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WESTERN CAPE**

**The effect of South African public debt on economic growth: An ARDL
cointegration approach from 1961-2017**

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Abstract

Abstract

This study investigates the effect of public debt on economic growth in South Africa since 1961-2017. Public debt stock is disaggregated into external debt and domestic debt in order to determine the effect of each on economic growth independently. The study employed the ARDL bound test to estimate the long and short run relationship among several macroeconomic variables - real economic growth, domestic debt, external debt, budget deficit, inflation rate and investment. An error correction model was used to analyse the short-run disequilibrium. The results show that there is a short and long run equilibrium relationship between foreign debt, domestic debt, budget deficit, inflation rate and economic growth. The empirical results indicate that external debt negatively affects the real GDP growth in South Africa, both in the short and long-run. Several policy implications emerged from the empirical results. To keep public debt more manageable, South Africa should improve its debt management. Furthermore, the country can make use of debt to equity swaps by privatizing underperforming parastatals. This would make them competitive and efficient. This move could attract more foreign direct investment inflows and create more employment thus improve the economic growth of South Africa.

Key words: ARDL, Public debt, Real GDP, Error Correction Model

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Declaration

I declare that the dissertation hereby submitted to the University of Western Cape for the degree of Master of Commerce in Economics has not previously been submitted by me for a degree at this or any other university; that it is my own work in design and in execution, and that all material contained herein has been duly acknowledged. In compliance with plagiarism policy, the sources used in this study have been acknowledged both in the text and the bibliography.

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08 July 2019



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List of abbreviations

ADF	Augmented Dickey-Fuller
OLS	Ordinary least squares
AR	Autoregressive
ARDL	Autoregressive distributed lag
ASGISA	Accelerated and Shared Growth Initiative of South Africa
BLUE	Best linear unbiased estimator
CLRM	Classical Linear Regression Model
CPI	Consumer price index
ECM	Error correction model
GDP	Gross Domestic Product
GEAR	Growth, Employment and Redistribution
GST	General Sales Tax
GST	General Sales Tax
KPSS	Kwiatkowski, Phillips, Schmidt, and Shin
MTBPS	Medium Term Budget Policy Statement
MTEF	Medium Term Expenditure Framework
NDP	National Development Plan
NGP	New Growth Path
RDP	Reconstruction and Development Program
RSA	Republic of South Africa
SARB	South African Reserve Bank
SARS	South African Revenue Service
StatsSA	Statistics South Africa
VAR	Vector autoregressive model
VAT	Value Added Tax

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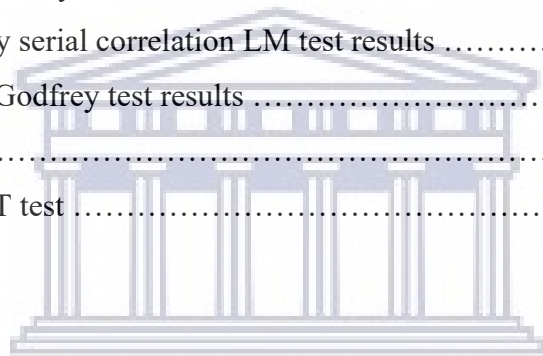
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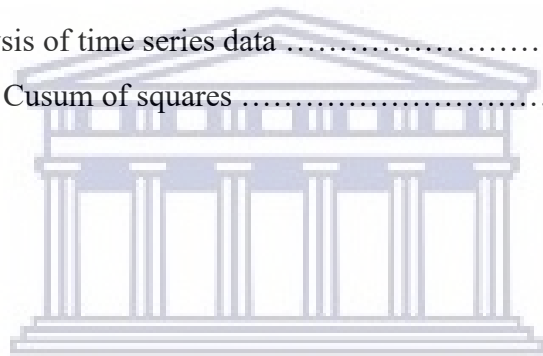
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CHAPTER 1

INTRODUCTION

1.1 Background of the study.

Recent contributors signposted the issue concerning how public debt affects economic growth. However, there is still much dispute over this issue in many nations in both policymaking and academic circles (Cashell, 2007). The impact of the financial crisis and the subsequent sovereign debt problem, which began in 2007/8, has been of concern to various governments in their effort to stimulate economic growth, more especially in developing countries. Against this background, government debt continues to be high in both developing and less developed countries. Notwithstanding, the consequence of high government debt from different countries, particularly African countries, was attributable due to high government expenditures, high unemployment and state corruption among other factors.

According to Mititi (2013), a sound risk management by the public sector is essential as it induces economic growth and economic balance through mobilising resources at a lower borrowing cost and concurrently minimises financial risk, to be consistent with a prudent approach. Furthermore, a stable economic growth in a country is productive if it is aided by an increase in the effective and proficient utilisation of resources in the interest of achieving macroeconomic objectives, notably, economic stability, and ultimately revival of the level of employment.

In the 2018 national budget speech, it was pointed out that South Africa's rising government debt ratio, accompanied by low or unpredictable growth, is an outcome of the mounting debt costs crowding out social and economic spending. As stated by National Treasury (2018), with state revenue under pressure the former Minister of Finance Mr Malusi Gigaba pointed out that government seeks to reduce the primary budget deficit over the medium term in order to balance the budget and keep the percentage of government debt to GDP at a stable level of 56.2% by 2022/23. According to Mabagu, Robichaud, Maisonnave and Chitiga (2013), the utilisation of high taxation to finance extra expenditure will offset the real risk of running into liquidity issues due to an increasing debt to GDP.

Consequently, a rise in expenditure on investment programmes could ameliorate the future growth rate and reduce the debt to GDP and deficit to GDP ratios. Additionally, South Africa came up with a National Development Plan (NDP) outlining the vision for 2030 in order to ensure economic stability and mitigate economic challenges. The underlying focal point on this

vision is progressive fiscal policy which is expected to perform a key role in leading the pace at which the South African economy can grow and the way to subsume the key challenges that may arise in future. This is in line with the findings of Ocran (2009), who suggested that in order to attain fiscal policy acceleration, there must be a balance and realignment of key areas of government policy in order to use consumption and investment expenditure to accelerate growth. All of this would be compatible with the economic infrastructure required to support the state's role in setting an appropriate macroeconomic framework.

The size of government deficit and the strategy to reduce and maintain it within the threshold remains a serious problem to deal with in many countries including South Africa. The Medium-Term Budget Policy Statement (2017) postulated that government deficit should not be sustained when the economy is unresponsive because current account deficit would worsen and result in high inflation and interest rates. Subsequent to the global crisis of 2008/9, South Africa and many other developing countries, more especially in Africa were left with a large public debt that is much worse than a degree of crowding out effect (Mabugu *et al*, 2013). Looking at countries like Spain, Greece, Cyprus Ireland and Portugal they ended up in situations of sovereign debt default due to the financial crisis. Even worse, for these countries to continue functioning, the international financial institutions had to bail them out (Beirne & Fratzscher, 2013).

The instruments of fiscal policy in most countries, including South Africa, are used to counter slowdowns in the economy. Swanepoel and Schoeman (2003) argue that countries utilise the instruments of fiscal policy owing to their countercyclical role in dealing with external shocks that could occur due to the vulnerability of an economy amid a worldwide monetary downturn. Furthermore, the effects of fiscal policy contribute enormously to a country's economic outcome and they are among the key tools benefiting business or economic cycles to promote fiscal stability in a country. Fiscal stability is determined by both the budget revenue side and by the consumption streams. On the income side, most nations are caught in profound budget shortfalls or government obligation and are calling for higher taxes or other revenue from the open segment to manage the subsequent increment in debt.

Such a decision, however, can spark the economic growth rate in a developing economy, which as a result, can ultimately induce the erosion of tax a base and dwindle tax revenue. As such, this could further increase the budget shortfalls, and lead to fiscal instability within the economy. The fiscal policy involves circulation of the resources at different times across society in the economy, as far as expenditure is concerned. Barker, Buckle and Clair (2008)

hold a view that there is not autonomy of structures and stability roles played by fiscal policy. However, such structures have significant ramifications concerning sustainability of the fiscus and the adequate stabilisation on the role of fiscal policy. For example, the availability of resources that can be spent by the government is determined by the size and structure of the tax base, thus affecting sustainability of the fiscus.

In this study, it is important to bring to light the idea that achieving economic growth rate will reduce poverty and inequality by 2030 and that requires the government to deal with a growing public debt amongst other factors. It is notable that many variables in the economy may restrict the likelihood of achieving some of the objectives of the NDP by 2030. However, in this study the primary focus is on public debt, to reveal its impact on South African's economic growth since 1961 to 2017.

1.2 Statement of the problem.

Post the financial crises era, the South African economy struggled to grow above 2% on average and this made it extremely difficult for the economy to consolidate its public debt that had accrued from countercyclical fiscal policy (Mark, 2015). The constraint behind sufficed due to several factors that have a huge impact on the fiscal environment. Recently, public debt has approached the upper limit of sustainability which is above 50% of GDP (MTBPS, 2017). The cost of servicing debt remains a fear owing to the possible risk of jeopardising the health of the national budget, and consequently compromises the expansion of public services and investment. Therefore, government is required to safeguard public finances by acting within its fiscal limits that can be sustainable for a long period (MTBPS, 2017). The downturn in economic growth that necessitated large government deficit caused South Africa's level of public debt to escalate to 53.1% of GDP, and it is expected to record about 60% of GDP by the fiscal year 2023/24.

According to Black, Calitz and Steenekamp (2015), South Africa's amount of public debt that was due by the end of December 2013 was R1 561 billion, which constituted 46% of GDP. Supposing the government were to pay-back the public debt immediately, this would imply imposing a once-off average tax of R29 500 per citizen (Black, *et al.*, 2015). Economies with high debt ratio to GDP experience subdued economic growth. A country such as Japan, for example, has the largest public debt ratio in the world, but still has not found an easier way to achieve modest economic growth (Egert, 2015); whereas public debt ratios of countries like Norway, Sweden and Australia are around 50% (Naraidoo & Raputsoane, 2015).

Large accumulations of debt burden, corruption, policy uncertainty, large social burden, such as unemployment and poverty, have placed the fiscal credibility of the South African government under threat. With all these issues in place, the National Planning Commission (2011) emerged with the purpose of ensuring a vibrant economy through support to revive growth by identifying and resolving market failures as well as providing proper public infrastructure and services. Lowering transaction costs across the economy is amongst the suggested priorities to reduce unemployment to attain the objectives of the NDP.

It appears that the plan fails to explain the risk associated with skyrocketing government debt levels to the anticipated economic growth. The scenarios given above led to the idea that public debt is a problem for many countries, including South Africa. The question concerning the impact that public debt has on economic growth over time is a key debatable issue with no consensus around the world. Against this backdrop, the study is aiming to assess the impact of public debt on economic growth rate of South Africa's economy from 1961 to 2017. The study will disaggregate public debt into two components; external debt and domestic debt.

1.3 Research objectives.

This study is an empirical study that sets out to delve into investigation on the impact of public debt on South Africa's economic growth

The specific objectives were as follows:

- a) To review the evolution of the South African fiscal policy over the study period.
- b) To examine the effect of domestic debt on the economic growth of South Africa.
- c) To ascertain the effect of external debt on South Africa's growth.
- d) To draw the policy conclusions based on the study results.

1.4 Relevance of the study.

In contrast to studies that overlooked the distinction of external and domestic public debt, of which some concentrated on how external debt generally affects economic growth, such as the work by Ahmed, Saeed and Saed (2015), Munzara (2015), Mhlaba and Phiri (2017), Baaziz, Pattilo, Poirson and Ricci (2002), this study split debt into domestic debt and external debt to investigate the relative effect of every element on the economic growth. Moreover, the study provided additional insight to policy makers and investors on the extent to which the existing public debt can impact on the economic growth of South Africa. For the country to overcome its current and future challenges, as well as achieving the NDP objectives of 2030, the management of these variables must be corrected. It has been attested that growth and

development of the country is dependent on how well fiscal and monetary policies are issued, based on these variables. Notwithstanding, the study impacted the South African economy as the findings and recommendations contained in this study would be accessed and used by policymakers. In addition, the study will be useful to scholars, students, corporate organisations and individuals, who may access it, because of the current issues captured in the background of the study.

1.5 Structure of the study.

The structure of the dissertation unfolds as follows: Chapter 2 provides a synopsis of South African fiscal policy, analysing the evolution of fiscal policy. The relevant literature reviewed for this study is presented in Chapter 3. The focus is on theories concerning public debt and economic growth, followed by an analysis of the empirical literature in the same chapter. Chapter 4 outlines the research methodology used in this study followed by Chapter 5, which provides an analysis of the results based on the methods discussed in Chapter 4. Lastly, Chapter 6 wraps up by providing the conclusions and recommendations.



CHAPTER 2

AN OVERVIEW OF FISCAL POLICY IN SOUTH AFRICA.

2.1 Introduction.

This chapter provides a historical overview at the back of dynamics pertaining to fiscal policy in South Africa from 1961 to 2017. The premise of this chapter is to provide the insights on the economic fiscal structure, in the interest of laying out the framework for other chapters. The chapter will begin by outlining the evolution of fiscal policy in South Africa, followed by economic policy reforms, tax revenue trend, and national government expenditure trend, an overview of public debt and fiscal balance, public debt structure in South Africa, trend of GDP and will conclude with a summary.

2.2 Evolution of the fiscal policy in South Africa.

The fiscal policy has been a superior policy that the South African government has used since the study reviewed period and continues to be a powerful instrument. Fiscal policy is defined as the management of government budget tools, like borrowing, tax and spending structures by ministry authorities to pursue fiscal goals such as providing government services to the people (Burger & Fourie, 2015). Essentially, the instruments of fiscal policy at the forefront encompass government expenditure (i.e. through budget allocation), tax revenue (via direct and indirect tax channels) and government borrowing. By using these instruments efficiently, Black *et al* (2005) postulated that government will contribute to achieving macroeconomic goals. These include economic growth, a reduction in poverty through price stability, job creation and income redistribution and low inflation. According to the National Treasury, there are three goals that provide guidance and the shape of fiscal stance in South Africa, which are:

- To ensure that the government has resources that are enough to fulfil its commitments in public service and support the movement of the economy as it enters the next phase.
- To support development and poverty alleviation through current spending and future capacity investments
- To safeguard the level of budget deficit by reducing and sustaining it in a way that does not compromise economic recovery. Reduction in deficits is attributed to an increase in tax revenue and moderate growth in government expenditure.

The government has been undertaking numerous reforms and fiscal consolidation since 1994 in order to build a new South Africa. The Reconstruction and Development Programme (RDP) was the first reform undertaken to boost economic development. According to Visser (2004),

the programme was essentially aimed to massively increase service delivery to the society more especially people living in poverty. In addition, the programme advocated prudent fiscal policy with the objective of economic growth. This was achieved mainly through loans to finance projects like this. During 1996, the government realised that the RDP's strategy objectives could not be achieved, due to low savings rate with high borrowing costs at the time. Furthermore, the country was faced with increased domestic demands, which were dependent on imports. Van der Berg (2009) holds the view that, the policy framework of RDP emphasised more on the expenditure with an interest to address inequality and poverty, and a very little emphasis concerning the fiscal constraints.

The government's role was to provide services in order to make the environment conducive enough for people to come and invest in the area. This has led to the strategic transition; notwithstanding, the government adopted the strategy for growth, employment and redistribution (GEAR) in 1996, with the aim of lifting economic growth by 6% annually. Moreover, Visser (2004) posited that the strategy laid a good basis for future economic progress and achieved an economic growth target of a maximum of 3% per annum. In addition, as Mboweni (2006) stipulated, fiscal consolidation has allowed the government to adopt an expansive fiscal policy over the period. Throughout this period, these reforms aimed to ensure that financial management is good and complemented by transparent budgeting; as such, government likewise adopted the Public Finance Management Act of 1999, calling for sound expenditure controls (Visser, 2004).

The presence of GEAR proved insufficient to address the legacy of unemployment, inequality and poverty sustainability. Albeit, in 2006, the government implemented another reform called accelerated and shared growth initiative of South Africa (ASGISA), the primary objective of this reform was to grow the economy by 6 percent annually by 2010 (Republic of South Africa, 2005). Through ASGISA, the country experienced a decline in unemployment from 27% in 2004 to 20.7% in 2008, but then a rise to 26% in 2009 (Statistics South Africa, 2010). The unemployment rises in 2009 was because of the negative effects of the worldwide financial turmoil and declining economic performance.

In 2010, the government adopted a new reform called the New Growth Path (NGP), which replaced ASGISA. The emergence of NGP aimed to revive growth in the South African economy, thereby reducing poverty, unemployment and inequality rapidly. Notably, the strategy has been viewed as the powerful policy tool to surmount obstacles to stimulate economic growth. Moreover, the year 2013 saw government's implementation of the NDP as

a long-term roadmap to ensure socio economic development and this reform is also aimed to by 2030, the levels of inequality and poverty amongst others. With NDP in place, South Africa can achieve the targeted goals by drawing on its people's energies, building an inclusive economy, enhancing capacity building of the state and fostering leadership and partnerships across society (NPC, 2011). This plan provides a long-term perspective and identifies the role to be played by different sectors of society in achieving this goal. It serves four broad goals as a long-term strategic plan:

- Providing overarching goals for what needs to be achieved by 2030
- Building consensus as a strategy to circumvent key obstacles that could possibly obstruct the achievement of the targeted
- Providing a shared long-term strategic framework to allow the execution of a detailed plan to advance the long-term goals as reflected in the NDP.
- Crafting a basis for making choices concerning good utilisation of limited resources

The country's long-term strategic outlook (up to 2030) and its objective are to ensure that all South Africans achieve decent living standards through poverty eradication and inequality reduction (NPC, 2011). Even though the NDP looks attractive on paper and appears more beneficial to the South African citizen, achieving these goals requires some leadership to drive implementation and convince South Africans of the need for long-term mutual sacrifices. In addition, in order to meet these objectives, the economic structure and the pace at which it grows will also require some changes. Table 2.1 outlines the post-1994 policy objectives and their outcomes thus far.

Table 2.1 Post-1994 policy targets and outcomes summary.

Policies	Objectives	Outcomes	Year of adoption
RDP	<ul style="list-style-type: none"> • Meeting basic needs 	Due to low savings rate with high borrowing costs at the time the RDP policy was not fully achieved. Many houses built under the RDP programme lack proper infrastructure. However, the RDP laid a good foundation for basic needs for the poor.	1994
	<ul style="list-style-type: none"> • Human resource development 		
	<ul style="list-style-type: none"> • Building the economy 		
	<ul style="list-style-type: none"> • Democratizing the State 		

	<ul style="list-style-type: none"> Structure for implementing the RDP 		
GEAR	<ul style="list-style-type: none"> Strengthening economic growth with 6% growth rate 	The government has successfully lowered budget deficit and inflation with GEAR policy. But growth rate remained at 3%, which was far from the 6% target. The policy also failed to deliver job growth as promised.	1996
	<ul style="list-style-type: none"> Broadening of employment 		
	<ul style="list-style-type: none"> Inflation rate less than 10% 		
	<ul style="list-style-type: none"> Redistribution of income and socioeconomic opportunities 		
ASGISA	<ul style="list-style-type: none"> Poverty alleviation 	With ASGISA in place, GDP had grown by 4.9% in 2006, and the budget surplus was small, with a narrowed gap between budget and expenditure. There was a decline of unemployment from 27% in 2004 to 20.7% in 2008.	2006
	<ul style="list-style-type: none"> Employment creation 		
	<ul style="list-style-type: none"> Enhancing economic stance 		
NGP	<ul style="list-style-type: none"> Rebuilding productive sectors 	Technological innovation opens the opportunity for substantial employment creation. However, the socio-economic challenges persist in the economy.	2010
	<ul style="list-style-type: none"> Create 5million jobs by 2020 		
	<ul style="list-style-type: none"> Eradicate poverty and inequality 		
NDP	<ul style="list-style-type: none"> Uniting South African of all races 	So far, the areas like infrastructure development, employment creation, health care, education and training saw significant progress among the targets set out in the NDP. The National Treasury together with the president continue working with departments in order to clarify the roles and responsibilities to ensure that the plans and budget are aligned.	2013
	<ul style="list-style-type: none"> Raising economic growth 		
	<ul style="list-style-type: none"> Building a capable and developmental state 		
	<ul style="list-style-type: none"> Job creation 		
	<ul style="list-style-type: none"> Improve infrastructure and education system 		
	<ul style="list-style-type: none"> Eradicate poverty 		

Source: Author's compilation.

2.3 Tax revenue trends in South Africa.

The major categories of total national government revenue are tax revenue and non-tax revenue. Like any other country, the South African economy depends more heavily on taxation

as the primary source through which the national government raises revenue in order to allocate government spending for the country. To ensure macroeconomic stability and fiscal sustainability, public spending trajectories need to be adjusted consistently in line with tax revenue collected for that period. Therefore, tax revenue is therefore an essential fiscal pointer of the economic performance of a nation, given its implications for budget deficits and government borrowing requirements.

The tax system in South Africa has been monitored and steered by four major commissions, (i.e Franzsen Commission, Margo Commission, Katz Commission, and Davis Tax Committee in 1967, 1987, 1994 and 2013 respectively) during the period 1960 and 2017. In 1967, the Franzsen Commission undertook the mandate to investigate the South African tax system, including the financial structure, plus fiscal and monetary structure. Moreover, the structural reform of revenue authority in South Africa was initiated by Margo the Commission recommended in 1986. This Commission was specifically mandated to vet and recommend the best way to implement a cohesive tax structure across all government levels.

Following the findings by Margo Commission in 1987, the previous Inland Revenue autonomy was reconsidered in South Africa, the aim being to eliminate the boundaries by state procedures as far as revenue authority is concerned (Margo Commission, 1987). According to Steyn & Stiglingh (2016), the tax system in South Africa experienced complexity during the previous years, largely due to numerous adjusted tax legislations coupled with administrative practices, especially post-1994 when politics and society underwent significant changes. Hence, the revenue authority experienced an unpleasant situation in 1994, and as such, the South African government saw the need for another commission to assess the tax system and recommend more reforms (Aaron & Slemrod, 1999).

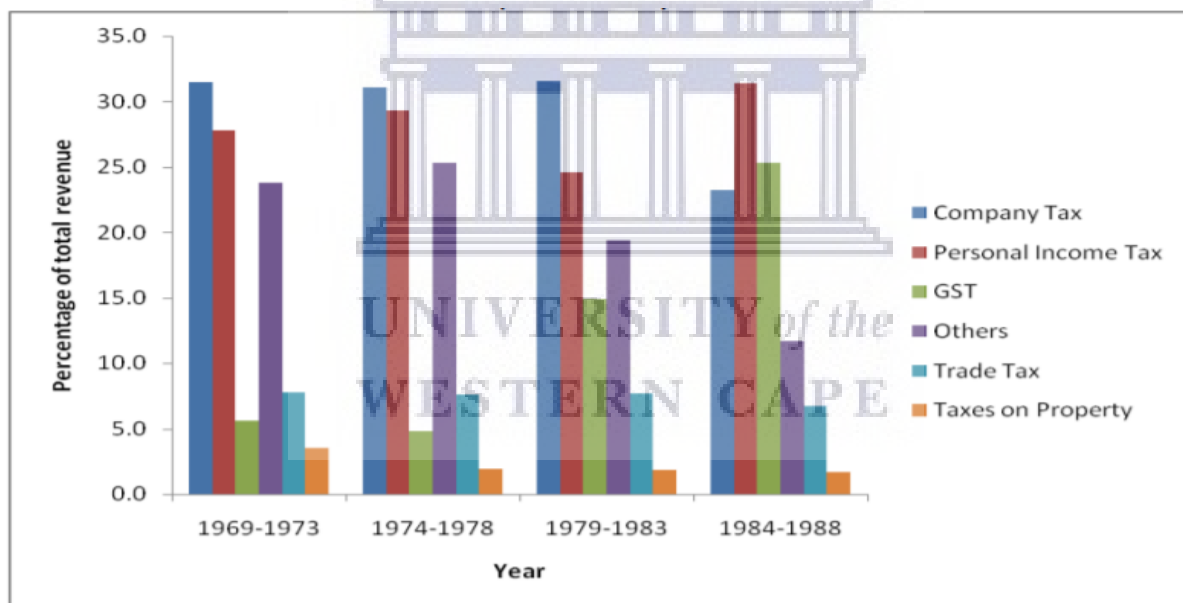
The broader mandate of this commission was to investigate all the aspects of tax regime that were inherited by South Africa in the previous government, as far as the goals (economic, social and political) of the new government were concerned (Manuel 2002). The commission, which was initially referred to as “Commission of Inquiry into Certain Aspects of the Tax Structure of South Africa” was ultimately referred to as Katz Commission (Aaron & Slemrod, 1999). Nine interim reports were issued by this commission from November 1994 to February 1999, which provided a good basis to enhance the tax reform efforts (Aaron & Slemrod, 1999).

The tax system in South Africa experienced significant transformation since the Katz Commission’s recommendations in 1995, following the emergence of value added tax (VAT),

which then signalled a fundamental shift within the landscape of taxation (Temkin, 2015). As a result, the former minister of Finance announced, in 2013, the members of the Davis Tax Committee (DTC) who were tasked to assess the framework of tax policy in South African, particularly its supportive role to inclusive growth and development, employment and fiscal sustainability.

Figure 2.1 represents the average revenue collection as a percentage of total revenue for the period 1969-1988. During this period, there was no value added tax (VAT) since it was only introduced in 1991, so data for this period were reported on the general sales tax (GST). From the graph, direct tax burden shouldered an incredible contribution compared to individuals and other tax sources for the periods 1969 to 1983. Corporate taxes averaged 31.5% (between 1969 and 1973) of total revenue, while personal taxes contributed 27.8%, GST 5.6%, trade taxes 7.8% and other taxes 23.8% within the same period.

Figure 2.1 The average revenue contribution as percentage of total revenue (1969-1988).

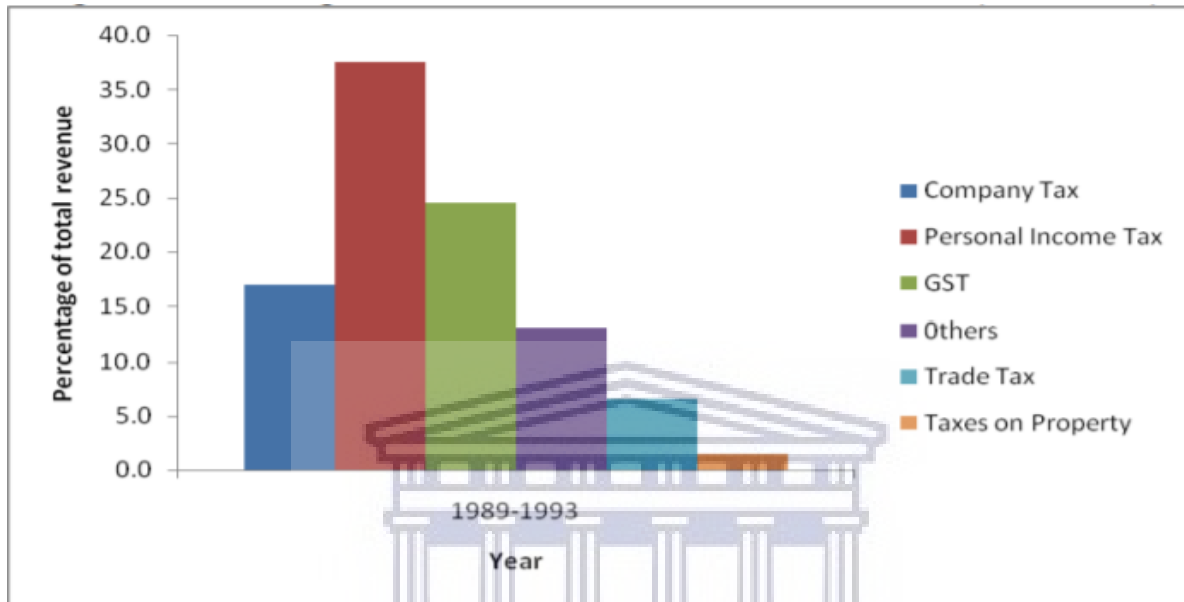


Source: SARS database (2018).

However, in the composition of direct taxes, corporate taxes saw a shift in the period 1984 to 1988 to personal income taxes. Furthermore, another huge change recorded in revenue composition was due to an expansion in GST’s contribution between 1984 and 1988 from 14% in the pre-period to 25.3%. Property taxes remained lower relative to the rest of the contribution made by various tax sources to total revenue collected between the period 1989 and 1993, which is represented by Figure 2.2. The tax-related component, which is tax revenue, kept on depending excessively upon direct taxation because of its average contribution of 54.4% as a

percentage of total revenue over that period. The most noteworthy contribution of income over that period was mostly generated through personal income tax of 37.5%, followed by GST / VAT of 24.5%, corporate tax of 16.9%, fuel levy of 7.0%, and international trade tax of 6.5% with the lowest contribution of 1.5% from property.

Figure 2.2 The average revenue contribution as percentage of total revenue (1989-1993).



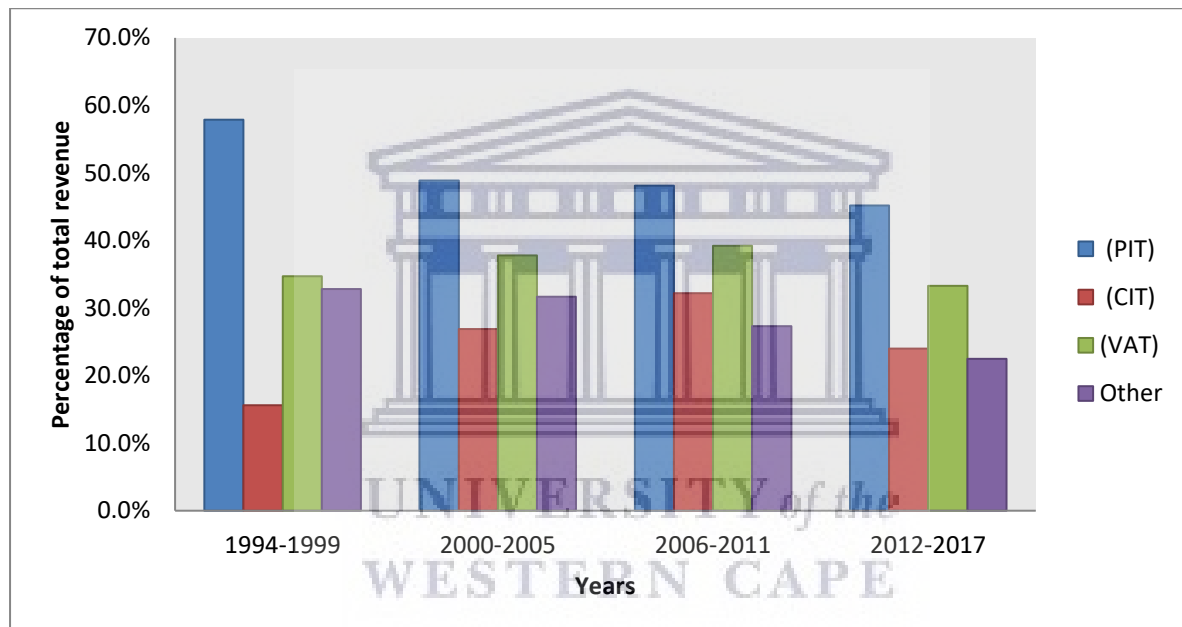
Source: SARS database (2018).

Even though South Africa gained democracy in 1994 under the government administration of the African National Congress (ANC), the apartheid dispensation resulted in the country being internationally excluded. In addition, the vision of separate development set out by the apartheid government led to the characterisation of high unemployment and low levels of growth and investment. As Mboweni (2006) said, the South African economy, to some extent, has been isolated from the global economy. He further alluded to the fact that during the restoration of the new South Africa in 1994, the underlying challenge was due to the struggle to diversify the economic base. Seeing that the country has been accepted in the international sphere, creating pressure and a need for fiscal policy reform as well as economic stability the government then embarked on a strong fiscal landscape adjustment program that resulted in an increase in the tax burden in early 1994 to 1999.

Furthermore, the government eventually allowed some fiscal space to set out on strong growth in expenditure and continued tax relief notwithstanding later antagonistic worldwide conditions (2000-2010). Figure 2.3 shows the contribution of the numerous tax sources to the total revenue, collated during 1994-2017. During this period, more tax revenue was contributed from

individuals' tax as compared to company tax. From 1994 to 1998, individual taxes average contribution was 40.8% of total revenue of which amounted to 9% of GDP. Company taxes contributed to 14.4% or 2.4% of GDP in the same period. Similarly, individuals contributed 39.4% on average between 1999 and 2003, while corporate taxes increased slightly from 14.4% to 19.5%. The gap between the average tax burden on companies and individuals seems to have moderated over the period 2004 and 2010. Individual taxes on total revenue fell between 2004 and 2008 to 31.1% or 7.9% of GDP, while corporate taxes soared to register an average of 26.3% over the same period. Total revenue contributed by PIT and company taxes rose to 33.9% and 28.6% respectively between 2009 and 2010.

Figure 2.3 The average revenue contribution as percentage of total revenue (1994-2017).



Source: SARS database (2018).

For the past 20 years, the South African tax-to-GDP ratio has shown a general upward trend from 21.9% in 1995/6 to 25.9% in 2017/18. This growth was largely contributed by an increase in PIT and VAT. In comparison to other developing countries, tax-to-GDP ratio in South Africa is higher than many developing countries and is significantly high when one considers that South Africa does not have large social security levies.

2.4 National government expenditure trends in South Africa.

Comprehending issue around growth in public spending has been a central concern of many economists and policymakers, going back at least to Wagner (1893) and Downs (1957). The government's role in promoting economic activities in South Africa has been gradually

increasing since 1960 and this led to a rise in the share of public sector resources. The government spent more on general administration, economic, social, and defence services. Government spending amounted to R0.6 billion in 1960, with the figure rising to R1.56 trillion by 2017. The expenditure of the national government as a ratio of GDP increased from 16.2% in 1960 to 29.7% in 2017. As postulated by Mthethwa (1998), whether one looks at government spending at levels or as a share of GDP, the picture remains the same. Increased economic sophistication was the driving force behind the growth of government spending in South Africa between 1960 and 2017. According to Meyer (1985), an economy becomes more sophisticated, when the demand for goods and services in the public sector surges. In response to the rising demand for public goods and services, governments are increasing their expenditures accordingly.

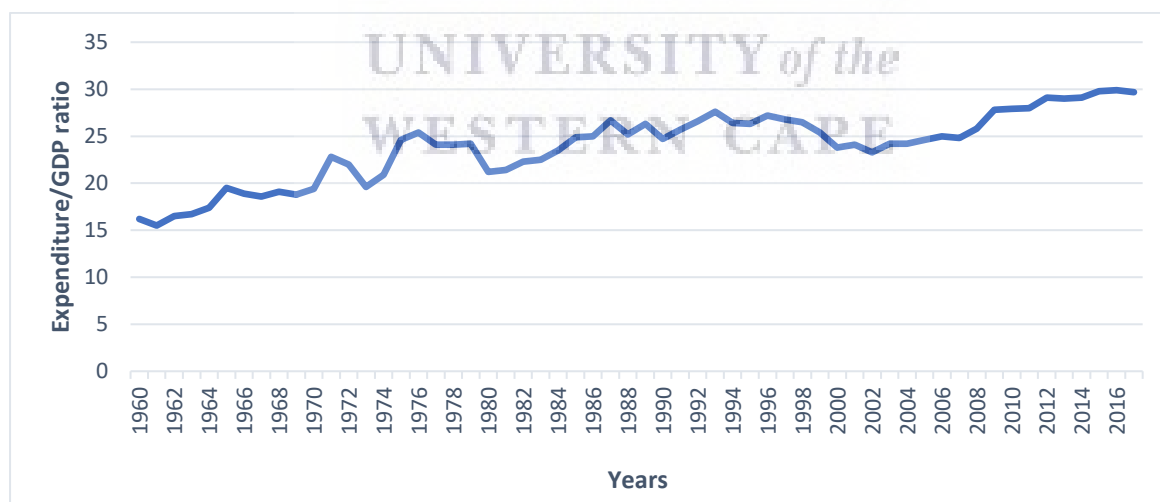
There are several reasons why public goods and services are increasing in demand. Mthethwa (1998) posited that once the essential necessities of life have been met, the community might have a developing inclination for more state assurance, health and other well-being services, education and training, pensions and cultural facilities. Browne (1975) ascertained that technological advances accompanying economic development lead to quicker development in proficiency and profitability in the private area (especially in essential and auxiliary production) than in the public sector, resulting in a moderately higher increment in government spending than in the private sector. The South African fiscal budget of 1975 was made up of two separate accounts, namely revenue account and the loan Account. The thought behind these two records was to finance current revenue spending and borrow capital spending. The government abolished this distinction in 1976 and set up a single state income account.

Figure 2.4 represents the overall government expenditure over the review period as a ratio of GDP. General government spending in the period 1960-64 averaged 16.5%. The share increased to 17% between 1965 and 1969 and then averaged 20.1 percent between 1970 and 1974. The expenditure-GDP ratio increased to 24.5% in the period 1975-79 by some 4.4% but fell to 21.5% in the period 1980-84 by some 2.8%. The share of GDP spending subsequently increased sharply, reaching about 26.2% of GDP between 1990 and 1993. After the dependency of South Africa, the government undertook several reforms to rectify the problems of the past; however, this came with a rise in government spending. The structure and organisation of governmental public expenditure in South Africa has undergone several major reforms since 1994 (National Treasury, 2010), which include, amongst others:

- The establishment of the three-year MTEF, which conveyed more prominent straightforwardness and assurance to the spending procedure and fortified the link between the policy priorities of the government and long-term plans to spend.
- Foundation of a statutory budgetary council and a few specialised boards of trustees to supervise financial and budgetary cooperation between national, provincial and local authorities.
- Establishing the Financial and Fiscal Commission to review and advice on intergovernmental monetary relations.

National government spending in 1994 amounted to R113.004 billion and averaged 26% of GDP in 1995-2000. Since 2009, South Africa's government finances have declined rapidly. The government finances of South Africa have experienced a sharp decline since 2009. Government spending amounted to 25% of GDP 2007/8 and the ratio started to rise automatically at the time of the international crisis, partly in response to lower than expected GDP figures due to the recession and partly due to counter-cyclical government spending. Government spending peaked at 30% of GDP in 2015/16 and amounted to 29.7% of GDP in 2016/17. Higher education funding was the biggest contributor of government spending amid the fees must fall outbreak in 2016.

Figure 2.4 National government expenditure as percentage to GDP from 1960-2017.



Source: SARB data base (2018).

Increasing government spending to the GDP ratio resulted in a combination of factors. For political reasons, the government found it difficult to oppose requests for increased public expenditure. Most segments of public expenditure had expanded their share of GDP. The rising

proportion of government spending to GDP likewise mirrored the absence of huge economic growth.

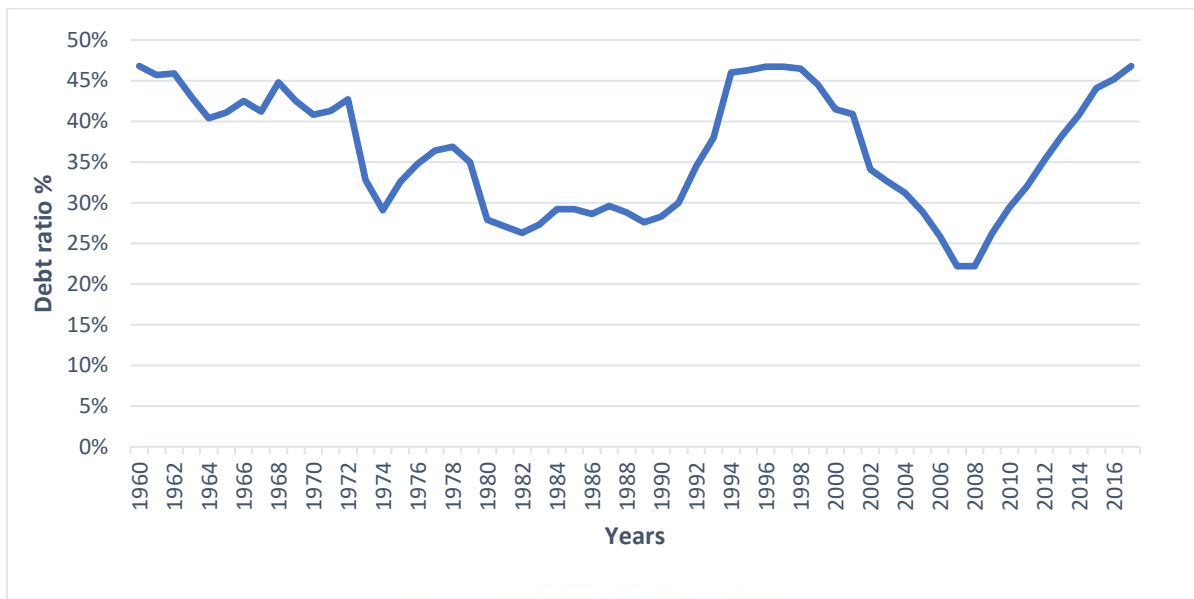
2.5 Review of public debt components and fiscal balance in South Africa.

As postulated by Marek (2014), public debt crisis induces various economic, social and political consequences within the economy. In a situation where the country is highly indebted, the government is less likely to be efficient in performing its main functions such as providing public goods, national security etc. In relation to this, Tsoulfidis (2007) added that, it is detrimental to the economy when government expenditures are financed through public debt. As such, this would also distress the capacity of the economy to generate wealth, since borrowing depresses savings directly. In situations where government spending is unproductive, such as spending on paying government workers and army maintenance, it pursues that government obligation undermines the economy's ability to gain momentum.

If such spending is compulsory, however, their wellspring of financing ought to be through taxation, rather than borrowing (Tsoulfidis, 2007). In the study by Presbitero (2008) it is pointed out that the critical issues confronting policy agenda of governments and international institutions is the problem of debt relief. Agim (2014) sets that, overflowing government debt levels resulted into seemingly unsound fiscal policies. Nevertheless, it is recognised broadly that fiscal policy can either promote economic growth or deter it (Aizenman, Kletzer & Pinto, 2007). The combination of policies and institutions may simultaneously have an impact on debt accumulation and growth (Presbitero, 2008). The definition of public debt is commonly understood as the sum of the national debt and foreign debt of the state.

The debt ratio was 48.2% in 1960, but overtime dropped to an average of 31.3% between 1980 and 1984 before rising to 43.5% in 1993 immediately before the first democratic election. In 1995, the gross debt-to-GDP ratio was 50 percent after 1994. In 1996, however, government took an initiative that included fiscal policy reforms aimed, among other things, at preventing further increases in the level of debt, and only in 2000 began to reduce the level of debt as a percentage of GDP. The government was unable to introduce spending cuts due to political tension during that period combined with domestic and international recession. Figure 2.5 shows the trend between 1960 and 2017 in the South African government debt/GDP ratio.

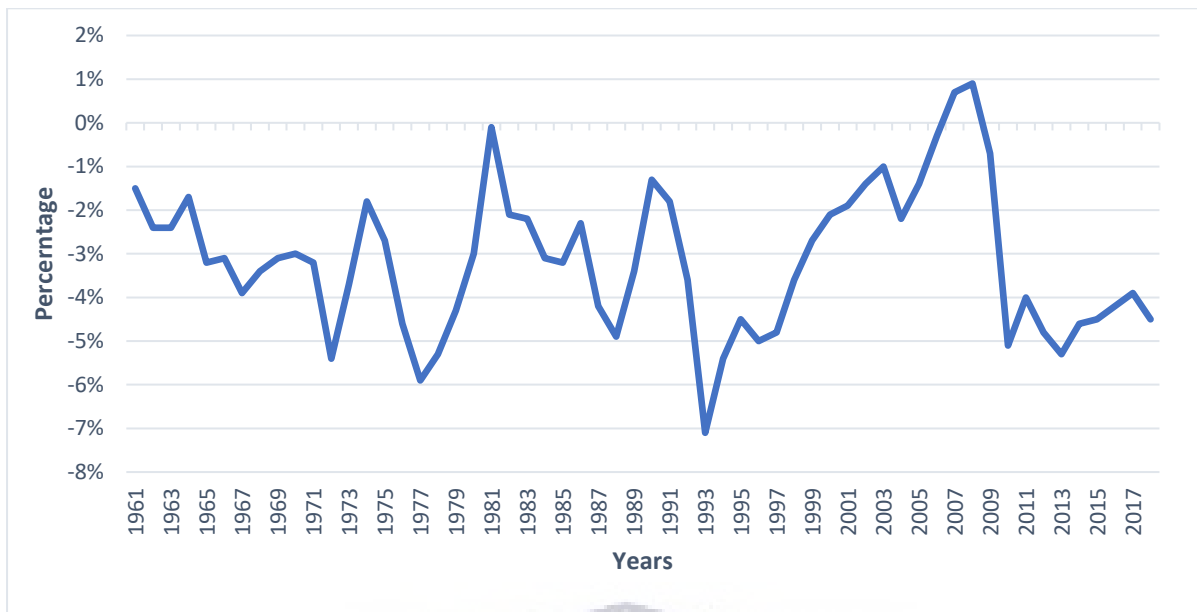
Figure 2.5 Public debt/GDP ratio trend, 1960-2017.



Source: SARB database (2018).

Generally, between 1984 and 1994 public debt/GDP ratio maintained an upward trajectory, springing mainly from rising fiscal deficits, which reached a period peak of 47% in 1994 (Statistics South Africa, 2017). This was followed by a marked decrease in the public debt/GDP ratio during the period from 1995 to 2008. In 2006 and 2007, the government recorded surpluses and low deficits that ultimately reduced the debt level substantially to less than 24%. In addition, the international crisis of 2008/09 and local economic consequences meant that the percentage of GDP inevitably increased as deficits arose. The debt ratio then began to rise again to about 30% by 2010, with government running larger fiscal deficits of 5.5% over the period (see Figure 2.6), partly due to countercyclical fiscal stimulus to fight the recession of 2008/09. Furthermore, debt levels continued and exceeded 36% of GDP in 2012 and continued to rise as deficits also continued to rise. Public debt to GDP reached an all-time high of 53.1% in 2017, supported in part by high unemployment, corruption and political instability among others.

Figure 2.6 Fiscal balance trend, 1961-2017.



Source: SARB database (2018).

It has been over two decades now since South Africa gained its democracy, but the issue of high level of public debt remain an issue without forthcoming resolution among government stakeholders. Table 2.2 shows the total government debt in South Africa for the financial year 2017/18. It has been pointed out in the 2018 budget speech that, government will borrow R246 billion, which comprises R217.3 billion and R28.7 billion for budget deficit and debt repayment respectively. To this end, South Africa’s public debt stands at R2.5 trillion, or 53.3% of GDP (National Treasury, 2018). The investors and rating agencies observe certain aspects as highlighted by Hilary (2017) to assess the sustainability and affordability of public debt. This includes, amongst others: level of debt, the length of time before it matures, whether the debt is local or foreign and who owns it.

Table 2.2 Total national debt.

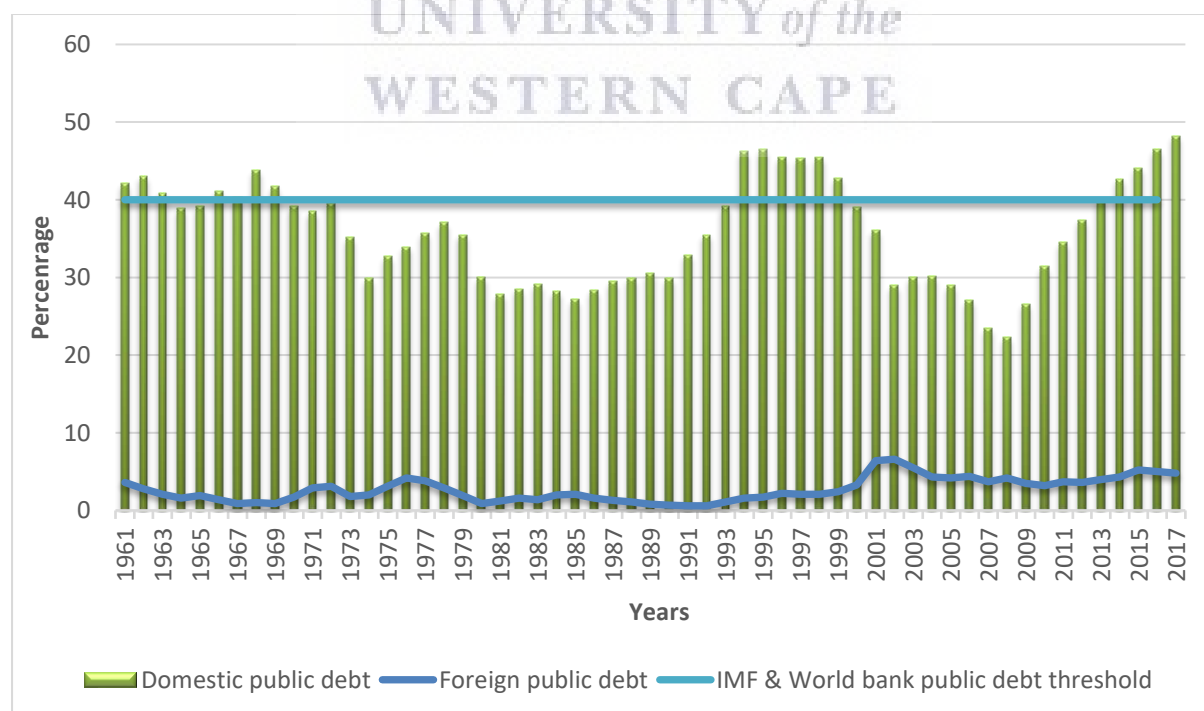
End of period R billion	2016/17 Outcome	2017/18 Estimate	2018/19 MDTM Estimate	2019/20 MDTM Estimate	2020/21 MDTM Estimate
Domestic loans	2020	2286	2502	2712	2940
Short-term	277	310	324	347	377
Long-term	1743	1976	2178	2365	2536
fixed rate	1300	1449	1584	1700	1818
inflation-linked	443	527	594	665	745
Foreign loans	213	220	269	271	310
GROSS LOAN DEBT	2233	2506	2771	2983	3250

Less: National Revenue	-225	-221	-244	-215	-220
Fund bank					
NET LOAN DEBT	2008	2285	2527	2768	3030
Percentage of GDP:					
<i>Gross loan debt</i>	50,7	53,3	55,1	55,3	56
<i>Net loan debt</i>	45,6	48,6	50,3	51,4	52,2

Source: National Treasury (2018).

It is indeed true that decisions concerning government borrowing, revenue and expenditure are guided through fiscal policy. Looking at the fiscal policy of South Africa for the past years, despite the economic challenges both locally and externally the government was able fulfil its development mandate through fiscal policy to provide resources in a sustainable manner that strengthens the economy's stability. At the back of downturns and sharply lower budget revenues, the government managed to preserve the expenditure on social priorities, while reviving growth in the economy. The combination of soaring expenditure and a largely cyclical downturn in tax revenue resulted in an increase of consolidated budget deficit to 7.6% of GDP in 2009/10. In response to the apparent economic challenges, National Treasury (2018) believes that higher borrowing is the correct tool to sustain investment in the economy. As such, the medium term could see recovery in tax revenues and a moderate expenditure growth to curb the deficit at more sustainable levels.

Figure 2.7 Public Debt Structure in South Africa, 1961-2017.



Source: SARB & IMF database (2018).

Government debt continues to grow, despite the efforts to cut expenditure and remain on the path of fiscal consolidation. It is with no doubt that over a period of time now, the South African government has been predominantly relying on the domestic capital markets to finance its budget needs since 1961, as domestic public debt constitutes a major part of total public debt, while the share of foreign public debt in the total public debt has, overall, declined over time.

In the period between 1995 and 2001, the decrease in public debt/GDP ratio was mostly emanating from the government's drive to reduce the foreign debt component and from the overall growth of the economy, as shown in Figure 2.7 (World Bank, 2018). The blending of a wide basket of government securities and attractive interest rates has added to the broadening of the country's investor base (RSA, 2016a; 2016b; 2016c). Figure 2.7 also shows that South Africa breached the International Monetary Fund and the World Bank public debt indicative threshold of 40% between the period of 1961 and 1963 with an average of 42%, again between 1966 and 1969 with an average of 41,7%, 1993 and 2002, and between 2012 and 2017 being caused by an exponential growth in domestic public debt that reached 43.1% in 2017 (SARB, 2018).

In 2017 government's domestic debt increased by R83.3 billion in the first quarter of 2017 to R2.1 trillion (SARB, 2018) The debt consisted of fixed income, floating-rate and zero-coupon bonds, which include retail bonds and other debt. All these instruments amount to R1.344bn, accounting for 63.9% of total domestic debt. During the period, domestic short-term loans, including Treasury bills, increased by R21.3 billion, pushing the total value to R298 billion by June 30 (SARB, 2018). Whilst Treasury bills and bonds accounted for 97.5% of total domestic debt. In addition, foreign currency denominated debt decreased by R6.8 billion, lowering total outstanding debt to R206 billion.

This was partly helped by the appreciation of the rand against other currencies, and the redemption of loans and a bond. The significance of these is that the debt indicator may portray a manageable picture of South Africa's debt situation, but the reality is that the present external debt situation may be unsustainable in the long run, especially if measures are not put in place for its management.

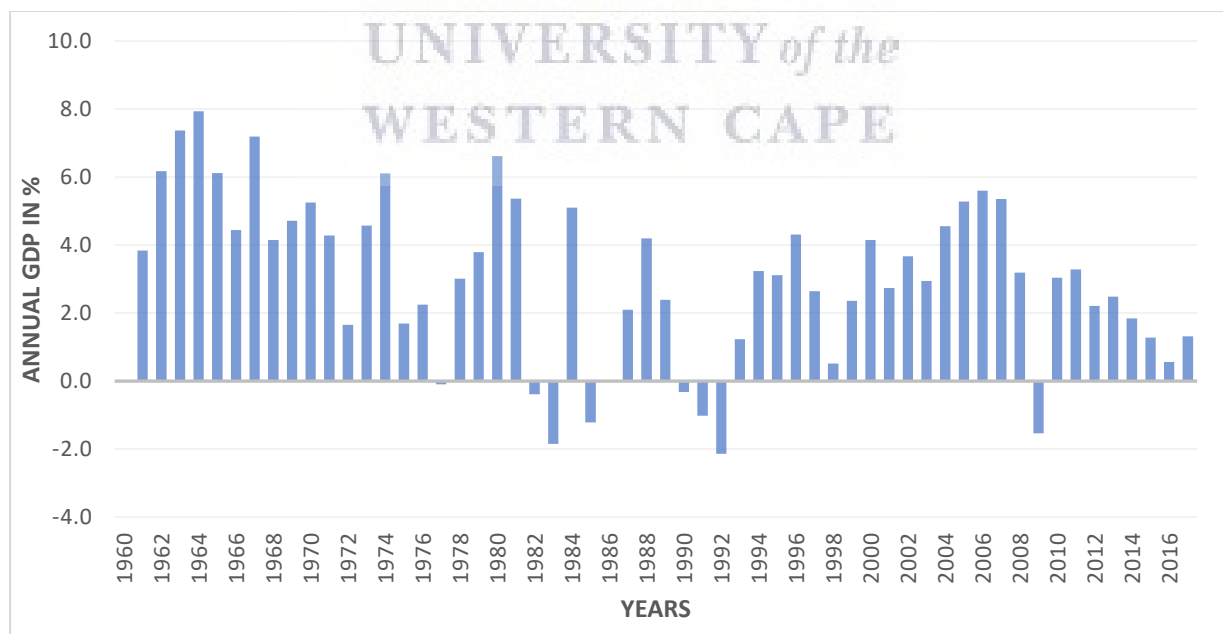
2.6 Economic growth in South Africa, 1961-2017.

South African economy established a well-developed manufacturing base which experienced a highly variable growth rates in the 1960s, with the economic growth rate being among the highest in the world. However, since the late 1970s, the country started to experience some

economic problems, initially because its apartheid policies led many countries to withhold foreign investment and to impose increasingly severe trade sanctions against it (Ncanywa & Masaga, 2018). The average nominal growth for the period 1970 and 1979 was 15.1% and from 1980-1989 it was 18.4%. As shown in figure 2.8, real average growth in those periods was 3.3% and 2.2%, respectively.

Since the dawn of democracy, economic growth of South Africa saw significant transformation, recording per annum average growth rate of 3.3% in real terms during 1994 to 2012 (Industrial Development Corporation, 2013). An average rate of real GDP growth was 2.8% per annum over the period 1994 to 2017. The pace decelerated somewhat, experiencing a shortfall of 3.6% on average compared to the global economy’s growth rate. The real growth of GDP in South Africa was 77% larger by 2012 relative to 1994, alongside higher growth of 90% in the global economy. Furthermore, per capita real GDP recorded 31% by the end of the above-mentioned period. However, the growth became quite volatile, as it was also correlated strongly to the performance of the global economy. The period 1998 that featured the East Asian crisis however, imitated a more dramatic dip for South Africa, since the economy was concurrently digesting the emerged globalisation, which incorporated substantial trade liberalization and structural adjustments.

Figure 2.8 Real GDP growth trend, 1960-2017.



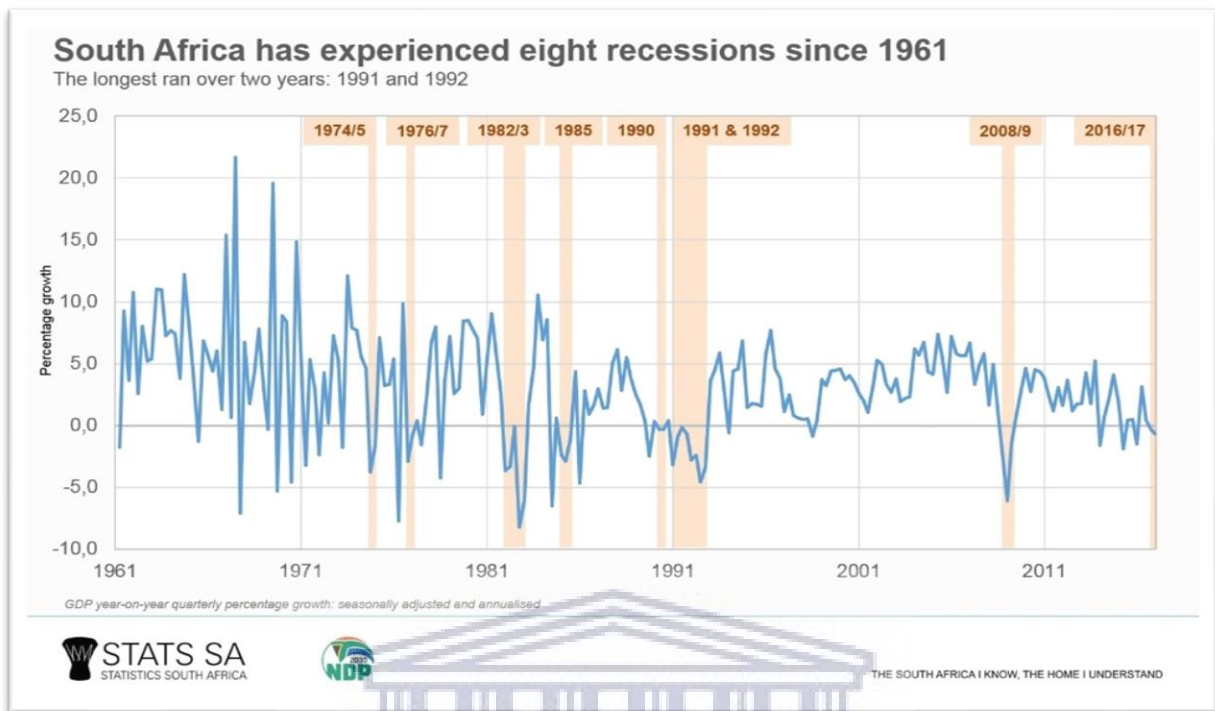
Source: SARB Database (2017).

The period reviewed here-in witnessed various external shocks, as presented in Figure 2.9. For instance, the East Asian crisis, the 9/11 events in the United States (2001) followed by corporate scandals during 2002/03, and 2007/08 global financial crisis which ultimately resulted in great recession globally (in most/major economies) in 2009. Since the 1960s, the fastest pace of growth in South Africa was registered in 2004 to 2007, averaging 5.2% of real GDP growth per annum. According to Mohr (2019), household consumption expenditure and fixed investments activities contributed significantly to the growth numbers, especially the exporting sectors that provided considerable impetus during 2005 to 2007. Furthermore, it was noted that, the last time South Africa experienced a sustained GDP growth rate of beyond 5% was in the 1960s, notwithstanding the growth rates of more than 4% registered in the 2000s.

South Africa has also suffered eight recessions since 1961. The 1973/74 oil crisis was recorded as the first recession in South Africa since 1961; the crisis has led the country with high rate of unemployment and low standard of living due to high oil prices. In addition, the economy experienced three prolonged phases of recession between 1981 and 1993, and the standard of living, particularly for poor families, continued to decline over the period with high unemployment rates. According to Botha (1999), South Africa recorded the real value of 30% fixed capital formation in 1993, which was lower than the figure for 1982, and inflation persisted at levels between 10% and 20% for most of the 80s and early 90s during this period.

Botha (1999) further added that the country was forced to maintain a surplus on its balance of payments current account during the period 1985 and 1993 because of the capital struggle instigated by debt-stop agreements with foreign creditors. Towards the end of 1980s, it was apparent that the country was destabilised by domestic socio-political unrest combined with international trade embargoes with South Africa. The global economic recession of the year 2008/9 caused by the fall of the Lehman Brothers is worthy of note as well.

Figure 2.9 Number of South African recession since 1961.



Source: Stats SA (2018).

2.7 Conclusion.

To provide robust content, this chapter presented the evolution of fiscal policy, premised on the period under review. An important development in fiscal policy was the introduction of different reforms aimed at dealing with the economic shocks, as well as the legacies of apartheid. The chapter also touched more on the fiscal policy variables' trends which includes revenues and expenditures.

CHAPTER 3

LITERATURE REVIEW.

3.1 Introduction.

This chapter will primarily concentrate on the theoretical perspectives concerning this study. Therefore, different theories neither complementing each other nor contradicting each will be considered in order to produce evidence-based findings of the study. Moreover, the empirical studies are carried out in order to ascertain that the facts and opinions made in this study have back up and support from other studies. Therefore, consideration of the literature will enable this study to identify and narrow the existence of the literature gap pertaining to public debt and economic growth in South Africa.

3.2 Theoretical literature review.

Mohanty and Mishra (2016) opined the observed literature of economic growth proposed by various schools of thought to indicate the discovered distinct relationship between public debt and economic growth. In the previous decades, the theories of public debt were centred on the contribution of debt management to the macroeconomic stabilisation, as Medeiros, Cabral, Baghdassarian and Almeida (2005) asserted, however, it remains concerning to think about the likelihood of imperatives that could confront monetary policy amid the structure and span of the government debt. Nevertheless, governments consider debt as an alternative for taxes, which enables government consumption to rise without any drastic adjustments in tax rates (Pascal, 2012).

3.2.1 Growth theories.

3.2.1.1 The classical growth theory.

During the late 18th and early 19th century, Thomas Robert Malthus, David Ricardo and Adam Smith, the well-known leading economists of that time, proposed the classical growth theory. This theory was associated closely with the name Malthus. The theory holds that real GDP growth is not permanent, wherein the assumption is that if per capita GDP surge beyond the subsistence level, the explosion population will eventually revert the real GDP per capita to the subsistence level. The study then continues to evaluate theories to get better view of economic growth in a country.

3.2.1.2 The two-gap theory.

The development models are many, ideas differ, thoughts interact, with various methods implied, but the aim is one; to increase the economic growth rate. Amongst the contributors to the economic growth process, Harrod (1939) and Domar (1946) outline the importance of domestic and foreign savings in attaining economic growth. Domestic and foreign savings are important in financing investment which is necessary for growth in a country. The Harrod-Domar model is used to determine the capital requirement for a country to reach its targeted rate of economic growth. According to this model, growth in output (g) equals to the rate of savings (s) divided by incremental capital to output ratio (v). Algebraically, this relationship can be given as:

$$g = \frac{s}{v} \quad (3.1)$$

Whereby the above algebraic equation implies that given a specific growth target and capital to output ratio, a specific rate of investment is required in order to achieve the growth target. However, in a situation where required investment rate exceeds the average savings rate for a desired growth rate, the government has either to cut down its intended growth or borrow. This analysis arises from the fact that growth requires investment. Harrod-Domar identified that two gaps exist when given the growth target, domestic savings are short of the requirement needed to finance growth (savings gap) and foreign exchange inflows are insufficient to provide financing for the imports of capital goods, hence induce foreign currency gap. Consequently, the two gaps are bridged by inflow of aid or by net inflow of capital goods imports. This model offers a channel through which debt affects growth. Debt augments the domestic savings to promote investment, which is necessary for economic growth.

Njokwe (2012) notes that the model has been criticised because it was unable to explain the deviations in growth, the short run to the long run. Bender and Lowenstein (2005) describe those short-term instabilities as being aggregate demand, cyclical inflation and unemployment. Furthermore, the model neglects other factors that have much effect on growth such as, efficiency in the use of savings and foreign exchange, hence promoting savings and foreign exchange as the key drivers of growth.

Despite all this criticism, the Harrod-Domar model offers a simple understanding of how debt augments the growth process. The assumptions of the two-gap model were unrealistic in explaining growth in developing countries (Chenery & Strout, 1962). They then pioneered the dual gap model where borrowing may also be a complement to foreign exchange earnings from

exports and required imports. The theory emphasises the role of foreign exchange and imports in the development process. It is based on the notion that the plethora of imports to exports funded by external borrowing make it possible for a country to incur more expenditure that exceed production or to invest more than it saves, therefore, the economy grows. In their proposition, Chenery and Bruno (1962) stress the fact that growth is restricted by two constraints, namely the savings gap and the foreign exchange gap. The savings gap encourages the nation to invest on the other hand limiting it's the capacity to save. Moreover, foreign exchange gap emanates from restricted export incomes and the set economic growth rate causes imports to surpass the economy's capacity to finance them. Even if the dual gap theory is related to the Harrod-Domar growth model, its main influence is that it indirectly describes growth-debt nexus external debt. Hence, it is revealing itself through the foreign exchange gap and savings gap.

3.2.1.3 Exogenous neo-classical growth theory.

The basic neo-classical model that has famously guided the evaluation of economic growth across countries was developed by Robert Solow (1956). The theory anticipated steady-state equilibrium in a situation where growth is seen as constant with no existence of technical progress, and it is increasing with labour augmenting technical progress. This model is built under the assumptions of a single composite good, such as dual factors of production, namely, capital and labour, two economic agents' firms and households and a closed economy. These assumptions are well illustrated in a function of Cobb-Douglas production, denoting output (Y) as a function of capital and labour, namely K and L respectively, with the function of production showing a constant and decreasing return to scale when technological progress is not achieved. Therefore, specification of the production function can be as follows:

$$Y = (K^a A L^{1-a}) \quad \text{Since } 0 < a < 1 \quad (3.2)$$

Where A represents technological progress; Y and K are per capita output and capital per person, respectively. Now a and 1-a are directly representative of the responsiveness of output with respect to capital and labour. With the influence of labour, an ascent in technological progress will prompt an ascent in output, other things held constant. This shows that the steady-state per capita output growth relies more on technological progress, which augments labour.

If technology is static, population growth induces growth per capita to dwindle. However, the long-run period is likely to see GDP per capita growth equating to zero. Through the accumulation of capital, growth in savings affects growth in the short run. In addition, long-

run growth is accounted by the accumulation of capital. Knight, Loayza and Villanueva (1993) argued that the Solow growth model envisages a steady-state equilibrium per capita level of income determined by the current technology and the savings rates, technical progress and population growth. The population growth, savings rate and technical progress are all assumed exogenous. The model has testable predictions as it allows savings, technical progress and population growth rates to differ across countries.

There are numerous attacks on Solow's growth model for its failure to explain the drivers of technical progress as well as the causes of cross-country differences observed when assessing the economic progress. According to Barro and Sala-i-Martin (1992), the condition of a negative association amid per capita GDP growth and the initial per capita GDP is disputed. Furthermore, Aghion and Howitt (2009) pointed out that the neoclassical model of growth is noteworthy, but its major flaw is the failure to explain the causes of technical progress. Ocran (2017) is of the view that the main weakness of this model is that it identifies growth in technological progress as critical in sustaining economic growth but fails to explain how to ensure it because technological progress can be used interchangeably with the notion of productivity. The model further failed to offer channels through which the economic environment influences economic growth. As stated by Njokwe (2012), there is somewhat a reason to believe that technical progress is endogenous given the fact that technical change is initiated by economic decisions of accumulated capital, profit seeking firms, funding of science and other economic activities meant to influence human welfare.

3.2.1.4 Neo-classical endogenous growth theories.

The assumption made by Robert Solow (1956) on the Solow growth model which states that technological progress is exogenous was dearly challenged by the endogenous growth model. This theory advocates endogenous technological progress, which is seen as an essential component of economic growth. This arises through an increased in factors such as population growth, savings and investment. Sengupta (2011) pointed out that these structural policies affect these factors and the rate of long-run growth is influenced by impacting human and physical accumulation, creation and diffusion of new knowledge through the development of software and other services provided by the advanced information technology. This was also supported by Romer (1994), who states that Arrow (1962) and Lucas (1988) accommodated the facts that there are large scales of firms in a market economy, whereby discoveries from other inputs differ, physical activities can be replicated and advance technological come from the things people do.

The AK hypothesis was the principal vision of the endogenous growth hypothesis, which did not explicitly distinguish between capital aggregation and technological progress. It combines physical and human capital, the collection of which is examined by neoclassical hypothesis with the scholarly capital amassed when development takes place. Frankel (1962) produced the early version of AK theory, arguing that thrift; capital amassing and distribution of resource efficiency are the keys to economic growth rather than innovation and novelty (Aghion & Howitt, 2006). The model assumes that learning through doing generates technological progress when people accumulate capital, which tends to increase capital's marginal product, thus counterbalancing the propensity of the marginal product to fall when technology innovation remains unaltered (Aghion & Howitt, 2010). The AK model holds the following assumptions, which are like Solow Swan model.

- The conditions of the economy's perfect competition,
- Production factors can be replaced by one another and
- Full employment.

To a greater degree, the model is significant for a less developed country like South Africa, especially because most developing countries are normally blessed with excessive workforce and low capital stocks that will boost the economy by creating more jobs. The AK model, however, advocates for a surge in capital to stimulate economic growth while reducing the rate of unemployment on the other hand. In developing countries, most of the labour is underused, especially within the agricultural sector. The government should ensure capital increase by promoting savings to alleviate the challenge of low industrialisation, which will result in investment and offset public debt.

According to Arrow (1962), the learning by doing theory ultimately results in an increase in a company's capital leading to a parallel increase in its knowledge stock. At the same time, increases in physical capital stock in a developing country like South Africa will simultaneously lead to higher labour. As the capital stock of a company increases, this ultimately results in a parallel increase in its knowledge stock. At the same time, an increase in physical capital stock in a developing country like South Africa will simultaneously lead to higher labour productivity. This results in efficient production and resource allocation within the economy, resulting in less borrowing by the government. Frankel's assertion of the AK model (Aghion & Howitt, 2010) is that economic growth is dependent on efficiency and thrift. Furthermore, learning by doing also improves technological progress, resulting in an increased marginal capital product that will counteract the declining marginal capital product.

Casaratto (2008) criticised the AK model, amid concerns that it disregards important economic growth factors such as human rights, political stability, good institutions and property protection. He further explained that in most developing countries, these factors are relevant and failure to incorporate them in the economic growth model could negatively impact on the intended outcomes.

Despite the criticism, Frankel's AK model (1962) remains relevant to developing countries such as South Africa as it helps to tackle the major economic growth barriers faced by these countries, such as low productivity, low investment levels, high unemployment, higher public debt and dilapidated infrastructure. In addition, the accumulation of capital will also bring positive externalities by learning through effects. However, the model may fail to produce results as it does not consider other factors like political instability and good institutions that equally contributes to economic growth, but it is important to explain the issue of public debt in a country like South Africa.

The AK hypothesis was trailed by a second wave of the endogenous growth hypothesis, commonly known as the "growth theory based on innovation". The hypothesis perceives that scholarly capital is an outcome of technological advancement, particularly from physical and human capital. Savings and education accumulate physical and human capital, but through intellectual innovation. Romer (1990) launched an innovative theory version, if productivity (aggregate) is an expanding function of the level of product assortment. Development creates productivity growth in this theory by creating new product varieties, but not necessarily improved.

3.2.2 Theories on debt burden.

3.2.2.1 The Keynesian view on public debt.

The development of the modern public debt theory resulted from the great 1930s depression, which led to an economic crisis. The traditional view outlines the constant unbalanced budget and rapidly public debt (Mah *et al*, 2015). Furthermore, imperative to the financial stability of the nations, huge public debt is viewed as a national asset rather than a liability, given the continuous deficit spending is significant to the economic property of the nation (assuming it is at full employment). With that said, an increase to the national income would result from the multiple effects caused by a rise in public debt as outlined by Keynes. He further linked an increase in employment and output by relating it to the effects of the public borrowing with deficit financing as well as authorised government spending ultimately affecting an increase in

aggregate demand. As stated by Parkin *et al* (2008), Keynes consumer borrowing is as desirable as borrowing for investment to finance production and technological innovation consequently consumption expenditure would lead to increased investment.

3.2.2.2 Debt overhang theory.

The theory of debt overhang holds that the stock of public debt, services' the cost effect of the economic growth thereby discouraging private investment or altering the efficient public spending. According to Reinhart *et al* (2012), this hypothesis of debt overhang suggests that unsustainable public debt undermines the credibility of state policy. On the other hand, Mohanty and Mishra (2016) stress that debt overhang theory expresses increased cost of servicing debt which impedes investment if the country's ability to repay debt is exceeded by its anticipated external debt. The implication of this is that, the possibility of government to sacrifice fiscal consolidation results from the ripple effect of pressure caused by public debt further increasing a country's budget deficit. As far as the theory is concerned, high stock of debt induces variations of incentives for both the creditor and the debtor. Therefore, reduction of debt is in the interest of both the debtor and the creditor.

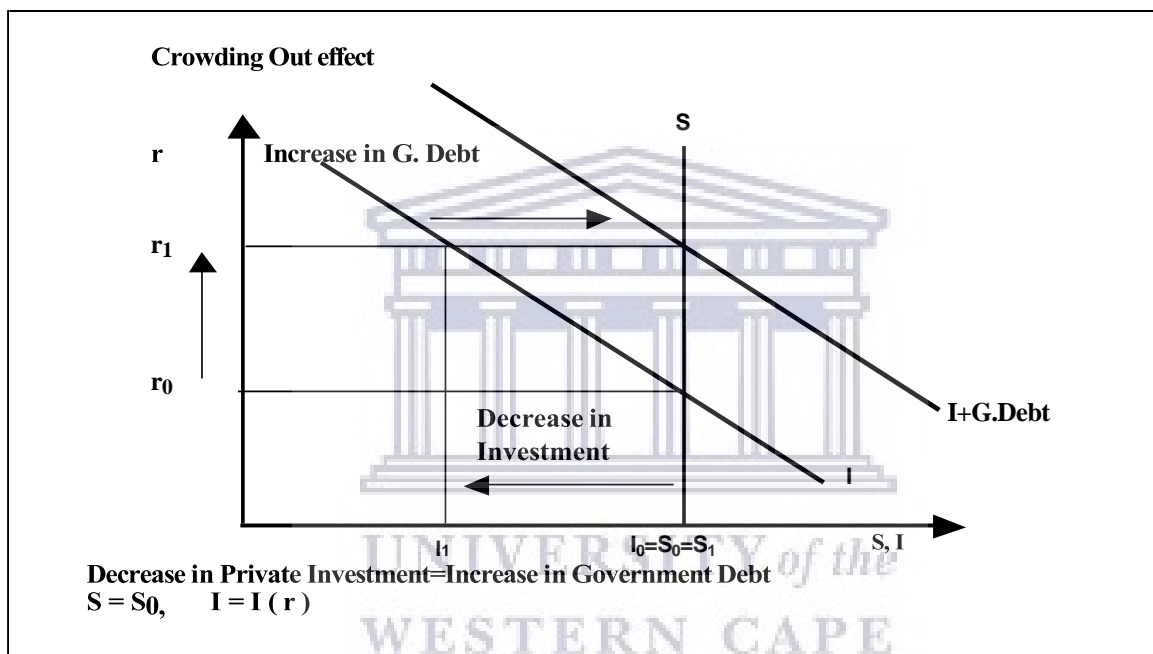
The theory further elaborates on the impact of capital accumulation or productive growth during which public debt is considered to have a non-linear outcome on growth. The probability of future debt lies under the umbrella that, debt acquired will exceed the country's ability to make payments. According to this hypothesis, a continuous increase of debt servicing cost in a country will further discourage both domestic and foreign investments that were going to accelerate economic growth. Krugman (1988) argues that potential investors would be more concerned about the heavily taxed production by creditors in the attempt to service public debt at the expense of the investment costs incurred from future output.

3.2.2.3 Crowding-out effect

Crowding out effect holds that a reduction in investments as well as personal consumption of goods and services by organizations results from an increase in spending by the government and deficit financing in a country, further raising interest rates and taking away available financial resources. That is said to be a direct result of an expansionary fiscal policy financed by either borrowing or increased taxes if not both. According to Buiters (1990), the crowding out effect hinders the smooth running of the fiscal policy due to lack of effectiveness of government to influence the economy.

To clarify the bigger picture of crowding out effect, the study will make use of the Figure 3.1. First, private investment is assumed to be just a component of interest rate given by $I=I(r)$. For this situation, financing cost diminishes increasingly investment ventures are gainful to attempt which speak to a negative relationship. Furthermore, assumption that saving and interest rate are positively related, this will mean that a higher rate of return to saving will ultimately cause a rise in private saving and be insensitive to the rate of return such that change in rate of return will not have an effect on saving. Figure 3.1 is the graphical illustration of crowding out effect explained above. The theory supports the second objective of this study.

Figure 3.1 Crowding out effect diagram.



Source: Buiter (1990).

3.2.2.4 Ricardian equivalence.

In contrast to the classical and Keynesian views on public debt, the Ricardian equivalence proposition found its roots in the following assumptions:

- Ideal capital markets with no borrowing restrictions
- Non distortionary charges
- Ideal conviction about future taxes

The theory holds that public obligation is proportional to future taxes, and if buyers are forward-looking, future tax assessments are equal to current tax assessments. It further suggests that when government spending is financed by debt it is equal to financing it by taxes. The

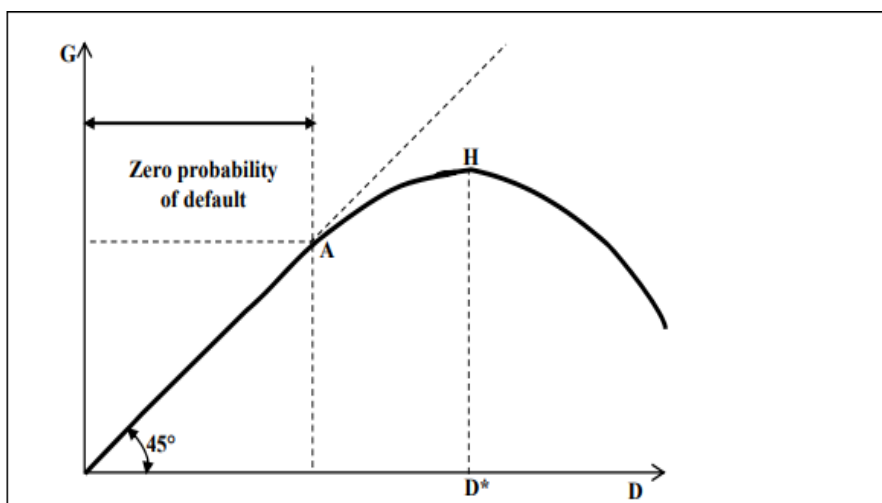
ramification of the Ricardian proportionality is that a debt funded by tax cut leaves consumption unaffected. Households spare the additional discretionary cash flow in order to pay the future regulatory expense risk inferred by the tax break. This expansion in private saving precisely balances the decline in public saving. The whole of private and public saving continues as before, investment, leaving real consumption and output are unaffected.

Following the renowned work of Barro (1974), the equivalence proposition received a rehabilitated consideration. Barro (1974) further suggests that the timing of taxes or the accumulation or dissimulation of public debt would not affect private consumption, savings and national income for a given path of government consumption. Therefore, leaves the interest rate, investment and output unchanged in a closed economy. If this proposition holds, the possibility of fiscal policy as a stabilisation device of the economy will be very restricted. This contrasts sharply with the Keynesian basic perspective. From the Keynesian point of view, accumulation of public debt or a tax reduction in one period, increases private consumption, affecting other macroeconomic variables such as output and unemployment. Barro (1974) argues strongly that government debt has no impact on consumption, savings, private investment or economic growth.

3.2.2.5 Debt Laffer curve hypothesis.

The Debt Laffer curve hypothesis suggests that public-sector debt financing can boost growth and investment to reach a level, albeit, its impact will be detrimental to investment and growth beyond that level.

Figure 3.2 Debt Laffer curve.



Source: Cohen (1993).

When the debt stock exceeds a certain limit, as designated by Cohen (1993), the possibility of repaying the borrowed funds becomes uncertain, thus depriving economic growth. A country can still grow when the debt level is low because there will be a very high chance of paying back (zero default probability). When the size of the debt grows so large, there will be increasing uncertainty in repaying back. The likelihood of default will begin to increase leading to a decreasing rate of growth until it finally decreases as shown in Figure 3.2.

The Debt-Laffer curve explains the relationship between economic growth and debt stock accumulation. The vertical axis (G) denotes a country's growth rate, and the horizontal axis (D) is the debt stock size. Point D* is the level of threshold that can accumulate a debt. The size of the debt at all points will have positive effects on growth. Growth, however, will begin to rise at a decreasing rate on the curve beyond point A. When the curve reaches its peak at point E, any further debt increase will lower a country's growth rate. Therefore, the maximum debt accumulation limit is the point H corresponding to the debt stock D*. Any further increase in debt will delay economic growth beyond the threshold level

3.3 Empirical evidence.

The previous section outlined the theoretical view pertaining to public debt and economic growth, thus forming the basis of the findings. Those theories are extensively tested empirically. There is a vast number of empirical works both within developed and developing countries which conducted the debt-growth nexus, deploying several models of econometrics and techniques which produced mixed result. With that said, this section will explore the empirical findings for developed and less developed countries.

3.3.1 Empirical evidence from non-African countries.

Much of the work done by different researchers from different economic perspectives on this issue includes the work done by Bittencourt (2015), Chowdhury (1994), Gómez-Puig and Sosvilla-Rivero (2017), Reinhart and Rogoff (2010), Mohanty and Mishra (2016), Dritsaki (2013), Saifuddin (2016), Hameed *et al* (2008), Akram (2016), Kumar and Woo (2010). These researchers mostly focused on the Latin American countries, and they have not drawn a concrete consensus on this matter. In his study, Bitterncourt (2015) found that the effective use of government borrowing speed up the economic growth ratio of a country, and consequently the socio-economic effect would be minimised. His findings were analysed using panel data analysis, with data spanning from 1970 to 2007.

Chowdhury (1994) undertook a study within Asian and Pacific countries to observe the link amid external public debt and growth in the economy. Their study employed the Granger causality test, and its findings depict that, the existence of surging external debt altitudes forms bases for sluggish growth in the economy. They further exposed inverse association of external public debt and performance of the economy within Asian and Pacific countries.

As reported by Gómez-Puig and Sosvilla-Rivero (2017), the auto-regressive distributed lag was deployed to assess the short- and long-term effect of public debt on the economic growth of euro countries. The study was conducted using the period from 1961-2013 to limit the approach to testing with annual data spanning. The results of the study revealed different patterns across all these euro countries, which in turn support the view that in the longer term, public debt is likely to impact inversely on the performance of the economy in the euro member states, while its short-run effect on other hand may be positive depending on the country.

Reinhart and Rogoff (2010), in their study of economic growth and inflation at different levels of government and external debt for 44 advanced and emerging countries over a 200-year period, found that public debt has adverse growth consequences only beyond 90 percent ratio of debt-to-GDP for those countries. Additionally, it was noted in the study that, the threshold of total external debt-GDP seems to be a greater for the emerging markets (60%) that is associated also with adverse growth outcomes.

With the primary objective of examining the causal debt-growth nexus for 15 national security council states of India, Mohanty and Mishra (2016) used the Dumitrescu Hurlin causality test with data spanning from 1991-2015. With the use of panel causality test the study was able to identify the endogeneity issue as it shows the bidirectional causality amongst two variables. The study adopted fully modified ordinary least square (FMOLS), which solves the endogeneity and caters for the problem of serial autocorrelation within the model. The results revealed that the explanatory variables namely; total revenue receipts, public debt and total credit had positively impacted on economic growth. The study then concluded by pointing out to government and policymakers that the proper tax reform strategies is required in order to minimize tax leakages as well as implementing effective credit and to improve the asset quality through risk management practices.

Dritsaki (2013) established the causal nexus of Greece's economic growth, exports and government debt. The study utilised time series data spanning from 1960-2011 of economic growth (proxy real GDP), exports and external debt. In the methodological approach, they

employed VECM and Granger causality tests to analyse their results. Their findings displayed the existence of “short-term and long-term relationship” amongst variables under investigation. Moreover, the study found the existence of unidirectional causality of Granger ranging two ways as follows, exports to growth, and from growth to public debt, with non-evidence of short-term causal connection amid exports and public debt. The results further signalled the evidence of a unidirectional Granger causality (long run) that ranges from economic growth to government debt.

Saifuddin (2016) looked at how public debt in Bangladesh can influence its growth, observing time series data for the period 1974 to 2014. The investment model was adopted in this study to determine how public debt could potentially signal indirect influence on economic growth by impacting investment. In addition, the study applied the growth model to observe the direct association of government debt, and economic growth. The estimation of both models was through the regression of two stage least squares (TSLS). As a result, it was found that both investment and economic growth are positively related to public debt. The empirical findings also suggest that through its positive influence on investment, public debt affect growth indirectly, albeit in a positive way. Numerous econometric tests are used in the current study to produce accurate results.

The veracity of long term and short-term association amid external debt and economic growth in Pakistan were corroborated by various studies that found similar but not same results (Hameed *et al*, 2008; Cunningham, 1993; Rabia & Malik, 2012; Akram, 2016). Despite the similar investigation and findings, different methods were utilised to obtain the outcome depending on the period and objectives applicable to each study. For instance, on the one hand, neo-classical production function were applied, incorporating variables as follows; capital stock, GDP, labour force, exports and debt service, so as to check how each affect economic growth considering time series data for the period 1970 to 2003 (Hameed *et al*, 2008; Cunningham, 1993). As a result, it was depicted that, the ratio of debt service tends to adversely affect economic growth. In Addition, the results revealed the appearance or existence of a long-run and short-run causal relationship between debt service and GDP.

On the other hand, the presence of inverse relationship between domestic debt and growth were validated by Rabia and Malik (2012) using Ordinary Least Squares (OLS) approach (period 1980-2010), and Akram (2016) using VECM model and ARDL (period 1972-2009). The former found minor effects of domestic debt on growth, albeit the external debt signalled significant association amid external debt and economic growth. While the latter concurred the

findings, the slight difference was to assess external debt as a percentage of GDP and include per capita GDP. Therefore, it can be said in a nutshell that, a huge amount of external debt retards growth momentum in the economy, though at a smaller magnitude in the case of domestic debt. Nevertheless, debt servicing in Pakistan has an insignificant relationship with economic growth as a percentage of exports. Therefore, informing the need to discourage heavy reliance on foreign and domestic debt (Akram, 2016). As such, policymakers were advised not to use debt to finance deficits, but rather as a way of stimulating revenue or cutting current spending in the interest of growth in the economy. Therefore, this study follows similar path from the above studies.

Moreover, panel study for emerging market and advanced economies was researched by Kumar and Woo (2010), observing the period 1970-2007 to assess how the longer-term economic growth could be deterred by high public debt. The empirical results reveal and suggested inverse relationship owing to initial debt and subsequent growth, and also indicated that, a 10 percent increase (on average) in the initial ratio of debt to GDP is associated with lethargic per capita real GDP of approximately 0.2% per annum, which slightly affect advanced economies. To achieve their primary goals, the study used the following variables; population, investment, and government size. More parameters of public debt have been added in the current study.

3.3.2 Empirical evidence in African countries.

The dynamics of economic growth and public debt within the developed countries triggered various empirical studies such as Bonga *et al* (2015), Munzara (2015), Cunningham (2003), Anning, Ofori and Affum (2016), Okon *et al* (2013), Kasidi and Said (2013), Tajudeen (2012), Ntshakala (2013), Tuffour (2012), Ochieng (2013), Matthew and Mordecai (2016) and Mwaniki (2016) scrutinize the impact of public debt on economic growth, particularly gazing at Zimbabwe, Tanzania, Nigeria, Kenya and Swaziland respectively.

Bonga *et al* (2015) covered the empirical research looking at the relationship pertaining to Zimbabwe's public debt and economic growth. Specifically examining the origin of debt crisis as well as the consequences and possible ways to reduce it. The study employed OLS models and performed econometric tests to inform the outcomes of the study, for example, ADF test, and correlation matrix for testing the strength of relationships between explanatory variables. The utilised annual time series data (from 1980 to 2013) indicated the significant impact of government debt on growth of the economy noting that, accumulation of capital is susceptible to large debt and ultimately dent growth momentum in Zimbabwe as far as GDP growth is

concerned. The study concluded by encouraging government to refrain from borrowing and if they proceed to borrow, the funds must strictly be used for investment purposes to boost economic growth.

Similarly, Munzara (2015) had researched the impact that foreign debt has on Zimbabwe's economic growth, making use of annual time series data, 1980 to 2013. Labour force, capital investment, and trade openness are chosen as control variables. The OLS regression was employed to interpret the data to fulfil the objectives of the study. The results revealed the negative impact of external debt and openness to trade in the economy of Zimbabwe, while the investment on capital and labour force growth yielded positive effects. Furthermore, the study made a strong emphasis in recommending that the country should not heavily rely on foreign borrowing to finance economic growth but instead rather create a conducive environment for alternative sources of foreign funds such as project finance and FDI. Additionally, the country should avert excessive imports of consumables and rather advocate for value-added exports by the manufacturers locally.

Cunningham (2003) determined the impact of public debt on the GDP growth rate at varying time intervals, observing 16 heavily indebted countries in Sub-Saharan Africa and Latin America, period 1971 to 1987. He used cross sectional data with structural breaks to determine how public debt impact on growth rates of the economy at different time intervals. The empirical results confirmed that debt affected economic growth in a negative way within those countries during the period 1971 to 1979 because of its negative impact on labour-capital productivity. As debt burden becomes significant, so do the servicing requirements. As a result, this induces severe implications on how labour and capital are utilised in the production process (Cunningham, 2003). On the other hand, the results for the 1980-1987 periods found no evidence pertaining to the growth of debt burden and economic growth

In their study, Anning *et al* (2016) applied simple OLS to explore how public debt in Ghana impact on economic growth, notably providing an insight of the sadness of the debt crisis of Ghana with data spanning from 1990-2015. Emphasis has been made on the fact that, the country has found itself in an unfortunate tragic situation where external government debt has exceeded the debt threshold, resulting in high dependency on aid and other loans to reinforce its development. Their results show a negative relationship hampering government debt and economic growth of Ghana, and their conclusion was mainly focused on recommending government and policy makers to discourage government borrowing or more debt

accumulation, since there is an alternative to increase the revenue base through tax reform programs, as this is encouraged.

Using an augmented Cobb-Douglas model to determine the impact of public debt on the economic growth of Nigeria, Obademi (2012) adapted a segregated approach for the period 1975-2005. Two models were developed, one with domestic debt and external debt as exogenous variables on the dependent variable real GDP whilst the second model had the entire public debt stock. Total public debt was found to have adversely impacted the growth rate of Nigeria. Another incidence channel was also observed, the incidence is felt as the rate of servicing draws away available domestic resources. Total debt stock was also found to have a long-run relationship with real GDP thereby an Error Correction Model had to be used to capture short-run dynamics towards the long-run equilibrium.

The relative potency of external and domestic debt was scrutinised to evaluate economic performance in Nigeria (Okon *et al.*, 2013). In particular, the emphasis was on the magnitude at which the type of debt exerts greater inspiration nor impact on GDP per capita and gross domestic product as a major macroeconomic variable. An attempt to achieve this objective led to the utilisation of time series data spanning from 1970-2011 and they also used econometrics analysis as their methodology. The results suggested that economic growth is more prone to external debt than domestic debt, perceiving the possible paraphernalia of crowding-out domestic investment, owing to external debt. The need for recourse to domestic market-based borrowing emerged as a proposal for Nigerian government to circumvent the issue by mobilising savings domestically to incite domestic investments. Similarly, the empirical results obtained from (Iyoha, 1999) also attest that an extremely high external debt stock wanes investment momentum and ultimately detriment economic growth, especially in a heavily indebted country like Nigeria, since it is less developed.

Kasidi and Said (2013) applied the regression analysis to appraise the bearing implications of external debt on growth of the economy in Tanzania. Using time series for the period 1990 to 2010, the results signposted the presence of positive link economic growth with external debt. Additionally, the negative effect of debt service payment in this regard also proved to exist. Furthermore, the test of cointegration displayed the absence of positive link of external debt and economic growth in the long run. Therefore, it was pointed out that the need for further research in this field is vital to appraise the susceptibility of foreign direct investment and domestic revenue to external debt.

Following investigation to detect causative link concerning external and internal public debt, vector autoregressive method revealed that causality amid economic growth and public debt is bi-directional (Tajudeen, 2012). The results were obtained using time series data in Nigeria for the period 1970 to 2010. The study concluded by making strong recommendation that government should use the obtained loans efficiently by investing it towards economic development through structural programs, as opposed to redirecting it into private pockets. Ntshakala (2013) examined the effect of public debt on economic growth in Swaziland, observing the period between 1988-2013. The study was guided by the neoclassical economic growth; the nature and the extent of debt-growth nexus was found using OLS. Nevertheless, the study found no significant relationship between external debt and economic growth, while on the other hand, domestic debt was found to have a significant relationship with economic growth at 5% level of significant.

In his study, Tuffour (2012) explored the threshold of external debt to detect how this could induce economic growth of Ghana to fade. Employing annual time series data from 1970 to 2009, OLS was used to estimate the outcome. In corroboration with the Laffer curve hypothesis, the outcome suggested a non-linear association of debt and growth since the external threshold was estimated at 46.2%. Additionally, the study illustrated positive outcomes of economic growth as a result of moderate external debt levels, unlike skyrocketing levels of external debt that causes economic growth to deteriorate. Based on this, their study estimated that, increasing external debt-GDP ratio from any level beyond the threshold will cause its impact on GDP growth to fall. This aligns to the theory that a continuous increase of external debt beyond a threshold will severely hamper the economic momentum. The results of the study provided noticeable warning signals for policy makers to act before external debt levels reach a critical value that is above the threshold.

Ochieng (2013) scrutinized the link concerning economic growth and public debt, employing data that covered the years 1992-2012. The study used the Harrod Domar growth model and the results revealed the evidence of a reasonably sustained domestic debt in Kenya. Nevertheless, the recommendation to the government was develop a policy framework to regulate contingent liabilities so that they could be recorded and well managed. This study differs with the current one based on the methodological approach; the study used Harrod Domar whereas the current one is using endogenous growth model.

Putunoi and Mutuku (2013) employed the test of Johannes VAR-based cointegration, supplemented by Engel Granger residual, concentrating on the shift in the composition of

public debt in Kenya to assess the possible influence of domestic debt on economic growth. The quarterly time series data from 2000 to 2010 were utilised to detect the association of domestic debt and economic growth in the long-run (Putunoi & Mutuku, 2013). As a result, the co-integration was found, thus prompting the need to consider the short run dynamics through ECM, hence, the results validated the significant safe havens of Kenya's economic growth owing to domestic debt. Therefore, capitalising on domestic borrowing was suggested as a strategy that Kenyan government must consider, notably using the funds towards productive economic avenues.

The susceptibility of economic development to public debt received attention from Matthew and Mordecai (2016), who adopted the test of Granger causality accompanied by ECM. The focus was on Nigeria applying time series data dated 1986-2014. On the one hand, the findings demonstrated that the proneness of economic development to external debt stock and its servicing is neither significant nor negative in Nigeria. On the other hand, results contradicted when displaying the long run possibilities, thus indicating that debt stock (domestic and external), including external debt serving and economic development are positively related, during which a conclusion was drawn advising the government to reduce borrowing.

In yet another study showing much insight on debt and economic growth in Africa, the explored the predisposition of growth and development to external debt in Nigeria (Ajayi & Oke, 2012). The OLS estimation was used to draw conclusion and recommendations pertaining the issue of debt and economic growth. Their findings reveal that, the burden of external debt tends to adversely influence the income per capita and national income in Nigeria (Ajayi & Oke, 2012). In addition, they also indicated that the Nigerian devaluation of national currency, high unemployment and continuous retrenchment of workers as well as poor education was partly because of high level of external debt. They further suggested that debt contracted in that nation must be used for investment purposes, which will yield benefit to grow the economy and minimise the socio-economic effect the country is facing. In their view, the obligation to service the debt servicing should not exceed the foreign exchange earnings.

3.3.3 Empirical evidence in South African economy.

The few studies which investigated the link of public debt and economic growth within South Africa are those conducted by Mhlaba and Phiri (2017), Ncanywa and Masaga (2018) and Baaziz, Guesmi, Heller and Lahiani (2015). However, most of the empirical studies are those of panel studies whereby South Africa was included with the host of other countries. These

include the studies that analysed the link between economic growth and external debt in 50 countries Iyoha (1999), and the one that scrutinised causality amid “exports, external debt and economic growth” covering 35 African countries, Amoateng and Amoako-Adu (1996), 14 African countries, Hussain, Haque and Igwike (2015) and 35 Sub-Sahara African countries (Fosu, 1999).

In summarising these findings, on the studies undertaken by Iyoha (1999) and Hussain *et al.* (2015), it is reported that government debt and economic growth are negatively related; hence policy makers were advised to be more concerned about the accumulation of high debt levels. In the study by Fosu (1999), growth and debt revealed a non-significant link; hence debt management was advocated to maintain the moderate level of public debt. Using the data from World Bank, for the years 1970-1986, OLS was employed as the estimation technique to obtain the outcome. However, given the nature of the cross-sectional analysis of the study (Fosu (1999), the likelihood test ratio was also employed to examine the error structure for heteroscedasticity. The results are in support of the hypothesis that debt burden has on average been deleterious to growth in Sub-Saharan Africa (SSA). While its effect on the level of investment is rather weak, debt apparently adversely influence the nature, and hence productivity, of investments undertaken. The study further found that, moderate levels of investment prompt a non-monotonic influence of public debt, notably, when the threshold of GDI/GDP reaches about 16 percent, it turns to be negative.

The dynamic relationship between accumulated public debt ratio and real GDP growth was analysed for the South African economy, years 1980-2014 (Baaziz *et al.*, 2015). The study made use of LSTR model with inflation rate and openness trade as two macroeconomic control variables. Furthermore, it was found that, the country’s level of indebtedness informs the type of link that can exist amid public debt and real growth of GDP. In their view, any level of public debt in South Africa that is plethora to 31.37% of GDP jeopardises growth momentum in the economy. Their findings sent a strong warning to government and policy makers concerning the rational to ameliorate fiscal credibility and enhance countercyclical fiscal policies that could steer the country to safe havens and safeguard the public debt level. Their study was more focused on two macroeconomic variables hence, in the current study more parameters of public debt are added as well as numerous econometrics test are employed. Unlike the study by Baaziz *et al.* (2015), which determined the threshold of public debt on economic growth of South Africa, the current study seek to address the effect of public debt on economic growth.

Ncanywa and Masaga (2018) explored how public debts impact on the investments and economic growth of South Africa using quarterly data spanning from 1994-2016. Their objective was achieved through multiple econometrics tests. The incorporated variables were, gross domestic product, public debt, investment and government deficit. Their results for Johansen test of cointegration confirmed the existence of cointegration among variables observed thus, validating long run association. Most importantly their research outcomes were mainly informed by vector error correction model (VECM) accompanied by other econometric tests such as Variance Decomposition and Impulse Response Function and Granger causality. The results of VECM validated the short run association relating public debt and economic growth in the short run. Granger causality results have shown that public debts can Granger cause economic growth, and there is bi-direction association amongst the two variables. The current study used different variables than the ones used by Ncanywa and Masaga (2018) as well as the study period, however, the current study has borrowed much from the above study. Ayadi and Ayadi (2008) assessed the predisposition of economic growth owing to external debt, comparing Nigeria and South Africa. OLS and general least square (GLS) were employed to inform the results, using annual data spanning from 1980-2007. Their findings confirmed an adverse impact of debt and its service requirements on growth in South Africa and Nigeria. Nonetheless, this study is not a comparative study, nor does it focus only on the external debt. Therefore, the current study overcomes the limitations of Ayadi and Ayadi (2008) by investigating the effect of public debt (including both external debt and domestic debt) in relation to the economic growth of South Africa.

With the aim of examining how public debt influences economic growth, Mhlaba and Phiri, (2017) employed the ARDL model to scrutinise the short-run and long-run responsiveness of economic growth to public debt in South Africa. Their study used the first quarter of 2002 and fourth quarter of 2016 data to mark their analysis marked. The results show that, in the long run, there exist a negative relationship between public debt and economic growth. Although economic growth and public debt could link positively in the short run, there is no clear indication of what the short-run effects could look like. The study concluded by stressing that, policy makers must be cautious while acquiring additional unit of debt and they must implement some debt management programmes in stabilising the level of high debt as this harm the economy. In line with Mhlaba & Phiri (2017), the current study uses annual data spanning from 1961 to 2017, a period which provides the pre and post South African democracy.

The choice of such observation is to also factor in the economics shocks that the country experienced such as the oil crisis of 1974/5, recession of 1982/83 and so on; unlike the quarterly observation by Mhlaba and Phiri (2017), which was primarily focused on the post-apartheid era. Another important aspect discovered through research is that, there are few studies conducted within the context of South Africa concerning public debt and economic growth. Instead, most studies only covered South Africa by generally concentrating on the emerging economies, African countries and sub-Saharan Africa. For instance, Hussain, Haque and Igwike (2015) empirically analysed the Sub-Saharan Africa to probe the link concerning public debt and economic growth. The current study adds to the existing literature of studies focused on how public debt affects economic growth in South Africa.

3.4 Research gap.

The empirical literature reviewed above have shown mixed and inconclusive results from different countries regarding how public debt affect economic growth. However, the debt overhang and threshold hypotheses played an important role in the literature, thereby identifying the importance of debt at reasonable levels, which, once exceeded, will infer an adverse impact on economic growth. A mixture of reported results makes it difficult to take a position from the broad literature except to refer to a specific study. In the case of South Africa, the scarce literature suggests a negative association of government debt and economic growth. Debt has continued to grow even though newly fiscal consolidation strategy indicates borrowing for debt-repayment as one of strategies towards resolving the debt crisis. South Africa continues to rely more on debt even though it is already highly indebted. For this reason, the study seeks to provide further evidence on the impact of debt on growth given the transformation in the economy that transpired since independence.

Following the variances in most of studies pertaining to the topic under observation, this study aims to emphasise the effect of public debt on economic growth through derivation of new and better models for sustainable public debt and finally highlighting quantifiable improvements that South Africa could use to enhance infrastructure development for governance and effective management of public shocks other than relying on grants and aids amidst borrowing to pay its existing debts.

3.5 Conclusion.

Theory suggests that debt attained for economic growth purposes has an important role of augmenting domestic savings in promoting capital accumulation. It is indeed true that no

government is an island on its own; it would require aid to perform efficiently and effectively. External debts arise as a natural economic phenomenon because some countries have financial surpluses while others are in deficit. As illustrated under the neoclassical theory of growth, investment enhances economic growth. Klein (1994) argued that the attainment of public debt gives the country an opportunity to invest in capital in excess of its own financial capability through borrowing excess capital. Worth notably, debt created is supposed to boost economic growth and development in order to fight unemployment in a country. It is clear from the theory that for public debt to promote growth there must be efficient and productive utilisation that ensures capital accumulation.

In conclusion, the literature reviewed so far in this chapter has not revealed any robust stylised facts about the effect of public debt on economic growth. Consequently, several empirical investigations are a way to advance on this issue. This study thus adds data from 1961-2017 in the context of South Africa to the ongoing debate on the effect of public debt on economic growth.



CHAPTER 4

RESEARCH METHODOLOGY.

4.1 Introduction.

This part of the study portrays the empirical strategy adopted to investigate the potential effect of debt on economic performance in South Africa. The method of estimation is the ARDL approach to cointegration. This section additionally legitimises the incorporation of variables used in the model and carries out model diagnostic tests. First, the study provides the sources of data. Secondly, it unpacks the hypothetical framework that informs the estimation model. Lastly, the study explores the empirical model that will be estimated, the econometrics procedures that will help achieve the primary objectives of this study are discussed, followed by a conclusion.

4.2 Definition of variables and data sources.

The study uses two main variables, which are economic growth and public debt, coupled with three control variables; gross fixed capital formation, inflation and budget deficit. A well-known definition of economic growth embodies the “total value of final goods and services” in the economy, also measuring real GDP by economic growth in this instance, as far as this study is concerned. The annual data from the study period, which is from 1961 to 2017, was obtained from the SARB. Furthermore, public debt is categorised into external debt and domestic debt. Arnone *et al.* (2005) defines external debt as the portion of debt a country obtained from foreign sources be it financial institutions, government or foreign corporations. On the other hand, Ozurumba and Kanu (2014) define domestic debt as the portion of a country's debt borrowed from within the country's confines. Usually, these loans are obtained from the central bank, deposit money banks, discount houses, and other financial houses other than banks. Annual data on the two variables was obtained from the SARB.

Mohr (2014) defines the inflation rate as the quantitative measure of the rate at which the average price level of a basket of selected goods and services in an economy increases over a period. It is the constant rise in the general level of prices where a unit of currency buys less than it did in prior periods. Often expressed as a percentage, inflation indicates a decrease in the purchasing power of a nation's currency. The annual data for this variable was obtained from the StatsSA. Bonga *et al.* (2015) opine that fiscal deficits, in the absence of Ricardian equivalence, can either overlap or overlap private investment. However, from Keynesian point of view, fiscal deficits can increase national savings and thus stimulate growth. The sign

expected can be either positive or negative. Budget deficit annual data for the study period was obtained from the SARB.

Furthermore, the study used gross fixed capital formation as an explanatory variable in the model. Essentially, the gross fixed capital stands as a net investment, and the computation of GDP via expenditure method embody this component. More precisely, the net increase in fixed capital measures the gross fixed capital formation. Annual data for this variable was obtained from the World Bank website (World bank, 2019).

4.3 Theoretical model.

The neo-classical endogenous theory is hypothetically unrivalled as reviewed in the literature section, making it attractive as the basis modelling. Thus, the examination follows Cunningham (1993) and Akram (2010). The model can be expressed in its auxiliary structure as:

$$Y = Af(K, L, Debt) \dots \dots \dots (4.1)$$

Where Y is economic growth, K is the capital stock; L is the labour force, debt is the public debt and A represents other constant factors. In the model, the *a priori* expectation is that $K \geq 0, L \geq 0, Debt \geq 0$ and $K + L + Debt \leq 1$.

4.4 Empirical model.

Following the theoretical model, the empirical model is specified as follows:

$$GDP = f(FDE, DDE, CBD, INF, GFCF) \dots \dots \dots (4.2)$$

Using the regression model, the model will take this form:

$$GDP = \beta_0 + \beta_1 FDE_1 + \beta_2 DDE_2 + \beta_3 CBD_3 + \beta_4 INF_4 + \beta_5 GFCF_5 + \mu \dots \dots \dots (4.3)$$

Where: $\beta_0, \beta_1, \beta_2, \beta_3, \beta_4, \beta_5$ denote the coefficients of the explanatory variables, with t signifying time series. Conspicuously, the possible sway of the omitted variables is denoted by error term. μ .

GDP= Log real gross domestic product in millions

FDE₁= Foreign debt stock (% to GDP)

DDE₂ = Domestic debt stock (% to GDP)

CBD₃ = Budget deficit (% to GDP)

INF₄ = Inflation rate

GFCF₅ = Gross fixed capital formation (% to GDP)

μ = Error term

β_0 = intercept

This study will employ autoregressive distributed lag (ARDL) modelling. The real GDP is the dependent variable which is transformed into log. The explanatory variables in this study are public debt (proxy by foreign debt and domestic debt), CBD (budget deficit), INF (inflation rate), and GFCF (gross fixed capital formation).

4.5 Estimation approach.

This study replicates some econometric methods applied by Clements *et.al* (2003); Sheikh *et al* (2010) to examine the effect of public debt on economic growth. That is OLS technique, the justification being the convenience and simplicity of this technique, accompanied by the advantage of BLUE parameter estimates owing to OLS. According to Gujarati (2004), the OLS estimators of the coefficients have a desirable property known as super-consistency subject to non-violation of the assumptions of OLS. A cointegration and error correction model is also employed to establish the short-run and long-run dynamics and speed of adjustment towards the long-run. It is also necessary to begin by analysing the time series properties of the data.

The idea of cointegration entails that a set of variables be coordinated of a similar order and they are as well as a stationary linear combination, that is, $I(0)$. The study therefore proceeds to test for cointegration if series have the same order of integration. Therefore, the performance of the cointegration method requires the prior check for stationarity of data (Gujarati & Perter, 2009). To make sure that we achieve our objectives without any econometric flaws that would render our estimates unreliable; we undertake econometric tests necessary for this purpose. The tests will be discussed below. First, the unit root test for stationarity to avoid spurious results will be employed, this will be achieved by making use of augmented Dickey-Fuller test (ADF), followed by the ARDL bound cointegration by Pesaran *et al.* (1997) and ECM model. For the robustness of the model, the study will also develop the methodology for diagnostic tests and Granger causality test will be employed to check whether the variables do cause each other.

4.6 Unit root and stationary tests.

The test for stationarity will be conducted through visual inspection; commonly viewed as an informal way of testing the presence of stationarity amongst the variables. The test of Unit root is important to detect the possible stationarity amongst the variables under investigation. A

stationary variable is one whose first moments (the mean and variance) do not vary with time. If a series is not stationary, then it cannot be used for forecasting or policy-making purposes outside the sample period. Using non-stationary series also leads to spurious results, which basically means a false, significant relationship is estimated. There are many tests available to test for a unit root. Each of them has strengths and weaknesses. However, this study will use unit root and stationarity tests to examine whether the time series of the dependent and independent variables are stationary. Two tests will be used, the Augmented Dickey-Fuller (ADF) test developed by Dickey and Fuller (1981), and the KPSS-test developed by Kwiatkowski, Phillips, Schmidt, and Shin (1992). The two tests are used to complement each other.

4.6.1 Augmented Dickey-Fuller test.

As stated in the study by Cheng and Annuar (2012), the ADF test was developed in 1970s by the famous statisticians Dickey and Fuller. The test is drawn in order to test for stationarity of variables in a time series data. Performing the unit root test bodes well for the study, as this is applied to avoid spurious results in the data. In addition, checking the stationarity, verification of the likelihood of long-run cointegrating relationships among other variables will be ascertained. Mathematically the test is estimated by the following regression with both trend and intercept:

$$\Delta Y_t = \alpha + \beta_1 t + \delta Y_{t-1} + \sum_{i=1}^m \omega_i \Delta Y_{t-1} + \varepsilon_t \quad (4.4)$$

The null hypothesis of the Augmented Dickey-Fuller t-test is;

$$H_0 : \theta = 0 \text{ (i.e. the data needs to be differenced to make it stationary).}$$

versus the alternative hypothesis of

$$H_1 : \theta < 0 \text{ (i.e. the data is stationary and doesn't need to be differenced)}$$

The ADF tests the null hypothesis against the alternative autoregressive equations. However, the decision rule is set on rejecting the null hypothesis given t-statistics to be greater than the critical ADF t-statistics. Alternatively, the obtained p-value can be attained at a lesser than specified significance level. In a situation where the data series is exponentially trending, the data series will be logged before differencing. The main criticism of the Augmented Dickey-Fuller (ADF) test is the power of the test is very low if the process is nearly non-stationary which means the process is stationary but with a root close to the non-stationary boundary (Brooks, 2002).

4.6.2 Kwiatkowski, Phillips, Schmidt, and Shin (KPSS) test.

To circumvent the limitation that ADF test always has a low power, Kwiatkowski, Phillips, Schmidt, and Shin (1992) proposed an alternative test which y_t is assumed to be stationary under the null. The KPSS test is a Lagrange multiplier test and the test statistic can be computed by firstly regressing the dependent variable y_t on a constant or a constant and a time trend t . And then save the OLS residuals ε_t and compute the partial sums $S_t = \sum_{s=1}^t \varepsilon_s$ for all t . Further the test statistic is given by (Verbeek 2004):

$$LM = \sum_{t=1}^T \frac{S_t^2}{\sigma_\varepsilon^2} \quad (4.5)$$

Where $S_t = \sum_{s=1}^t \varepsilon_s$ and σ_ε^2 is the estimated error variance from the regression.

$$y_t = \alpha + \varepsilon_t \text{ or } y_t = \alpha + \beta t + \varepsilon_t \quad (4.6)$$

For the conclusion to be robust, the study uses the unit root test and the stationary test jointly. The results of these two tests can be compared and see if the same conclusion is obtained. If the contradictive results are reached based on both ADF and KPSS tests, KPSS test is preferred due to the drawbacks of ADF tests.

4.7 Auto regressive distributed lag (ARDL) approach.

The investigation embraces the ARDL bounds testing to cointegration strategy to assess connections, notably, long run link as well as short run connection, including dynamic collaboration among the variables. ARDL model or the so-called Bound test was suggested by Pesaran *et al.* (1997) in the interest of evaluating the possible presence of cointegration amongst concerned variables. This methodology holds three explicit advantages as follows:

- a) It does not require variables to be incorporated in similar order allied to the prospect of Johansen (Johansen & Juselius, 1990).
- b) In contrast to other customary techniques of cointegration that are multivariate and substantial for big sample size, the appropriateness of bounds test approach is attributed to smaller sample size (Pesaran *et al.*, 1997); and
- c) It gives the estimates that are not prejudiced as far as long-run model is concerned, and legitimate t-statistics notwithstanding when a portion of the regressors are endogenous (Harris & Sollis, 2003).

The estimation of ARDL model is presented below to test if variables are cointegrated, i.e; real GDP, external debt, domestic debt, budget deficit, inflation and gross fixed capital formation.

$$\begin{aligned}
\Delta \ln GDP_t = & \alpha_0 + \delta_1 \ln GDP_{t-1} + \delta_2 DDE_{t-1} + \delta_3 FDE_{t-1} + \delta_4 CBD_{t-1} + \delta_5 INF_{t-1} + \delta_6 GFCF_{t-1} \\
& + \sum_{i=1}^p \phi_1 \Delta \ln GDP_{t-i} + \sum_{j=0}^{q1} \phi_2 \Delta DDE_{t-i} + \sum_{j=0}^{q2} \phi_3 \Delta FDE_{t-i} + \sum_{j=0}^{q3} \phi_4 \Delta CBD_{t-i} \\
& + \sum_{j=0}^{q4} \phi_5 \Delta INF_{t-i} + \sum_{j=0}^{q5} \phi_6 \Delta GFCF_{t-i} + \varepsilon_t
\end{aligned} \tag{4.7}$$

Where δ_i denote “long run multipliers”, while ϕ_s , α_0 and ε_t denote unknown parameters, intercept and white noise errors respectively.

The initial phase to conduct bounds test (ARDL) is to appraise equation (4.7) by OLS to test if the long-run connection is present among the variables, using F-statistic to detect joint significance of the coefficients of the variables (at different lag levels), that is

$H_N: \delta_1 = \delta_2 = \delta_3 = \delta_4 = \delta_5 = \delta_6 = 0$ Against the alternative

$H_A: \delta_1 \neq \delta_2 \neq \delta_3 \neq \delta_4 \neq \delta_5 \neq \delta_6 \neq 0$

The test denotes F_{GDP} (GDP|DDE, FDE, CBD, INF, GFCF) which normalises by GDP. The ARDL bound test consists of two bounds, the upper and lower bounds. The decision to either reject/accept the cointegration null hypothesis depends on where the F-statistic lies, thus, should F-statistic fall beneath the lower bound, null hypothesis cannot be rejected. Hence, cointegration become valid, while the visa-versa applies, there is a possibility of inconclusive results the F-statistic remains amid two bounds. The ballpark F-statistic critical values were attained from Pesaran *et al* (1997). Therefore, the establishment of cointegration is accomplished; the estimations of conditional ARDL ($p, q_1, q_2, q_3, q_4, q_5$) for the long run model for GDP_t can be as follows:

$$\begin{aligned}
\ln GDP_t = & \alpha_0 + \sum_{i=1}^p \delta_1 \ln GDP_{t-1} + \sum_{j=0}^{q1} \delta_2 DDE_{t-i} + \sum_{j=0}^{q2} \delta_3 FDE_{t-i} + \sum_{j=0}^{q3} \delta_4 CBD_{t-i} \\
& + \sum_{j=0}^{q4} \delta_5 INF_{t-i} + \sum_{j=0}^{q5} \delta_6 GFCF_{t-i} + \varepsilon_t
\end{aligned} \tag{4.8}$$

This involves selection pertaining the arrangements of ARDL ($p, q_1, q_2, q_3, q_4, q_5$) model in the six variables using Schwarz information criterion (SIC). The next stage is to acquire the short run dynamic coefficients by estimating ECM. This is specified as:

$$\begin{aligned} \Delta \ln GDP_t = & \pi + \sum_{i=1}^p \phi_1 \Delta \ln GDP_{t-i} + \sum_{j=0}^{q1} \phi_2 \Delta DDE_{t-i} + \sum_{j=0}^{q2} \phi_3 \Delta FDE_{t-i} + \sum_{j=0}^{q3} \phi_4 \Delta CBD_{t-i} \\ & + \sum_{j=0}^{q4} \phi_5 \Delta INF_{t-i} + \sum_{j=0}^{q5} \phi_6 \Delta GFCF_{t-i} + \gamma ECM_{t-1} \\ & + \varepsilon_t \end{aligned} \quad (4.9)$$

Here γ measures the speed of short-run adjustment back to long-run equilibrium, while ϕ are the short-run coefficient.

4.8 Granger causality test.

Granger (1969) holds the fact that the test of granger causality considers the causal connection between the variables which are dependent and independent. However, the causation does not mean the existence of relationship among variables, but rather the variables predict each other. The study will make use of this test in order to check if the variables granger causes each other. A variable P is causal to variable Q if P is the cause of Q. Now, on the ARDL model estimate we have Z_{2t} and Z_{3t} which fails to Granger cause Z_{1t} if $\omega_{12}^c = \omega_{13}^c = 0$ for all c: Below is the matrix explanation of granger causality.

$$\begin{bmatrix} Z_{1t} \\ Z_{2t} \\ Z_{3t} \end{bmatrix} = \begin{bmatrix} \beta_{10} \\ \beta_{20} \\ \beta_{30} \end{bmatrix} + \begin{bmatrix} \omega_{11}^1 & 0 & 0 \\ \omega_{21}^1 & \omega_{22}^1 & \omega_{23}^1 \\ \omega_{31}^1 & \omega_{32}^1 & \omega_{33}^1 \end{bmatrix} \begin{bmatrix} Z_{1t-1} \\ Z_{2t-1} \\ Z_{3t-1} \end{bmatrix} + \dots + \begin{bmatrix} \omega_{11}^x & 0 & 0 \\ \omega_{21}^x & \omega_{22}^x & \omega_{23}^x \\ \omega_{31}^x & \omega_{32}^x & \omega_{33}^x \end{bmatrix} \begin{bmatrix} Z_{1t-x} \\ Z_{2t-x} \\ Z_{3t-x} \end{bmatrix} + \begin{bmatrix} \mu_{1t} \\ \mu_{2t} \\ \mu_{3t} \end{bmatrix}$$

The metrics below shows the failure of two variables Z_{1t} and Z_{3t} to Granger cause variable Z_{2t} given $\omega_{21}^c = \omega_{23}^c = 0$ for all c.

$$\begin{bmatrix} Z_{1t} \\ Z_{2t} \\ Z_{3t} \end{bmatrix} = \begin{bmatrix} \beta_{10} \\ \beta_{20} \\ \beta_{30} \end{bmatrix} + \begin{bmatrix} \omega_{11}^1 & \omega_{12}^1 & \omega_{13}^1 \\ 0 & \omega_{22}^1 & 0 \\ \omega_{31}^1 & \omega_{32}^1 & \omega_{33}^1 \end{bmatrix} \begin{bmatrix} Z_{1t-1} \\ Z_{2t-1} \\ Z_{3t-1} \end{bmatrix} + \dots + \begin{bmatrix} \omega_{11}^x & \omega_{12}^x & \omega_{13}^x \\ 0 & \omega_{22}^x & 0 \\ \omega_{31}^x & \omega_{32}^x & \omega_{33}^x \end{bmatrix} \begin{bmatrix} Z_{1t-x} \\ Z_{2t-x} \\ Z_{3t-x} \end{bmatrix} + \begin{bmatrix} \mu_{1t} \\ \mu_{2t} \\ \mu_{3t} \end{bmatrix}$$

Similarly, if given $\omega_{31}^c = \omega_{32}^c = 0$ for all c then variables Z_{1t} and Z_{2t} does not Granger cause Z_{3t} .

$$\begin{bmatrix} Z_{1t} \\ Z_{2t} \\ Z_{3t} \end{bmatrix} = \begin{bmatrix} \beta_{10} \\ \beta_{20} \\ \beta_{30} \end{bmatrix} + \begin{bmatrix} \omega_{11}^1 & \omega_{12}^1 & \omega_{13}^1 \\ \omega_{21}^1 & \omega_{22}^1 & \omega_{23}^1 \\ 0 & 0 & \omega_{33}^1 \end{bmatrix} \begin{bmatrix} Z_{1t-1} \\ Z_{2t-1} \\ Z_{3t-1} \end{bmatrix} + \dots + \begin{bmatrix} \omega_{11}^x & \omega_{12}^x & \omega_{13}^x \\ \omega_{21}^x & \omega_{22}^x & \omega_{23}^x \\ 0 & \omega_{32}^x & 0 \end{bmatrix} \begin{bmatrix} Z_{1t-x} \\ Z_{2t-x} \\ Z_{3t-x} \end{bmatrix} + \begin{bmatrix} \mu_{1t} \\ \mu_{2t} \\ \mu_{3t} \end{bmatrix}$$

If found that the p-values of the test are below 0.05, then presence of Granger causality will be concluded at the critical level of 5%. If the test shows that the p-values are more than 0.05 that will mean that the presence of Granger causality is not identified.

4.9 Model diagnostics tests.

Symptomatic tests are executed on the evaluated model of statistics, to assess the possible manifestations of misspecifications. The misspecification within the model can be analysed in the form of nearness in autocorrelation, heteroscedasticity, test of normality and parameter non-steadiness. The evidence of substantiality in the assessed basic model can be realised when, the vector of stuns proves to be uncorrelated, nor having heteroscedasticity. In addition, it is also useful to examine steadiness of the model to evaluate whether the evaluated process proves to be stationary and ergodic with the methods of time-invariant, fluctuations, and auto-covariance.

4.9.1 Residual test of normality.

According to the hypothesis underlying classical linear regression model (CLRM), the required residuals that are normally distributed should have mean value of zero and steady difference. Whereby, Jarque and Bera (1980) dispute that infringement of this limitation will result in non-validity of t-statistics and F-statistics. In our estimated testing for fitness distribution, the study will use Jarque-Bera test of normality that practices skeletal and measurements of kurtosis to match a sample data that is normally distributed.

The choice rule that holds in the test applied here denotes that if the p-value is observed to be not exactly nor equivalent to significant dimension whereby JB statistic turns out to be more prominent compared with Chi-square statistic, the study will dismiss the invalid theory and the contrary hold. Then the computation to test JB-statistic can be as follows:

$$JB = N \left[\frac{Skewness^2}{6} + \frac{(kurtosis - 3)^2}{24} \right]$$

Where:

$$Skewness = \frac{\frac{1}{n} \sum_{i=1}^n (x_i - \bar{x})^3}{\left(\frac{1}{n} \sum_{i=1}^n (x_i - \bar{x})^2 \right)^{3/2}}$$

$$Kurtosis = \frac{\frac{1}{n} \sum_{i=1}^n (x_i - \bar{x})^4}{\left(\frac{1}{n} \sum_{i=1}^n (x_i - \bar{x})^2 \right)^2}$$

Therefore:

$$JB = \frac{N-k+1}{6} \left[S^2 + \frac{1}{4} (C - 3) \right]$$

The sample skewness is represented by S, sample size represented by N and C representing the sample kurtosis.

4.9.2 Serial autocorrelation test.

Sequential autocorrelation alludes to the connection of a sign within the model or even the error with itself. For any evaluated model, the idea may result from factual issues, for example, overlooked factors, non-linear relationships, estimation blunders and model misspecification. Information control systems like averaging, interpolation and extrapolation can likewise result in sequentially corresponded blunders. Sequential correlation is progressively pervasive in time series data as contrasted with cross-sectional data. In this study, Breusch-Godfrey LM test is utilised to conduct a formal test for sequential autocorrelation within the framework residuals. The Breusch-Godfrey test is very advantageous as it checks for serial correlation in higher order for the $AR_{(p)}$ process. The following hypothesis forms basis for the test:

$$H_0: \rho_1 = \dots = \rho_r = 0$$

$$H_1 = \rho_1 \neq \dots \neq \rho_r = 0$$

In the above equations, the coefficients represent the null hypothesis of lagged variables which equals to zero. However, an alternative hypothesis holds that the coefficients from zero are significantly different. With that said, if the F-statistical probability value yields a number not more than 0.005 that would imply rejection of null hypothesis at 5% level of significance.

4.9.3 Heteroscedasticity test.

The OLS assumes that for all $V(\mu_j) = \sigma^2$ for all j . This shows that homoscedasticity must be the variance of the error term. Therefore, signifying the presence of heteroscedasticity in the instance of an error term that is not constant. The existence of heteroscedasticity in modelling yields misleading results as its consequence will make OLS estimators and predictions of regression inefficient and therefore no longer BLUE. The study will therefore use the Breusch-Pagan heteroscedasticity test. The null hypothesis on the Breusch-Pagan test, as supported by Williams (2015), argues that the error variance is all the same as the alternative that the error variance is multivariate function of one.

$$H_0: \rho_1 = \dots = \rho_r = 0$$

$$H_1 = \rho_1 \neq \dots \neq \rho_r = 0$$

The test holds that, the null hypothesis at 5% critical value should be rejected if the probability value of t-statistic is less than 0.005. In addition to Breusch-Pagan test, the study will also apply the white test to check for heteroscedasticity.

4.9.4 CUSUM and CUSUM of Squares: testing for model stability.

To assure stability in the model, Brown *et.al* (1975) proposed two tests, i.e. Cumulative Sum (CUSUM) coupled with Cumulative sum of Square (CUSUM) tests. For a model to be stable, the CUSUM statistic and the CUSUM of square (CUSUMSQ) should fall within the 5 per cent confidence interval of stable parameter, that is, fall within the two parallel red lines.

4. 10 Merits and methodology limitations.

The received hypothetical model, the Neo-classical endogenous growth theory, is hypothetically predominant. However, the experiential evidence suggests unaccomplished elucidation owing to dynamics of public debt and economic growth. For the experimental model, the ARDL model have a few appealing highlights for observational research as signposted by Harris and Sollis (2003) that one of the advantages is that it gives fair gauges of the long-run model and legitimate t-statistic notwithstanding when a portion of the regressors endogenous.

An additional merit of the ARDL approach lies in its adaptability that it tends to be applied when the variables are integrated in different orders (Perasan & Perasan, 1997). This technique also embodies an important value with respect to its adequacy to capture various numbers of lags during the process of generating data, especially on a general structure to explicit modelling (Laurenceson & Chai, 2003). Additionally, Banerjee *et al.* (1993) asserted that, the basic linear transformation can be applied on the ARDL model to attain the so-called ECM. In other words, the ECM coordinates the short-run elements with the long-run equilibrium while maintaining information relating to long-run. Furthermore, (Laurenceson & Chai, 2003) contended that utilizing the ARDL approach maintains a strategic distance from issues that result from a time series data that contains unit root.

However, the model simplicity seems to be cost associated. This procedure will crash within the sight of coordinated stochastic trend of I(2). Considering the forecast and policy stance, there is a need to investigate the fundamental conditions that offer ascent to ARDL cointegration procedures to avoid its unfair application, estimation, and interpretation. For instance, if the conditions are not pursued, it might prompt model misspecification, inconsistent and unrealistic estimates. It has been exposed through examination that; such a deficiency is

cured by picking the suitable lag length using the SIC criteria. The diagnostic test is another method embraced owing to its robustness to assess stability.

4.11 Conclusion.

This research has set an objective to probe the empirical effect of public debt on economic growth. From the literature reviewed, the neo-classical endogenous growth was found superior in terms of theory, hence forming the basis to be adopted in the econometric model. That being on spotlight, the formulation of neo-classical endogenous growth as espoused by Cunningham (1993) and Akram (2010) aided how variables to be included in the empirical model are decided; log GDP, public debt proxy (domestic and external debt) budget deficit, the rate of inflation and gross fixed capital formation are explanatory variables. The model is built and grounded from the work of Obademi (2012). Perceiving the penchant of exhibiting non-stationary stochastic process, as far as economic time series is concerned, the framework applied to conduct econometric specification permits variables to be non-stationary, albeit preserve potential cointegration.

The decision pertaining to stationarity properties of the variables is informed by the ADF. The variables observed could either validate or invalidate stationarity of the model, thus justifying if ARDL bound test could be evaluated. Essentially, ARDL bound test of cointegration would be expedient to detect if cointegration amongst concerned variables is extant. In the presence of unit root (i.e. non-stationarity) amongst observed variables, cointegrated, ECM could then be applied. In addition, the statistical inferences will also be appraised. Notably, scrutinise the causal effects by employing Granger causality test, and run the model through diagnostic tests.

CHAPTER 5

APPLICATION AND EMPIRICAL RESULTS.

5.1 Introduction.

In accordance with the methodology displayed previously, this chapter extrapolate the methods applied in the study. At first, the summary of time-series statistics is conferred prior to graphical analysis of data followed by ADF test of unit root to check for possible stationarity of the series. The study then continues to adopt the optimum lag-length and then test the long-term relationship between the variables within the model after using the ARDL bounds Cointegration approach. Completing the chapter is the estimation of the ARDL model's "long-term and short-term" parameters and the discussion of the model diagnostics. All the tests are carried out using the Eviews 9 econometrics statistical package.

5.2 Summary statistics.

The empirical examination starts with descriptive insights. Table 5.1 details the results of descriptive insights on the variables utilized in the investigation. The data demonstrates that there are significant variations for all variables over the review period. The following statistics are derived; mean and standard deviation for each individual series and identify the extreme values.

Table 5.1 Summary statistics.

Variables	Mean	Standard. deviation	Min	Max
LNGDP	14.266	0.438*	13.306	14.954
CBD	-3.135	1.6768**	-7.100	0.900
INF	8.256	4.592	1.200	18.700
DDE	35.856	6.747	22.300	48.200
FDE	2.677	1.5178*	0.600	6.600
GFCF	21.746	4.548	15.150	32.102

Source: Author's computation. Note: Figures denote level of significance (, **) at 1% and 5% relatively.*

As can be seen from table 5.1, the substantial values of all variables are generally proximate to the mean, signposting the minimal substantial variation. GDP, budget deficit and foreign debt have standard deviations of 0.43, 1.67 and 1.51, respectively, suggesting that the data points are close to the average. Inflation rate, domestic debt and gross fixed capital formation, on the contrary, have relatively high standard deviation values of 4.59, 6.74 and 4.54, respectively,

implying that the data points are spread out. In a nutshell, it can therefore be stated that, the study has a moderate magnitude in terms of variations in the macroeconomic variables data.

The examination further employs the correlation matrix to identify the association amongst the variables. By correlation means a simple statistic that explains whether there's a relationship or between any two factors. The association is either negative or positive. A positive association implies that factors move abreast, whilst a negative association implies that the two factors wander away from each other. An association between two factors is computed into correlation coefficients, which spans between -1 and +1.

Table 5.2 Correlation matrix results.

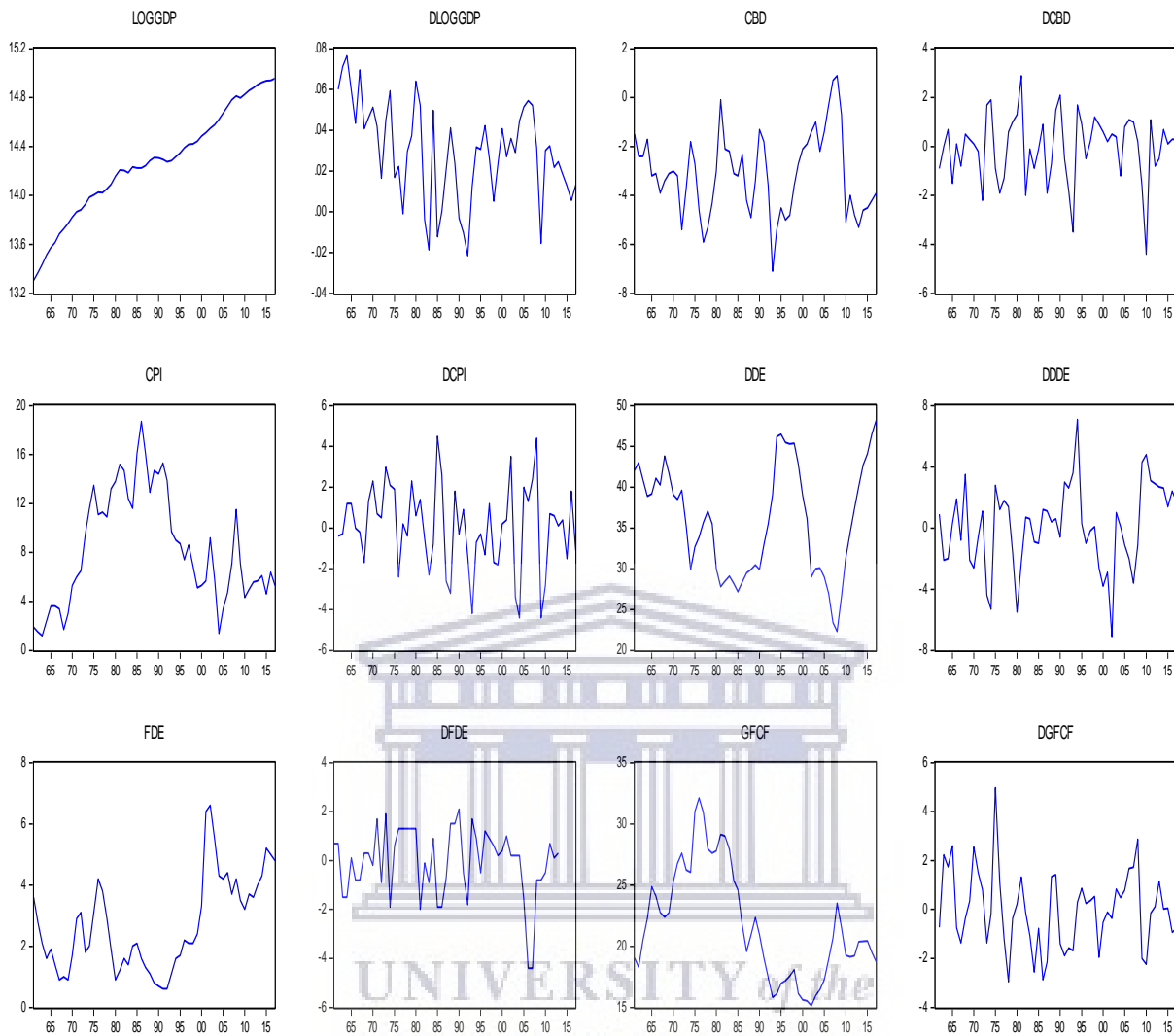
	LNGDP	CBD	CPI	DDE	FDE	GFCF
LNGDP	1.000	0.018	-0.066	-0.098	0.591	-0.425
CBD	0.018	1.000	-0.002	-0.563	0.150	-0.031
INF	-0.066	-0.002	1.000	-0.512	-0.370	0.383
DDE	-0.098	-0.563	-0.512	1.000	-0.019	-0.275
FDE	0.591	0.150	-0.370	-0.019	1.000	-0.258
GFCF	-0.425	-0.031	0.383	-0.275	-0.258	1.000

Source: Author's own computation.

Table 5.2 detail findings from the correlation matrix and it can be observed that the budget deficit and foreign debt are positive but weakly correlated with GDP of 0.01 and 0.59, respectively. On the contrary, the rate of inflation, domestic debt and gross fixed capital formation are negatively correlated with the GDP. Clearly, there is no strong correlation between the regressors. This means that multicollinearity is less likely to be present in the model.

The study then proceeds with the visual inspection of the data. By plotting the variables, we can discover the conduct of the variables graphically over the review period. Figure 5.1 provides a subjective visual review of the variables in their dimensions and initial differences before the unit root tests are carried out. All variables in the model are level-shaped non-stationary. However, we assume that at first difference all variables become stationary as one of the ways of converting a variable to stationary is through the first difference. Once the variable is stationary, the study will now use the variables to apply the models of the time series. Figure 5.1 also shows all variables that are not stationary because their variances are not constant and the mean does not swing along zero on the X-axis, but if differentiated, there is a constant variance and the mean swings along zero indicating stationarity. As a result, the ADF and KPSS unit root tests will verify the results.

Figure 5.1 Graphical analysis of time series data.



Source: Author's computation.

5.3 Unit root and stationary tests.

It is fundamental for the variables to be tested for stationarity before estimating the ARDL bounds test. This is done essentially to avert differencing variables for the second time to obtain stationarity, as this might explode the model. As indicated by Outtara (2004), within the sight of $I(2)$ variables, the estimated F-statistics given by Pesaran *et al.* (2001) are not substantial on the grounds that the bounds test depends on the supposition that the variables are stationary at first difference if not at level, i.e. $I(0)$ or $I(1)$. Hence, to dodge spurious results, the data series were evaluated for stationarity.

Before investigating the effect of public debt on economic growth, the ADF test and the KPSS test are applied to examine the stationary properties. The null hypothesis of ADF test is that the series has a unit root, whereas stationary is the null hypothesis in the KPSS test. Thus, we

perform KPSS test as confirmatory test of the results of ADF. But if two approaches are contradicted, KPSS is preferred.

Table 5.3 demonstrates the summary of the findings as yielded by ADF stationarity tests. The technique tests a variable for stationarity to validate or invalidate a null hypothesis that “variable contains a unit root”. The level of significance at which this null hypothesis can be rejected it or validated is 5%. The decision to reject / accept the null hypothesis can be guided by comparing t-statistic and critical values. When the former is higher, we reject the null hypothesis, and visa-versa is applicable to the latter. The ADF confirms that stationarity of budget deficit and foreign debt is validated at level, unlike, GDP, inflation rate, domestic debt and gross fixed capital which became stationary when subjected to first difference.

Table 5.3 Unit root results.

Variables	With Constant and Linear Trend					Outcome
	ADF		Outcome	KPSS		
	Level	1 st Deference		Level	1 st Deference	
GDP	-2.028	-4.321**	I(1)	0.907	0.420**	I(1)
CBD	-3.884**	N/A	I(0)	0.066	0.215**	I(1)
INF	-1.941	-6.853**	I(1)	0.223**	N/A	I(0)
DDE	-2.328	-4.470**	I(1)	0.096**	N/A	I(0)
FDE	-3.335*	N/A	I(0)	0.504**	N/A	I(0)
GFCF	-1.901	-5.683**	I(1)	0.431	0.169*	I(1)

Source: Author's computation. Note: Figures denote t-statistics, 1% level of significant and 5% level of significance**.*

The null hypothesis of KPSS test is that a series is in a stationary process against the alternative of non-stationary process. Commenting on the test, the result shows that the t-test statistics of KPSS test for some variables in levels are lower than the critical values while some have higher critical values. For this reason, we do not have enough statistical evidence to reject the null hypothesis of presence of unit root. However, looking at the results, we have strong statistical evidence to reject the null hypothesis in the first differences as the t-test statistics KPSS tests are higher than the critical values.

The t-test statistics for INF, DDE and FDE variables under consideration are greater than critical values in levels while GDP and CBD t-test statistics are higher than the critical values in the first difference. This is enough statistical evidence to reject the null hypothesis of stationarity at level and first difference. These results clearly show that some variables under investigation exhibit non-stationarity characteristics in levels, both under ADF and KPSS tests

whilst others don't. However, they become stationary in both levels and first difference, and for this reason, we treated these variables as I(0) and I(1) process. Having established this stationarity process, we proceeded to ARDL analysis and this follows in the next section. As such, the use of ARDL bounds test of cointegration was triggered since variables are integrated of different orders. Prior to applying the model thereof, the optimum lag-length for the specified ARDL model is being estimated and provides the output in Table 5.4.

5.3 Determining optimal lag length.

A significant part of experimental research with error correction modelling is to select an optimal lag-length. This is because the statistical inference of utilizing a model depends on the determination of a suitable model. The examination then determines the optimal order of lags on the first difference variables after determining the order of integration.

Table 5.4 The optimal lag-length selection output.

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-760.26	NA	145562.1	28.915	29.138	29.001
1	-509.44	435.37	44.321	20.809	22.370*	21.409*
2	-467.93	62.66*	37.915*	20.601	23.501	21.716
3	-433.43	44.264	46.092	20.657	24.895	22.287
4	-394.58	41.053	55.127	20.550*	26.126	22.694

Note: the lag order selected by the criterion is denoted by*

LR denotes sequential modified LR test statistic (5% level at each test), Final prediction error is denoted by FPE, while AIC, SC and HQ denotes Akaike information criterion, Schwarz information criterion, and Hannan-Quinn information criterion respectively. Considering the findings displayed in table 5.4, we choose SIC over AIC for the purpose of this study as AIC is known to suggest more lags than necessary, resulting in loss of degrees of freedom and model overfitting. SIC recommends one lag, supported by HQ, as can be seen in Table 5.4. AIC recommends four lags.

5.4 ARDL Bounds Cointegration.

The next stage determines how gross domestic product associate with the concerned regressors, the main interest variables being domestic debt and foreign debt. Table 5.5 provides the output.

Table 5.5 ARLD bound cointegration.

F-statistics	Lag	Significance	Bound critical values	
			I(0) Bound	I(1) Bound
9.669***	1	10%	2.26	3.35
		5%	2.62	3.79
		2.5%	2.96	4.18
		1%	3.14	4.68

Source: Author's own computation. Note: 1% level of significant*, 5% level of significance**, and 10% level of significance***

The ARDL bound test corroborates the presence of long-run relationship amongst the variables in question. This came as a result of the 9.66 F-statistic, which is higher than both the lower (2.62) and upper (3.79) boundaries at the 5% level of significant. Therefore, for the alternative hypothesis of cointegration $H_0 = 0$, the null hypothesis of no cointegration $H_0 = 0$ is rejected. These findings are consistent with the use of the same cointegration technique by Hassan *et al.* (2015) and Ahmad and Aworinde (2015). This confirms that variables in the model are stable and have long-run relationship. The results also confirm the use of an ECM to represent the relationship between economic growth and factors contributing to it. Therefore, the study continued to estimate the regression output, and speed of adjustment to balance given the existence of a long-run relationship and the results are presented below.

5.4.1 Long run error correction model.

Regression of the variables in their level form is done for the period 1961 to 2017 to produce a long-run model. The rationale for running the regression of the data at levels is to generate the residual to be used in formulating an error correction term to be used to construct short run ECM. The residuals from the estimation were tested for their order of integration. The results indicated an integration of the residual term to be at order zero, hence justifying long-run relationship amid real GDP and its explanatory variables.

Table 5.6 Long-run dynamics of the ARDL error correction model.

Dependent variable: LOGGDP				
Long run coefficients				
Variables	Coefficients	Std. Error	t-Static	p-values
FDE	-0.576***	0.202	-2.841	0.006
DDE	-0.197	0.080	-2.448	0.018
INF	-0.521***	0.094	-5.530	0.000
CBD	-0.719	0.336	-2.136	0.037
GFCF	0.014	0.071	0.203	0.839

C	13.426***	3.739	3.590	0.000
Source: Author's own computation. Note: 1% level of significant*, 5% level of significance**, and 10% level of significance***				

Adjusted R-squared = 0.548628

F-statistic = 12.5528(0.00008)

Durbin-Watson = 3.05172

From Table 5.5, all significant variables have their expected signs. Foreign debt is factually significant at the 5% level, while domestic debt and budget deficit are factually significant at 5%, followed by gross fixed capital formation recording 1% level of significance. The adjusted R^2 is 0.55 implying that the model fitted well within the data. Therefore, when real economic growth (RGDP) adjusts by 55%, this could be explained by the changes in all the explanatory variables. Likewise, there is 1% significance of the entire model signalled by F-statistic probability value of 0.00008, which do not exceed 0.01.

The coefficient of foreign debt recorded a negative value of -0.576, which is factually significant at 5% level. According to the findings, if foreign debt surge by 100%, the real economic growth will dwindle by 57.6% ballpark. Therefore, the contribution of foreign debt to economic growth does not bode well for encouraging further accumulation of debt. The economic logical viewpoint in this case would suggest a cut in government expenditure owing to skyrocketing level of foreign debt, the results found here concur with the findings of Putunoi and Mutuku (2013).

An adverse link of domestic debt with real economic growth has been corroborated and denoted by a negative coefficient of 0.197 which is statistically significant at the 5% level. Therefore, a 100% increase in domestic debt induces real economic growth to fall by roughly 19.7%. This is a true reflection of the 'debt overhang effect'. The results are consistent with the Debt Overhang theory which stipulates that when size of the debt stock grows so large, it can retard economic growth. In other words, a large debt overhang increases the uncertainty of the environment in which the country is operating in, it acts as an indirect tax on returns to investors. The findings in this research support Elbadawi *et.al.* (1997) findings, in which debt accumulation proved to have a negative effect in 99 developing countries covering sub Saharan Africa (SSA), Asia, Latin America and the Middle East Countries hence, external debt accumulation deters economic growth.

The coefficient of budget deficit was found to be statistically significant at the 5% level with a negative value of 0.719. This means that a 100% increase in inflation results in an

approximately 71.9% decrease in real economic growth. A conceivable clarification for the negative sign could be that the funds that could have been used for productive purposes may be diverted towards the repayment of the debt. This may result in swarming out of the private sector when the government draws away resources in the economy towards the servicing of the debt. The results support the crowding out hypothesis by Cohen (1993) and Kasidi and Said (2013), who also found the same results. Furthermore, an adverse linkage of Inflation rate coefficient to real economic growth was attested significant. It has a coefficient of 0.521 which means that a 100% increase in inflation rate will induce approximately 52.1% decrease in economic growth.

The gross fixed capital formation coefficient exhibited not just a positive link to real economic growth, since the linkage is also significant. A coefficient of 0.0146 means that if gross fixed capital formation increases by 100%, it will, in turn induce a 1.5% increase in real economic growth. Since investment is a dominant component of GDP, an increase in investment will also increase real income. The more the inflow of capital formation in an economy, the more national income will also increase. The study by Sulaiman and Azeez (2012) delivered the same results.

5.4.2 Short run error correction model.

From the ARLD bound of cointegration, the results revealed the presence of the long-run behaviour among the variables, thus suggesting that there is cointegration. The ECM in this case would capture the long-run economic connection among economic growth and its determinants. To explain the connection between economic growth and its determinants in different time periods, both the long-run model and the short-run error correction mechanism (ECM) were employed.

Table 5. 7 Short-run dynamics of the ARDL error correction model.

Dependent variable: LOGGDP				
Short run Coefficients				
Variable	Coefficient	Std. Error	t-Statistic	p-values
D(FDE)	-0.461	0.156	-2.959	0.004
D(DDE)	-0.549	0.103	-5.289	0.000
D(INF)	-0.417	0.076	-5.486	0.000
D(CBD)	-0.801	0.236	-0.771	0.444
D(GFCF)	0.011*	0.058	0.200	0.842
ECM	-0.801	0.121	-6.571	0.00

Source: Author's computation. Note: 1% level of significance*, 5% level of significance**, and 10% level of significance***

Adjusted R-squared = 0.385716

F-statistic = 4.118739 (0.034756)

Durbin-Watson = 1.370943

In the short-run, most variables maintained their expected signs. A Durbin-Watson (DW) statistic of 1.371 suggests that there is no decision on autocorrelation since it lies between 1.166 (dL) and 1.808 (dU). The adjusted R^2 with a value of 0.386 is very low since some variables had to be differenced once to make them stationary, which resulted in the loss of some degrees of freedom. However, the model is still useful as depicted by the F-statistic probability of 0.035, which is less than the 5% critical value. The prospect of spurious regression is ruled out by the circumstance of Durbin-Watson statistic being greater than the coefficient of determination.

There is solid proof of debt-overhang as shown by a statistically negative connection between foreign debt and real economic growth. A 100% expansion in foreign debt results in 47.1% reduction in real economic performance. This means that external debt accumulation retards economic performance in the short-term, and in the long-term. Clements, Bhattacharya and Nguyen (2003) found similar results. However, domestic debt is found to negatively affect the real growth rate of South Africa although the effect is noteworthy in the short run. In addition, budget shortfall and the price level are found to influence economic performance negatively, as far as short run period is concerned.

The results of this are evident in the coefficients, which are negative and factually significant. The coefficient of the gross fixed capital formation recorded a positive value of 0.0117, and it is statistically insignificant at 1% level of significance. A 100% expansion in gross fixed capital formation will increase real economic growth by 1.17%. The relationship is supported by the multiplier effect of national income, which states that initial injection of investment will produce immense amount in national income, and ultimately revive growth rate.

The ECM coefficient printed a negative value of -0.801, signifying statistical significance, and suggesting that speed of acclimation to equilibrium consequential to a shock is roughly 80%. These findings are consistent with Mhlaba and Phiri (2017)'s findings, which affirmed negative short-term impacts amid growth and public debt.

5.5 Granger causality test results.

The findings of the Granger causality test in Table 5.8 indicate that five variables show bi-directional causality, whereas two variables are not causing each other. The null hypothesis

that, for example, foreign debt (FDE) does not cause Granger, is rejected based on the probability value of the GDP, which is less than 0.05%. Therefore, rejection of the null hypothesis denotes that Granger can cause economic growth due to foreign debt. This is a coherent outcome corroborating to Rajan (2005)' study, which contended that nations with frail economic performance are most likely to incur huge government shortfalls, prompting expanded borrowing. That being the case, when there is high level of government debt that resulted from lower growth, as far as the impact of causality is concerned; debt relief cannot provide enough leeway to revive growth (Yasemin, 2017).

Table 5. 8 Granger causality test results.

Null Hypothesis	df	F-Statistic	p-value	Decision
CBD does not Granger cause LNGDP	1	0.532	0.590	Do not reject
LNGDP does not Granger cause CBD	1	5.472	0.007	Reject
INF does not Granger cause LNGDP	1	8.162	0.000	Reject
LNGDP does not Granger cause CPI	1	2.343	0.106	Do not reject
DDE does not Granger cause LNGDP	1	1.123	0.333	Do not reject
LNGDP does not Granger cause DDE	1	0.281	0.755	Do not reject
FDE does not Granger cause LNGDP	1	8.323	0.000	Reject
LNGDP does not Granger cause FDE	1	4.885	0.011	Reject
GFCF does not Granger cause LNGDP	1	2.871	0.066	Do not reject
LNGDP does not Granger cause GFCF	1	21.528	0.002	Do not reject

Source: Author's computations. Note: 1% level of significant*, 5% level of significance**, and 10% level of significance***

The results indicate bi-causality among foreign debt and economic growth, but the presence of a short or long-run connection is not confirmed by this. In this instance, the question of how the borrowed funds are used becomes crucial, because if the borrowed funds are spent more productively on investment, then economic growth is most likely to accelerate, as a result of foreign debt. However, budget deficit and economic growth exhibit a unidirectional link. Similarly, the findings of Granger causality indicate that inflation rate (INF) can cause economic growth to Granger. The findings likewise show that domestic debt (DDE) is not associated with economic growth because the probability value is above 5%. However, there is a unidirectional connection in the case of budget deficit and economic growth.

5.6 Model diagnostics tests.

In this section, we applied a series of diagnostic tests and CUSUM test to the ARDL model. In experimental research, model determination includes a few decisions, for example, the variables to incorporate, the useful structure associating the variables, and the idea of the

interaction between the variables, assuming any. Nevertheless, economic theory usually cannot provide a concrete detail of the dynamic connections in macroeconomic data. That unavoidably creates vulnerability with respect to whether the assessed model is effectively determined. This reality propelled the examination to execute the accompanying diagnostic tests; normality test, sequential correlation and the heteroscedasticity test. We, likewise, chart the CUSUM and CUSUM and Ramsey RESET test to decide if the assessed model fulfils the stability condition. Ideally, the aggregate sum must not lie beyond the two critical lines. Through the tests, the study assesses the nature of the evaluated model along various measurements; residual normality, sequential correlation, parameter consistency as well as homoscedasticity.

5.6.1 Residual normality test.

The Jarque-Bera statistics shown in Table 5.9 yielded 1.187, with the corresponding probability value of 0.5523, which is more than 5 percent, which indicates that the model's residuals are normally distributed, which is a good indication. Therefore, the null hypothesis is accepted, thus meaning residuals are normally distributed.

Table 5. 9 Jarque-Bera normality test results.

Null hypothesis	JB-statistic	p-value	Decision
Residuals are normally distributed	1.187	0.552	Do not reject

5.6.2 Serial correlation results.

To confirm the legitimacy of the model assessed, the examination further checks for the presence of sequentially correlated disturbances utilizing the Breusch-Godfrey LM test. The test assumes that the residuals are not serially correlated, herein referred to as the null hypothesis. Table 5.10 present the test outcomes.

Table 5. 10 Breusch-Godfrey serial correlation LM test results.

Null hypothesis	F-statistic	p-value	Decision
Residuals are not autocorrelated	0.650	0.424	Do not reject

The computed probability coefficient is 0.424, which is more than 5% critical value, indicating null hypothesis acceptance. Because the model has no serial correlation, this model is desirable.

5.6.3 Heteroscedasticity results.

We further assessed the model for heteroscedasticity and the outcomes are detailed in table 5.11 below.

Table 5. 11 Breusch-Pagan-Godfrey test results.

Null hypothesis	F-statistic	p-value	Decision
residuals are homoscedastic	1.691	0.125	Do not reject

In Table 5.11 the calculated probability value for the F-statistic is more than 5%, indicating homoskedasticity rather than heteroskedasticity. This implies a constant variance in the residuals, which is a desirable or good indication. The White test also confirms that the model does not suffer from heteroskedasticity because the probability value is higher than 5% critical value. Accordingly, table 5.12 results suggest that model residuals have the desired statistical property of homoscedastic variances.

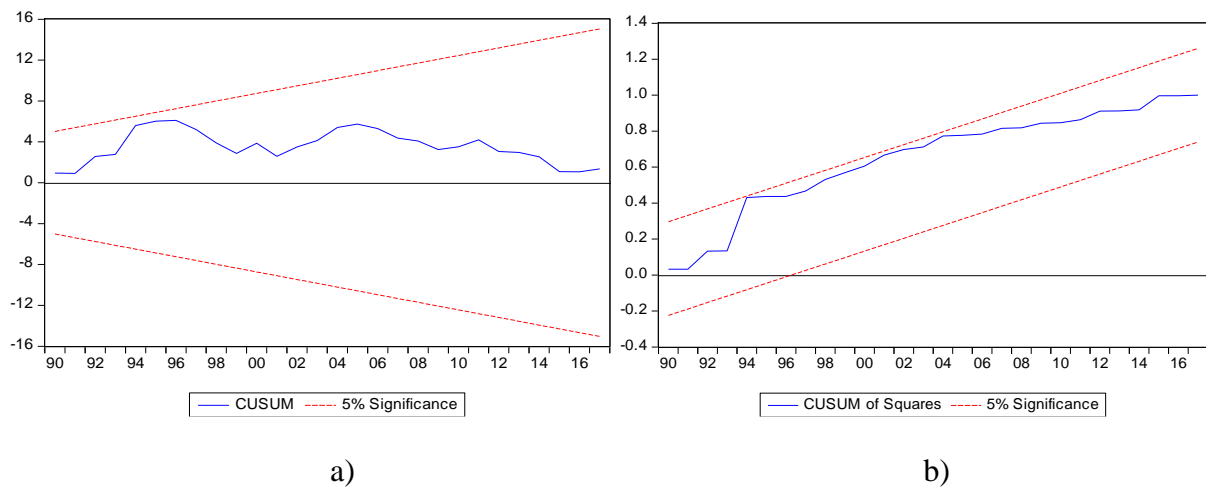
Table 5. 12 White test.

Null hypothesis	F-statistic	p-value	Decision
residuals are homoscedastic	2.012	0.065	Do not reject

5.6.4 CUSUM and CUSUM of squares tests.

To guarantee the credibility of the ARDL model and results, it could be helpful to assess the steadiness of the evaluated residuals. To test the null hypothesis of the model steadiness, we execute the “cumulative sum of recursive residuals (CUSUM)”, coupled with the “CUSUM of Square (CUSUMSQ)” test (Brown *et al*, 1975). CUSUM statistics and band speak to the limits of the basic region for the test at 5% significance level. The test discovers parameter unsteadiness if the aggregate sum goes outside the zone between the two critical lines. Figure (a) and (b) plot the outcomes for CUSUM and CUSUMSQ tests.

Figure 5. 2 Cusum test and Cusum of squares.



The outcomes demonstrate that the plot of the CUSUM and CUSUMQ measurement remains inside the basic limits of 5% confidence interim, suggesting no dismissal of the null hypothesis of stability. Subsequently, that demonstrates the non-appearance of any instability of the regression coefficients.

5.6.5 Ramsey RESET test.

Table 5. 13 Ramsey RESET test

Null hypothesis	t-Statistic	p-Value	Decision
The model is correctly specified	0.994	0.328	Do not reject

Table 5.10 presents the result from the Ramsey reset test. The null hypothesis state that the model is correctly specified. This came as a result of the p-value which is greater than the 5% level of significance. Therefore, the model is correctly specified.

5.7 Summary.

This section presented all the econometric estimations and made interpretation of the research findings. External debt, domestic debt, budget deficit, gross fixed capital formation and the rate of inflation were found as key explanatory variables of real economic growth based on the model developed by Obademi (2012). Two models were considered, namely, the long-run and the short-run models. The regression results of the long-run model showed that most explanatory variables were statistically significant. External debt, domestic debt, budget shortfall and inflation rate were found to impact negatively on the real growth rate of South Africa. The long-run results confirmed the presence of both debt overhang and crowding-out.

Gross fixed capital formation is found to contribute positively to economic growth. The short-run model revealed that external debt acts as an impediment to the growth prospects of South Africa debt overhang prevails even in the short-run in South Africa. Moreover, the short-run error correction term (ECMt-1) is factually significant and negative. The implication is that the short-run disequilibrium converges to its long-run steady state. The summary of results, conclusion and policy recommendation will be present in the next chapter.



CHAPTER 6

SUMMARY, CONCLUSION AND RECOMMENDATIONS.

6.1 Summary and interpretation of the findings.

This study investigated the effect of public debt on growth of the South African economy, as far as a set objective is concerned. Different techniques of econometrics were applied in the analysis that is ARDL bound cointegration, ECM, Granger causality test, ARDL model and CUSUM. The study obtained annual data (1961-2017) from different sources including SARB and World Bank for explanatory variables, to achieve the objectives set here-in. The ARDL co-integration test found that the investigated variables had a long-term relationship. It turns out that the relationship between FDE, DDE, CBD and INF and GDP are negative in the short and long-run, while GFCF revealed that a relationship with GDP is positive. The ECM model confirmed that these variables have a short-run relationship in the series and that the system can adjust to the equilibrium at a speed of 80.11%. Five variables show bi-directional causality, whereas two variables are not causing each other. The stability test of the CUSUM squares was also used to check the robustness of the model and the adopted model was stable.

6.2 Conclusion.

Looking at the results found in the analysis, conclusion can be drawn to say there is a short term and long term relationship between public debt (foreign and domestic debt) The results reveal that the long term relationship between the determinants of GDP (FDE, DDE, CDB, INF and GFCF) and GDP is present across all models. The significant existence of short term and long-term negative relationship between FDE and DDE and GDP imply that, increasing debt level underpins economic growth. As stated by the SARB (2017), South Africa's foreign debt accounted for 49.6% of the country's nominal GDP; this has been reported as the highest ratio of all time, which affected economic growth negatively owing to high debt interest cost of sustaining it. With an on-going budget deficit in South Africa, an additional government debt emphasises economic growth.

As the study reveals, there is a long-term negative relationship between the budget deficit and economic growth. It is not surprising to see that the South African government is resorting to excessive borrowing to curb revenue and expenditure (the so-called fiscal gap), which ultimately dents the economic stance. The findings in this study may be due to several limitations. According to Armony, Corbo, Clement and Brunet (2005), various politicians and economists /or financial experts described that, financial crisis can be attributed to institutional

malfunctioning and ineffective policies as a result of corruption by public officials, thus exacerbating the already weak macroeconomic factors. Meanwhile, GFCF has shown a positive short-and long-term relationship with GDP and is statistically significant. Consequently, it is concluded that in order to increase capital accumulation, a capital-scarce country like South Africa, can be encouraged to borrow in order fund programmes that can bring good return to economic development (Ncanywa & Masoga, 2018). However, as the results confirm, subdued growth will result from the later stage of high debt borrowing.

6.3 Recommendations.

The study recommends that South Africa needs to improve its productive capacity and infrastructure to raise exports, which in turn, will increase investment resources and reduce reliance on debt, and the economy should grow without reliance on debt. The policy makers should consider a route of investing in capital as a technique to expand the production capacity of the South African economy.

The study also echoes David Ricardo's policy recommendation that government spending should not be financed through borrowing irrespective of circumstances. Nevertheless, in accordance with Baseerit (2009), a slight exception is made for South Africa, which pointed out that capital scarce country must borrow. However, South Africa should only borrow more if, and only if the funds borrowed are channelled into productive infrastructure projects to grow and develop the economy. In circumstances where public debt does not seem to benefit the economy, it becomes advisable to consider David Ricardo's recommendation that advocates for immediate response or remedial action to effectively resolve public debt effectively (Churchman, 2001). In line with this view, it was mentioned in chapter 2 that, the International Monetary Fund cautioned policy makers in the United States to react with immediate effect to ensure orderly and controlled mechanisms for public debt reduction (Boccia, 2013). South Africa is not an exception, given the tough economic environment.

6.4 Contributions of the study.

In addition to the results found in the study, other contributions made by the study include the issue of fiscal policy which has been raised in the context of this study. Since public debt is part of fiscal policy, it is important to revisit fiscal policy more regularly to ensure effectiveness and its positive contribution to economic growth. The academic literature and economic research are marked by debate concerning connection between fiscal policy and economic growth. This is because of its complexity and critical importance. The study made an important

contribution by using prior and post-apartheid era to investigate nexus between public debt and economic growth because there are few studies in South Africa which considered the period after transition into democracy to investigate how public debt influences economic growth.

6.5 Limitations of the study.

The study limited its concentration on the prior and post-apartheid era, that is, 1961 to 2017 to assess how public debt had impacted economic growth. Therefore, any circumstances that may have affected data beyond the above-mentioned period were not considered in this study. Additionally, the study applied the ARDL model and Granger causality tests to produce the desired results. It means it is possible for future research to consider different models and possibly obtain different results.

6.6 Areas of future research.

This study discovered an important issue concerning the “impact of public debt on economic growth” shown by Megersa and Cassimon (2015). The important issue discovered in that study is the “quality of public sector management” such as property rights, budget management and transparency, which affect economic growth. The quality of the public sector may affect debt-growth nexus through different channels. For instance, countries with a low quality of public sector, such as those with “lower rate of mobilising revenue, low transparency and poor budget management”, are more prone to a high rate of public debt because they have a tendency of borrowing more (Megersa & Cassimon, 2015). Therefore, the above-mentioned issues bode well for future research, especially the quality and management of public sector, including fiscal policy reform.

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APPENDICES

APPENDIX A – DATA

Year	GFCF	CPI	CBD	LogGDP	FDE	DDE
1961	19,01	1,9	-1,5	13.30	3,6	42,1
1962	18,28	1,5	-2,4	13.36	2,8	43
1963	20,52	1,2	-2,4	13.43	2,1	40,9
1964	22,25	2,4	-1,7	13.51	1,6	38,9
1965	24,85	3,6	-3,2	13.57	1,9	39,2
1966	24,10	3,6	-3,1	13.61	1,4	41,1
1967	22,74	3,4	-3,9	13.68	0,9	40,3
1968	22,38	1,7	-3,4	13.72	1	43,8
1969	22,73	3	-3,1	13.77	0,9	41,7
1970	25,27	5,3	-3	13.82	1,7	39,1
1971	26,78	6	-3,2	13.86	2,9	38,5
1972	27,59	6,5	-5,4	13.88	3,1	39,6
1973	26,22	9,5	-3,7	13.92	1,8	35,2
1974	26,03	11,6	-1,8	13.98	2	29,9
1975	31,00	13,5	-2,7	14.00	3,1	32,7
1976	32,10	11,1	-4,6	14.02	4,2	33,9
1977	30,89	11,3	-5,9	14.02	3,8	35,7
1978	27,94	10,9	-5,3	14.05	2,9	37,1
1979	27,58	13,2	-4,3	14.09	1,9	35,5
1980	27,79	13,8	-3	14.15	0,9	30

1981	29,12	15,2	-0,1	14.20	1,2	27,8
1982	28,99	14,7	-2,1	14.20	1,6	28,5
1983	27,93	12,4	-2,2	14.18	1,4	29,1
1984	25,36	11,6	-3,1	14.23	2	28,2
1985	24,59	16,1	-3,2	14.22	2,1	27,2
1986	21,72	18,7	-2,3	14.22	1,6	28,4
1987	19,58	16,1	-4,2	14.24	1,3	29,5
1988	20,92	12,9	-4,9	14.28	1,1	29,9
1989	22,35	14,7	-3,4	14.30	0,8	30,5
1990	20,94	14,4	-1,3	14.30	0,7	29,9
1991	19,05	15,3	-1,8	14.29	0,6	32,9
1992	17,48	13,9	-3,6	14.27	0,6	35,5
1993	15,81	9,7	-7,1	14.28	1,1	39,1
1994	16,09	9	-5,4	14.31	1,6	46,2
1995	16,96	8,7	-4,5	14.34	1,7	46,5
1996	17,20	7,4	-5	14.39	2,2	45,5
1997	17,56	8,6	-4,8	14.41	2,1	45,3
1998	18,09	6,9	-3,6	14.42	2,1	45,4
1999	16,13	5,1	-2,7	14.44	2,4	42,8
2000	15,62	5,3	-2,1	14.48	3,3	39
2001	15,51	5,7	-1,9	14.51	6,4	36,1
2002	15,15	9,2	-1,4	14.54	6,6	29
2003	15,98	5,8	-1	14.57	5,5	30

2004	16,46	1,4	-2,2	14.62	4,3	30,1
2005	17,25	3,4	-1,4	14.67	4,2	29
2006	18,92	4,7	-0,3	14.72	4,4	27
2007	20,65	7,1	0,7	14.78	3,7	23,4
2008	23,51	11,5	0,9	14.81	4,2	22,3
2009	21,51	7,1	-0,7	14.79	3,5	26,6
2010	19,27	4,3	-5,1	14.82	3,2	31,4
2011	19,12	5	-4	14.85	3,7	34,5
2012	19,23	5,6	-4,8	14.88	3,6	37,4
2013	20,37	5,7	-5,3	14.90	4	40,1
2014	20,39	6,1	-4,6	14.92	4,3	42,7
2015	20,44	4,6	-4,5	14.93	5,2	44,1
2016	19,51	6,4	-4,2	14.94	5	46,5
2017	18,73	5,3	-3,9	14.95	4,8	48,2

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Appendix A. Literature review summary table

Empirical studies on the effect of public debt on economic growth					
Evidence from non-African countries					
Author(s)	Title	Country	Period	Variables	Methodology & Findings
Akram (2016)	Impact of public debt on economic growth of Pakistan	Pakistan	1972-2009	Investment, External debt, Domestic debt, Debt servicing cost.	<ul style="list-style-type: none"> • VECM and ARDL approach The study found a negative relationship between Public debt GDP per capita.
Dritsaki (2013)	Causal Nexus Between Economic Growth, Exports and Government Debt: The case of Greece	Greece	1960-2011	Real GDP, Export, External debt.	<ul style="list-style-type: none"> • VECM and Granger causality approach The study found a short-run and long-run relationship amongst the variables. Unidirectional Granger causality that runs between exports and economic growth as well as from economic growth to government debt was also found.
Saifuddin (2016)	Public Debt and Economic Growth: Evidence from Bangladesh	Bangladesh	1974-2014	Real GDP, Investment, Public debt.	<ul style="list-style-type: none"> • TSLS regression model The study found that there exist a positive relationship between public debt and both investment and economic growth.
Hameed et al (2008)	External debt and its impact on economic and business growth in Pakistan.	Pakistan	1970-2003	Real GDP, Labour force, Capital stock, Export, Debt servicing.	<ul style="list-style-type: none"> • VECM Approach The study found that there exist long-run and short-run causal relationship between debt service and GDP.
Gómez-Puig & Sosvilla-Rivero (2017)	Examined the short- and long - term impact of public debt on euro countries' economic growth	Euro countries'	1961-2013	Real GDP, Domestic debt, External debt, government debt.	<ul style="list-style-type: none"> • ARDL Approach The study revealed different patterns across all euro countries, which in turn support the view that long-term public debt has a negative impact on the economic performance, while its short - run effect may be positive depending on the country.
Mohanty et al (2016)	Examining the causal nexus between public debt and economic growth for 15 NSC states of India	India	1991-2015	Public debt, Revenue receipts, Total credit, GDP	<ul style="list-style-type: none"> • Fully Modified Ordinary Least Square (FMOLS) The results revealed that the explanatory variables namely; total revenue receipts, public debt and total credit have favourable effect on economic growth.

Rabia & Malik (2012)	The impact of domestic debt and external debt on economic growth in Pakistan	Pakistan	1980-2010	Real GDP, Domestic debt, External debt	<ul style="list-style-type: none"> • Ordinary Least Squares (OLS) approach <p>The findings showed an inverse relationship between domestic debt and economic growth though the effect was minor</p>
Kumar & Woo (2010)	Public debt and growth	Advanced and Emerging countries	1970-2007	Real GDP, Domestic debt, External debt	<ul style="list-style-type: none"> • Panel regression <p>Their empirical results reveal and also suggest an inverse relationship between initial debt and subsequent growth</p>
Empirical evidence from Africa countries					
Okon et al (2013)	The relative potency of external and domestic debt on economic performance in Nigeria	Nigeria	1970-2011	GDP per capita, External debt, Domestic debt, Inflation rate, Real exchange rate, Interest rate.	<ul style="list-style-type: none"> • ECM model <p>The result reveals that external debt is more superior to domestic debt in terms of economic growth.</p>
Obademi (2012)	An empirical analysis of the impact of public debt on economic growth: Evidence from Nigeria 1975-2005	Nigeria	1975-2005	External debt, Domestic debt, Total debt, External debt service, Domestic debt service	<ul style="list-style-type: none"> • VECM Approach <p>Total public debt was found to have impacted negatively the growth rate of the Nigerian economy.</p>
Kasidi & Said (2013)	Impact of External Debt on Economic Growth: A Case Study of Tanzania	Tanzania	1990-2010	Real GDP, External debt, Debt servicing.	<ul style="list-style-type: none"> • Cointegration Approach <p>The study revealed that there exist a significant impact of the external debt and debt service on GDP growth.</p>
Matandare & Tito (2018)	Public Debt and Economic Growth Nexus in Zimbabwe	Zimbabwe	1980-2016	Real GDP, External debt, Exports, Inflation, Debt servicing.	<ul style="list-style-type: none"> • Ordinary Least Square (OLS) method <p>The study found a negative relationship between external debt and economic growth. Exchange rate and inflation were also found to have negative relationships with economic growth.</p>
Nwaniki (2016)	Effect of public debt on gross domestic product in Kenya	Kenya	2003-2015	Real GDP, Bank loans, Central bank overdraft, External debt, Government securities.	<ul style="list-style-type: none"> • ARDL model <p>The study found that external debt have a significant relationship with gross domestic product</p>

Matthew & Mordecai (2012)	The impact of public debt on economic development of Nigeria	Nigeria	2003-2014	Domestic debt, External debt, External servicing stock, Domestic servicing stock, Real GDP.	<ul style="list-style-type: none"> • ECM and Granger causality test <p>The study shows the negative effect of public debt on economic development in Nigeria.</p>
Bonga et al (2015)	Growth-Debt Nexus: An Examination of Public Debt Levels and Debt Crisis in Zimbabwe	Zimbabwe	1980-2013	GNI per capita, Population growth, Trade balance, Investment level, Debt payment, External debt.	<ul style="list-style-type: none"> • Ordinary Least Square (OLS) method <p>The study found that public debt affects economic growth negatively.</p>
Ntshakala (2013)	The effect of public on economic Swaziland	Swaziland	1988-2013	Real GDP, Domestic debt, External debt, Inflation, Government expenditure	<ul style="list-style-type: none"> • Ordinary Least Square method <p>The study found that there is no significant relationship between external debt and economic growth.</p>
Putunoi & Mutuku (2013)	Domestic debt and economic growth nexus in Kenya	Kenya	2000-2010	GDP, Domestic debt, Private sector credit, Domestic interest rates.	<ul style="list-style-type: none"> • VAR Approach <p>The results showed positive and significant effect of domestic debt on economic growth in Kenya.</p>
Munzara (2015)	The impact of foreign debt on economic growth in Zimbabwe	Zimbabwe	1980-2013	GDP, Capital investment, External debt, Trade openness, Labour force.	<ul style="list-style-type: none"> • Cointegration Approach <p>The results revealed that external debt and trade openness impact negatively on economic growth in Zimbabwe while capital investment and labour force growth has a positive effect</p>
Ochieng (2013)	The relationship between public debt and economic growth in Kenya	Kenya	1992-2012	Treasury bills, Treasury bonds, Government stock, External debt, overdraft.	<ul style="list-style-type: none"> • Harrod Domar growth model <p>The results revealed that government debt in Kenya was reasonably sustained</p>
Tajudeen (2012)	Public debt and economic growth in Nigeria: Evidence from Granger causality	Nigeria	1970-2010	Real GDP, External debt, Domestic debt	<ul style="list-style-type: none"> • VAR Approach <p>The study revealed that there is a bi-directional causality between public debt and economic growth in Nigeria.</p>
Empirical evidence from South Africa					
Mhlamba & Phiri (2017)	Is public debt harmful towards economic growth? New	South Africa	2002-2016	Real GDP, Government debt, Inflation, Terms of trade, Investment.	<ul style="list-style-type: none"> • ARDL Approach <p>Their study found a negative relationship between public debt and GDP growth in the long run.</p>

	evidence from South Africa				
Baaziz et al (2015)	Does public debt matter for economic Growth? Evidence from South Africa	South Africa	1980-2004	Real GDP, Openness trade, Inflation	<ul style="list-style-type: none"> LSTR model <p>The study found nonlinear relationship in the public debt-Growth nexus in South Africa</p>
Ayadi & Ayadi (2008)	The impact of external debt on economic: A comparative study of Nigeria and South Africa	Nigeria and South Africa	1994-2007	Real GDP, External debt, Debt services to export, Growth rate of investment stock	<ul style="list-style-type: none"> Ordinary least squares (OLS) and generalized least squares (GLS) <p>Their findings confirmed a negative impact of debt and its service requirements on growth for both Nigeria and South Africa.</p>
Ncanywa & Masaga (2018)	The impact of public debt on investments and economic growth of South Africa	South Africa	1994-2016	Real GDP, public debt, investment, government deficit	<ul style="list-style-type: none"> VECM Approach <p>The results revealed the existence of a short run relationship between public debt and economic growth</p>

