.2.

**Figure 5:1 Graphical representation of variables in levels (1980 to 2015)**



**Figure 5:2 Graphical representations of differenced variables (1980 to 2015)**



Both the ADF and PP tests are conducted under a null hypothesis which states that there is unit root amongst the variables. When a time series portrays evidence of non-stationary, this means we fail to reject the null hypothesis and conclude that the variable has unit root. In this case the variables are differenced to the first order to attain stationarity. The level of significance that this study employs will be at 10 per cent and it will be shown by the asterix (\*\*\*) on the ADF and PP tables.

Indicated in Table 5.1, are the ADF test results in levels and difference form. The variables government revenue (GREV), government expenditure (GEXP) and government debt (GDEBT) have a unit root in levels. This confirms that the variables are non-stationary as the null hypothesis cannot be rejected. As a result, differencing of the variables to the first order is needed to attain stationarity. When first differencing is employed, the series becomes stationary at the level of significance which the study indicated. Indicated also in Table 5.1 are the PP test results in levels and difference form. In levels form the series displays non-stationarity, however when differenced to the first order the series becomes stationary. Therefore, the null hypothesis cannot be rejected as the variables are integrated of the same

order  $I(1)$ . Since the individual time series are stationary and are integrated of the same order the cointegration test can be performed.

**Table 5:1 Augmented Dickey Fuller and Phillips-Perron tests at levels and first difference**

		ADF TEST		PP TEST	
Order of integration	Variable	Coefficient	Coefficient with trend	Coefficient	Coefficient with trend
Levels	GREV	-2.163681 (0.2225)	-3.626391 (0.0423)	-1.971131 (0.2976)	-2.997284 (0.1473)
1 <sup>st</sup> difference	D(GREV)	-5.699928*** (0.0000)	-5.598739*** (0.0003)	-7.702423*** (0.0000)	-7.461017*** (0.0000)
Levels	GEXP	-1.115605 (0.6986)	-1.566125 (0.7860)	-1.151803 (0.6839)	-1.736641 (0.7133)
1 <sup>st</sup> difference	D(GEXP)	-6.122385*** (0.0000)	-6.029010*** (0.0001)	-6.089340*** (0.0000)	-6.001406*** (0.0001)
Levels	GDEBT	-1.654948 (0.4444)	-1.827051 (0.6693)	-1.359025 (0.5908)	-1.623107 (0.7631)
1 <sup>st</sup> difference	D(GDEBT)	-3.270926*** (0.0244)	-3.240140 (0.0938)	-3.272535*** (0.0243)	-3.243510 (0.0932)

(\*) represents stationary at 1% level of significance

(\*\*) represents stationarity at 5% level of significance

(\*\*\*) represents stationarity at 10% level of significance

Values in () represents the probability value

(D) representation of the differenced variables

### 5.3 Cointegration results

The cointegration test helps to establish the long run equilibrium characteristics between the variables. Therefore, a stationary linear combination amongst the variables is called the cointegration equation. The cointegration of variables can be estimated in two components being the long run equilibrium characteristics and short run disequilibrium dynamics. The Johansen's maximum likelihood method is used in this study to test for cointegration of the variables.

Before the cointegration test can be estimated, the Johansen procedure requires that an indication of the lag order be determined. The lag length criterion results as shown in table 5.2 indicate a maximum of 3 lags under the guidance of different criterions. For the purpose of this study, the AIC and SIC criterion are of interest. However, the criterion with the lowest lag between AIC and SIC was chosen. As a result, the lag that is adopted in this study is lag 1 provided by both AIC and SIC criterion. This is the lag that is used to determine the Johansen cointegration results.

**Table 5:2 Lag length criterion**

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-225.2007	NA	203.7252	13.83035	13.96639	13.87612
1	-144.4209	141.9767*	2.637988*	9.480054*	10.02424*	9.663156*
2	-135.9337	13.37370	2.765236	9.511136	10.46346	9.831563
3	-132.3129	5.047283	3.984643	9.837143	11.19760	10.29490

\* 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

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

The Johansen (1988 and 1991) procedure allows for two different likelihood-ratio tests of cointegration: trace test and maximum eigenvalue test. The trace test is conducted under the null hypothesis that the cointegrating vectors is less ( $\leq r$ ) than the number of variables in the equation and the alternative states that the number of the cointegration vectors ( $=r$ ) is equal to the number of variables in the equation. The maximum eigenvalue is conducted under the null hypothesis that the number of the cointegrating vectors ( $=r$ ) and the alternative states that the number of cointegrating vector plus one ( $r + 1$ ). The results of the trace test and maximum eigenvalue test are shown by Table 5.3 and 5.4.

**Table 5:3 Unrestricted cointegration rank test (Trace)**

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.450531	32.20144	29.79707	0.0259
At most 1	0.192265	11.84212	15.49471	0.1647
At most 2*	0.126089	4.582411	3.841466	0.0323

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

\* denotes rejection of the hypothesis at the 0.05 level

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

Table 5.3 shows that there is one cointegrating vector at 5 per cent level of significance. The trace statistics at none ( $r=0$ ) reveal a trace statistic of 32.20 which exceeds its critical value of 29.79 per cent. Therefore, the study rejects the null hypothesis of no cointegration vector since the trace test shows evidence of one cointegrating vector. The maximum eigenvalue test in Table 5.4 indicates that there is no cointegration vector at 5 per cent level of significance. Therefore, the study fails to reject the null hypothesis that states that there is no cointegrating vector. Since the trace test reveals evidence of at least one possible cointegration vector while the maximum eigenvalue indicates that there is no cointegration, the trace test is the one this study will follow.

**Table 5:4 Unrestricted cointegration rank test (Maximum Eigenvalue)**

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None	0.450531	20.35932	21.13162	0.0638
At most 1	0.192265	7.259713	14.26460	0.4589
At most 2*	0.126089	4.582411	3.841466	0.0323

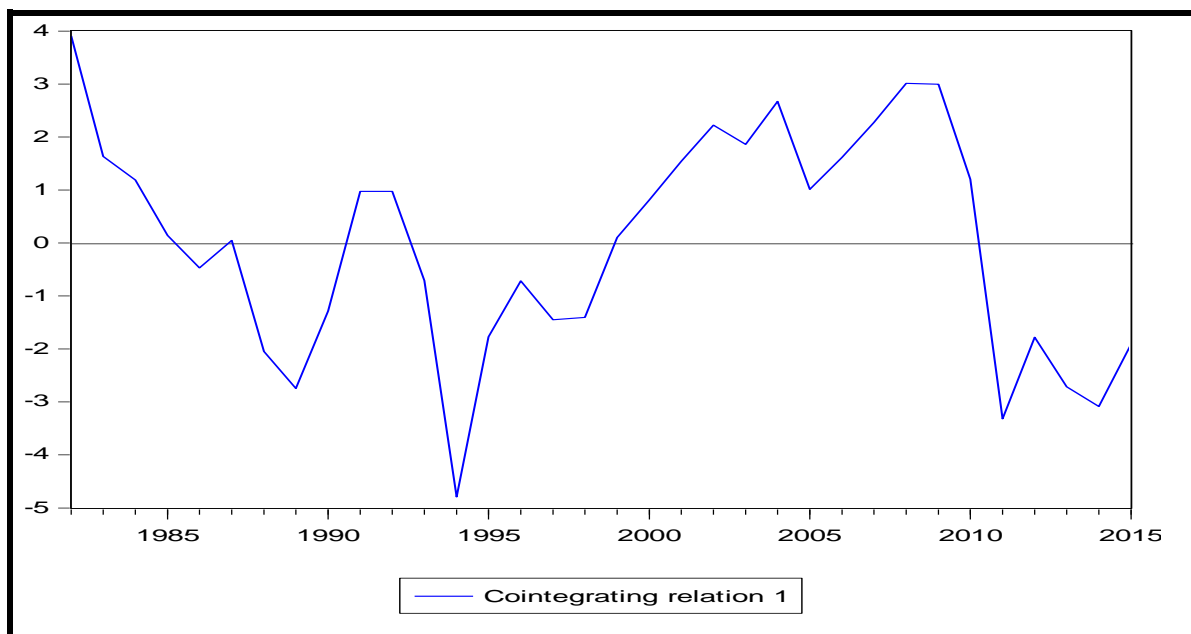
Max-eigenvalue test indicates no cointegration eqn(s) at the 0.05 level

\* denotes rejection of the hypothesis at the 0.05 level

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

Evidence of the one cointegrating vector can be represented by a cointegration graph as shown in Figure 5.3. The cointegration graph from 1980 to 2015 represents the deviations of the endogenous variables from its long run equilibrium level. The graph is stationary as it fluctuates around the mean. This suggests that an error correction model can be estimated with the inclusion of one vector.

**Figure 5:3 Cointegration graph**



#### 5.4 Vector Error Correction Model (VECM)

The presence of cointegration between variables suggests that there is a long run relationship that exists between the dependent variable government revenue (GREV) and the independent variables. This implies that the VEC model can be applied. The advantage of the VEC model is that it can estimate and distinguish the long run relationship and the short run relationship between the variables. The results of the Vector Error Correction Model are given by Table 5.5 and 5.6.

**Table 5:5 Long run relationship results**

Variable	Coefficient	Standard error	t-statistic
GREV(-1)	1.000000	–	–
GEXP(-1)	1.384591	0.23760	-5.82735
GDEBT(-1)	-0.102698	0.06097	1.68433
C	8.988060	–	–

The long run relationship between government revenue (GREV), government expenditure (GEXP) and government debt (GDEBT) are shown by Table 5.6. The results suggest that in the long run there is a positive relationship between GREV and GEXP. However, the long run relationship between GREV and GDEBT suggests that there is a negative relationship. The absolute t-statistic for the independent variable GEXP is greater than 2 indicating that the variable is significant while the variable GDEBT is statistically insignificant. All the coefficients are significant at 1% level of significance. Thus, a 1% increase in GEXP is likely to increase GREV by 1.38% while a 1% increase in GDEBT is likely to decrease GREV by 0.10%. This relationship between GREV, GEXP and GDEBT from the period 1980 to 2015 can be summarised in an equation as follows:

$$GREV = 8.98 + 1.30GEXP - 0.10GDEBT + \mu_t \quad (5.1)$$

From equation (5.1) the positive relationship between the dependent variable government revenue and the independent variables being government expenditure and government debt are in line with economic theory. The tax-spend hypothesis developed by Friedman (1978) explains that when tax revenue is increased it results in government expenditure being

increased. These findings are consistent with that of (Apergis, Payne and Saunoris (2012), Al-Khulaifi (2012), Eita and Mbazima (2008), Masenyetse and Motelle (2012), Nanthakumar, Kogid, Sukemi and Muhamad (2011), Demirhan and Demirhan (2013)). The negative relationship between government revenue and government debt suggests that in the long run the increase in government debt may not be influenced only by the level of government revenue but by the level of government expenditure. These signs are in line with the expected signs outlined in chapter four. The short run model or ECM is shown by Table 5.6.

**Table 5:6 Error Correction Model (ECM) results**

Variable	Coefficient	Standard error	<i>t</i> -statistic
D (GREV)	-0.245017	0.11616	-2.10930
D(GEXP)	0.312998	0.08993	3.48065
D(GDEBT)	-0.077592	0.27213	-0.28514

The error correction corrects any disequilibrium that may have occurred in the previous year. The results of the error correction model indicate that the variable D (GREV) is negative and statistically significant as the absolute *t*-statistic is -2.10. Table 5.6 suggests that the coefficient of D (GREV) is -0.2450. This coefficient implies that the speed of adjustment is 24.5 per cent. This means that if there is deviation from equilibrium, only 24 per cent is corrected in one year as the variable D (GREV) moves towards restoring equilibrium.

### **5.5 Diagnostics tests results**

Diagnostics tests are important when modeling time series data. This is because diagnostics tests provide information regarding the behaviour of the data in a model. When a model is estimated, diagnostics tests can be applied to evaluate the residuals of the model. Furthermore, diagnostics tests provide information on the adequacy of the model. Therefore, conducting various diagnostics tests is of importance to determine the validity of the government revenue model. This study makes use of three tests: LM test, normality test and heteroskesasticity test. Table 5.7 gives the results of the diagnostics tests.

**Table 5:7 Diagnostics tests results**

Test	$H_0$ hypothesis	Statistic	Probability
LM test	No serial correlation at lag order h	5.390905	0.7990
Normality Test (Jacque – Bera)	Residuals are multivariate normal	3.255220	0.7762
Heteroskedasticity Test (includes Cross Terms)	There is no conditional heteroskedasticity	85.22172	0.4423

The LM test which is conducted under the null hypothesis that there is no serial correlation at lag order h is shown in Table 5.7 and the results suggest that there is no serial correlation as the probability value is 0.79 which is above the 5 per cent level of significance. The second diagnostic test is the normality test of Jacque – Bera which is conducted under the null hypothesis that the residuals are multivariate normal. The test of normality has a Jacque-Bera statistic of 3.25 and a probability of 0.77. This suggests that the residuals are multivariate normal. Therefore, the study fails to reject the null hypothesis which states that the residuals are multivariate normal. The third diagnostic test is the test of heteroskedasticity and it is conducted under the null hypothesis of no heteroskedasticity. The test of heteroskedasticity White heteroskedasticity test (including cross terms) reveals that the probability is 0.44. This result suggests that there is no heteroskedasticity. Therefore, the study fails to reject the null hypothesis.

### **5.6 VEC Granger causality results**

One of the main objectives of this study is to determine the direction of causality between government expenditure and government revenue. To analyse the short run causal relationship between GREV and EXP for each equation in the VECM, the study considers the  $X^2$  (Wald) statistics for the significance of the lagged endogenous variables. The test employed is the VEC Granger causality test. This test is conducted under the null hypothesis that states that government revenue does not granger cause government expenditure against the alternative hypothesis that government revenue does granger cause government expenditure. The causality results are reported in Table 5.8.

**Table 5:8 Causality test (VEC Granger causality)**

<b>Dependent variable: D(GREV)</b>			
Excluded	Chi-sq	df	Prob.
D(GEXP)	0.217887	1	0.6407
D(GDEBT)	1.935664	1	0.1641
<b>Dependent variable: D(GEXP)</b>			
Excluded	Chi-sq	df	Prob.
D(GREV)	0.159842	1	0.6893
D(GDEBT)	8.718036	1	0.0032

The null hypothesis of the test states that we fail to reject the null hypothesis whenever the p-value is greater than the 5 per cent level of significance. The VEC Granger causality results suggest that both government expenditure and government debt do not determine government revenue. The p-value of both GEXP and GDEBT are greater than the 5 per cent level of significance. Therefore, the null hypothesis cannot be rejected. The reverse equation suggests that government expenditure does not determine government revenue whilst government debt does granger cause government expenditure. This concludes that in the short run there is no direction of causality between government revenue and government expenditure. This finding is consistent with Dada (2013) whom has provided the same evidence for Nigeria. Whilst in the short run there is a significant relationship between government expenditure and government debt.

### **5.7 Impulse response**

Impulse response analysis reveals the responsiveness of the dependent variable in the VAR to shocks to the error term. This implies that impulse response functions (IRFs) are helpful in determining how government expenditure reacts to its own shock and the shocks of its independent variables. Output of the impulse response is normalized to have an impact of one percent. This is achieved by dividing each shock by the standard deviation of the respective fiscal shock. Impulse response can reveal the persistence and direction over a certain period. The impulse response results are shown by Figure 5.4.

**Figure 5:4 Impulse response graphs**

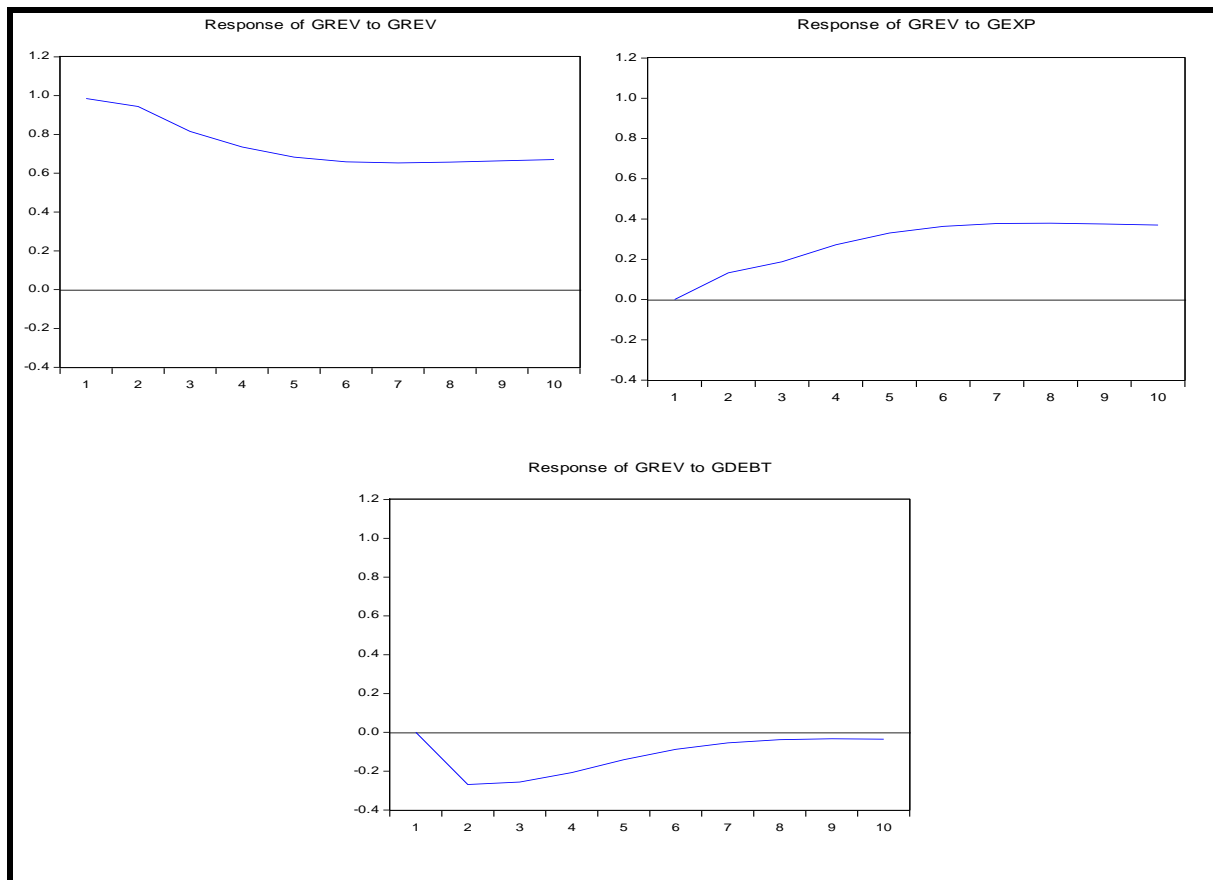


Figure 5.4 displays the impulse response of the variables under study over a 10 year period. The impulse responses of all endogenous variables are found not to be persistent. The shock of government revenue to itself is positive and the impulse response is significant. A one period standard deviation shock from GREV to GREV marginally appreciates by approximately 7 per cent but the impact dies off quickly after a period of 6 years. A one period standard deviation shock to GEXP appreciates GREV by 4 per cent but the impact dies off quickly after a period of 7 years. A one period standard deviation shock to GDEBT will depreciate GREV by approximately 1 per cent but the shock gradually dies off in 7 years.

### **5.8 Variance decomposition**

Since, the dynamic responses or shocks of the variables of interest to government revenue were analysed using impulse response functions. This section calculates the forecast error variance decomposition of the economic variables. This is done to assess how the previously determined shocks are transmitted through the system. Furthermore, variance decomposition

measures the contribution of shock to the variance decomposition of that variable. This provides relative information about each shock and how it affects the endogenous variables in the VAR system. The variance decomposition results are shown by Table 5.9.

**Table 5:9 Variance decomposition of Government Revenue (GREV)**

<b>Period</b>	<b>S.E.</b>	<b>GREV</b>	<b>GEXP</b>	<b>GDEBT</b>
1	0.984868	100.0000	0.000000	0.000000
2	1.396941	95.40328	0.898547	3.698173
3	1.648411	92.98561	1.943023	5.071369
4	1.837182	90.88661	3.760133	5.353260
5	1.992603	89.00620	5.942992	5.050807
6	2.131885	87.31045	8.108068	4.581481
7	2.262201	85.88182	9.992537	4.125639
8	2.386406	84.75695	11.51078	3.732270
9	2.505584	83.90676	12.68993	3.403307
10	2.620199	83.26840	13.60150	3.130096

10 years is the period that is used in this study to analyse the variance decomposition of the variables. The variance decomposition of the dependent variable being GREV and the independent variables (GEXP and GDEBT) in the first year, are explained by their own shocks. However, looking at table 5.9, the fluctuations of the GREV model are explained mainly by the shocks of GEXP in the long run. In the sixth year forecast, GEXP shock accounts for 8.10 per cent, GDEBT shock accounted for 4.58 per cent, of its own variations.

However, the last remaining four years particularly the tenth year shows evidence that the shock of GEXP continues to have a greater influence in explaining the significant proportion of variation in GREV. The shock of GEXP increased to 13.60 per cent while the shock of GDEBT decreased to 3.13 per cent. These results suggest that in the short run, shocks to the explanatory variables have significance in explaining the dependent variable. These results are consistent with the impulse response analysis in that the variable that has the greatest influence of GREV is the shock of GEXP. The shock of the other variable GDEBT explains

only a smaller percentage of variation to GREV. Lastly, GREV explains a higher percentage of its own variation as shown by the impulse response analysis.

## **5.9 Conclusion**

This chapter under the guidance of different subsections presented the results of the government expenditure model. The ADF and PP tests were used to conduct unit root tests. The results of the unit root test indicated that in levels the variables are non-stationary but when differenced to the first order  $I(1)$  the variables revealed evidence of stationarity. Once the variables proved stationarity, the appropriate lag number was determined using the Akaike information criterion and Schwarz information criterion. Both the AIC and SIC criterions indicated that lag one is the appropriate lag to be used.

The cointegration results presented under the two Johansen likelihood tests provided two different findings. The trace test found that there is one cointegrating vector at 5 per cent level of significance whilst the maximum eigenvalue test indicated there is no cointegration among the variables. The maximum eigenvalue statistics cannot exceed its critical value and as such the null hypothesis cannot be rejected. Therefore, the study followed the trace test.

To check the short and the long run effects of the variables the vector error correction model was applied. All the coefficients are significant in explaining the dependent variable. The long run results suggest that there is a positive relationship between GREV and GEXP. However, the long run relationship between GREV and GDEBT suggests that there is a negative relationship. The model was checked for stability by performing the diagnostics tests. The model was normally distributed, no serial correlation and no misspecification was found. The impulse response and variance decomposition were consistent with each other. These two tests revealed the variable that has the greatest influence of GREV is the shock of GEXP. The shock of the other variable GDEBT explains only a smaller percentage of variation to GREV. Lastly, GREV explains a higher percentage of its own variation. From these results a conclusion can be made.

## **CHAPTER SIX**

### **CONCLUSIONS AND POLICY RECOMMENDATIONS**

#### **6.1 Introduction**

In this chapter the major findings are summarised and based on the results found policy recommendations are provided. This chapter is divided into five sections. Section 6.2 provides the summary of the study; section 6.3 discusses the conclusions of the study; section 6.4 outlines the policy implication and recommendations and section 6.5 provides proposal for future research

#### **6.2 Summary of the study**

This research studied the causal and cointegration relationship between government revenue and government expenditure from 1980 to 2015. The introductory chapter outlined the main objective of this study as to determine the causal relationship that exists between government revenue and government expenditure. The second chapter gave a detailed overview of government revenue, government expenditure and other variables that affect the study. These variables are government debt and economic growth depicted as GDP in the study. The third chapter introduced the theoretical and empirical framework. The theoretical framework laid the foundation of the study while the empirical framework re-viewed research done by other scholars. The fourth chapter provided in detail the method that the study adopted in analysing the data. The fifth chapter analysed and interpreted the results. In this chapter a more in-depth summary and discussion of the study is presented together with policy implication and recommendations in South Africa followed by proposal for future research.

#### **6.3 Conclusions of the study**

This section concludes the different objectives of the study as well as indicates how the objectives were realised.

### **6.3.1. Conclusion on trends of government revenue and government expenditure in South Africa**

The relationship between government revenue and government expenditure has a significant impact on the fiscal deficit of South Africa. When government expenditure exceeds government revenue this causes the budget deficit to rise. An in-depth analysis of the overview of government revenue and government expenditure trends in South Africa reveal that the government expenditure trends always exceed the government revenue trends resulting in the fiscal deficit. The South African government has been experiencing widening budget deficit except for the fiscal year 2007 and 2008 when the surplus was recorded. The government needs to implement sources of increasing the revenue levels so that the revenue base can grow. The reducing of the government expenditure levels also needs to be made a priority. Policies that address wasteful expenditure need to be strengthened.

### **6.3.2. Conclusion on the literature on literature of government revenue and government expenditure**

The literature review in this study analysed the relationship between government expenditure and government revenue from two perspectives. The theoretical framework employed the following theories: Wagner's law of increasing state activity, Peacock and Wiseman's theory of public expenditure, the tax-spend hypothesis, fiscal synchronisation and fiscal neutrality hypothesis. Although, these theories gave an insight of the relationship between government revenue and government expenditure, they all advocate for different causality behaviour.

Evidence from the empirical literature was in line with economic theory with various studies revealing support that there is a unidirectional relationship from revenue to expenditure (Apergis, Payne and Saunoris (2012), Al-Khulaifi (2012), Eita and Mbazima (2008), Nanthakumar, Kogid, Sukemi and Muhamad (2011), Demirhan and Demirhan (2013)) and others from expenditure (Khalaf (2008), Carneiro, Faria, Barry (2005), Gounder, Narayan and Prasad (2007), Dogan (2013), Saysombath and Kyophilavong (2013), Lukovic and Grbic (2014) to revenue.

Whereas, other studies (Al-Qudair (2005), Mehrara, Pahlavani and Elyasi (2011), Al-Zeaud (2012), Aregbeyen and Insah (2013), Antwi, Zhao and Mills (2013), Takumah (2014)) have indicated that there is a bi-directional causality while others state there was no relationship. A Study done by Dada (2013) has found no causality between the variables. In South Africa the studies analysed indicated that there is evidence of bi-directional causality from government

revenue to government expenditure. Studies such as (Nyamonga, Sichei and Schoeman (2007), Lusinyan and Thornton (2007), Ziramba (2008) in South Africa have supported bi – directional causality. This study however has shown that in South Africa there is no causality between government revenue and government expenditure.

### **6.3.3. Conclusion on the long run and short run relationship between government revenue and government expenditure in South Africa**

The study employed the Johansen multivariate cointegration approach in investigating the long run relationship between government revenue and government expenditure. The results found that there is a long run relationship between government revenue and government expenditure for the period 1980 to 2015. This shows that in the long term government revenue and government expenditure do converge. The study further employed the vector error correction model to determine the short run relationship. The study found that in the short run there error correction model is negative and statistically significant. This implies that the speed of adjustment is 24 per cent. The deviation from equilibrium is that is corrected in one year is 24 per cent. However, in the short run there is no clear direction of causality.

### **6.3.4. Conclusion on the direction of causality between government revenue and government expenditure**

In the short run the vector error correction Granger causality test reveals that there is no causality between government revenue and government expenditure. Furthermore, there is causality between government expenditure and government revenue. There was no direction of causality between government revenue and government debt. However, the reverse causality indicates that there is a unidirectional relationship from government debt to government revenue.

## **6.4 Policy recommendations**

The model and results analysis in this study are important as they will assist economists and policy makers to make informed decision when it comes to containing the fiscal deficit in South Africa. Therefore, this study views the policies that can assist in reducing the budget deficit.

In society higher taxes contribute positively to the revenue and in the long term can assist in reducing the budget deficit. The long run equation in this study suggests that government revenue affects government expenditure in a positive manner. Thus, a 1 per cent increase in

government revenue will increase government expenditure by 1.38 per cent. This finding suggests that the increase in government revenue will result in government expenditure increasing. However, to reduce the fiscal deficit the South African government should increase the level of taxation in the country so that more revenue can be generated. However, this should not be done in a manner that will burden the tax payers. Rather, the government should also strengthen its revenue collections so that there is no evasion of taxes from companies that should be contributing back to the receiver of revenue.

However, the increase in taxation needs to be accompanied by low levels of government expenditure within the country. The government expenditure trends of South Africa reveal that there has been an increase in the trend from 1980 to 2015. Policy makers should guard against the spending patterns that are harmful to the economy and rather prioritise expenditures that result in building and growing the economy. Prioritising expenditure that will result in productivity of the country can result in long term sustainability. For e.g. government towards education, health and other factors can contribute towards long term development of the economy.

Although government debt serves as an injection into the economy it can result in a higher demand of loans, increased borrowing from international investors and borrowing from the private sector causing government spending to increase as societies also demand more. Therefore, for a developing country like South Africa this causes a greater dependence on debt financing and for the economy there is negative crowding out effects. These negative effects are: decline in foreign (capital) investment, higher interest rates re-payments, debt burden for future generations and many more. Therefore, to boost or sustain economic growth policy makers in the government need to reduce the level of the budget deficit.

### **6.5 Proposal for future research**

This study analysed the causal relationship between government expenditure and government revenue in South Africa. This is because the difference between the two variables has a greater impact on the budget deficit in South Africa. Therefore, this study focused only mainly on the budget deficit. However, as a developing country the role of government in South Africa is socially and politically influenced. Therefore, important variables that could have influenced the outcome of this study were not modelled due to lack of data. Variables such as political instability index, corruption index, trade openness and taxation data amongst others. If quality data arises, future research should explore how the inclusion of these

variables affects the level of government expenditure and revenue so that the budget deficit can remain sustained.

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## APPENDICES

### Appendix 1: Data set

Code	Unit Of Measure	Description		
<a href="#">KBP4116J</a>	R millions	Total loan debt of national government: Total gross loan debt as percentage of GDP		
<a href="#">KBP4434J</a>	Percentage	National government expenditure as percentage of GDP		
<a href="#">KBP4433J</a>	Percentage	National government revenue as percentage of GDP		
Date	<b>KBP4116J</b> Total loan debt of national go ...	<b>KBP4433J</b> National government revenue as ...	<b>KBP4434J</b> National government expenditur ...	
1980	30.9	19.6	22.6	
1981	29	20.6	20.7	
1982	30.1	19.6	21.7	
1983	30.5	20.5	22.7	
1984	30.2	19.9	23	
1985	29.3	20.9	24.1	
1986	30.1	23	25.3	
1987	30.8	21.8	26	
1988	31	21.5	26.3	
1989	31.2	22.8	26.2	
1990	30.5	24.3	25.6	
1991	33.5	23.3	25.1	
1992	36.1	21.9	25.5	
1993	40.2	21	28.1	
1994	47.8	21.3	26.7	
1995	48.2	21.9	26.4	
1996	47.8	21.9	26.9	
1997	47.4	22.4	27.2	
1998	47.4	22.8	26.4	
1999	45.2	23.6	26.3	
2000	42.3	23.1	25.2	
2001	42.5	22.1	24	
2002	35.6	23	24.4	
2003	35.5	22.3	23.3	
2004	34.4	22	24.2	
2005	33.2	23	24.4	
2006	31.4	24.4	24.8	
2007	27.1	25.3	24.6	
2008	26.5	25.9	25	
2009	30.1	25.4	26.2	
2010	34.7	22.9	28	
2011	38.2	23.8	27.8	
2012	41	24.1	28.9	
2013	44	23.7	29.1	
2014	46.9	24.3	28.9	
2015	49.8	24.8	29.3	

Source: South African Reserve Bank (2016)

## Appendix 2: Johansen cointegration test

Sample (adjusted): 1982 2015  
 Included observations: 34 after adjustments  
 Trend assumption: Linear deterministic trend  
 Series: GREV GEXP GDEBT  
 Lags interval (in first differences): 1 to 1

### Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.450531	32.20144	29.79707	0.0259
At most 1	0.192265	11.84212	15.49471	0.1647
At most 2 *	0.126089	4.582411	3.841466	0.0323

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

\* denotes rejection of the hypothesis at the 0.05 level

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

### Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None	0.450531	20.35932	21.13162	0.0638
At most 1	0.192265	7.259713	14.26460	0.4589
At most 2 *	0.126089	4.582411	3.841466	0.0323

Max-eigenvalue test indicates no cointegration at the 0.05 level

\* denotes rejection of the hypothesis at the 0.05 level

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

## Appendix 3: Vector Error Correction

Vector Error Correction Estimates  
 Sample (adjusted): 1982 2015  
 Included observations: 34 after adjustments  
 Standard errors in ( ) & t-statistics in [ ]

Cointegrating Eq:	CointEq1		
GREV(-1)	1.000000		
GEXP(-1)	-1.384591 (0.23760) [-5.82735]		
GDEBT(-1)	0.102698 (0.06097) [ 1.68433]		
C	8.988060		
Error Correction:	D(GREV)	D(GEXP)	D(GDEBT)
CointEq1	-0.245017 (0.11616) [-2.10930]	0.312998 (0.08993) [ 3.48065]	-0.077592 (0.27213) [-0.28514]

## Appendix 4: LM test

VEC Residual Serial Correlation LM Tests  
 Null Hypothesis: no serial correlation at lag order h

Sample: 1980 2015

Included observations: 34

Lags	LM-Stat	Prob
1	5.390905	0.7990
2	6.775591	0.6605
3	10.11983	0.3409
4	5.439504	0.7944
5	5.648872	0.7745
6	4.192651	0.8983
7	15.10589	0.0881
8	7.062180	0.6306
9	22.19174	0.0083
10	5.725332	0.7671
11	6.627863	0.6758
12	5.108411	0.8248

Probs from chi-square with 9 df.

## Appendix 5: Jacque – Bera test

VEC Residual Normality Tests

Orthogonalization: Cholesky (Lutkepohl)

Null Hypothesis: residuals are multivariate normal

Sample: 1980 2015

Included observations: 34

Component	Skewness	Chi-sq	df	Prob.
1	0.023415	0.003107	1	0.9556
2	0.454370	1.169896	1	0.2794
3	-0.203116	0.233784	1	0.6287
Joint		1.406787	3	0.7039

Component	Kurtosis	Chi-sq	df	Prob.
1	2.064158	1.240717	1	0.2653
2	3.567992	0.457038	1	0.4990
3	2.673869	0.150678	1	0.6979
Joint		1.848433	3	0.6045

Component	Jarque-Bera	df	Prob.
1	1.243823	2	0.5369
2	1.626934	2	0.4433
3	0.384462	2	0.8251
Joint	3.255220	6	0.7762

## Appendix 6: Heteroskedasticity test

VEC Residual Heteroskedasticity Tests: Includes Cross Terms

Sample: 1980 2015

Included observations: 34

Joint test:

Chi-sq	df	Prob.
85.22172	84	0.4423

Individual components:

Dependent	R-squared	F(14,19)	Prob.	Chi-sq(14)	Prob.
res1*res1	0.534359	1.557424	0.1821	18.16819	0.1992
res2*res2	0.302415	0.588345	0.8423	10.28211	0.7413
res3*res3	0.396092	0.890125	0.5808	13.46713	0.4901
res2*res1	0.343052	0.708688	0.7415	11.66378	0.6333
res3*res1	0.319756	0.637939	0.8023	10.87170	0.6961
res3*res2	0.400643	0.907190	0.5662	13.62188	0.4782

## Appendix 7: Causality test

VEC Granger Causality/Block Exogeneity Wald Tests

Sample: 1980 2015

Included observations: 34

Dependent variable: D(GREV)

Excluded	Chi-sq	df	Prob.
D(GEXP)	0.217887	1	0.6407
D(GDEBT)	1.935664	1	0.1641
All	1.986560	2	0.3704

Dependent variable: D(GEXP)

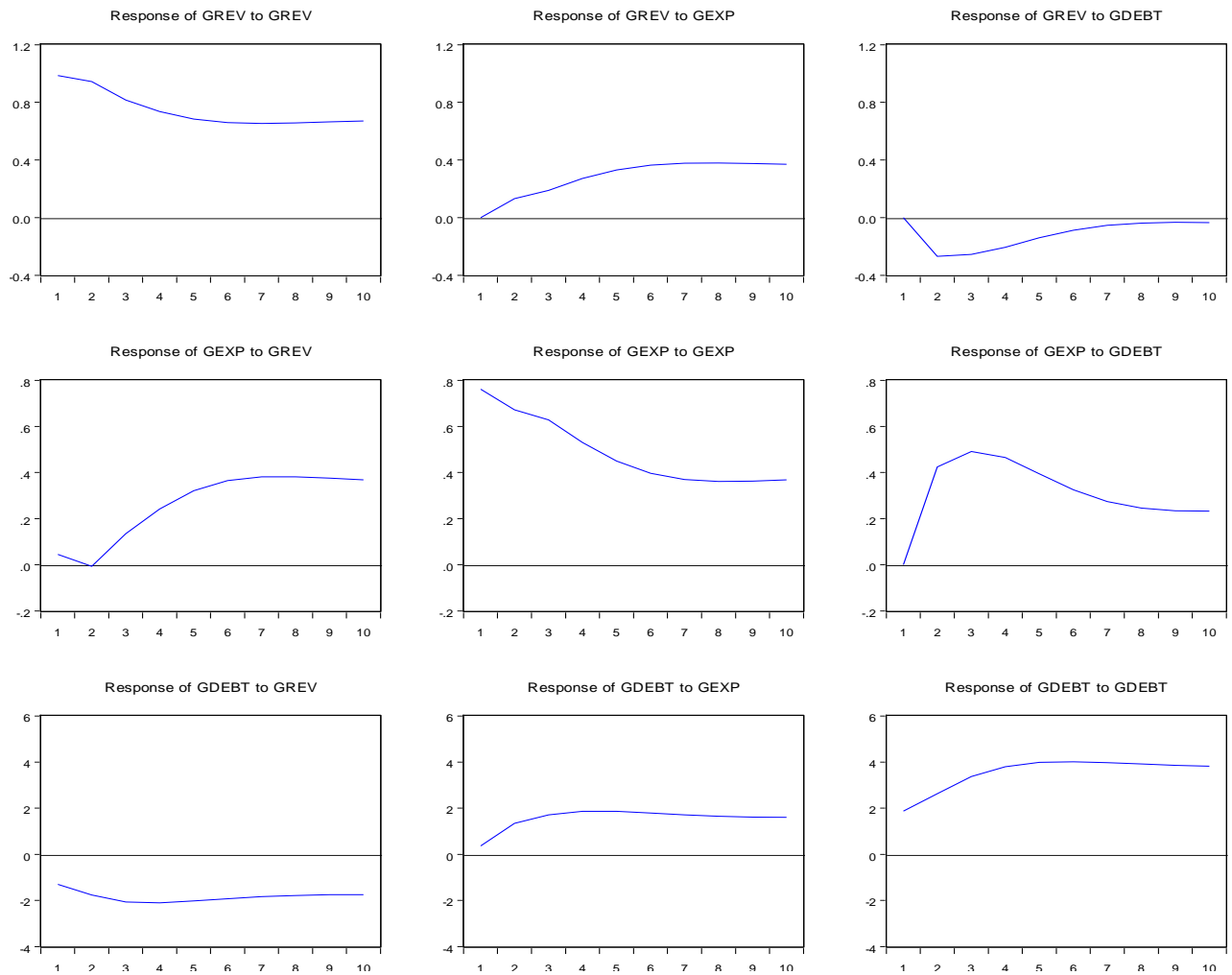
Excluded	Chi-sq	df	Prob.
D(GREV)	0.159842	1	0.6893
D(GDEBT)	8.718036	1	0.0032
All	10.63659	2	0.0049

Dependent variable: D(GDEBT)

Excluded	Chi-sq	df	Prob.
D(GREV)	0.031363	1	0.8594
D(GEXP)	4.089605	1	0.0431
All	4.096427	2	0.1290

## Appendix 8: Impulse response

Response to Cholesky One S.D. Innovations



## Appendix 9: Variance Decomposition

Varian  
ce  
Decom  
position  
of  
GREV:

Period	S.E.	GREV	GEXP	GDEBT
1	0.984868	100.0000	0.000000	0.000000
2	1.396941	95.40328	0.898547	3.698173
3	1.648411	92.98561	1.943023	5.071369
4	1.837182	90.88661	3.760133	5.353260
5	1.992603	89.00620	5.942992	5.050807
6	2.131885	87.31045	8.108068	4.581481
7	2.262201	85.88182	9.992537	4.125639
8	2.386406	84.75695	11.51078	3.732270
9	2.505584	83.90676	12.68993	3.403307
10	2.620199	83.26840	13.60150	3.130096