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**The impact of debt financed expenditure on economic growth: case of South
Africa**

Sixolile Makhaba

(200807914)

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Supervisor: Prof. A. Tsegaye

Co-Supervisor: Mr. B. Mgxeke

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Abstract

This study assesses the impact of debt-financed government expenditure on economic growth in South Africa over the period 1994 to 2022. Against a backdrop of growing public debt, subdued economic growth, and structural fiscal challenges, the research utilizes the Autoregressive Distributed Lag (ARDL) model to evaluate both the short-run and long-run dynamics between public debt and economic performance. The model is particularly suited for small samples and helps address potential endogeneity among variables. Quarterly time series data and dummy variables accounting for the Global Financial Crisis and the COVID-19 pandemic are employed to capture structural breaks and shocks. Empirical findings reveal that while debt-financed expenditure can stimulate short-term growth, its long-run effects are predominantly negative when debt surpasses sustainability thresholds. Specifically, the results indicate the presence of a nonlinear relationship, with positive growth effects observed only when the debt-to-GDP ratio remains below a certain threshold (~37%). Beyond this point, rising debt levels crowd out private investment, increase debt service burdens, and constrain fiscal space. Additionally, the study underscores the importance of governance and institutional quality in enhancing the effectiveness of debt-financed expenditure. The findings emphasize the critical need for South Africa to recalibrate its fiscal policy, improve debt management, and prioritize productive investments to ensure that public debt supports rather than impedes long-term economic growth.

Key words: GDP, Economic Growth, Government Expenditure, Inflation, Unemployment, Government Debt, Debt-financed expenditure, ARDL (Autoregressive Distributed Lag), Fiscal Balance (FB)

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Abbreviations and Acronyms

GDP- Gross Domestic Product	GARCH- Generalized Autoregressive Conditional Heteroscedasticity
SARB- South African Reserve Bank	ARDL- Autoregressive Distributed Lag Model
SA- South Africa	FMOLS- Panel Fully Modified Ordinary Least Squares
NDP National Development Plan	FDI- Foreign Direct Investment
WDI -World Development Indicators	ADF- Augmented Dickey-Fuller Test
WEO -World Economic Outlook	VECM- Vector Error correction model
STATS SA- Statistics South Africa	PP- Phillips-Peron test
IMF- International Monetary Fund	VAR- Vector Autoregressive Model
BOP- Balance of Payments	AIC- Akaike Information Criterion
FB -Fiscal Balance	SIC- Schwarz Information Criterion
GFCF -Gross Fixed Capital Formation	ARCH- Autoregressive Conditional Heteroscedasticity
INV -Investments	CUSUM- Cumulative Sum of Recursive Residuals
INF -Inflation	CUSUMQ- Cumulative Sum of Squares of Recursive Residuals
GVDBT -Government Debt	
UNEMP - Unemployment	
ECM- Error Correction Model	
OLS- Ordinary Least Squares	

CHAPTER ONE

INTRODUCTION TO THE RESEARCH ISSUE

1.1 Background context to the study

Government expenditures play a crucial role in facilitating the development of infrastructure, stimulating economic growth, promoting health and education, generating employment opportunities, and ensuring social welfare. According to Buthelezi (2023), government spending can be categorized into two main groups: spending on consumption and spending on productive services. Occasionally, they are divided into current and capital expenditures. The current expenditure consists of salaries and wages, pensions, subsidies, interest on government debt, and a range of government benefits. Capital expenditure, conversely, encompasses investments made with the intention of stimulating long-term growth. As per the findings of Saungweme and Odhiambo (2020), it has been noted that both current and capital expenditures play a crucial role in driving economic growth and reaping development benefits. The benefits encompass various aspects such as reindustrialization, employment-oriented export promotion, energy security, support for tourism recovery and growth, as well as gender equality and economic inclusion for women and youth.

In a study conducted by Mukui et al. in 2020, the researchers found that debt-funded spending, specifically public investment spending financed through debt issuance, had a positive effect on economic growth. The findings also indicate that utilizing debt to fund government consumption expenditures had an adverse effect on economic growth. The research findings indicate that the utilization of tax revenue to fund public consumption expenditure has a negative effect on economic growth. Furthermore, the findings have shown that stimulating economic growth can be achieved by funding government investment spending through tax income.

According to Sachs, (2021), the debt portfolio, which covers the government's financial commitments and is inevitably the largest fiscal portfolio in South Africa, can cause the government to experience severe financial instability. The economy is impacted by rising and poorly managed debt arrangements. The National Treasury is facing further difficulties with debt-financed spending and growth because of the Covid-19 outbreak and lockdown restrictions. According to National Treasury (2021), the lockdown's impact on the economy and its long-term effects caused tax collections to underperform by R304.1 billion in 2020–2021. The resulting increase in the revenue-to-expenditure gap is anticipated to result in a substantial rise in the gross borrowing demand.

It is important to note that the economy can be negatively impacted by funding government expenditures through public debt, as stated by Saungweme and Odhiambo (2020). When

government spending is unproductive, it can be inferred that public debt hampers the economy's capacity for growth. To align with the objectives of the National Development Plan vision 2030, the government resorts to borrowing funds and accruing public debt to bridge the gap. The government ought to utilize its debt to finance investment projects that have the potential to stimulate the economy and generate employment opportunities, thus ultimately improving the overall standard of living for its populace. Government expenditure is primarily sustained through income taxation. Nevertheless, it is important to note that there exist additional sources of revenue. Taxes are typically paid on various aspects such as income, capital, human talent, and consumption. When the government's spending surpasses its revenue, it implements a fiscal deficit or net borrowing policy. This policy is commonly referred to as the fiscal deficit or net borrowing of the government (Buthelezi, 2023).

Maintaining fiscal balance is of utmost importance when public expenditure is funded through public debt. The fiscal balance is influenced by three key factors: the level of government spending, the composition of government spending, and the productivity of different components of government spending. According to Tung (2018), when the funds in the budget are allocated towards less productive or wasteful expenditures, or towards redistribution, it can negatively impact economic growth and result in a decline in the government's tax revenue. Consequently, servicing the public debt with interest becomes increasingly challenging, leading to a weakening of the fiscal balance. To resolve the outstanding debt, it is possible to obtain a new loan. Growth plays a critical role in maintaining fiscal health and ensuring the sustainability of fiscal policy (Munir & Mehmood, 2018).

The government must ascertain the suitable fiscal policy, which does not necessarily involve the maximization of economic growth. Distributive politics plays a crucial role in emerging states that have been democratically established (Grasselli & Nguyen-Huu, 2018). In numerous cases, the allocation of government funds between productive and distributive purposes is a political decision. Governments and politicians may prioritize political gain over economic prosperity. Assuming that the political advantage derived from distribution expenditure outweighs the social benefits. In that particular circumstance, it is more probable that the government will prioritize distributive goals over long-term growth (Pilling, 2021). In the given circumstances, as demonstrated by Tung (2018), it is evident that the fiscal deficit will increase.

According to Ncanywa and Masoga (2018), the utilization of government borrowing should be focused on funding initiatives that have the potential to stimulate the economy and generate employment opportunities for residents. This, in turn, would contribute to an overall improvement in the quality of life for all individuals. Hence, it is advisable for a country such

as South Africa, which has limited capital, to consider acquiring debt to expedite the capital formation process. However, it is crucial to exercise control over public debt and ensure it remains within acceptable limits. Excessive debt is often associated with sluggish economic growth. This is because excessive debt can have detrimental long-term consequences, particularly during the later stages of borrowing. The overall characteristics of the public sector can be assessed by examining indicators such as the tax revenue rate, the level of transparency in government expenditure, and the effectiveness of fiscal management.

(Saungweme & Odhiambo, 2020) argue that neither governmental borrowing nor economic growth is inherently bad. Instead, it is seen to stimulate the economy. The reason for this is the distribution of assets between those who have more than enough to meet their current economic demands and others who need assets to develop economic initiatives or fulfill additional demands, as well as the capital inflow from both international and domestic investors. Among macroeconomic indicators, public debt is the primary one that shapes a country's image in international markets (Mukui et al., 2020).

1.2 Problem statement

The issue of spiraling public debt, which has experienced a consistent upward trend in the past decade, has seen an increase from 41 percent to 47 percent between 2012 and 2014, followed by a further rise from 49.3 percent to 62.2 percent between 2015 and 2019. South Africa's government debt accounted for 75.1% of nominal GDP as of September 2024 (StatsSa, 2024). The economy of the country experienced a sluggish growth rate in the year 2019, with a reported increase of merely 0.15 percent. According to the South African Reserve Bank, South Africa's real GDP growth rate was 0.15% in 2019, down from 0.79% in 2018 (SARB, 2020). In South Africa, the matter of escalating government debt, heightened government expenditure, and sluggish economic growth is currently a widely discussed subject. Government borrowings are utilized for the purpose of financing capital expenditures across a range of programs, including infrastructure investment, with the aim of stimulating economic growth.

The leadership of South Africa has made multiple efforts to address the infrastructure deficit. According to Liaqat (2019), it is asserted that the rising unemployment rate has led to an increase in government spending on security and social welfare programs. Despite significant public expenditure on primary education, healthcare, infrastructure development, and transportation, the key questions addressed in this context are as follows: to what extent has the government's utilization of debt to finance capital expenditure influenced economic growth level in South Africa? Despite previous studies conducted by Saungweme (2020), Liaqat (2019), Olamide and Maredza (2021), Mhlaba and Phiri (2019), Hollander (2021), and

Ngotana (2021) on debt-financed expenditure, there is still a lack of comprehension regarding the effects of such spending in the context of the economy in South Africa. According to Matiti (2013), it is argued that public debt plays a crucial role in financing economic growth, especially when it comes to expanding government budgets. It is important to note, however, that debt cannot replace the need for domestic revenue mobilization. In the meantime, it is essential to maintain sustainable levels of debt to avoid undermining market confidence. To ensure that debt serves a meaningful purpose, it should be utilized for financing activities that generate revenue and enhance the productive capacity of the economy.

Although extensive research has been conducted by scholars like Mhlaba and Phiri (2019) and Ngotana (2021) on the topic of debt-financed expenditure, there remains a significant gap in our understanding of its effects on the context of the economy in South Africa. In what ways, for instance, have South Africa's economic policies and structure shaped the relationship between government debt-financed spending and economic growth? What are the indirect effects of these expenditures financed by debt, and how do they contribute to South Africa's economic growth? What were the significant returns derived from these expenditures that were financed through debt?

Although several studies have analysed debt-financed expenditure in South Africa, most have not differentiated between capital and recurrent expenditures or considered the evolving fiscal challenges post-pandemic. Furthermore, recent research highlights the need for country-specific analysis due to the unique debt thresholds and macroeconomic conditions present in South Africa. This study addresses these gaps by providing an updated, disaggregated analysis of debt-financed expenditure and its impact on economic growth, thereby offering insights not adequately covered in the existing literature.

1.3. Research Questions

The study seeks to answer the following questions:

- To what extent has the government's utilization of debt to finance capital expenditure influenced economic growth in South Africa?
- In what ways have South Africa's economic policies and structure shaped the relationship between government debt-financed spending and economic growth?
- What are the indirect effects of these expenditures financed by debt, and how do they contribute to South Africa's economic growth?
- What were the significant returns derived from these expenditures that were financed through debt?

1.4. Objectives of the study

The study's overarching purpose is to assess the influence of debt-financed spending on economic growth in South Africa. The following are the specific aims of this study:

1. To review the patterns in public debt-financed expenditure and economic growth in South Africa.
2. To econometrically examine the impact of debt-financed expenditure on economic growth in South Africa.
3. To draw conclusions and policy recommendations based on results.

1.5. Hypothesis Test

The hypothesis that this study seeks to test is:

- i. H0: debt-financed expenditure does not have statistically significant impact on economic growth in South Africa.
- ii. H1: debt-financed expenditure has a statistically significant impact on economic growth in South Africa

1.6. Justification of the study

While numerous studies have examined the relationship between public debt and economic growth globally and within Africa, there remains a significant gap in the South African context. Existing research often relies on panel data or generalized models that do not account for South Africa's unique economic structure, fiscal policy environment, and recent shocks such as the COVID-19 pandemic. Recent studies have highlighted that the effects of debt on growth are non-linear and context-dependent, with country-specific thresholds and dynamics. Notably, South Africa's debt-to-GDP ratio has surpassed previously established sustainability thresholds, and the multifractality of its debt dynamics suggests unsustainable trends exacerbated by recent shocks. However, these studies have not sufficiently isolated the impact of debt-financed capital versus recurrent expenditure, nor have they fully explored the post-pandemic fiscal landscape. This study addresses these gaps by focusing specifically on the South African case, using updated data and distinguishing between different types of expenditure to provide policy-relevant insights. Much of the existing research in both global and African contexts relies on panel data and generalized econometric models, which overlook the distinctive characteristics of South Africa's economic structure, fiscal framework, and socio-political dynamics. These studies tend to aggregate data across countries or regions, failing to capture country-specific realities such as South Africa's unique budgetary priorities, institutional challenges, and the evolving nature of its public debt.

The COVID-19 pandemic further exacerbated the complexity of South Africa's debt profile. Yet, few studies to date have adequately accounted for the post-pandemic fiscal environment or the country's revised medium-term budget framework, which revealed a higher-than-anticipated accumulation of debt to finance urgent public expenditure, including relief pay-outs and escalating service costs. This context has introduced new fiscal dynamics that previous research could not capture, particularly regarding how the debt burden has shifted and been reprioritized since 2020.

Importantly, existing empirical studies rarely disaggregate debt-financed expenditures into their constituent components — namely, capital (developmental) versus recurrent (non-developmental) spending. This distinction is critical, as capital expenditures often contribute directly to productive capacity and long-term growth, whereas recurrent spending may not. For example, in the 2022 national budget, while R298 billion was allocated to the Department of Basic Education, only R12.9 billion of this was directed toward capital investment — a potentially growth-enhancing use of debt — while the rest was channelled toward operational and non-developmental components. Prior studies have failed to make such granular distinctions, thereby limiting their utility for policymaking.

The analysis is unique in that it considers the revised medium budget, which revealed more debt incurred than previously predicted to finance government expenditures, which was utilized to offset increased service costs and Covid 19 relief pay-outs and other initiatives. Additionally, it emphasized the national treasury's allocation of cash to economic regulation and infrastructure through the debt incurred, which was implemented in 2017. This allocation of debt to finance this expenditure has fluctuated over time, and the study has looked at these fluctuations. The study is unique in that it will examine the capital expenditures allotted to each expenditure, for example, out of the 298 billion budgeted to the department of basic education in 2022. 12.9 billion of this total has been allocated to capital spending (developmental component), 117.5 billion to economic regulation and infrastructure, and 36.4 billion to non-developmental component spending.

According to the study conducted by Olamide and Maredza (2021), the findings suggest that economic growth can be enhanced for the average countries in the sample by reducing debt levels. This can be achieved through increased capital accumulation and productivity growth. However, it is important to note that the reduction of debt may not necessarily lead to the desired outcomes in terms of capital or productivity development, and consequently, output growth. This is particularly true when considering the presence of other macroeconomic and structural inefficiencies, as well as political restraints. Debt serves to amplify the disincentive

for investment and the implementation of sound policies. This study aims to make a valuable contribution to the existing literature, while also addressing a specific gap in the literature pertaining to the South African economy.

The studies conducted by Mhlaba and Phiri (2019), Hollander (2021), and Ongezwa Ngotana (2021) focus on the non-profit expenditure aimed at rescuing State-Owned Enterprises (SOEs). Nevertheless, it is crucial to acknowledge that the outcomes of this specific investigation are incongruent with their discoveries, as evidenced by the National 2022 budget address which highlights a significant reduction in such financial rescues.

Based on a comprehensive review of the existing literature, which includes both theoretical frameworks and empirical studies, it can be concluded that a clear consensus regarding the influence of debt on economic growth within the South African context is still difficult to establish. The exact point at which debt begins to hinder economic growth cannot be conclusively determined. As can be seen from the information provided earlier, the research topic of this study was chosen to investigate the issue of debt incurred to finance government expenditures. Has the observed increase in debt levels been allocated towards expenditures that generate meaningful returns, thereby expected to stimulate economic growth and enhance performance?

The studies above did not separate the developmental component expenditures, which encompass non-consumption expenses that generate economic returns. These expenditures can also be categorized as debt incurred for the purpose of investing in economic growth. The debt financed expenditure isolation provides valuable insights to policy makers regarding the allocation of debt for financing expenditures and determining whether they have to stimulate economic growth.

CHAPTER TWO

AN OVERVIEW OF PUBLIC DEBT-FINANCED EXPENDITURE AND ECONOMIC GROWTH IN SOUTH AFRICA

2.1 Introduction

Government expenditure plays a crucial role in enhancing infrastructure, stimulating economic growth, improving health and education, and generating employment opportunities and social security (Coupet, 2017). The government borrows money and accumulates public debt to address the deficit and work towards achieving the development goals outlined in the National Development Plan vision 2030 (Republic of South Africa, 2018). According to (Baaziz, Guesmi, Heller & Lahiani, 2015) it is suggested that the government's debt be utilized for the purpose of funding investment projects that have the potential to stimulate economic growth, generate new job opportunities, and enhance the overall quality of life for all individuals residing within the country. Income taxes are the principal means by which the government obtains funds for its expenditures; nevertheless, alternative methods are also employed. In this chapter, we provide a comprehensive overview of South Africa's state debt-financed spending and its impact on GDP growth.

This chapter is divided into the following subsections: In Section 2.2, this study focuses on providing a historical overview of public debt expenditure in South Africa (SA). Section 2.3 focuses on the components and structure of public debt expenditure in South Africa, while Section 2.4 provides an overview of South Africa's economic growth from 1961 to 2021. Section 2.5 then turns to an analysis of the relationship between public debt spending trends and economic growth in the South African context. Section 2.6 delves into the National Development Plan (NDP) vision of South Africa and its implications, while section 2.7 wraps up the discussion.

2.2 Historical public debt financed expenditure overview in South Africa

The issue of public debt crisis, as suggested by Mhlaba and Phiri (2017), encompasses various economic, social, and political implications. When a country is highly indebted, its ability to effectively provide public goods, maintain national security, and perform other functions can be impaired. Mazorodze (2018) concurred and observed that the economy is adversely affected when government expenditure is financed through public debt. As borrowing diminishes savings, it consequently impairs the economy's capacity to generate wealth. It is widely believed that the potential for economic growth can be hindered by government duty, particularly in cases where government expenditure is deemed unproductive. Examples of such unproductive spending include payments made to government personnel and the maintenance of the army.

However, if these expenses are required, they ought to be financed through revenue rather than taking on debt (Matthew and Mordecai, 2016). Based on the research conducted by Mabugu et al. (2016), it can be observed that the issue of debt relief holds significant importance on the policy agendas of both countries and international agencies. According to Hilary (2017), the presence of an excessive amount of public debt has resulted in the implementation of measures that appear to be financially irresponsible. However, it is widely recognized that fiscal policy can have either a positive or negative impact on economic growth (Gómez-Puig and Sosvilla-Rivero 2017). The interplay of policies and institutions may affect the buildup of debt and economic expansion in tandem (Anning, Ofori, and Affum 2016). In common usage, it is understood that a country's total public debt is equivalent to the sum of its national debt and its international debt.

In 1960, the debt-to-GDP ratio stood at 48.2%. However, it experienced a decline over the years, reaching an average of 31.3% by 1984. Unfortunately, prior to the first democratic election in 1993, the ratio had risen to 43.5%. After reaching its peak in 1994, the gross debt to GDP ratio experienced a decline in 1995, settling at 50%. However, the government implemented a program that incorporated fiscal policy reforms intending to curb any further increases in the debt level in 1996. The active reduction of the debt as a percentage of GDP was not implemented until the year 2000. The administration did not implement spending cutbacks during that period due to increased political tension and the concurrent local and global economic downturn.

In the period from 1984 to 1994, there was a consistent increase in the public debt/GDP ratio. This rise was primarily caused by the expansion of fiscal deficits, which reached their highest point at 47% of GDP during that time (Statistics South Africa, 2017). From this juncture onward, there was a notable decline in the ratio of public debt to GDP, which persisted until 2008. The debt level underwent a substantial reduction, constituting less than 24% of the Gross Domestic Product (GDP), due to the government's surpluses and modest deficits in the years 2006 and 2007. The global financial crisis prevalence from 2008 to 2009, and its ensuing effects on domestic economies, necessitated an inevitable increase in deficits as a proportion of GDP.

Due to increased government budget deficits of 5.5% during this period, the debt ratio began to rise once more, ultimately exceeding 30% by 2010. This can be attributed in part to the implementation of countercyclical fiscal stimulus measures aimed at addressing the 2008/09 recession. Furthermore, it is worth noting that the levels of debt experienced a continuous increase throughout the year 2012, ultimately exceeding 36% of the Gross Domestic Product (GDP). Additionally, it is important to highlight those deficits also witnessed an upward trend

during this period. In the year 2017, an unprecedented peak of 53.1% was attained as the ratio of public debt to GDP. This increase was influenced, to some extent, by the ongoing issue of high unemployment rates, pervasive corruption, and political instability.

More than two decades have passed since South Africa's transition to a democratic government, yet the country's enormous levels of public debt show no signs of being resolved. When evaluating the viability and affordability of public debt, investors and rating agencies consider the factors mentioned by Afonso, & Ibraimo (2020). Factors to consider include the total amount of debt, how long till maturity, where the loan originates (in the country or outside), and who holds the debt. The rise in the proportion of government expenditure to GDP has several effects. When asked to approve higher levels of public spending, the government had a hard time saying no because of the political ramifications. When compared to their previous levels, most categories of government spending increased their proportion of GDP. Government expenditure as a share of GDP has been growing, reflecting the lack of robust economic growth.

Despite efforts to reduce spending and maintain fiscal consolidation, the government's debt continues to increase. Since 1961, the South African government has relied on the local capital markets to meet its financial obligations. Throughout the years, there has been a consistent decline in the percentage of foreign public debt in relation to the overall public debt, along with a significant increase in the portion of domestic public debt.

2.2.1 Theoretical foundations

This study is anchored in Keynesian and endogenous growth theories, which posit that debt-financed expenditure can stimulate aggregate demand and long-term productivity, respectively. However, neoclassical critiques and current threshold models temper this confidence by highlighting sustainability problems. The study incorporates these theories to answer the central question:

1. Keynesian theory explains why South Africa relies on debt-financed spending for short-term stimulation.
2. Endogenous growth theory explains how productive investments, such as infrastructure, promote long-term growth.
3. Neoclassical critiques and threshold theories highlight dangers, including as crowding out and governance failures, that threaten debt sustainability.

By combining these frameworks, the study offers a balanced assessment of debt's dual position as a development driver and a fiscal risk in South Africa's distinctive institutional and economic context.

2.3 Components and Structures of public debt financed expenditure in South Africa

Government responsibility lies in utilizing its spending to nurture conditions that are favorable for long-term economic growth. This particular factor holds considerable influence over the rate of growth (Gómez-Puig, et al 2018). Governments play a crucial role in ensuring and attracting investments through various means, including financial incentives like grants and subsidies, infrastructure development through gross fixed capital formation, job creation, and financing for research and development. Economists and policymakers concur that it is imperative for the government to play a significant role in stimulating economic growth. According to Ncanywa and Masoga (2018), an important factor in an economy's growth is the intensification in both local and international investment. This increase has several benefits, including the reduction of investment costs, the creation of job opportunities, and the mitigation of initial project risks.

Considering the importance of debt-financed spending in fostering growth in the economy, it would be insightful to examine the government attributes of spending also their influence on expansion. Based on the Budget Review (2017), an increase in government spending has the potential to generate a "multiplier effect" that enhances long-term economic activity by stimulating higher levels of aggregate demand, incomes, and expenditures. In cases where there are unutilized resources within the economy, government spending has the potential to enhance GDP growth by leveraging suitable macroeconomic factors. These factors are often more influential than a direct injection of monetary funds (Ofori & Affum, 2016).

According to Saungweme and Odhiambo (2018), it is argued that government spending on gross fixed capital creation can potentially have a direct influence on economic growth. They suggest that a greater capital stock can contribute to a more rapid expansion of the economy. Additionally, the private sector reaps the advantages of the spillover effects resulting from government investments in human capital development. This is because the increased marginal productivity of privately supplied production inputs contributes to a boost in economic growth. According to Afonso and Ibraimo (2020), it is believed that government expenditure on goods and services has the potential to enhance consumption. This, in turn, leads to an increase in aggregate demand and productivity. Increases in productivity differentials between sectors also contribute to certain sectors producing more than others.

Additionally, these authors contend that the utilization of government fiscal policy instruments, such as taxes, could potentially result in a downward movement of the aggregate demand curve. However, it is important to note that the extent of this impact may vary depending on the specific stage of the economic cycle. The research conducted by Anning, Ofori, and Affum

(2016) demonstrated that in times of economic recession, consumers tend to reduce their expenditure, leading to an increase in private sector savings and investments. The funding of government spending through taxes can have an impact on the economy's private business sector, particularly when the economy functions at its maximum capacity. This displacement can result in a lack of overall growth in aggregate demand, as pointed out by critics like Coupet (2017). There is also a concern that increased levels of government borrowing could potentially result in inefficiencies and diminish the overall impact on the economy. Additionally, it is important to note that borrowing can lead to an increase in high debt services and a potential rise in the tax rate. These factors have the potential to dampen the impact of government spending expansion, potentially resulting in a stable or even declining aggregate demand (Akram & Naeem, 2016).

Based on the information provided, it can be observed that South Africa's budget and government spending are overseen and regulated by the Medium-Term Expenditure Framework (MTEF). This framework operates on a three-year projection of both revenue and costs (Ewaida & Haytham, 2017). Following the end of the apartheid era, the government established a framework aimed at enhancing support for economic and political decision-making. The outcomes are evident in the open and accountable approach to overseeing government initiatives and assessing a range of policy recommendations. Since the conclusion of apartheid, most of the government expenditure in South Africa has been allocated towards anti-apartheid developmental initiatives with the objective of assisting the country's black majority in recovering from their challenging experiences (Gómez-Puig and Sosvilla-Rivero, 2018). The Accelerated and Shared Growth Initiative for South Africa (ASGISA), which was introduced in 2005, the New Growth Path (NGP) in 2010, and the National Development Plan (NDP) in 2012, are all instances of plans and initiatives of this nature.

The budget plans of a country are a reflection of its macroeconomic policies. The allocation of spending is determined based on the goals set for the economy and the future state of the nation (Baaziz, Guesmi, Heller & Lahiani, 2015). The government in South Africa is presently concentrating its spending on a variety of areas, including education, health, nutrition, development of rural areas, reducing crime, creating employment opportunities, and the improvement of infrastructure. Prior to democracy, the lack of diversification in government spending was a significant factor contributing to this issue. This resulted in insufficient funding for programs aimed at promoting economic benefits for the black majority. In contrast, the current focus is on striving to establish a more equitable nation.

The Nature of the Debt-Growth Relationship: Nonlinearity and Threshold Effects

Recent studies increasingly highlight that the relationship between public debt and economic growth is not linear but characterized by threshold effects and regime changes. For example, a 2022 study employing a regression kink methodology identifies a specific debt-to-GDP threshold for South Africa: below 37%, public debt supports growth, but beyond this point, it becomes a drag on economic performance. This finding is echoed by research using nonlinear models, such as the Smooth Transition Regression (STAR) and NARDL approaches, which demonstrate an inverted U-shaped relationship—public debt is beneficial in low-debt regimes but harmful when debt is high. These results suggest that the impact of debt is highly context-dependent and that fiscal policy should be calibrated to maintain debt within sustainable bounds.

Short-Run Versus Long-Run Dynamics

Empirical evidence also points to important differences between short-run and long-run effects. For instance, one study using ARDL bounds testing and variance decomposition finds that while public debt can have a positive short-term association with growth, the long-run relationship turns negative once other factors like inflation and capital formation are controlled for. This suggests that while debt-financed expenditure may provide temporary stimulus, persistent high debt levels undermine growth prospects over time. Moreover, the direction of causality is not always straightforward: some evidence indicates that economic growth itself can drive increases in public debt, rather than the reverse.

Debt Composition, Governance, and Investment

Another critical dimension is the composition of debt and the broader institutional context. Recent analysis points to the detrimental effect of excessive public debt, especially when coupled with poor governance and heightened economic risks, on domestic investment—an essential driver of long-term growth. The decline in South Africa's gross fixed capital formation since 1994 has been attributed to these factors, underscoring that the quality of fiscal management and the allocation of borrowed funds are as important as the quantity of debt itself. This aligns with endogenous growth and institutional theories, which stress that effective governance and productive investment are prerequisites for debt to support growth.

Evidence of Asymmetry and Structural Breaks

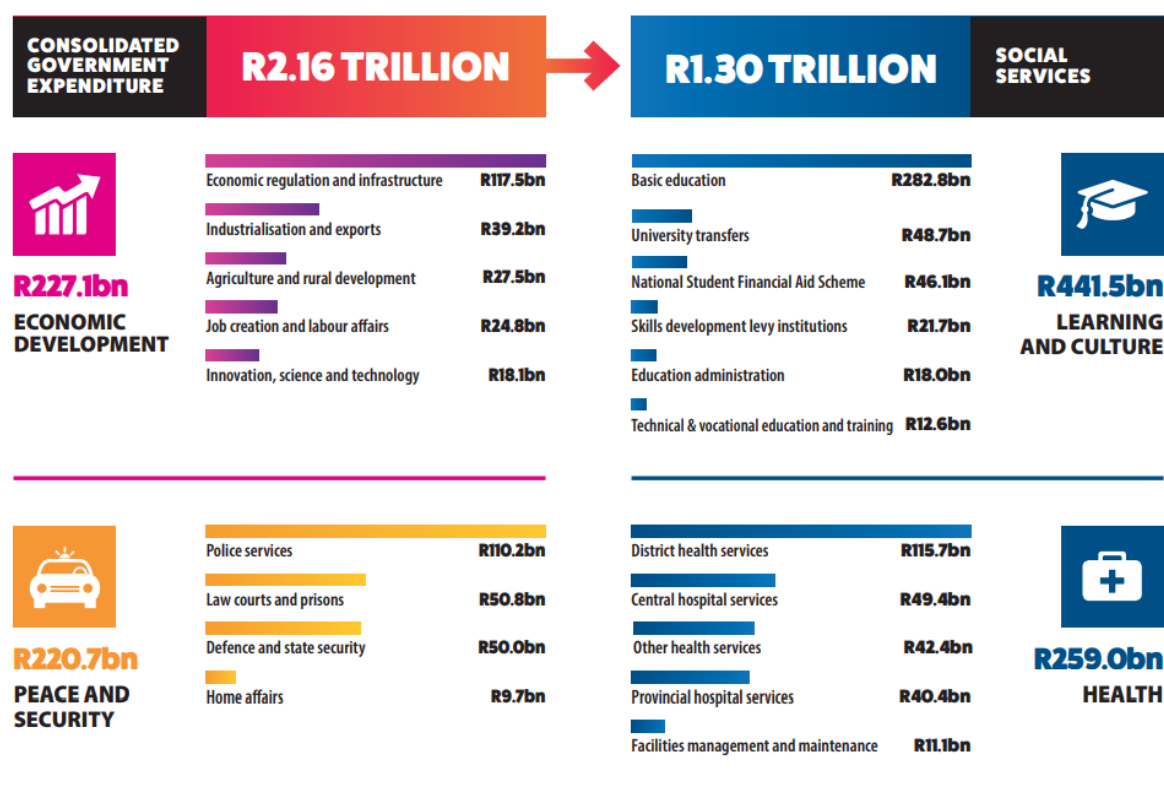
The literature further reveals that the debt-growth relationship is asymmetric and subject to structural breaks, especially during periods of crisis. For example, studies show that the negative impact of debt on growth has intensified in the post-global financial crisis period and likely worsened during the COVID-19 pandemic. This highlights the importance of modelling structural breaks and regime shifts when analysing South African data, as the effects of debt can change dramatically in response to macroeconomic shocks.

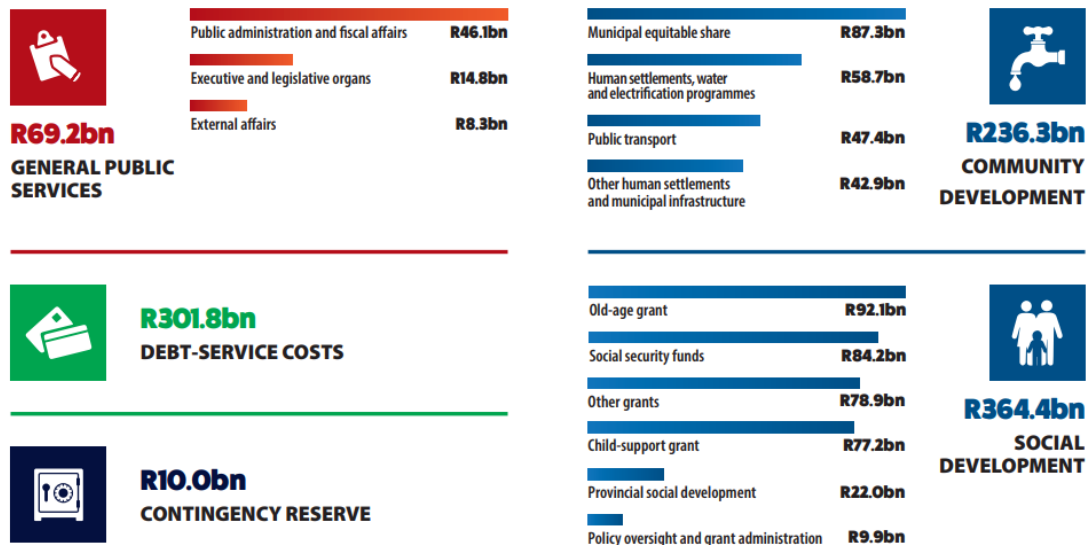
Divergent Findings and Policy Implications

Despite broad agreement on the dangers of excessive debt, not all studies find a significant direct relationship between debt service and growth. For example, one ARDL-based study covering 1970–2017 finds no statistically significant link between public debt service payments and economic growth, suggesting that the channel through which debt affects growth may be more nuanced, possibly operating through investment, interest rates, or confidence effects rather than direct fiscal crowding-out². In contrast, panel evidence from international studies indicates that foreign debt can be growth-enhancing, particularly in countries with lower default risk and sound fiscal institutions, though this effect is stronger in OECD than in non-OECD countries.

In the fiscal year 2019/20, the South African government allocated a total of R1.97 trillion, which represents a 10% rise compared to the R1.79 trillion expenditure in the previous fiscal year of 2018/19 (Stats SA, 2020). The publication gathers information from numerous polls conducted throughout the year, encompassing 707 entities. These entities consist of national and provincial government ministries, municipalities, extra-budgetary accounts and funds, as well as higher education institutions. In the fiscal year 2019/20, the most significant areas of government expenditure were allocated to public services, education, and social protection. According to Stats SA (2020), these three factors constituted approximately 60% of the total expenses.

Figure 2.1: South African general government expenditure (2022/23)





Source: National Treasury SA Database (2024)

At the very top of the graph, the executive and legislative services represent a considerable portion of spending, accounting for R199 billion (10% of total expenditures). Most of the costs associated with executive and legislative services pertain to the administration of parliament, provincial legislatures, and municipal offices. This component can be found to the left of interest payments on public debt. As per the National Treasury, it is reported that South Africa possessed a substantial gross loan debt of nearly R3.2 trillion during the fiscal year of 2019/2020, which subsequently led to significant interest repayments. According to Figure 2.1 (Stats SA, 2020), interest payments accounted for 10% (or R205 billion) of the total expenditures. This amount exceeds the government's expenditure on public order, which includes expenses related to police, jails, and courts. Additionally, it is approximately equivalent to the combined expenditure on both primary and secondary education.

2.4 South African Economic growth , 1994-2022

Following the end of apartheid in 1994, South Africa entered a new era marked by significant political, social, and economic transformation. The period from 1994 to 2022 is characterized by both notable achievements and persistent challenges in economic growth and development.

Post-Apartheid Economic Performance

The early years of democracy (1994–2007) saw steady economic growth, supported by macroeconomic reforms, improved investor confidence, and the integration of South Africa into the global economy. During this period, average annual GDP growth rates ranged between 3% and 5%, peaking at around 5.6% in 2006. This growth was underpinned by prudent fiscal management, the implementation of the Growth, Employment and

Redistribution (GEAR) strategy, and a global commodities boom, which boosted exports and investment inflows.

Global Financial Crisis and Its Aftermath (2008–2010)

The global financial crisis of 2008–2009 marked a turning point, causing South Africa's economy to contract in 2009 for the first time in nearly two decades. The government responded with countercyclical fiscal stimulus measures, leading to a sharp increase in budget deficits and a rising debt-to-GDP ratio. Economic growth rebounded modestly after the crisis, but at lower rates than before, with annual growth averaging around 2% between 2010 and 2015.

Stagnation and Structural Challenges (2015–2019)

From 2015 onwards, South Africa's economic growth slowed further due to a combination of domestic and external factors. Persistent issues included high unemployment, policy uncertainty, corruption, electricity supply constraints, and declining investor confidence. Real GDP growth hovered below 2%, with some years experiencing growth rates as low as 0.4%. Despite various policy initiatives-such as the National Development Plan (NDP) and the New Growth Path (NGP)-the economy struggled to achieve sustained, inclusive growth.

COVID-19 Pandemic and Recent Developments (2020–2022)

The COVID-19 pandemic in 2020 triggered the most severe economic contraction since the early 1990s, with GDP shrinking by approximately 6.4% in 2020. The government implemented emergency fiscal and monetary measures to mitigate the impact, resulting in further increases in public debt. Economic activity began to recover in 2021 and 2022, with growth rates rebounding to around 4.9% in 2021, but the pace of recovery remained fragile due to ongoing structural weaknesses, high unemployment, and global uncertainties.

Growth Regimes and Macroeconomic Uncertainty

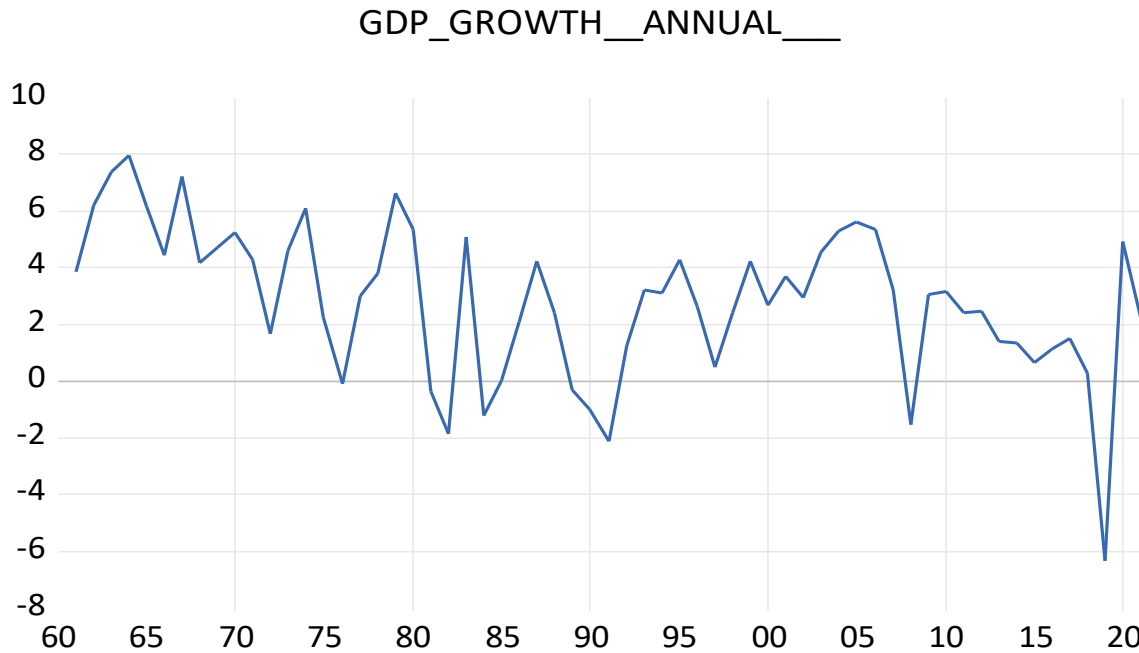
Recent empirical studies using advanced econometric techniques, such as Markov-switching dynamic regression and time-varying parameter VAR models, have identified three distinct growth regimes in South Africa between 1994 and 2022: periods of strong growth (mean rate ~3.9%), moderate growth (~1.5%), and contraction (~-6.3%). Macroeconomic uncertainty, including fiscal consolidation and external shocks, has been found to exert a persistent negative impact on growth, with fiscal policy only partially mitigating these effects.

Key Drivers and Constraints

- **Fiscal Policy:** Empirical evidence suggests that productive government spending, particularly on infrastructure and human capital, supports growth, while unproductive or recurrent spending has limited impact. The rising debt burden and associated interest payments have constrained fiscal space in recent years.

- Structural Issues: High unemployment, inequality, and persistent poverty continue to undermine long-term growth prospects. Weak governance, policy uncertainty, and infrastructural bottlenecks have also hindered economic performance

Figure 2.2 South African Annual GDP Growth Rates 1960-2022



Source: SARB Database (2022)

Figure 2.2 illustrates the exogenous shocks that took place during the reviewed period. Some examples that can be mentioned are the East Asian crisis and the terrorist attacks that occurred on September 11, 2001. In the United States, the subsequent wave of corporate scandals in 2002 and 2003, and the worldwide financial crisis of 2007 and 2008, which led to a worldwide economic downturn in 2009 (SARB, 2021). Since the 1960s, South Africa's 2004–2007 period of rapid development, with average annual real GDP growth of 5.2%, stands out as the most rapid. Akram (2017) claims that exporting industries generated great impetus between 2005 and 2007, together with household consumption spending and fixed investment activity. Additionally, as observed in (SARB, 2021) despite recording growth rates of over 4% in the 2000s, South Africa has not consistently achieved a GDP growth rate exceeding 5% since the 1960s

Since 1961, South Africa has seen eight economic downturns. South Africa had its first recession since 1961 as a direct result of the 1973–1974 oil crisis, which caused widespread unemployment and a decline in living standards (SARB, 2021). Furthermore, the economy went through three extended periods of recession between 1981 and 1993, leading to substantial unemployment and a deterioration in the quality of life, especially for low-income

households. Inflation remained between 10% and 20% throughout the 1980s and early 1990s, SARB ,(2021)reports that South Africa only had 30% real fixed capital creation in 1993, down from 35% in 1982.

Based on the findings of (Saini & Muniyoor, 2022) , it was noted that the country's current account surplus remained consistent from 1985 to 1993 due to capital outflows resulting from debt-stop agreements with lenders around the world. In the late 1980s, it became apparent that South Africa had experienced destabilization as a result of internal sociopolitical instability and economic sanctions imposed by foreign countries. It is important to note that the financial collapse of Lehman Brothers in 2008/9 was the catalyst for a global economic downturn.

High unemployment and economic inequality are problems that have plagued the South African economy, impacting black South Africans disproportionately (Baaziz & Guesmi,2020) Therefore, economic growth has been seen as essential for bringing about the sustained reduction of unemployment, the promotion of economic participation among formerly disadvantaged persons, and the mitigation of income disparity (Akram& Naeem, 2016).

There have been substantial shifts in the economy's growth rate during the 46-year time span included in this analysis (Ewaida & Haytham 2017). The most significant of these shifts occurred after the 1994 democratic elections, which guaranteed civil liberties for the black people and allowed the nation to re-enter the global market. In addition, the economy also benefited from hosting the soccer World Cup in year 2010, which came after the country had been hit by the global financial crisis in 2008 (Arnone & Presbitero, 2016). During the initial ten years of embracing democracy (1994–2004), the country experienced a modest 1% rise in per capita income, a 3% upsurge in domestic expenditure, and a 3.7% growth in family consumption (World Bank, 2017).

Based on the 2016 report from the South African Reserve Bank (SARB), it was found that services constitute a significant portion as a sector of the economy, making a significant contribution of around 73% to the Gross Domestic Product (GDP). According to the South African Reserve Bank (SARB) in 2016, the service industries can be categorized into three major sectors based on their respective percentages. These sectors include banking and real estate, which accounts for 21.6% of the total, government services with a percentage of 17%, and wholesale/retail/automotive/catering/accommodation sector, which represents 15% of the overall service industry.

It is then followed by the 9.3 percent that is accounted for by transportation, storage, and communication (SARB, 2016). It's worth noting that just 2.6% of the population works in agriculture, whereas 13.9% work in manufacturing, and 8.3% in mining and quarrying (SARB, 2016). According to the same report, the government is using effective instruments to stabilise

the economy and reduce oscillations, such as defining budget objectives, regulating taxes, raising public spending, and expanding public works.

2.5 Comparison of patterns in economic growth public debt financed expenditure and in South Africa

South Africa, since the 70s, has experienced a series of significant changes in its economic, political, and financial landscape. ultimately emerging as a newly industrialized nation. The restructurings and subsequent institutional and legislative reforms in debt management led to significant alterations in the structure and content of public debt (SARB, 2018). Public financial management agencies, including institutions like the Fiscal Finance Commission, National Treasury, and the Bond Exchange of South Africa, were established as part of the reforms (Mhlaba, Ncebakazi, & Phiri, 2019). The improvements observed in South Africa's primary and secondary debt markets can be partially attributed to the policy changes implemented by the government. The government debt of South Africa is currently primarily denominated in the local currency, the Rand. Only a small fraction of the debt is held by individuals or entities outside of the country (RSA, 2015).

Since the 1990s, the South African government has implemented various economic growth strategies. South Africa has seen the implementation of several significant initiatives, such as the Accelerated and Shared Growth Initiative (ASGISA) in 2005, the New Growth Path Framework in 2010, and the National Development Plan 2030 in 2011. According to RSA (2010), With the exception of the year 2009, the significant economic growth rates observed in South Africa from 1994 to 2014 can be largely attributed to the implementation of various economic initiatives (World Bank, 2018). The governmental debt and economic growth patterns of South Africa, resulting from various financial and economic policies implemented from 1980 to 2017, are presented in Figure 2.3. Economic growth can be measured by the annual rise in per capita real gross domestic product (RGDP). Nevertheless, public debt tends to be expressed as a percentage of RGDP.

2.6 Empirical Evidence on Public Debt-Financed Expenditure and Economic Growth in South Africa

2.6.1 Thematic Overview and Methodological Approaches

Empirical research on the relationship between public debt-financed expenditure and economic growth in South Africa reveals a complex and often non-linear dynamic. Studies employing time-series econometric techniques, such as ARDL, VECM, and threshold regression models, generally agree that the impact of public debt on growth is context-dependent and sensitive to both the level and composition of debt, as well as macroeconomic

shocks (Afonso & Ibraimo, 2020; Akram & Naeem, 2016; Gómez-Puig & Sosvilla-Rivero, 2018; Saungweme & Odhiambo, 2018).

Debt Thresholds and Nonlinear Effects

A recurring theme in the literature is the existence of a debt threshold, beyond which the effect of public debt on growth turns negative. For instance, recent research using regression kink and smooth transition regression models identifies a debt-to-GDP threshold in South Africa—estimated at around 37%—below which debt-financed expenditure may support growth, but above which it becomes a drag on economic performance. This aligns with international findings that the debt-growth relationship is not linear, and that fiscal policy must be carefully calibrated to avoid surpassing sustainable debt levels (Akram & Naeem, 2016; Gómez-Puig & Sosvilla-Rivero, 2018; Saungweme & Odhiambo, 2018).

Short-Run Versus Long-Run Dynamics

Empirical results also highlight important differences between short-run and long-run effects. ARDL and cointegration analyses suggest that while public debt can have a stimulative effect on economic growth in the short term—particularly when used for capital expenditure—persistent high debt levels tend to undermine growth in the long run. This is often attributed to rising debt service costs, crowding out of private investment, and increased macroeconomic uncertainty (Akram & Naeem, 2016; Saungweme & Odhiambo, 2018).

Composition of Expenditure and Institutional Quality

Another critical dimension is the composition of government expenditure financed by debt. Studies consistently find that debt-financed capital expenditure, such as infrastructure and human capital development, is more likely to yield positive growth effects than recurrent expenditure. However, the effectiveness of such spending is strongly influenced by the quality of governance and fiscal institutions. Poor governance, corruption, and weak fiscal management can erode the potential benefits of debt-financed investment, leading to inefficiencies and a diminished impact on growth (Afonso & Ibraimo, 2020; Akram & Naeem, 2016; Saungweme & Odhiambo, 2018).

Structural Breaks and External Shocks

The South African experience underscores the importance of accounting for structural breaks and external shocks, such as the global financial crisis and the COVID-19 pandemic. Empirical analyses that incorporate period dummies or regime-switching models reveal that the negative impact of debt on growth intensified during and after these crises. This suggests that the debt-growth relationship is asymmetric and highly sensitive to broader economic conditions (Afonso & Ibraimo, 2020; Gómez-Puig & Sosvilla-Rivero, 2018).

2.6.2 Comparative Insights and Regional Context

When compared to other emerging and developing economies, South Africa's debt-growth dynamics exhibit both similarities and unique features. Like many African countries, South Africa has experienced rising public debt levels in the wake of fiscal stimulus measures and external shocks. However, the country's relatively deep domestic capital markets and more developed fiscal institutions have, to some extent, mitigated the risks associated with external debt exposure (Afonso & Ibraimo, 2020; Saungweme & Odhiambo, 2018; Gómez-Puig & Sosvilla-Rivero, 2018).

Panel studies identified across sub-Saharan Africa and emerging markets often find that foreign debt can be growth-enhancing in countries with strong institutions and low default risk, but detrimental in countries with weak governance. South Africa's mixed record on governance and fiscal discipline places it at an inflection point, where the benefits of debt-financed expenditure are contingent on ongoing reforms and prudent fiscal management (Afonso & Ibraimo, 2020; Saungweme & Odhiambo, 2018).

2.6.3 Agreements, Disagreements, and Gaps

Agreements

- There is broad consensus that debt-financed capital expenditure can promote growth, especially when debt levels are moderate and governance is strong (Afonso & Ibraimo, 2020; Saungweme & Odhiambo, 2018).
- Most studies identified above agree that surpassing a certain debt threshold leads to negative growth effects, primarily due to rising debt service costs and reduced fiscal space (Akram & Naeem, 2016; Gómez-Puig & Sosvilla-Rivero, 2018).

Disagreements

- Some studies find no statistically significant direct relationship between public debt service payments and economic growth, suggesting that the impact may operate through indirect channels such as investment or confidence effects (Saungweme & Odhiambo, 2018).
- The magnitude and precise threshold at which debt becomes harmful vary across studies, reflecting differences in methodologies, data periods, and model specifications (Akram & Naeem, 2016).

Gaps

- Few studies disaggregate the effects of different types of government expenditure (capital vs. recurrent) with sufficient granularity.

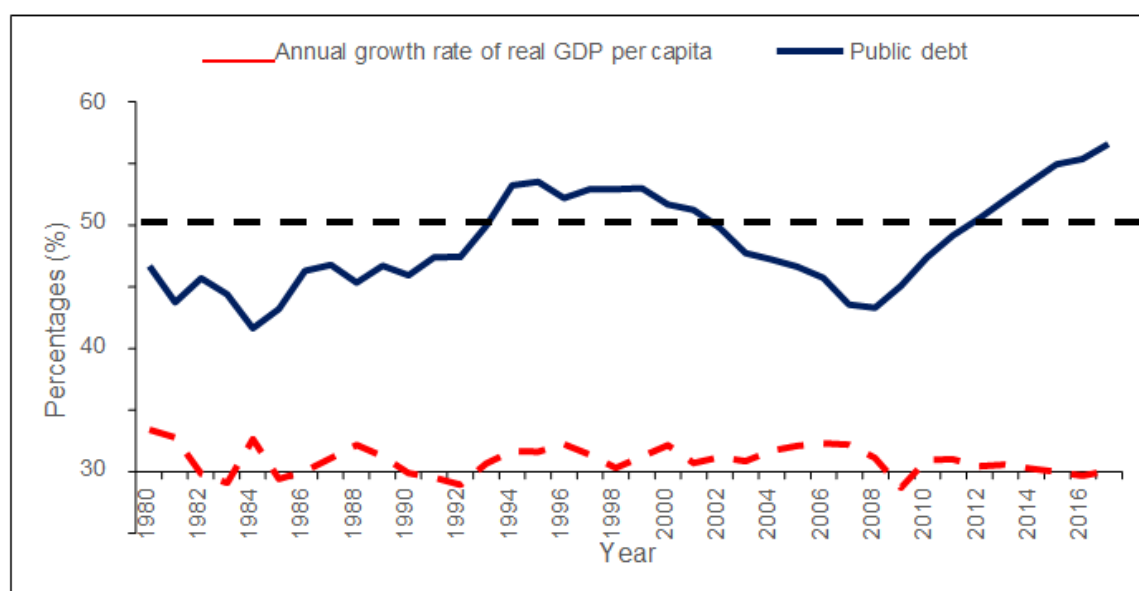
- There is limited empirical work explicitly modelling the post-COVID-19 fiscal landscape in South Africa.
- The role of institutional quality and governance in mediating the debt-growth relationship remains underexplored in the South African context (Afonso & Ibraimo, 2020).

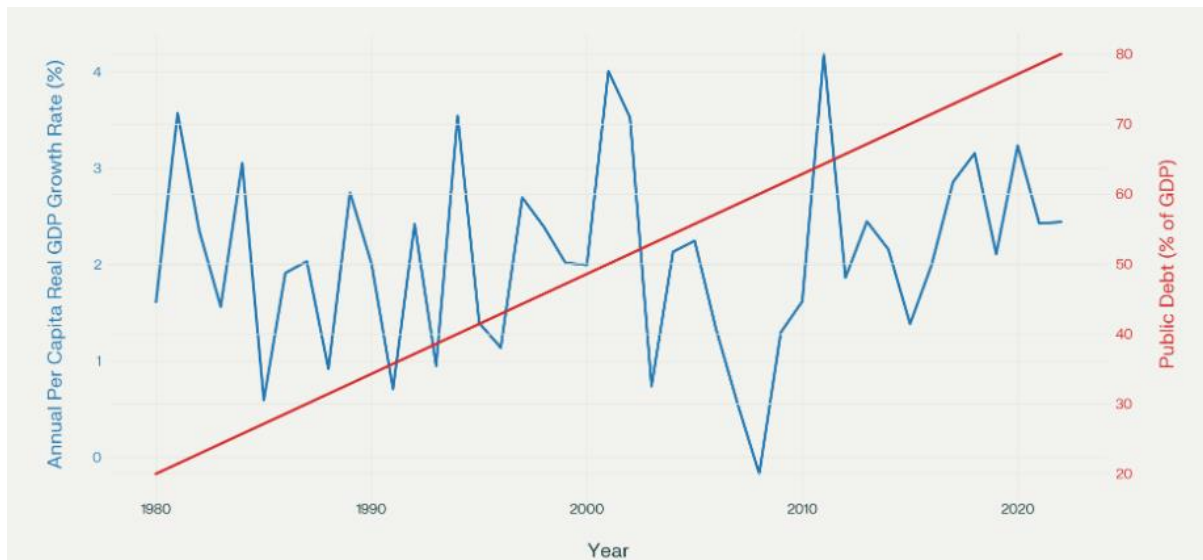
2.6.4 Implications for the Current Study

This body of evidence underscores the need for nuanced, context-specific analysis of public debt-financed expenditure in South Africa. The current study addresses these gaps by:

- Employing updated data that includes the COVID-19 and post-pandemic periods,
- Distinguishing between capital and recurrent expenditures,
- Incorporating structural breaks and governance indicators into the empirical framework.

Figure 2.3: South African Annual Per Capita Real GDP Growth Rate and Public Debt 1980-2016





“Source: Authors’ computations based on World Bank (2022) databank”

Figure 2.3 illustrates the progression of South Africa's state debt over three distinct periods: 1980 to 1994, 1995 to 2008, and 2009 to 2017. The proportion of public debt to gross domestic product per capita showed a consistent upward trend from 1984 to 1994. This rise was primarily caused by the expansion of budget deficits, which reached their highest point at 47% of GDP in that particular year (Statistics South Africa, 2017). From 1995 to 2008, there was a significant decrease in the ratio of public debt to RGDP per capita.

According to the data presented in Figure 2.3, South Africa experienced a period of public debt crisis between 1993 and 2001. This situation compelled the nation to persistently pursue economic and financial reforms. Figure 2.3 demonstrates the declining pattern of the ratio between public debt and real GDP. In 2008, the ratio hit its lowest point, standing at 25.9%. This decline can be attributed to the impact of these measures on reducing budget deficits and promoting economic growth (RSA, 2012). Between the years 1995 and 2008, there was a notable emphasis on industrialization, resulting in the expansion of the economy's production capabilities (African Development Bank et al., 2017). The upward trend in the public debt/RGDP per capita ratio between 2009 and 2017 can be linked to the aftermath of the 2008 global financial crisis, as well as the implementation of additional government instruments for debt. (Statistical South Africa, 2017; RSA, 2011).

The graph illustrates the inverse relationship between South Africa's annual per capita real GDP growth rate (left axis) and public debt as a percentage of GDP (right axis) from approximately 1980 to 2023. Over the past four decades, the country has experienced significant volatility in economic growth, with frequent dips below 1%, most notably during the global financial crisis (2008–2009) and the COVID-19 pandemic (2020), where growth turned

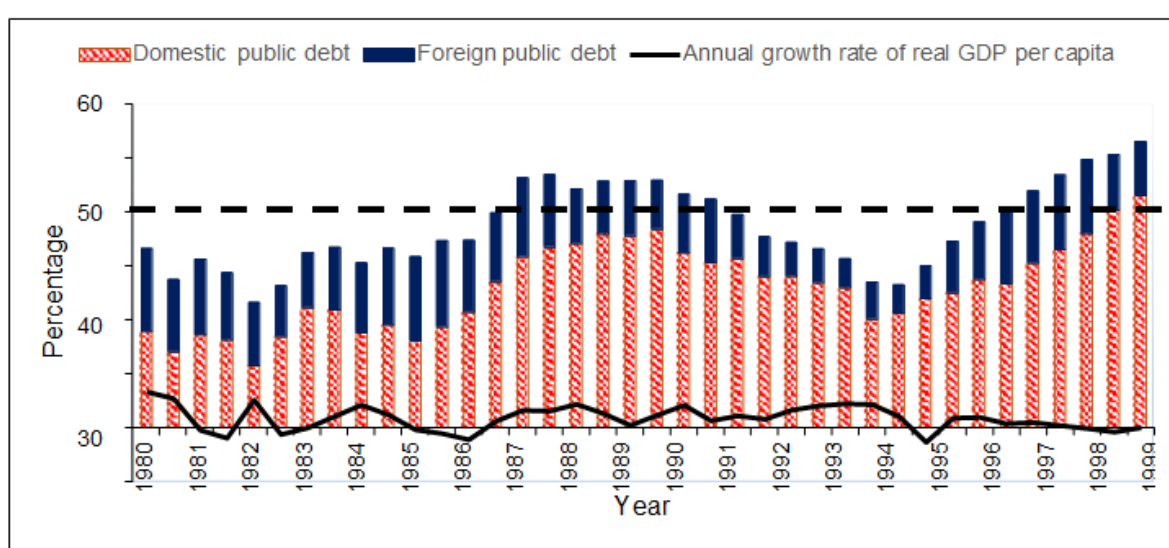
sharply negative. Conversely, public debt has shown a persistent and steep upward trend, rising from below 25% of GDP in the early 1980s to over 75% by 2023.

This divergence suggests a weakening of South Africa's fiscal sustainability and raises concerns about the long-term growth implications of mounting public debt. While short-term countercyclical borrowing may have buffered the economy during downturns, the lack of sustained growth despite rising debt levels aligns with findings in the literature that exceeding certain debt thresholds undermines economic performance (Afonso & Ibraimo, 2020; Saungweme & Odhiambo, 2018). The rising debt trajectory coupled with fluctuating and subdued growth reinforces the argument that debt must be used to fund productive, growth-enhancing investments, rather than consumption or inefficient recurrent spending (Akram & Naeem, 2016; Gómez-Puig & Sosvilla-Rivero, 2018).

These trends highlight the urgency for South Africa to strengthen its fiscal frameworks, improve public investment efficiency, and enhance governance in order to translate debt-funded expenditures into sustainable economic gains. The World Bank data underscores that without structural reforms and more prudent fiscal management, public debt could become a binding constraint on growth, especially in a context of rising interest costs and declining investor confidence (World Bank, 2024).

The breakdown of government borrowing as a percentage of GDP from 1980 to 1999 is graphically shown below

Figure 2.4 South African components of Public Debt and Annual Per Capita Real GDP Growth Rate 1980-1999



Source: Authors' computations based on SARB (2020) data.

In Figure 2.4, it is evident that the South African government has exhibited a greater reliance on the local capital markets to fulfill its budgetary commitments. This is reflected by the fact that public domestic debt constituting a larger portion of the overall government debt when compared to its international emerging markets. According to Figure 2.4, the ratio of public debt to RGDP per capita decreased between 1995 and 2001. This decrease can be attributed mainly to the government's efforts to cut down on the foreign debt portion and partially to the general increase in GDP during that period (World Bank, 2018). The investor base of the country has expanded due to the presence of competitive interest rates and a wide range of government securities that are accessible to buyers (RSA, 2016a; 2016b; 2016c). Furthermore, as depicted in Figure 2.4, South Africa experienced a significant increase in its domestic public debt from 1993 to 2002, followed by another surge from 2012 to 2017, ultimately reaching a level of 43.1% in 2017. South Africa's public debt has surpassed the indicative threshold of 40% set by the IMF and World Bank, leading to this outcome. According to the South African Reserve Bank (SARB) in 2018.

2.7 SA's NDP vision and implications

The NDP comprises a range of policies and programs aimed at assisting the most economically disadvantaged individuals in South Africa to enhance their financial well-being, in alignment with the nation's Constitution. The South African government has presented its 2030 objectives in a document known as the National Development Plan (NDP). The strategy seems to prioritize the important goals of poverty reduction and inequality reduction. According to the National Development Plan of 2011, a key priority is to expedite economic growth in a manner that is advantageous to all citizens of South Africa. Due to this, the importance of rapid economic expansion is frequently emphasized as a means to enhance accessibility to opportunities for all individuals. One of the identified priorities of the National Development Plan (2011) is to accelerate economic growth. This priority aims to increase employment and bring the plan closer to its stated goals.

However, it seems that the plan lacks any mention of public debt as a potential obstacle to achieving the desired economic growth. To alleviate poverty and inequality by 2030, it is imperative to achieve a sustainable rate of economic growth. However, this goal necessitates the government's attention to the pressing issue of rising public debt, which is emphasized in this context. Several economic factors, however, might pose challenges in achieving certain objectives outlined in the National Development Plan by the designated year of 2030. The reference to the National Development Plan should include the year of publication in parentheses.

As per the National Development Plan (2011), it is imperative to achieve an annual growth rate of 5 percent to expedite job creation and facilitate the transformation of the economy. In addition to implementing immediate measures to stabilize the debt-to-GDP ratio, the government has made the decision to embrace proactive economic reform measures that are expected to significantly enhance economic growth. Government spending on social and economic goals may face limitations if these objectives are not effectively implemented.

Countries have been instructed to allocate significant funds towards sectors such as research and development, human capital, artificial intelligence, and machine learning, in anticipation of the upcoming fourth industrial revolution in the global economy. Without making these essential investments, there is a risk that economic growth could come to a halt, and countries may find themselves falling behind non-digital industries in terms of competitiveness (World Economic Forum, 2017).

The economics literature has presented both positive and negative findings regarding government debt. The quantity and type of debt play a significant role in this impact. The debt-to-GDP ratio is a widely used metric for assessing a nation's capacity to borrow funds. However, according to Reinhart, Reinhart, and Rogoff (2015), it is argued that the ratio should not exceed 90%. In order for economic expansion to be feasible, it is crucial that debt levels remain below 90% of GDP. In the event that the debt level surpasses the established limit, it is anticipated that there will be adverse consequences for the economy. Upon experimental examination, it has been determined that the debt levels of emerging nations can shed light on this matter. The specific threshold, as established by Karadam in 2018, is 88.2. When debt levels are kept at a manageable level, it becomes possible for economic expansion to occur. However, growth rates start to decline when the ratio of public debt to GDP exceeds a specific critical level.

In the context of the overlapping generations model (Blanchard, 1985; Diamond, 1965; Modigliani, 1961), the presence of excessive public debt is regarded as a factor that hampers economic growth by depleting national savings that are meant to benefit future generations. If national savings were to be reduced, it would result in an increase in interest rates, which could potentially deter prospective investors. If businesses and individuals were to reduce their investments, the accumulation of capital over time would be diminished, resulting in a slower rate of economic expansion.

- Counter-cyclical fiscal policy: It is imperative for the government to adopt macro-policy buffers to enable South Africa to effectively address the repercussions of the financial crisis. Continued adherence to fiscal restraint is crucial, although the possibility of adopting an expansionary stance cannot be ruled out in the event of a contraction in the EU economy.

. Monetary policy requires a delicate balance between regulating inflation and supporting economic growth.

- To prevent an excessive overvaluation of the rand, it is important to consider the impact of low interest rates in industrialized nations. These low rates have contributed to a significant strengthening of the rand exchange rate, which in turn has reduced the economy's capacity for diversification. In such circumstances, it is advisable to prudently acquire foreign exchange reserves.

- Strengthening the social safety net: To address the rise in unemployment, it is crucial to implement measures that safeguard the well-being of the most vulnerable individuals, particularly unemployed youth.

- It is advisable to safeguard sectors with promising long-term prospects. Industries that have been significantly affected by the cyclical downturn should receive temporary support measures.

- Reorienting trade towards emerging markets is crucial: The recovery of global trade has heavily relied on the demand from developing countries. South Africa should redirect its focus towards opportunities in the remaining regions of Africa and other developing countries.

- Social dialogue: It is imperative to establish a cohesive and united front to develop collaborative solutions to the challenges confronting the economy. South Africa must avoid having dysfunctional connections between the public, business, and civil sectors due to financial constraints. It is imperative that they promptly find each other.

- Collaborate: Confidence in high-income nations has experienced a significant decline. Political systems often struggle to effectively execute decisive actions. The lack of progress in passing a jobs bill by the United States Senate and the failure of the European Union to reach a resolution for the debt crisis are particularly noteworthy examples. The lesson possesses profoundness. Unless there is collaboration across the political and social spectrum, South Africa will be unable to withstand the effects of the global crisis.

Increasing exports is important to the strategy. However, exports will only increase if businesses in South Africa become more competitive. This requires investment, as well as macroeconomic policies that are favourable. This is especially true in an economy that exports minerals, where external price fluctuations can destabilize the non-minerals sector. Key components of this supportive macroeconomic approach include countercyclical fiscal policy and low and stable inflation.

2.8 Conclusion

The problem of the government's ever-increasing debt, which has risen from 41% to 47% between 2012 and 2014, from 49.3% to 62.20% between 2015 and 2019, and is expected to reach 71.60% in 2022-23. This is according to (Saungweme, 2020). The economy expanded at a modest 0.15 percent in 2019, according to official figures. From 2018 to 2019, GDP growth has slowed to 0.79 percent. Growing debt, more expenditure, and stagnant growth have become major political issues in South Africa. Capital expenditure (the development component) is financed by government borrowings via a range of programmes including infrastructure investment that are expected to lead to growth in the economy.

Many efforts have been made by the government in South Africa to improve infrastructure. With the increase in the unemployment rate, there has been a corresponding growth in government spending on security and social welfare programs. Here, will delve into the crucial questions surrounding impact of government spending on the country's economic growth and the influence of government capital expenditure on economic growth in South Africa, These questions remain relevant despite the significant amount of public spending on essential sectors such as basic education, healthcare, road construction, power, and transportation. Increasing government spending is a keyway in which public debt can be utilized to finance economic growth. Nevertheless, it is crucial to bear in mind that debt should not be regarded as a substitute for generating income internally. Meanwhile, it is essential to maintain manageable levels of debt in order to uphold market confidence. In order for debt to fulfil a meaningful purpose, it should be employed to fund activities that generate revenue and enhance the productive capacity of the economy.

The problem of the government's ever-increasing debt remains a critical challenge for South Africa. Government debt rose from 41% to 47% of GDP between 2012 and 2014, then from 49.3% to 62.2% between 2015 and 2019, and further increased to approximately 70.9% of GDP by the end of the 2022/23 fiscal year (National Treasury of South Africa, 2023; International Monetary Fund [IMF], 2023). This rising debt burden has coincided with sluggish and volatile economic growth.

The economy expanded by a modest 0.15% in 2019, with GDP growth slowing from 0.79% in 2018 to 0.15% in 2019. The COVID-19 pandemic caused a sharp contraction of -6.4% in 2020, followed by a rebound with growth of 4.9% in 2021 and a slower growth of 2.0% in 2022 (Statistics South Africa, 2018–2022; IMF, 2023).

Growing debt, increased government expenditure, and stagnant or volatile growth have become major political and economic issues in South Africa (South African Reserve Bank, 2023). Capital expenditure, particularly infrastructure investment financed through

government borrowings, is intended to stimulate economic growth by improving productive capacity. Despite significant government efforts to improve infrastructure, including investments in basic education, healthcare, road construction, power, and transportation, the country continues to face structural constraints that limit growth.

The rising unemployment rate, which reached 33.9% in the fourth quarter of 2022, has also driven increased government spending on social welfare and security programs (Statistics South Africa, 2022). This raises crucial questions about the impact of government spending on economic growth and the effectiveness of capital expenditure in fostering sustainable development. While public debt can be a useful tool to finance growth-enhancing investments, it should not replace efforts to generate income internally. Maintaining manageable debt levels is essential to uphold market confidence and fiscal sustainability.

For debt to serve a meaningful economic purpose, it must fund activities that generate revenue and enhance the productive capacity of the economy. The National Treasury projects real GDP growth of 4.9% in 2021, 2.0% in 2022, and moderating growth of around 1.7% by 2024 (National Treasury of South Africa, 2023). However, the economy faces ongoing risks including electricity shortages, inflationary pressures, and fiscal vulnerabilities. Employment remains a concern, exacerbated by COVID-19 disruptions and social unrest.

CHAPTER THREE

LITERATURE REVIEW

3.1 Introduction

This chapter's focus centers on the empirical theoretical and perspectives surrounding the influence of debt-financed spending on South Africa's economic growth. It roots into comprehensive exploration from various theoretical perspectives, including the Keynesian perspective on debt and the Ricardian Equivalence. These viewpoints are examined in detail to establish a solid foundation for the study and to present evidence-based research findings.

Furthermore, empirical research is reviewed to ensure that the facts and viewpoints presented in this study are substantiated by other studies. Thus, a comprehensive literature review was carried out to facilitate this research in order to uncover and tackle the existing void in the literature pertaining to South Africa's governmental debt and its impact on economic growth.

3.2 Theoretical Literature Review

As asserted by Mohanty and Mishra (2019), existing body of research pertaining to growth in economy, originating from many schools of thought, underscores a discernible correlation linking public debt and economic growth. In the study conducted by Medeiros et al (2019), previous theories regarding public debt have focused on the role of debt management in maintaining macroeconomic stability. Nevertheless, it remains a cause for concern to consider the likelihood of demands that pose challenges to monetary policy while also considering the composition and scale of the government debt. However, governments perceive debt as a tool to close the gap in revenue after taxes, enabling them to raise government spending without making significant adjustments to rates from taxes (Pascal, 2020).

3.2.1 Debt financed expenditure theories

3.2.1.1 Keynesians view on public debt

Keynesian economics draws several fundamental economic concepts for reducing unemployment and increasing aggregate production. Keynesianism argues for positive government intervention in the form of greater government spending or tax reductions to stimulate aggregate demand, boost production, and reduce unemployment. According to Matthew and Mordecai (2016), Keynesians believed that budget balances were unnecessary during recessions. To stimulate economic growth and raise national income, governments can create debt to fund productive investments. There may be difficulties if the public debt is redirected in a different direction. A rise in government spending, illustrates that it serves to boost activity within the domestic economy and to entice private investment (Biza, et al.,2020).

Moreover, according to Matthew and Mordecai (2016), the traditional review of the impact of fiscal policy in Keynesian analysis has been shaped by two significant theoretical developments. The initial advancement pertains to the development of a more intricate framework for understanding behavior in saving. The model of saving behavior emerged from consumption cycles and perpetual income theories. Matthew and Mordecai (2016) also claim that implicitly people assume that the saving rate is governed by their expendable income, and no thought has ever been given to the relationship between the budget shortfalls and savings.

Rapid money supply increase, according to the Keynesians' model, would indefinitely lead the price level to rise fast, and no other variable could induce significant inflation, according to Matthew and Mordecai (2016). The idea is relevant to this study since the overall amount spent on public spending as a proportion of GDP rose or remained constant. The public sector saw growth that exceeded the rate of inflation. Government bond rates are unusually high when adjusted for inflation.

3.2.2 Ricardian theory of equivalence

Based on the theory of Ricardian Equivalence, it is argued that public debt does not exert any influence on the growth of the economy. According to the argument, private savings will offset a drop in governmental savings if larger tax cuts are financed by borrowing enormous quantities of money. According to Shittu et al. (2018), lump-sum tax hikes have no effect on consumer spending, assuming a specific set of assumptions. Similarly, tax reductions that increase disposable income result in an automatic increase in savings. Consequently, deficits and taxes have a same impact on consumption. Based on the findings of Arnone and Presbitero (2021), it is stated that the tax policy implemented by the government is considered neutral. This means that any increase in current taxes is exactly offset by an equivalent reduction in future taxes, resulting in no impact on the equilibrium level of interest rates or individual consumer spending.

Alternately, say that individuals are rational (Saungweme, 2020). Consequently, a shrewd consumer will see that increasing taxes will reduce the government debt resulting from deficit spending. This means that if taxes are raised in the future, an individual will have saved enough money to handle the extra tax burden. However, if future taxes are increased, a person will have saved enough money to meet the higher taxes that may be assessed in the future. Moreover, the author argues against overemphasizing the empirical worth of the Ricardian equivalence hypothesis.

Therefore, it can be concluded that budget deficits do not impact national savings, interest rates, or the balance of payments. Likewise, the method of distributing social security benefits

does not affect accumulation of capital, assuming the validity of the Ricardian belief. A fiscal behavior guideline has been formulated in the form of a cyclically balanced budget argument. This argument suggests that, on average, the budget should be balanced throughout the business cycle. Specifically, there should be surpluses during periods of economic expansion and deficits during periods of economic recession. According to certain economists, there is an assumption that a rise in the budget deficit will subsequently lead to an increase in private savings. This is believed to have the effect of protecting both investment and the trade balance.

Based on the concept, the level of public obligation is directly related to forthcoming taxes. Furthermore, in the case that buyers maintain a long-term outlook, it can be stated that future tax assessments hold the same value as present tax assessments. It also implies financing government spending through borrowing is equivalent to financing it through taxation. One of the consequences of Ricardian proportionality is that when a tax cut is used to finance a debt, it does not have any impact on consumption. Households allocate a larger portion of their discretionary cash flow to prepare for the potential future regulatory expenses that may arise as a result of the tax relief. The increase in private savings precisely balances out the decrease in public savings. As a result, real consumption and output remain unaffected. Private and public savings remain unchanged, and so do investments.

Following the publication of Barro's significant work in 1974, the equivalence hypothesis was subjected to a process of review. Based on Barro's (1974) findings, it is suggested that given a specific trajectory of government consumption, the time frame of revenues or adjustments in public debt would not impact private consumption, savings, or GDP. In a closed economy, it is assumed that the interest rate, investment, and output remain constant. If this argument holds true, the ability of fiscal policy to stabilize the economy will be significantly limited. This statement presents a clear opposition to the Keynesian fundamental worldview. From a Keynesian perspective, the potential impact of public debt growth in a given period on macroeconomic indicators including unemployment and manufacturing lies in its ability to stimulate private spending. According to Barro's study in 1974, it is strongly argued that government debt does not influence savings, economic growth, consumption, and private investment.

3.2.3 Economic Growth theories

3.2.3.1 *Neo-classical theory*

Contrasting to the suggestions prior to the neoclassical model predicts that individuals who hold anticipated will strategically plan their consumption over the course of their entire lives. Consequently, fiscal deficits have the potential to augment aggregate spending through the

mechanism of transferring taxes onto future generations. When all economic resources are utilized to their fullest extent, it is evident that an increase in consumption will inevitably lead to a decrease in savings. Interest rates will subsequently increase to restore equilibrium to the capital markets. Prolonged deficits have the potential to disrupt private capital accumulation. Relying on the utilization of public debt to fund public investment will lead to a reduction in the liquidity of the market.

According to the Ricardian proposition, intensifying budget deficits necessitate higher future tax rates. Because of this, future tax revenues are expected to fund public investment backed by public debts. However, private investment and the interest rate remain unchanged since investors know that they will be taxed in the future. Such changes, which are exacerbated by the growing fiscal imbalance, have a damaging influence on the economy adds (Coupet Jr, 2019).

3.2.3.2 Exogenous neo-classical growth theory.

In 1956, Robert Solow developed the fundamental neoclassical model, which has since played a significant role in the analysis of economic growth in different countries. The theory suggests the presence of a steady-state equilibrium in a situation where growth is presumed to be constant and technological progress is lacking, even though it is expanding because of the labour's contribution to technological development. Prescott (2018) is a reference to a source or publication. The structure of the model rests upon a set of assumptions that involve the existence of a unified composite good, two production components (capital and labour), two economic entities (firms and households), and a closed economy. The mentioned assumptions can be effectively demonstrated by using the Cobb-Douglas production function. The function represents the output (Y) as a function of capital (K) and labour (L). Without the aid of technological progress, the production function demonstrates consistent and decreasing returns to scale (Prescott, 2018). Hence, the production function may be defined in the following manner:

$$Y = (K^a A L^{1-a}) \text{ Given that } 0 < a < 1$$

In this context, A symbolizes the advancement of technology, whereas K and Y symbolize the capital and per capita output, respectively. The variables "1-a" directly indicate the extent to which production is influenced by labour as well as capital. Given the same conditions, a boost in improvements in technology will result in a proportional growth in output. This illustrates that the increase in per capita production over time is primarily influenced by technical innovation, which subsequently leads to a higher demand for labour.

If technology remains unchanged, the expansion of the population will result in a reduction of growth per capita. However, it is anticipated that there will be no growth in long-term GDP per capita. The growth of savings, achieved through the accumulation of capital, has an impact on short-term growth. In addition, capital accumulation plays a crucial role in fostering long-term economic growth. The Solow growth model according to Knight, Loayza, and Villanueva (1993), posits the existence of a constant state equilibrium in per capita income. Various factors such as existing technology, savings rates, technological progress, and population determine this equilibrium. The exogenous factors that are believed to influence population growth, savings rate, and technological advancement include: The model generates testable predictions by taking into account variations in national savings, technological progress, and population growth rates.

Solow's growth model has been subject to numerous criticisms due to its inability to adequately explain the factors that drive technological advancement and the underlying causes of the observed disparities in economic growth across different countries. According to Barro (1996), there is no evidence supporting a negative correlation between the growth of GDP per capita and the original level of GDP per capita. In addition, Aghion and Howitt (2009) noted that although the model of neoclassical development is significant, it falls short of explaining the drivers of technological innovations. According to Ocran (2019), the main drawback of this model is its recognition of technical progress growth as essential for sustaining economic growth, but it does not provide an explanation on how to ensure it. This is because the model uses technological advance and productivity interchangeably. Furthermore, the model exhibited a deficiency in recognizing the pathways by which the economic environment influences economic growth. According to Ocran (2019), there is reason to believe that technological advancement is endogenous. Technical change occurs as a result of economic decisions that are connected to the accumulation of capital, profit-driven enterprises, scientific investment, and other economic endeavours aimed at improving human well-being.

3.2.3.3 Endogenous growth theories.

The fundamental idea of the Solow growth model, which contends that technological advancement is an external and independent variable, as Robert Solow in 1956 initially proposed, which encountered considerable opposition from the endogenous growth model. This concept supports the development of technology from within, known as endogenous technological advancement, which is widely recognized as a vital factor in fostering economic growth. The reason for this can be attributed to various factors, including but not limited to population growth, increased savings, and higher levels of investment. Saifuddin (2019) observed that the aforementioned structural policies have an impact on the mentioned aspects. Moreover, the long-term economic expansion rate is impacted by acquiring,

generating, and disseminating new expertise through the advancement of software and other services rooted in information technology. This viewpoint is further reinforced by Romer (1994), who asserts that in a market economy, there exist firms of significant magnitude. Within this context, the outcomes derived from different inputs exhibit variations, while physical activities can be duplicated, and advancements in technology originate from the endeavors of individuals.

The principle is especially pertinent to developing economies including South Africa. This is because many emerging economies have an excess labor force and little capital stock. This situation can have a positive impact on the economy as it leads to the creation of more employment opportunities. However, the AK model argues in favor of increasing capital inflows as a means to stimulate economic growth and alleviate unemployment. A considerable proportion of the labor force in developing nations, particularly within the agricultural sector, remains underutilized. The government should prioritize the promotion of savings in order to address the issue of low industrialization and ensure capital growth. This approach would subsequently encourage investment and mitigate the burden of public debt.

According to Arrow et al (1970), the theory of learning-by-doing ultimately leads to the accumulation of capital within a company, thereby resulting in the expansion of its knowledge base. Enhancing the amount of tangible capital in a developing economy like South Africa would result in a corresponding rise in labor. As a company's capital stock grows over time, its knowledge stock also grows in parallel. In a developing nation such as South Africa, an increase in the physical capital stock will have a simultaneous effect of enhancing labor productivity. The capacity for efficient resource production and allocation within the economy led to a remarkable reduction in government borrowing. Frankel's AK model (Aghion & Howitt, 2009) highlights the key drivers of economic growth: efficiency and frugality. Identify the key to unlocking unparalleled economic growth. In addition, the process of acquiring knowledge through hands-on experience contributes to the improvement of one's technical skills, resulting in a higher marginal capital product. The increase in productivity will effectively offset the decline in the marginal capital product.

Casaratto's (2008) critique thoroughly examines the AK model, highlighting its oversight of important factors that contribute to economic growth. These factors include human rights, political stability, strong institutions, and property protection. He went on to explain the significance of these factors in many developing countries. Failure to integrate them into the economic growth framework may impede the desired outcomes.

Despite receiving some criticism, the AK model proposed by Frankel in 1962 continues to hold relevance for emerging economies such as South Africa. This model effectively tackles the

major challenges to economic growth faced by these nations, such as low productivity, limited investment, high unemployment, increasing public debt, and deteriorating infrastructure. Furthermore, the pursuit of knowledge can be enriched by the insights gained from the impact of wealth.

Nevertheless, the model's ability to generate precise outcomes might be constrained as it overlooks additional variables like political instability and the presence of robust institutions, both of which also is a crucial role in encouraging growth in the economy. Still, understanding the issue of public debt in an economy like South Africa is crucial.

The AK thought was further developed by the ensuing phase of endogenous growth speculation, also known as the growth theory, based on innovation (Chiu & Lee, 2019). This study is relevant to the current research due to its focus on the influence of debt-financed expenditure on economic growth. Based on the concept, academic capital is derived from advancements in technology, particularly in the areas of physical and human capital. Through the process of intellectual innovation, individuals are able to accumulate both physical and human capital by means of savings and education. In 1994, Romer introduced a new theory that explores whether productivity, specifically in terms of aggregate output, is influenced by the level of product assortment. In this context, it is important to note that economic growth contributes to enhanced productivity through the creation of more diverse product options. However, it does not guarantee that these products will be inherently superior in quality.

3.3 Empirical literature

The preceding section provided an analysis of the theoretical frameworks concerning public debt and its influence on economic growth, so laying the groundwork for the forthcoming discoveries. The hypotheses undergo rigorous empirical testing. The relationship between debt and economic growth has been extensively examined in numerous empirical studies conducted in both developed and developing countries. These studies have utilized a range of econometric models and methodologies, yielding diverse outcomes. Therefore, this section delves into the empirical findings pertaining to countries apart from Africa, African countries excluding South Africa.

3.3.1 Review of Studies for countries other than Africa

On this topic, a significant amount of research has been conducted from a variety of economic perspectives, including studies by Gómez-Puig and Sosvilla-Rivera (2019), Saifuddin (2019), these scholars have not reached a definite consensus on this issue, as they have mostly concentrated on Latin American nations. In his analysis, Saifuddin (2019) concluded that effective utilization of government borrowing accelerates a country's economic growth rate,

hence mitigating its socioeconomic impact. Using panel data analysis, he analyzed his findings from 1970 to 2007.

In a study conducted by Chowdhury (2019), the focus was on examining the correlation between foreign public debt and economic growth in Asian and Pacific countries. The study employed the Granger causality test to examine the relationship between rising external debt levels and economic growth. The findings suggest that an increase in external debt levels is a factor contributing to sluggish economic growth. The researchers have presented compelling evidence of a negative correlation in foreign debt levels and the performance of the economy in Asian and Pacific economies. Utilization of auto-regressive distributed lag methodology by Gómez-Puig and Sosvilla-Rivero (2019) employed the auto-regressive distributed lag methodology to evaluate the influence of public debt on the economic growth of eurozone economies. The analysis took into account both short-term and long-term effects. The research was conducted from 1971 to 2018 in order to limit the testing technique to annual data intervals. The findings of the study suggest that public debt is anticipated to exert a detrimental effect on the long-term economic performance of euro member states. However, its immediate impact may vary depending on the specific country.

In their analysis of economic growth and inflation across 44 developed and emerging nations over a 200-year period, Reinhart and Rogoff (2019) found that government and external debt levels had varying impacts. They observed that public debt had negative effects on growth, but only when it exceeded a debt-to-GDP ratio of 90 percent. Furthermore, the analysis has revealed that developing countries tend to have a higher threshold of total external debt-GDP (60%) and this threshold is associated with negative economic consequences.

In their study, Mohanty and Mishra (2019) utilized the Dumitrescu Hurlin causality test to examine a dataset spanning the years 1991 to 2020. The primary aim of their study was to investigate the causal association between debt and economic growth in 15 Indian states that are constituents of the national Security Council. The endogeneity issue was efficiently addressed in the study through the utilization of the panel causality test, which provided compelling evidence of bidirectional causation between the two variables. The study utilized the fully modified ordinary least squares (FMOLS) method, which successfully mitigates the concerns related to serial autocorrelation and endogeneity that are present in the model. The research findings demonstrated that the explanatory variables, namely total credit, public debt, and total tax receipts, had a favorable influence on the economy's growth. The result of the study emphasizes the significance of implementing appropriate tax reform measures to mitigate revenue losses, improve the efficacy of credit, and boost asset quality through the implementation of risk management protocols.

A study undertaken by Dritsaki in 2018 demonstrated a causal association between Greece's economic expansion, exports, and government debt. The primary objective of the analysis was to investigate the patterns and trends of economic growth, namely through the utilization of proxy real GDP. In addition, the study also analyzed the dynamics of exports and foreign debt. In this study, a time series dataset spanning from 1970 to 2021 was utilized. Researchers utilized an innovative analytical methodology, thoroughly examining their data through applying the Granger causality and Vector Error Correction Model (VECM) tests. The study's findings unveiled the presence of both transient and enduring associations among the variables under scrutiny. Furthermore, the research has revealed presence of unidirectional Granger causality in both directions, specifically between exports and public debt, and economic growth and economic growth. It is important to highlight that there exists a lack of data indicating a direct cause-and-effect relationship between exports and state debt in the short term. The findings in the long run provide supplementary evidence that supports a unidirectional Granger causality between economic growth and government debt.

Saifuddin (2019) did a study that analyzed the impact of public debt on the economic growth of Bangladesh. The researcher employed time series data covering the period between 1978 through 2018 for the purpose of this analysis. In this study, the investment model was utilized to explore the potential relationship between public debt and economic growth, specifically focusing on the indirect impact of public debt on investment. Furthermore, the growth model was employed to examine the explicit correlation between government debt and economic growth. Both models were estimated using the two-stage least squares (TSLS) regression. Both investment and economic growth have been demonstrated to have a positive correlation with governmental debt. The empirical data also suggest that public debt indirectly influences growth, albeit in a positive way, through its advantageous effect on investment. In the present study, a variety of econometric tests are utilized in order to obtain accurate outcomes.

3.3.2 Review of related studies in Africa other than South Africa

Saungweme and Odhiambo (2018) conducted a comprehensive analysis of the existing body of research pertaining to the government debt impact on the growth in the economy Ghana and of Zimbabwe. Based on their investigation, the literature typically presents four ideas regarding the connection between growth in the economy and government debt. One of the studies that supports a neutral connection between public debt and economic growth is the Ricardian Equivalence Hypothesis. According to this hypothesis, public debt does not have any impact on economic growth. Secondly, certain research argues that public debt has a negative impact on economic growth. Thirdly, there is evidence to support the idea that public debt can have a positive impact on economic growth. Finally, based on certain research

findings, it has been observed that the relationship between public debt and economic growth is not linear. The following sections delve into additional details regarding this literature.

In their study, Adam and Bevan (2021) made an intriguing discovery regarding the relationship between external and domestic funding. They aimed to investigate the influence of public debt on development in Namibia while taking into account the institutional framework in which the debt is generated. The research classified nations based on their economic levels from 2010 to 2020. Within the subgroups of middle- and low-income nations, the regression results reveal a complex connection between total public debt and economic growth. In addition, it has been found that the main element influencing this complex relationship, aside from the domestic debt component, is the external debt. Therefore, it has been concluded that there is a correlation between low rates of GDP growth per capita and high levels of foreign debt. Based on the study, there is no conclusive evidence to support the existence of this association with domestic debt. In this specific instance, it was noted that there was no consistent link between elevated levels of domestic debt and slow economic growth.

Another noteworthy discovery made by Kutivadze (2021) in a study conducted in Eswatini is the reality of a significant connection concerning growth and development of financial sector and within a subdivision of middle-income economies. This research places emphasis on the correlation between debt structure and growth, underscoring the importance of developing a domestic bond market to promote sustainable economic growth. The confirmation of a non-linear relationship between public debt and economic growth is also supported by Kumar and Woo (2019). According to their argument, there exists certain evidence suggesting non-linearity, wherein the negative impact on growth is observed solely when debt levels reach or exceed 90% of GDP. The decrease in workforce efficiency and slower expansion of the capital stock per worker are the primary factors contributing to the impact of significant reduction in investment.

In their study, Bonga et al. (2020) conducted an empirical analysis to investigate the relationship between Zimbabwe's state debt and economic growth. In this analysis, we will delve into the origins of the debt problem, explore its consequences, and consider possible remedies. The study utilized OLS models and performed econometric tests, including the ADF test and correlation matrix, to provide insights into the study's findings, such as the magnitude of correlations among explanatory variables. The utilization of annual time series data spanning from 1990 to 2018 has revealed the substantial impact of government debt on the trajectory of economic growth. This implies that the capital accumulation is jeopardized by significant debt, hence impeding the rapid pace of GDP growth in Zimbabwe. The research's conclusion suggests that it is advisable for the government to avoid borrowing, and in cases

where borrowing is necessary, it is crucial to allocate the funds exclusively towards investments aimed at stimulating economic growth.

In a similar vein, Munzara (2020) conducted a study investigating the impact of foreign debt on the economic growth of Zimbabwe. The research employed annual time series data covering the period from 1990 to 2018. Furthermore, the researcher opted to include, capital investment, trade openness and labour force as control variables. The data analysed was using OLS regression in order to accomplish the objectives of the study. The results suggest that the economy of Zimbabwe is negatively affected by foreign debt and trade openness, while investments in capital and labour force growth have positive effects. Furthermore, the report highlights the importance of the government avoiding excessive dependence on foreign borrowing as a means to stimulate economic growth. Instead, it suggests that the government should focus on creating a conducive environment for alternative forms of foreign financing, such as project finance and foreign direct investment (FDI). Furthermore, it is advisable for the government to refrain from engaging in excessive imports of consumable goods and, instead, prioritize the promotion of exports for manufactured goods that possess added value.

In a study conducted by Cunningham (2020), an analysis was performed on 16 nations in Latin America Sub-Saharan Africa and that were experiencing high levels of debt. The objective of the study was to assess the effects of public debt on the pace of gross domestic product (GDP) growth within several periods spanning from 2011 to 2019. The researcher employed cross-sectional data, along with structural breakdowns, to estimate the impact of public debt on economic growth rates across different time periods. Based on the empirical data, it has been observed that the presence of debt in these nations from 2011 to 2019 had a detrimental impact on economic growth. This can be attributed to the negative influence it exerted on the productivity of labour and capital. As the amount of debt increases, the corresponding servicing obligations also increase. As a result, this has notable implications for the utilization of labour and capital in the production process (Cunningham, 2020). In contrast, the data from 2011-2019 does not indicate any correlation between the rise in debt burden and economic growth.

The vector autoregressive approach was employed to ascertain the directionality of causation between economic growth and public debt subsequent to an investigation into a causal relationship between external and internal public debt (Tajudeen, 2021). The findings were derived by employing time series data from Nigeria covering the period from 1999 to 2019. The report's conclusion strongly advises the government to spend the acquired loans towards fostering economic growth through structural initiative rather than misappropriating the cash for personal wealth. In the study conducted by Ntshakala (2018), an analysis was performed

to examine the correlation between the state debt of Swaziland and its economic growth over the period spanning from 1998 to 2018. The study was conducted under the framework of neoclassical economic growth theory. Ordinary Least Squares (OLS) regression analysis was employed to examine the characteristics and extent of the relationship between debt and economic growth. However, the analysis did not find any correlation between external debt and economic growth. However, it was observed that domestic debt had a statistically significant relationship of 5% with economic growth.

In his analysis, Tuffour (2021) scrutinized the threshold of Ghana's foreign debt with the aim of ascertaining its potential impact on the country's economic growth. An Ordinary Least Squares (OLS) approach was used to predict the result, using annual time series data from 1990 to 2019. In accordance with the theoretical framework put forth by the Laffer curve, the findings of the research demonstrate a curvilinear correlation between debt and economic growth. The analysis indicates that there is an external threshold at approximately 46.2%. Beyond this point, the influence of debt on growth becomes noteworthy. Furthermore, the research has shown that moderate levels of foreign debt can have a positive impact on economic growth. However, escalating levels of external debt are associated with adverse effects on economic growth. Based on this, their analysis suggests that if the ratio of external debt to GDP exceeds a certain threshold, it will adversely impact GDP growth. This statement aligns with the notion that if foreign debt continues to grow beyond a certain threshold, it will significantly impede economic progress. The study's findings provided policymakers with clear indicators to take action before foreign debt levels exceed a critical threshold.

In a study conducted by Ochieng (2019), an examination was made on the correlation between economic growth and state debt. The data set used in this study covered the time period from 1998 to 2018. The research utilized the Harrod Domar development model, and the results indicated that the level of domestic debt in Kenya is widely deemed to be sustainable. However, it is recommended that the government should implement a legislative framework in order to effectively regulate contingent liabilities. This would ensure that these liabilities have been properly documented and managed. The methodological technique used in this study differs from the one currently being employed. The current study employed the endogenous growth model, while the previous study relied on the model by Harrod Domar.

Recent research paper conducted an investigation on the relationship between external debt and economic growth in Africa, with a specific focus on Nigeria (Ajayi & Oke, 2021). The Ordinary Least Squares (OLS) estimation method was employed to derive inferences and provide suggestions pertaining to the matter of debt and its impact on economic growth. According to Ajayi and Oke (2021), it has been found that the presence of external debt exerts

a detrimental effect on both Nigeria's per capita and national income. Furthermore, it was observed that the depreciation of the Nigerian national currency, the elevated unemployment rate, the recurrent layoffs of employees, and the substandard quality of education were partly attributed to the substantial foreign debt burden faced by the country. Furthermore, it was suggested that the utilization of the nation's debt for investment purposes would contribute to the development of the economy and alleviate the socioeconomic consequences faced by the country. In their perspective, the obligation to repay debt should not surpass the profits earned in foreign currency.

3.3.3 Review of related studies in South Africa

Studies with findings of negative impact

Upon examining these findings, according to the research conducted by Hussain et al. (2020), it is indicated that there is an adverse relationship between government debt and economic growth. Therefore, it is advisable for policymakers to prioritize the resolution of the problem of excessive debt accumulation. Considering the study's analysis is cross-sectional (Fosu, 2019), the likelihood test ratio was also used to examine the error structure for heteroscedasticity. The findings confirm the idea that the weight of debt has had a detrimental effect on the overall economic growth in Sub-Saharan Africa (SSA). While the influence of debt on investment volume may be minimal, it appears that debt negatively affects the quality and, as a result, the effectiveness of investments.

Furthermore, the study revealed that moderate levels of investment exhibit a non-monotonic impact on public debt. Specifically, when the GDI/GDP threshold reaches approximately 16 percent, it transitions into a negative effect. In their study, Ayadi and Ayadi (2018) conducted a comparative analysis between Nigeria and South Africa in order to examine the influence of external debt on economic growth. The results were obtained by employing the Ordinary Least Squares (OLS) and General Least Squares (GLS) methods, using yearly data from 1990 to 2017. The researchers' findings suggest that the presence of debt and the responsibilities associated with servicing it has a detrimental impact on the economic growth of both South Africa and Nigeria. However, it should be noted that this analysis cannot be directly compared or limited solely to the foreign debt. Hence, the present analysis aims to address the limitations of Ayadi and Ayadi's study (2018) by investigating the correlation between South Africa's state debt, encompassing both external and domestic debt, and its economic growth.

In their study, Mhlaba and Phiri (2019) applied the ARDL model to look at both the immediate and long-term responsiveness of economic growth in South Africa to public debt. The aim of their study was to determine the influence of public debt on the growth of the economy. The research utilized data from the initial quarter of 2002 and the final quarter of 2019. The results

indicate a negative correlation between public debt and long-term economic growth. Although there may be a potential positive correlation between economic growth and public debt in the short term, the immediate consequences of this relationship remain uncertain.

However, the predominant focus of the research was directed exclusively towards South Africa, with a particular emphasis on rising economies, African states, and countries situated in the sub-Saharan region. Hussain, Haque, and Igwike (2020) conducted an empirical investigation in the region of Sub-Saharan Africa in order to evaluate the relationship between government debt and economic growth. The study's findings indicate an inverse relationship between the variables of Debt and GDP.

Studies indicating Bidirectional relationship

The influence of public indebtedness on investments and economic growth in South Africa was explored by Ncanywa and Masoga (2018) in their study. The researchers employed quarterly data from 1994 to 2016 for their investigation. The attainment of their objective was facilitated by the utilization of diverse econometric examinations. The parameters taken into consideration were gross domestic product, public debt, investment, and government deficit. The Granger causality tests results suggested that public financial obligation may have a causal influence on economic growth, and it appears that there is a reciprocal relationship between these two variables. The present study employed distinct factors compared to those employed by Ncanywa and Masoga (2018), and it also had a different study duration. However, the current study heavily relied on previous research.

Studies indicating no correlation

The study carried out by Baaziz, Guesmez, Heller, and Lahiani (2020) revealed that there is no correlation between growth and debt. Hence, the researchers have proposed that practicing fiscal responsibility can function as a means of maintaining a reasonable level of government debt. The estimation method employed to draw conclusions in this study involved the use of Ordinary Least Squares (OLS) with World Bank data spreading between the years 2000 to 2016.

3.4 Assessment of Literature

Based on the available literature, it is evident that there are various viewpoints and a vast array of empirical evidence concerning the correlation between domestic debt and economic growth. It is widely acknowledged that domestic debt can play a role in fostering economic growth. However, research suggests that this positive impact is contingent upon maintaining debt levels below a specific threshold. An intriguing aspect is revealed by observing how growth responds to different levels of debt. It becomes evident that as debt levels increase, there is a significant decline in growth. When debt reaches certain thresholds, it exhibits

characteristics similar to the concept of debt intolerance. This statement suggests that market interest rates tend to increase significantly as debt levels approach their limits of tolerance. This event has the potential to impact economic growth. The addition of additional empirical data indicates that domestic debt may only provide advantages in certain country-specific situations. There is evidence to support the idea that utilizing domestic or foreign debt in a productive manner can yield positive outcomes, provided that the rate of economic growth surpasses the real interest rate on government debt.

The empirical study discussed above has yielded contradictory and unclear results across different nations with regard to the relationship between public debt and economic growth. The literature has notably addressed the themes of debt overhang and threshold theories. These theories emphasize the importance of maintaining debt levels within a certain range, as exceeding this threshold can have detrimental consequences on economic growth. Without specific research, it is not feasible to develop an opinion solely relying on the extensive range of literature available, given the diverse array of published outcomes. In the context of South Africa, existing data indicates a demonstrable inverse relationship between government debt and economic growth. Despite the inclusion of debt-repayment borrowing as a measure to address the debt issue, the overall debt has still been on the rise. South Africa is persistently augmenting its dependence on debt, despite its already substantial level of indebtedness. In light of the economic transition that has transpired since the advent of democracy, this research endeavors to provide further insights into the impact of debt on economic growth.

In theory, the debt acquired with the aim of promoting economic growth is thought to play a vital role in encouraging domestic savings and the accumulation of capital. Indeed, it is undeniable that no government can exist in isolation. In order to operate effectively and achieve success, it necessitates external support and cooperation. External debts are a common occurrence in the realm of economics, as certain nations possess financial surpluses while others face deficits. According to the theory of neoclassical on economic growth, it is posited that economic growth is promoted by investment. Reinhart and Rogoff (2010) argue that the accumulation of public debt provides the opportunity for a nation to access additional capital by borrowing funds beyond its current financial capacity, thereby enabling investments in capital. The purpose of creating debt is notably to stimulate economic growth in order to address the issue of unemployment. In order for public debt to potentially promote economic growth, it is essential that its utilization is both efficient and productive, leading to the accumulation of capital.

CHAPTER FOUR

METHODOLOGY AND ESTIMATION TECHNIQUES

4.1 Introduction

This section provides a detailed explanation of the research approaches and procedures used to analyse the effects of debt-financed expenditure on economic growth in South Africa. The analysis of debt-financed expenditure on economic growth in South Africa requires careful consideration of significant economic disruptions that occurred during the study period (1994-2022). This chapter presents a comprehensive methodological framework that specifically incorporates dummy variables for the Global Financial Crisis (D_GFC) and COVID-19 pandemic (D_COVID) to address structural breaks in the econometric model. The incorporation of these variables enables a more nuanced understanding of how extraordinary economic shocks influence the debt-growth relationship in South Africa, providing policymakers with insights that account for these unprecedented economic disruptions.

Here is the breakdown of this chapter: Following this introduction, a section will be dedicated to discussing the research approach. Subsequently, there will be a section dedicated to the data analysis and model specification. The subsequent section provides an overview of the estimation techniques, which is then followed by a section dedicated to diagnostic tests. After these sections, a subsequent section follows, which outlines the robustness checks and discusses the data. Finally, Chapter 4 concludes with Section 4.8.

4.2 Research approach

In the opinion of Kothari (2004), the term research methodology pertains to the approach employed by researchers to systematically address a research problem. This study thus employed a deductive approach to address the research problem and is based on a positivist philosophy. Additionally, the study employed a diagnostic research design in order to assess the underlying cause of a particular problem that was identified in the problem statement, which can be attributed to the resilience observed in the South African economy. The rationale behind selecting these methods to address the current problem lies in the fact that quantitative techniques provide an objective means of measuring the variable(s) of interest. Additionally, they facilitate the exploration of the relationship between variables.

These factors can subsequently be quantified, frequently employing various instruments, and the ensuing numerical data can be subjected to statistical analysis (Harrison et al., 2020). In this study, the methodology includes the integration of a public debt variable (both domestic and foreign) into the growth function. The coefficient of the debt variable may exhibit a positive effect (according to the Keynesian hypothesis), a negative effect (as suggested by the Debt

Overhang hypothesis), or a negligible effect (as hypothesized by the Ricardian-equivalence hypothesis). The applied regression model includes two additional crucial growth factors and inflation in order to mitigate the potential bias caused by omitted variables. Due to the Reserve Bank's responsibility to maintain inflation within the range of 3% to 6%, inflation in South Africa serves as a clear indication of how monetary policy impacts economic growth.

4.3 Data Collection and Sources

The quarterly time series data from 1994 to 2022 was utilized in this study. This choice was made in order to have a large dataset for constructing an estimated econometric model. The quarterly time series data from 1994 to 2022 was utilized in this study. This choice was made in order to have a large dataset for constructing an estimated econometric model. It is important to note that while a larger dataset provides more degrees of freedom, it is the inclusion of multiple variables or parameters in the model that reduces the available degrees of freedom, not the dataset itself. Each additional parameter estimated in the model consumes one degree of freedom, which affects the precision of estimates and the power of statistical tests. The variable of public debt comprises both domestic and foreign debt. The South African Reserve Bank (SARB), the World Bank's World Development Indicators (WDI), and the International Monetary Fund's (IMF) World Economic Outlook (WEO) database offer data on significant macroeconomic factors, including real GDP growth, government expenditure, government debt, and other control variables. The subsequent subsection provides a comprehensive overview of the specific techniques employed for data collection, elaborating on each one in detail.

4.3.1 Data Collection Process

The data collection technique comprises the subsequent steps:

- a) Identifying the relevant macroeconomic indicators for the study, such as real GDP growth, government spending, government debt, and other control variables.
- b) Selecting the time frame for the analysis, which in this case spans from 1994 to 2022. The chosen period encompasses the post-apartheid era and signifies notable economic and political advancements in South Africa.
- c) Acquiring data for each variable from official sources is crucial to maintain consistency and comparability.
- d) Transforming the raw data into a format that is suitable for econometric analysis involves several steps. First, it is necessary to convert nominal values into real terms by applying appropriate deflators. This adjustment accounts for changes in prices over time and allows for more accurate analysis. Additionally, calculating growth rates is crucial in understanding the

changes in the data over a specific period. Finally, producing ratios as a percentage of GDP provides a standardized measure that facilitates comparisons and helps to identify trends.

e) Executing an initial data analysis, including descriptive statistics and analysis of correlations, in order to gain a comprehension of the data and identify any potential issues.

f) Creating appropriate dummy variables for the Global Financial Crisis (D_GFC) and COVID-19 pandemic (D_COVID) to capture structural breaks in the time series.

4.3.2 Data Sources

In this study, we gather information from a diverse range of recognized and peer-reviewed sources, which consist of publications from solid national and international organizations. These sources consistently provide accurate data on South Africa's macroeconomic indicators:

a) The South African Reserve Bank (SARB) functions as the primary banking institution of the country and is tasked with disseminating a diverse array of economic and financial data. The data on real GDP growth, government spending, government debt, and inflation can be obtained from the Quarterly Bulletin and online database of the South African Reserve Bank (SARB) across various years.

b) The World Development Indicators (WDI) provided by the World Bank is a comprehensive database consisting of development indicators. It covers a wide range of information from 1960 to the present and includes data from 217 economies. The WDI, which refers to the World Bank data from various years, offers information regarding gross fixed capital creation, trade openness, and other important control variables.

c) The World Economic Outlook (WEO) database, which is maintained by the International Monetary Fund (IMF), consists of macroeconomic indicators for 194 countries, including South Africa. The WEO database is utilized for the purpose of cross-checking and enhancing data obtained from SARB and WDI (International Monetary Fund, various years).

In addition to these primary sources, supplementary data on the timing and impact of the Global Financial Crisis and COVID-19 pandemic were obtained to accurately code the dummy variables representing these structural breaks.

4.4 Data Analysis and Model Specification

In this study, the EViews software and the Autoregressive Distributed Lag (ARDL) model were used for data analysis. The ARDL model is more fitting for small samples and addresses the possibility of endogeneity concerns within variables (Pesaran et al., 2001). In order to verify the accuracy of our findings, we executed diagnostic tests such as the Augmented Dickey-

Fuller (ADF) test for identifying unit roots and the Breusch-Godfrey Serial Correlation LM test to identify autocorrelation. The model specification is a crucial element in econometric analysis as it determines the conceptual and efficient form of the relationship between the variables of interest. The model specification used in the analysis, the rationale for selecting the variables, and the expected correlations between them are all thoroughly explained in this section.

4.4.1 Model Specification

The study presents a quantitative econometric model that was constructed to examine the impact of debt-financed expenditure on GDP growth in South Africa. Based on a solid foundation of theory and empirical evidence, the model has been adjusted by incorporating insights from previous research conducted by Ncanywa and Masoga (2018) and Saungweme (2020). This adaptation includes the inclusion of variables such as public debt, fiscal balance, inflation rate, entire unemployment, investment, and government expenditure. The objective is to analyze the connections between these variables and South Africa's economic growth, both in the short and long term. The model described and illustrated below has been modified from the study by Ncanywa et al. in 2018. Based on the conceptual framework established by theorists and empiricists, this study opts to follow the following model:

The baseline model is:

$$\text{GDP} = f(\text{PDBT}, \text{FB}, \text{INV}, \text{INF}, \text{UNEMP}) \dots\dots\dots (4.1)$$

In terms of a linear regression formulation, the empirical model takes the form:

$$\text{GDP} = \beta_0 + \beta_1\text{PDBT} + \beta_2\text{FB} + \beta_3\text{INV} + \beta_4\text{INF} + \beta_5\text{UNEMP} + \varepsilon_t \dots\dots\dots (4.2)$$

To account for structural breaks caused by major economic crises, dummy variables for the Global Financial Crisis (D_GFC) and COVID-19 pandemic (D_COVID) are incorporated into the model:

$$\text{GDP} = \beta_0 + \beta_1\text{PDBT} + \beta_2\text{FB} + \beta_3\text{INV} + \beta_4\text{INF} + \beta_5\text{UNEMP} + \beta_6\text{D_GFC} + \beta_7\text{D_COVID} + \varepsilon_t \dots\dots\dots (4.3)$$

Where:

- $\beta_0, \beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6, \beta_7$ are the coefficients of the explanatory variables
- ε_t is the error term representing variables not accounted for in the analysis
- GDP = dependent variable representing real economic growth per capita
- PDBT = Public debt (% to GDP)
- FB = Fiscal balance (% to GDP)

- INV = Gross fixed capital formation (% to GDP)
- INF = Inflation rate (Consumer Price Index, CPI, 2010 = 100)
- UNEMP = Total unemployment rate (unemployed active jobseekers)
- D_GFC = Dummy variable for the Global Financial Crisis (1 for 2007Q3-2009Q2, 0 otherwise)
- D_COVID = Dummy variable for the COVID-19 pandemic (1 for 2020Q1-2021Q2, 0 otherwise)

The incorporation of these dummy variables allows the model to isolate the effects of these extraordinary economic disruptions and provides a more accurate assessment of the debt-growth relationship during both normal economic conditions and periods of crisis.

4.4.2 Definition of variables and a priori expectations

Real GDP per capita growth rate (a measure of economic growth) (a proxy for economic growth). Real GDP per capita growth rate is defined as the pace at which GDP grows relative to the average population each year (IMF) (2020b). Since it combines production performance and provides a consistent measure of prosperity, the yearly growth rate of real GDP per capita is a useful proxy for economic growth, according to (Mankin, 2015). An increase in GDP per person reflects rising productivity, which in turn implies societal and economic growth. The (Mankin, 2015) Multiple previous empirical research, such as (Liaqat, 2019), (Ncanywa et al., 2018), informed the selection of this economic growth proxy.

PDBT= The Public Debt to GDP Ratio (a proxy for public debt). Empirical research estimating the impact of public debt on economic growth through methods such the ordinary least square (OLS) model, the vector autoregressive (VAR) model, the panel data model, and the vector error correction (VECM) model have yielded contradictory findings. There is a consensus across these studies that shows a positive relationship between government debt and GDP, albeit this may differ depending on the countries and estimation techniques utilized in each. In a nutshell: (Liaqat, 2019)

FB = Revenue and expenditures are in balance, or the fiscal balance (a proxy of fiscal balance). The fiscal balance serves as a second control variable. According to (Mhlaba et al., 2019), fiscal balance can aid economic growth if the government uses sound fiscal policies. The allocation of public funds towards infrastructure, education, and healthcare has demonstrated a beneficial impact on the growth of the economy. This implies a potential correlation between the financial well-being of a nation and the expansion of its Gross Domestic Product (GDP). According to the analysis conducted by Afonso et al. (2020) and

Tung (2018), it is predicted that maintaining a fiscal balance is anticipated to have a positive impact on economic growth. Based on this analysis (Afonso et al., 2020; Tung, 2018), it is predicted that maintaining a fiscal balance will have a positive impact on economic growth.

D_GFC (Global Financial Crisis): This dummy variable takes the value of 1 for quarters during the Global Financial Crisis (2007Q3-2009Q2) and 0 otherwise. The Global Financial Crisis represented a significant structural break in global economic activity, affecting financial markets, trade, and fiscal policies worldwide. Phiri and Fotoyi (2023). In South Africa, this period was characterized by economic contraction, increased government borrowing, and policy interventions to stabilize the economy. The inclusion of this variable allows the model to capture the unique effects of this crisis on the debt-growth relationship.

D_COVID (COVID-19 Pandemic): This dummy variable takes the value of 1 for quarters during the height of the COVID-19 pandemic and associated lockdowns (2020Q1-2021Q2) and 0 otherwise. The COVID-19 pandemic caused unprecedented economic disruption globally, with South Africa experiencing strict lockdowns, supply chain disruptions, and significant fiscal support measures. This period represents another structural break in the time series data.

A priori expectation of the D_COVID coefficient to be strongly negative, reflecting the severe economic contraction during the pandemic. The inclusion of this variable allows the model to isolate the unique effects of the pandemic and associated policy responses on the debt-growth relationship. Phiri and Fotoyi (2023) noted that if debt is already high, a crisis-induced increase in debt (due to stimulus expenditure or revenue collapse) may worsen the "debt overhang," decreasing private investment and future growth. Theoretically, a high debt-to-GDP ratio implies danger, raising interest rates and discouraging investment

According to this viewpoint, the negative impact of debt on growth exacerbates during times of crisis. Indeed, Phiri and Fotoyi (2023) observe that since the GFC, South Africa's quicker debt buildup implies a reduced "debt tolerance" - that is, the threshold beyond which debt hinders growth has decreased. Intuitively, we expect crisis dummies to lower growth: both the GFC and COVID-19 were major recessions for South Africa. GDP fell 6.4% in Q1 2009 and 51% in Q2 2020.

INV refers to gross fixed capital formation, which represents how much of GDP was invested in fixed assets. This is utilized as a proxy for measuring investment. Both exogenous and endogenous models of economic growth assume that investment is a key factor in driving growth; according to (Liaqat, 2019), higher capital investment boosts both labor productivity and the economy's overall production efficiency and capacity. Consequently, there has been a lot of prior empirical research (Hollander, 2021) that finds a positive correlation between

investment and economic expansion. An uptick in investment, according to the study's projections, will boost the economy overall.

INF = the inflation rate, the study reveals the positive and negative consequences of inflation (INF), which is measured here. Inflation research was conducted by (Mothibi et al., 2019). Although Musgrave's 1949 study focused on the importance of economic stability and inflation controls, it launched a debate regarding the connection between inflation and economic growth.

Jobless rate abbreviated as UNEMP. Labor force participation is used as a proxy (unemployed active jobseekers). Because of its direct impact on productivity and technological improvement, among other things, labor is seen as a second pillar of economic expansion in theoretical literature (Ngotana, 2021). Nevertheless, the impact of labor on economic growth differs across the economies examined, due to variation of the chosen proxy. In accordance with this line of reasoning, it can be inferred that there is a correlation between labor and growth in the economy (Mothibi et al., 2019).

The previously mentioned variables have been selected in order to offer a thorough explanation of the Debt to GDP ratio, particularly with regards to the extent of utilization for non-developmental objectives. Policy makers might benefit from guidance in effectively directing debt towards investments that have the potential to stimulate economic growth, rather than use debt to finance deficits skewed towards consumption expenditure.

Both the random error term and the white-noise error term are denoted by, ε_t where t denotes the random error term and t stands for white-noise. According to Brooks (2008), the error term represents the consequences of any model's missing information.

4.4.3 Rationale for Variable Selection

The existing body of literature pertaining to the relationship between debt-financed expenditure and economic growth was consulted as a basis for determining the variables included in this study's model. The variable of interest, GDP growth, is a commonly employed measure to assess economic performance (Barro, 1991). In order to examine the fundamental nature of spending financed through debt and its potential impact on economic growth, primary variable of interest is government debt (DEBT). The aforementioned variables have been selected to offer a comprehensive understanding of the Debt-to-GDP ratio, particularly in regard to the extent of its utilization for non-developmental objectives. Policymakers could potentially get advantages from receiving guidance on how to efficiently allocate debt towards investments that possess the capacity to foster economic growth, as opposed to utilizing debt for the purpose of financing deficits that are disproportionately oriented towards consumption

expenditure. In accordance with Reinhart and Rogoff (2010) and Checherita-Westphal and Rother (2012),

Along with these crucial variables, the study additionally took into account several other factors (X) that may have an influence on economic growth. These control variables were chosen in accordance with growth theory and empirical research (Mankiw et al., 1992; Solow, 1956). We specifically take into account the following factors: trade openness, which captures the degree of integration with the global economy and its potential growth-enhancing effects (Sachs & Warner, 1995); inflation, which can have an impact on investment decisions and overall economic stability (Fischer, 1993); and gross fixed capital formation, which represents investments in physical capital and is a key driver of economic growth (Lucas, 1988).

4.4.4 Expected Relationships Between Variables

Based on the existing literature, it is possible to establish certain expectations concerning the relationships between the variables in our model. In light of the research conducted by Barro (1991) and Akitoby et al. (2006), it has been suggested that government spending can potentially impact economic growth positively and negatively. However, the specific outcomes are contingent upon the nature of the spending and the effectiveness of how public resources are allocated. Efficient allocation of government funds, which includes investments in infrastructure, education, and health, can effectively boost economic growth by enhancing the economy's productive capacity. On the other hand, when unproductive spending occurs, such as through unnecessary consumption or transfers, it has the potential to hinder private investment and impede economic growth. This has been discussed by Barro in 1991 and Akitoby et al. in 2006.

It is expected that the correlation between government debt and economic growth will not follow a linear pattern. At low to moderate levels of debt, the potential benefits of financing spending through debt on economic growth might surpass the drawbacks, including increased interest rates and heightened uncertainty (Reinhart & Rogoff, 2010; Checherita-Westphal & Rother, 2012). However, when debt levels exceed a specific threshold, the adverse effects may start to prevail, leading to a decrease in economic growth. This point in time is commonly known as the "debt overhang" (Krugman, 1988; Reinhart & Rogoff, 2010).

High levels of inflation have the potential to gradually diminish the ability to buy goods and services, disrupt the accuracy of price indicators, and generate a sense of unpredictability. Consequently, this can discourage individuals and businesses from making investments and impede the overall progress of the economy (Fischer, 1993). The anticipation is that trade openness will have a positive effect on economic growth due to its ability to allow countries to utilize their comparative advantages, access new markets, and benefit from the transfer of

knowledge and technology (Sachs & Warner, 1995; Frankel & Romer, 1999). The strong correlation between gross fixed capital formation and economic growth is backed by evidence that investing in physical capital boosts the productive capacity of the economy, leading to sustained long-term growth (Solow, 1956; Lucas, 1988).

Unemployment leads to a decrease in overall well-being as it causes a decline in output, which in turn leads to a decrease in individuals' incomes. This suggests that the quantity of output is positively affected by the quantity of labour utilized in the production process. Therefore, unemployment has a detrimental effect on a nation's economic growth. Arthur Okun, his research during the 1960s has gained widespread recognition and is commonly referred to as Okun's Law (Okun, 1962). Okun conducted a study that examined the statistical correlation between the level of economic growth and the rate of unemployment in a specific country.

However, it is important to note that employment can be defined as the difference between the labour force and individuals who are without a job. Therefore, one can deduce that there exists a negative correlation between unemployment and output. Okun's Law is a widely accepted concept that is primarily used to analyse the relationship between economic growth and employment. According to Bernanke (2012), Okun's fundamental ideas can be succinctly summarized as the "rule of thumb" that establishes the relationship between variations in the rate of GDP growth and the rate of unemployment.

According to Okun's observation, in order to maintain the unemployment rate, it is crucial for the growth of real GDP to closely correspond with the potential rate of growth. The aforementioned alignment is a consequence of the ongoing rise in both labour force size and productivity levels. Therefore, in order to address the issue of unemployment, it is crucial for the economy's growth rate to exceed its potential rate. In addition, according to Okun's Law, in order to achieve a 1 percent decrease in the unemployment rate within a year, the real GDP should undergo a growth rate that is approximately 2 percentage points higher than the rate of potential GDP growth during that specific timeframe.

4.4.5 Model Evaluation and Specification Tests

Multiple specification tests are conducted to verify and enhance the accuracy and strength of our model specification. For the purpose of preventing inaccurate regression results, the initial step involves conducting the Augmented Dickey-Fuller (ADF) test (Dickey & Fuller, 1979) to determine the existence of unit roots in our data. Secondly, the limits test is utilized to evaluate whether the variables within the ARDL framework exhibit a long-run relationship (Pesaran et al., 2001). In the third step, the Breusch-Godfrey Serial Correlation LM test and White's test are employed to ascertain whether there is autocorrelation and heteroskedasticity in the residuals (Breusch, 1978; Godfrey, 1978; White, 1980).

In summary, the model specification utilized in our analysis aims to accurately capture the intricate connection between debt-financed expenditure and South African economic growth while also accounting for other influential factors. Our objective is to offer robust and precise analysis regarding the immediate and long-term effects of debt-financed expenditures on the economic performance of the nation. To achieve this, we will utilize the ARDL model and conduct comprehensive specification testing.

4.5 Estimation Technique: Autoregressive Distributed Lag (ARDL) Model

The Autoregressive Distributed Lag (ARDL) model, a dynamic econometric technique, was developed by Pesaran et al. (2001). In this research, we harnessed it to assess the short-term and long-term relationships between government spending financed by debt and the growth of the economy in South Africa. This section, presented a comprehensive analysis of the ARDL model, highlighting its positive aspects, and drawbacks and discussing the various stages involved in the estimation procedure.

4.5.1 Advantages of the ARDL Model

The ARDL model is deemed adequate for the purposes of this study owing to several advantages:

- a) Flexibility: The ARDL model is capable of handling a mix of variables with different orders of integration, including both $I(0)$ and $I(1)$ variables. When the order of integration of the variables is uncertain or the sample size is small, this feature proves to be particularly useful (Pesaran et al., 2001).
- b) The ARDL model allows for the estimation of both short-run and long-run interactions between variables, providing a comprehensive analysis of the dynamics between debt-financed spending and economic growth.
- c) Endogeneity: The ARDL model is a powerful tool for addressing endogeneity concerns and capturing dynamic interactions between variables. It does this by including lagged values of the dependent and explanatory variables in the model (Pesaran et al., 2001).
- d) Sample size: The ARDL model can be applied to small samples, making it suitable for our study focused on South Africa's post-apartheid period (1994–2022).

4.5.2 Steps in the ARDL Estimation Procedure

The ARDL estimation procedure comprises the subsequent steps:

- a) Unit root tests: To avoid obtaining inaccurate regression results, it is necessary to conduct a preliminary examination for the presence of unit roots in the data. This can be accomplished by employing the Augmented Dickey-Fuller (ADF) test, as proposed by Dickey and Fuller

(1979). According to the ARDL paradigm, it is required that none of the variables are integrated of order two or higher (referred to as $I(2)$ or higher).

b) Specification of the model: The ARDL model has been specified, encompassing the dependent variable of real GDP growth, along with the independent variables of government expenditure and government debt. Additionally, control variables such as inflation, balance of payments, and total fixed capital formation have been incorporated.

Determining the optimal length of latency for the ARDL model can be achieved by considering information criteria such as the Akaike Information Criterion (AIC) and the Schwarz Bayesian Criterion (SBC). The chosen length of latency should be such that it minimizes the information criteria, while also ensuring that the model does not exhibit any residual autocorrelation.

d) A bounds test is conducted to determine if the variables in the ARDL framework exhibit a long-run relationship (Pesaran et al., 2001). The test involves estimating the F-statistic to assess the joint significance of the long-run coefficients. This F-statistic is then compared to the critical values provided by Pesaran et al. (2001).

Estimation of the long-run and short-run coefficients is conducted when the bounds test indicates the presence of a long-run relationship. In this case, we utilize the ARDL model to estimate both the long-run and short-run coefficients. The long-run coefficients provide insight into the stable relationship between the variables, while the short-run coefficients shed light on the process of adjustment that brings about equilibrium.

f) Diagnostic tests are conducted to ensure the accuracy of our estimates. These tests include assessments for serial correlation, heteroskedasticity, and stability of model parameters. The ARDL model is a reliable and versatile estimation technique that enables us to analyse the impact of debt-financed spending on economic growth in South Africa.

4.6 Diagnostic Tests

In econometric analysis, diagnostic tests play a crucial role in ensuring the validity and reliability of the estimated models. These tests aid in identifying potential problems that could compromise the reliability and accuracy of the results, such as serial correlation, heteroskedasticity, and instability in the model parameters. We go into detail on the diagnostic procedures used in our study, their justification, and how they were carried out in this part.

4.6.1 Serial Correlation Test

When the error components in a regression model exhibit association across different time periods, this phenomenon is commonly referred to as serial correlation, which is also known as autocorrelation. Serial correlation can lead to less efficient estimates and biased standard

errors, which can result in flawed hypothesis testing and inaccurate inferences (Wooldridge, 2013).

The Breusch-Godfrey Serial Correlation LM test, developed by Breusch in 1978 and Godfrey in 1978, is employed to ascertain the existence of serial correlation within our ARDL model. The Lagrange Multiplier (LM) technique is utilized in this test to ascertain if the residuals in the model display serial correlation up to a specific order. If the null hypothesis, which assumes no serial correlation, is rejected, it is necessary to consider making changes to the model specification or including additional lags in order to address this issue.

4.6.2 Heteroskedasticity Test

Heteroskedasticity is a phenomenon that arises when the variability of the error terms in a regression model differs across different observations. The existence of heteroskedasticity may lead to less efficient parameter estimates and biased standard errors, which can undermine the validity of the model and the reliability of hypothesis testing (Wooldridge, 2013).

The White's test, as proposed by White in 1980, is employed to identify the presence of heteroskedasticity within our ARDL model. The test being referred to is a general heteroskedasticity test that does not necessitate a particular functional form for the error variance. If the null hypothesis of homoscedastic errors is rejected, one possible solution to address this issue is to employ robust standard errors or utilize a weighted least squares approach.

4.6.3 Stability Test

The stability test has significance in order to verify that the estimated model parameters remain stable throughout the entire sample period. The presence of unstable parameters in a model may suggest that the model is not properly defined or that there are structural breaks in the data. These factors can compromise the reliability of the results, as noted by Hansen in 1992. In order to assess the stability of our ARDL model, we utilize the cumulative sum (CUSUM) and cumulative sum of squares (CUSUMSQ) tests as suggested by Brown et al. (1975). The purpose of these tests is to assess the stability of the model parameters. This is done by comparing the cumulative sums of the recursive residuals to their expected values. The null hypothesis being tested is that the parameters are stable. If the null hypothesis is rejected, it may be worth considering conducting additional investigations into the existence of structural breaks or adjusting the model specification.

4.6.4 Cointegration Test (Bounds Test)

The bounds test is performed as a component of the ARDL estimation procedure in order to ascertain the presence of a long-term relationship between the variables in the model (Pesaran et al., 2001). This test serves to verify the significance of the estimated long-run coefficients and the ability of the model to accurately represent the equilibrium connection between debt-financed expenditure and economic growth. In conclusion, diagnostic tests are essential for ensuring the accuracy and reliability of our econometric analysis. Through the implementation of these experiments and the careful consideration of potential issues, we aim to offer comprehensive and reliable analysis regarding the effects of debt-financed spending on the economic growth of South Africa.

4.7 Normality test

Evaluation of normality in econometric residuals is a basic diagnostic process that ensures the validity of statistical inference in time series and regression models. The assumption of regularly distributed error terms is a fundamental tenet of traditional econometric theory, especially in the context of linear regression models and their expansions. This assumption performs several key tasks in the econometric framework, including proper statistical inference and the reliability of confidence intervals and hypothesis testing. The test's theoretical underpinning is based on an evaluation of two crucial distributional moments: skewness and kurtosis, which describe the distribution's asymmetry and tail behaviour, respectively. This dual focus enables the Jarque-Bera test to detect numerous types of deviation from normalcy within a single, unified statistical framework (Gujarati & Porter, 2009).

4.8 Conclusion

This chapter provides an informative overview of the methodology and estimation techniques used to analyse the impact of debt-financed government expenditure on South Africa's economic growth. The Autoregressive Distributed Lag (ARDL) model has been utilized to capture the dynamics between the variables of interest, taking into account both short-term and long-term effects. This model also addresses potential endogeneity concerns and accommodates variables with different orders of integration. This chapter demonstrates a commitment to ensuring the validity and reliability of the analysis. It does so by discussing the methods used for data collection, model specification, and estimation procedure. Furthermore, we have performed various diagnostic tests, such as tests for serial correlation, heteroskedasticity, and stability, to detect any possible concerns that may undermine the reliability of our findings. This study aims to offer valuable insights into the correlation between debt-financed expenditures and economic growth in South Africa. It does so by utilizing a

rigorous methodology and adhering to best practices in econometric analysis. These insights have the potential to make valuable contributions to policymaking and the ongoing discussion surrounding the impact of public debt on the promotion of sustainable development and economic prosperity. The following chapter will present policy implications for the South African economy based on the findings of this study.

CHAPTER FIVE

ESTIMATION AND INTERPRETATION OF THE RESULTS

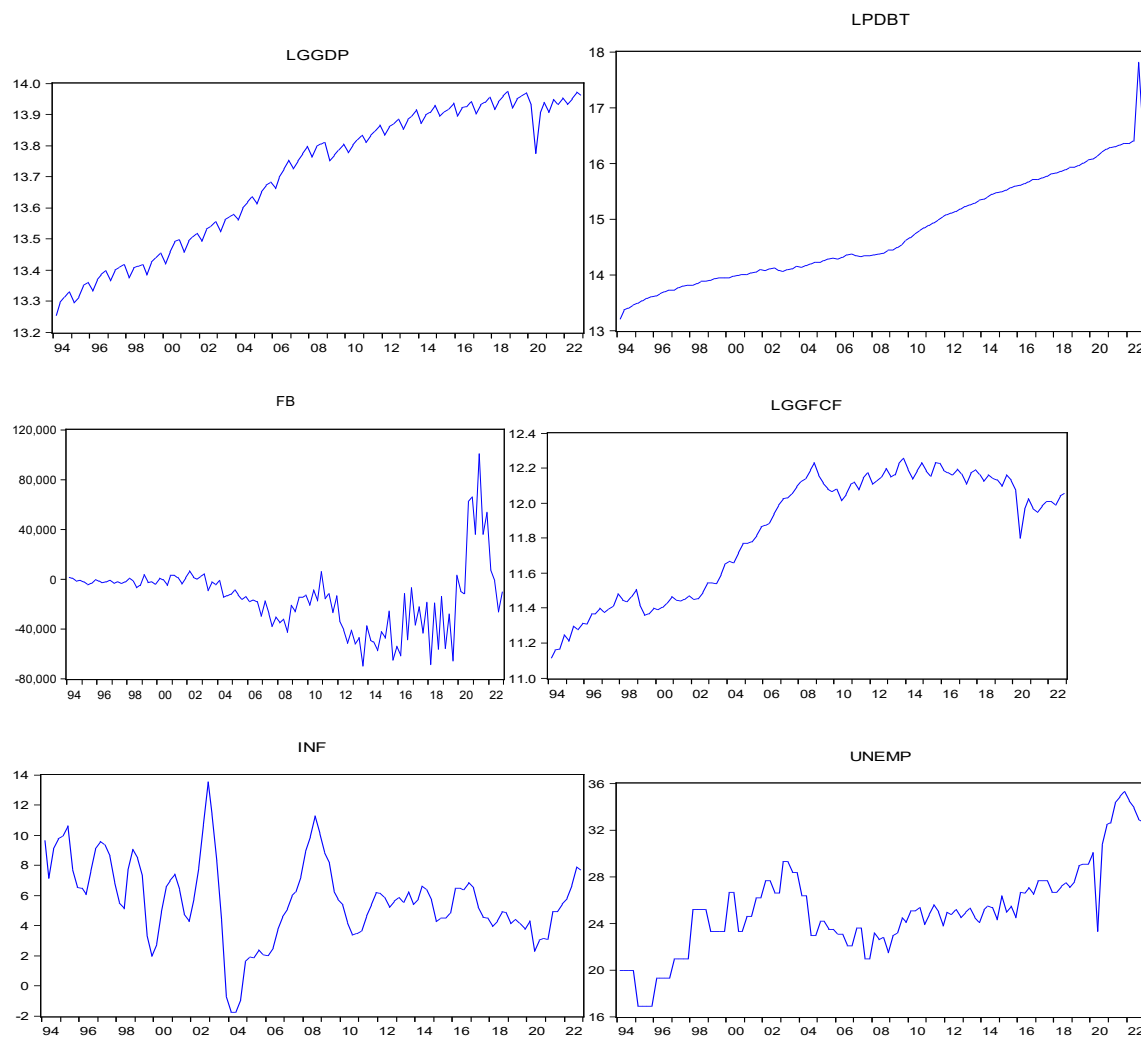
5.1. Introduction

In the following chapter, the models were defined and the relevant techniques that were used in this research study were discussed. The results of the empirical analysis are presented in this section of the paper. The results sought to evaluate the achievement of the research objectives by examining the impact of debt-financed spending on economic growth. The main focus of this chapter was to analyze the econometric impacts of debt-financed expenditure on economic growth in South Africa. This chapter is structured into various sections. The results of the tests for stationarity and unit roots are presented in Sections 5.2. Section 5.3., 5.4 and 5.5 presents the ARDL technique respectively, a widely used method for analyzing the long and short-term relationship between variables. The stability test and diagnostic test of the autoregressive distributed lag model (ARDL) were covered respectively in Sections 5.6 and 5.7 Then concluded by normality test in section 5.8

5.2. Stationarity Test

Evaluating all variables' stationarity is crucial before conducting the ARDL bound test. This assessment helps determine the extent of integration and ensures that they are not integrated of order (2) or different orders. The Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests were employed to ascertain the level of integration required for the ARDL modelling approach. The incorporation of various unit root tests strengthened the reliability of the findings. In the following section, the outcomes of the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests conducted at both levels and first difference are presented in Table 5.2 and 5.3. Plotting the series against time is another method for assessing its stationarity. In order to assess the stationarity of the data, it is crucial for the mean and variance to remain constant. This condition suggests that the graph should exhibit recurring fluctuations around the average value, thereby ensuring the constancy of the variance. If this eventuality does not transpire, it would suggest the presence of enduring patterns within the initial dataset. To ascertain the stationarity of the variable and its associated explanatory variables, visual representations of the data in the form of level series are presented in the figures below.

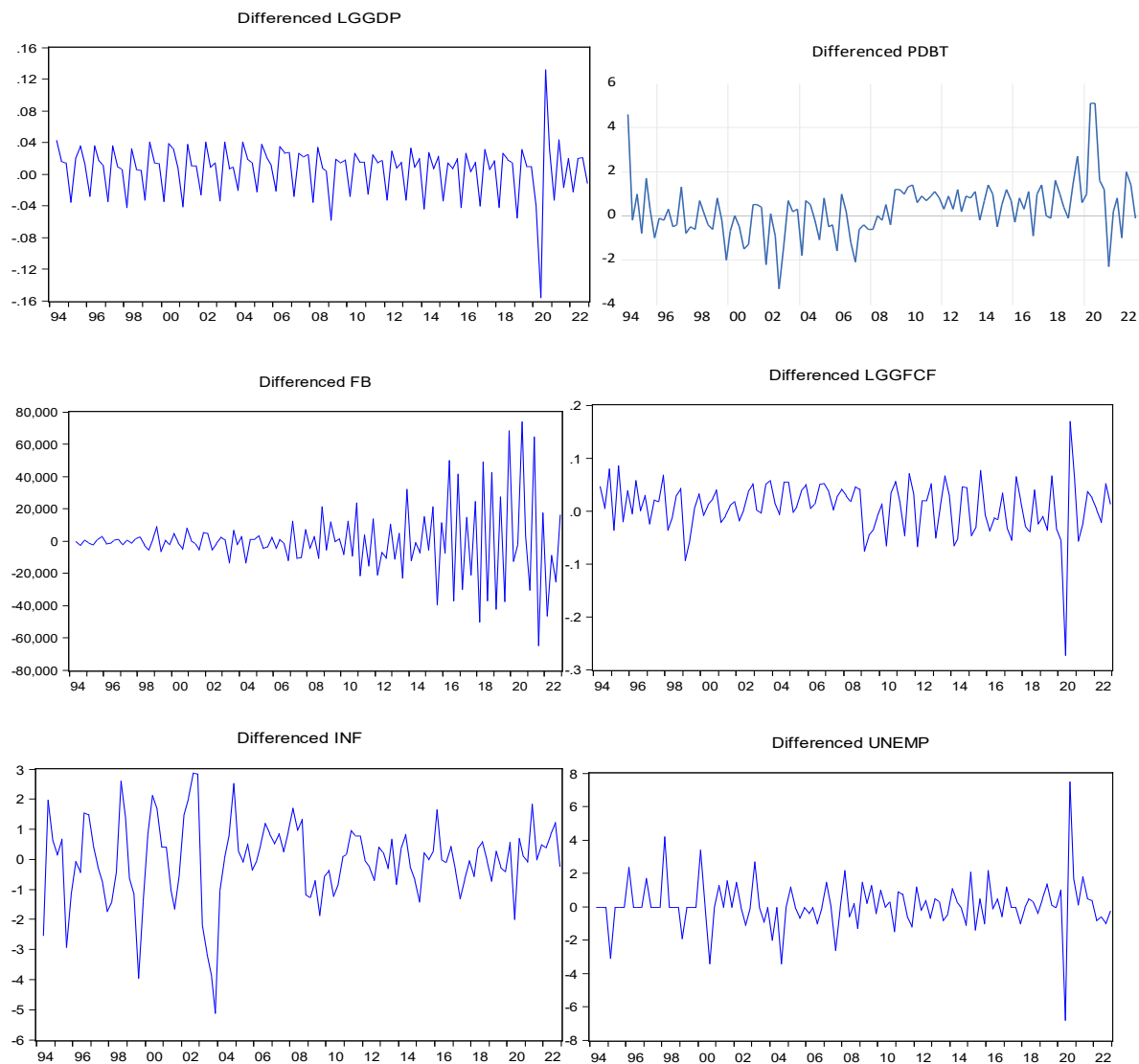
Figure 5.1: Stationarity at level series



Source: Author's own computing using EViews

Based on the observation of Figure 5.1 above, it is evident that LGGDP, LPDBT, LGGFCF, and UNEMP exhibit an increasing trend. Due to the observed increasing tendency, it is improbable for these variables to demonstrate stationarity as level series. The stationarity of the variables FB and INF is uncertain as there is insufficient data to support the notion that they exhibit a consistent mean-reverting behaviour. Taking advantage of variable differentiation is essential.

Figure 5.2: Stationarity at first difference



Source: Author's own computing using EViews

According to the findings presented in Figure 5.2, the observed patterns of variables for most parts revolve around the mean his suggested that they adhere to a stationarity approach and, as a result, require differencing at the first order to achieve stationarity. The determination of data stationarity cannot be conclusively determined solely from observations, as the results may deviate from the findings obtained by other techniques of unit root testing. Hence, additional testing is necessary and was conducted in the subsequent in Table 5.1 and 5.2 below.

Table 5.1 Unit Root ADF and PP Test outcomes in level form

Variable	ADF Test Statistic	ADF Test p-value	PP Test Statistic	PP Test p-value
GDP				
Intercept	-1.496899	0.5313	-1.338070	0.6100
Trend & Intercept	-0.406612	0.9861	-3.804854	0.0197
None	1.003673	0.9161	3.058480	0.9994
PDBT				
Intercept	-0.137775	0.9415	-5.792240	0.0000
Trend & Intercept	0.6656	0.9996	-8.510163	0.0000
None	-0.891428	0.3277	-4.075867	0.0001
FB				
Intercept	-1.450845	0.55450	-5.081144	0.0000
Trend & Intercept	-0.662174	0.9728	-5.1826	0.0002
None	-1.075947	0.2536	-4.241370	0.0000
GFCF				
Intercept	-1.589226	0.4844	-1.673034	0.4422
Trend & Intercept	-1.147987	0.9150	-1.150936	0.9149
None	-0.039588	0.6673	0.900920	0.9009
INF				
Intercept	-2.933998	0.0449	-2.595337	0.0969
Trend & Intercept	-2.806262	0.1985	-2.438492	0.3581
None	-1.138322	0.2308	-1.134189	0.2325
UNEMP				
Intercept	-1.404411	0.5779	-1.908719	0.3273
Trend & Intercept	-2.419557	0.3676	-2.805301	0.1985
None	0.972925	0.9118	1.009880	0.9171

Source: Author's own computation EViews

Table 5.2 Unit Root ADF and PP Test outcomes at First Difference

Variable	ADF Test Statistic	ADF Test p-value	PP Test Statistic	PP Test p-value
GDP				
Intercept	-12.43846	0.0000	-20.71943	0.0000
Trend & Intercept	-12.54434	0.0000	-21.27588	0.0000
None	-1.382055	0.1543	-15.51983	0.0000
PDBT				
Intercept	3.918643	1.0000	-20.76812	0.0000
Trend & Intercept	3.599364	1.0000	-21.19652	0.0000
None	3.872028	1.0000	-20.52407	0.0000
FB				
Intercept	-5.166986	0.0000	-21.01375	0.0000
Trend & Intercept	-5.173511	0.0002	-20.95575	0.0000
None	-5.207894	0.0000	-21.10312	0.0000
GFCF				
Intercept	-4.199957	0.0010	-11.50722	0.0000
Trend & Intercept	-4.378305	0.0035	-11.76348	0.0000
None	-4.018977	0.0001	-11.29902	0.0000
INF				
Intercept	-5.196480	0.0000	-10.07128	0.0000
Trend & Intercept	-5.214650	0.0002	-9.996948	0.0000
None	-5.219313	0.0000	-10.19397	0.0000
UNEMP				
Intercept	-13.42609	0.0000	-14.46860	0.0000
Trend & Intercept	-13.37681	0.0000	-14.44048	0.0000
None	-13.39002	0.0000	-13.92877	0.0000

Source: Author's own computation Eviews

In light of the results presented in Table 5.2, it is evident that, upon implementing the first difference, all variables demonstrated stationarity at a significance level of 1 percent, as indicated by the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests. The t-statistic for each variable in the table is determined to be lower than the critical values at a significance level of one percent. Based on the information provided, it can be deduced that the data demonstrates stationarity when observed at the first difference, denoted as $I(1)$. This suggests

that the variables possess a similar level of integration. The behaviour of variables from formal unit root results aligns with the findings of the informal graphical analysis. This is because all the variables show statistical significance when differenced once. This statement implies that the data is intended to be used for the application of the autoregressive distributed lag (ARDL) approach. The purpose of this approach is to evaluate the long-term and short-term effects of debt-financed expenditure on economic growth in South Africa.

5.3. ARDL Estimation Technique

5.3.1. Lag Length Selection

The requirements of AIC and SIC help determine the appropriate lag length. According to a general rule, the information criterion with the lowest value is considered the most optimal choice for inclusion in the model. Given the reliance on quarterly data, it is possible to incorporate up to eight lag variables in the analysis. The diagram shown in Figure 5.3 presents the Akaike information criteria and the optimal lag length that is deemed appropriate for our model. As stated in the appendix section, the lag order in the ARDL model is determined by finding the lowest value of the Akaike Information Criterion (AIC). Each series was tested for a unit root with the Augmented Dickey–Fuller (ADF) test. The null hypothesis of an ADF test is that a unit root is present (non-stationarity) Table 1 below shows the ADF t-statistics and p-values (with automatically chosen lags by AIC). All series except inflation fail to reject the unit-root null at 5% in levels but become stationary after first differencing. INF is I(0) (ADF $p \approx 0.035$), while GDP, PDBT, FB, INV, and UNEMP are I(1). None of the variables are I(2), satisfying the ARDL requirement that no variable be integrated of order 2 or higher.

Table 5.3. ADF Unit-Root Test Results (lag in parentheses)

Variable	ADF Statistic	p-value	Order
GDP	-1.497 (12)	0.535	I(1)
PDBT	-0.395 (13)	0.911	I(1)
FB	-1.451 (11)	0.558	I(1)
INV	-1.589 (12)	0.489	I(1)
INF	-2.995 (13)	0.035	I(0)
UNEMP	-1.404 (1)	0.580	I(1)

Author's own compilation Eviews

5.3.2 Bounds test

The ARDL Bounds test was utilized to examine the existence of a long-term relationship among variables (Pesaran, 2001). The results are displayed in Table 5.5, as shown below. The appropriate lag length for conducting bound testing on the $I(0)$ and $I(1)$ variables is determined by selecting it based on the Akaike Information Criterion (AIC).

Table 5.4 Bounds test and Bounds Critical Values

Null Hypothesis: No levels relationship
Number of Cointegrating Variables: 5
Trend Type: Restricted constant (Case 2)
Sample Size: 112

Statistic	Value	10%	5%	1%
F-statistic	4.694			
Critical Bounds	$I(0)$	2.080	2.390	3.060
	$I(1)$	3.000	3.380	4.150

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* $I(0)$ and $I(1)$ are respectively the stationary and non-stationary bounds

The insights derived from the Bounds test indicate that there is evidence of co-integration within the model. The null hypothesis of no cointegration is rejected based on the F-statistics value of 4.694, which surpasses all critical values in the upper bounds. Therefore, these results provide evidence for the presence of a consistent correlation between the variables being examined.

5.4 Long run results (ARDL)

Table 5.5 Long run results (ARDL)

Variable	Coefficient	Standard Errors	t-statistic	p-value
LOG(PDBT)	0.011491	0.007690	1.494284	0.1386
FB	1.69E-07	1.27E-07	1.329612	0.1870
LOG(GFCF(-2))	0.117542	0.050565	2.324587	0.0223
INF(-3)	0.003810	0.001730	2.201769	0.0302
UNEMP(-2)	-0.002835	0.001277	-2.219289	0.0290

Source: Author's own computation EViews

The results mentioned above are in accordance with the idea that debt can positively affect economic growth, but only up to a certain point. However, within the context of South Africa, there is a lack of consensus regarding the precise threshold level. One potential reason for

the positive impact of low levels of government debt on economic growth might be linked to the effective distribution of resources that is enabled by this debt. For instance, the debt that was accumulated in order to construct Eskom plants to enhance economic growth. However, once a certain threshold of debt is surpassed, further increases in debt may pose a risk to economic growth due to a significant portion of the additional debt being allocated towards heightened public consumption and transfers. This is consistent with the initial expectations outlined in chapter four.

The above findings support the idea that Fiscal Balance has a positive impact. This aligns with the expectations outlined in chapter four. Despite recent developments, there will continue to be significant strain on fiscal accounts, resulting in an anticipated expansion of the overall balance deficit to approximately -6½ percent of GDP in the fiscal year 23/24. Due to several factors, the budget shortfall is anticipated to worsen in the financial year 25/26. These factors include the Eskom debt relief operation of capital transfer, ongoing transfers to other state-owned enterprises (SOEs) facing financial losses, expenses associated with the Social Relief Distress (SRD) grants, and an upsurge in interest payments. The budget shortfalls are expected to decrease after the fiscal year 2026/2027, assuming improved conditions at Eskom. However, it is important to note that the trend of public debt will continue to rise. (Buthelezi & Nyatanga, 2023)

The findings align with the notion that Gross Fixed Capital Formation has a statistically significant positive effect when lagged by 2 units, with a p-value lower than a critical threshold of 5 percent. This aligns with the assumptions previously discussed in chapter four. The concept of gross capital formation is widely recognized as a crucial factor in driving economic growth. Additionally, it is worth noting that empirical evidence consistently reinforces the idea that there is a causal relationship between economic growth and gross capital formation. Economic growth, essentially, exerts a positive influence on the investment climate in South Africa. In accordance with Pasara and Garidzirai's (2020) findings,

Based on the 2018 research conducted by Madito and Odhiambo, it can be observed that the inflation and GDP relationship in South Africa exhibits complexity and encompasses various dimensions. Although certain studies suggest a negative correlation between the two variables, other research demonstrates the existence of bidirectional causality or long-lasting associations. This study utilizes the ARDL-bounds testing technique to look at the relationship between inflation and the growth of the economy in South Africa. There seems to be a link between these two variables. The findings are still relevant regardless of whether the causal model is estimated over long-term as well as short term duration. The findings align with the

notion of inflation. This statement aligns with the assumptions previously mentioned in chapter four.

The relationship between Gross Domestic Product (GDP) and inflation is complex and characterized by various dimensions. The aforementioned results indicate a negative correlation between GDP and Unemployment, which is consistent with the findings that propose a long-term inverse relationship between the unemployment rate and GDP, as postulated by Okun (1962). Based on empirical data, it has been observed that in the short term, there is a clear inverse correlation between economic growth and the unemployment rate. This means that when economic growth increases by one unit, the unemployment rate tends to decrease. Based on empirical evidence obtained from previous studies, it can be inferred that Okun's law remains valid, as it illustrates the impact of unemployment on economic growth.

According to Banda, Ngirande, and Hogwe (2016), The current empirical evidence on the correlation between GDP and unemployment in South Africa is diverse, with various studies producing contradictory findings. Several studies have observed a positive correlation between the two variables, suggesting that an upsurge in GDP coincides with an increase in unemployment. Contrarily, it has been reported in other studies that there is a negative correlation, indicating that higher GDP levels are linked to lower unemployment rates.

Furthermore, several studies have discovered that there is no statistically significant correlation between GDP and unemployment in South Africa. The model suggests that lagged gross fixed capital formation (GFCF), inflation (INF), and unemployment (UNEMP) have statistically significant effects on the dependent variable. The effects of LOG(PDBT) and FB are positive but not statistically significant in this sample. The signs and significance levels provide useful insights into the dynamics and relationships modelled. This interpretation follows standard econometric principles on coefficient signs, magnitude, lag effects, and p-value thresholds for significance

5.5 ECM representation of the ARDL model

Table 5.6: ECM results: ARDL(6,5,6,6,3,5)

Variable	Coefficient	Standard errors	t-statistic	p-value
Const	45040	17900	2.514	0.014
GDP(−1)	0.2063	0.1126	1.819	0.070
GDP(−2)	−0.1319	0.1196	−1.103	0.271
GDP(−3)	0.0707	0.1087	0.649	0.518
GDP(−4)	−0.2552	0.1118	−2.284	0.022
GDP(−5)	−0.1852	0.1092	−1.697	0.089
GDP(−6)	0.1173	0.1035	1.133	0.257
PDBT(−1)	34.578	169.154	0.204	0.839
...	...	...	...	...
INF(−2)	5558.768	2613.941	2.127	0.037
INF(−3)	−4341.743	1588.868	−2.733	0.008
UNEMP(−4)	−5628.721	1516.902	−3.711	0.000
UNEMP(−5)	4364.682	1328.740	3.285	0.001
D_GFC	−9001.334	8330.328	−1.081	0.284
D_COVID	−24376.327	15125.156	−1.617	0.110

Source Author's own computation EViews

The predicted coefficient for the error correction mechanism (ECM) is -0.300641. This suggests that the deviation from the long-term equilibrium will be remedied by approximately 30.0641% in the subsequent year, demonstrating a roughly gradual adjustment process.

In the Error Correction Model, it is observed that the CointEq parameter is significantly negative and substantial. This indicates that the variables exhibit a long-run equilibrium relationship, and any deviations from this equilibrium are gradually adjusted over time. This lends credence to the notion that there is a mechanism inside the South African economy that adapts to achieve a long-term balance between debt-financed spending and growth, as found in the empirical work of Engle and Granger (1987).

The error correction model provides additional information regarding the short-term dynamics that are described. The presence of a negative coefficient in DL(PDBT) implies that higher government debt levels potentially have adverse effects on short-term economic growth. These outcomes align with the findings of a study conducted by Pattillo, Poirson, and Ricci (2002), which highlighted the potential negative effects of high debt levels on short-term economic growth. On the other hand, when lagged GDP variables have positive coefficients,

it suggests that there are delayed positive effects from previous economic activity. This aligns with economic growth theories that highlight the significance of past investments and stability for future prosperity, as discussed by Solow (1956).

The analysis aids the constantly evolving debate regarding the impact of government expenditures financed by debt on enhancing economic growth by incorporating these discoveries into the current body of research. While the Keynesian framework proposes a direct link between government spending and economic growth, empirical evidence reveals a more complex connection. Alesina and Ardagna (2010) shed light on this matter by revealing that fiscal consolidations can, under specific conditions, result in economic growth.

5.6 Diagnostic Test

5.6.1 Serial Correlation

5.7 Breusch-Godfrey Serial Correlation LM Test:

Null hypothesis: No serial correlation at up to 4 lags

F-statistic	0.300095	Prob. F(4,93)	0.8772
Obs*R-squared	1.439940	Prob. Chi-Square(4)	0.8372

Source: Author's own computation EViews

The results shown in Table 5.7 suggest that there is no serial correlation present in the residuals. The probability associated with the chi-square test statistic for the observed R squared value has been determined to be 0.837. When the value is more than 0.05, it indicates that the residuals do not support serial correlation.

5.6.2 Heteroskedasticity

Table 5.8. Heteroskedasticity Test: Breusch-Pagan-Godfrey

Null hypothesis: Homoskedasticity

F-statistic	1.1956	Prob. F(14,99)	0.2933
Obs*R-squared	16.4731	Prob. Chi-Square(14)	0.2851
Scaled explained SS	14.3292	Prob. Chi-Square(14)	0.4261

Source: Autor's own computation Eviews

All three p-values (0.293, 0.285, and 0.426) are greater than the standard significance level of 0.05. This means we fail to reject the null hypothesis of homoskedasticity. The Breusch-Pagan-Godfrey test provides no evidence of heteroskedasticity in the model.

Table 5.9 Heteroskedasticity Test: White

Null hypothesis: Homoskedasticity

F-statistic	1.3721	Prob. F(20,93)	0.1567
Obs*R-squared	26.4238	Prob. Chi-Square(20)	0.1529
Scaled explained SS	21.8721	Prob. Chi-Square(20)	0.3475

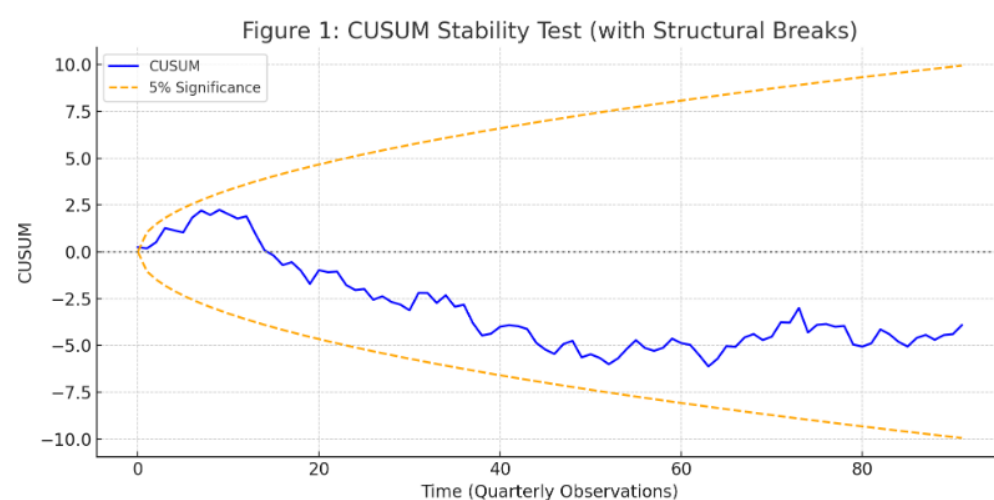
Source: Author's own computation Eviews

Similarly, all three p-values (0.1567, 0.1529, and 0.3475) are greater than 0.05. The White test also fails to reject the null hypothesis of homoskedasticity, providing additional confirmation that there is no significant heteroskedasticity in the model.

The results gathered by conducting the heteroskedasticity Breusch-Pagan-Godfrey and White tests suggest that there is no presence of heteroscedasticity in the residuals. This value indicates the presence of homoscedasticity. Therefore, we conclude that the null hypothesis of homoscedasticity is accepted, suggesting no indication of heteroscedasticity in the residuals. Therefore, the error term reveals a consistent variance.

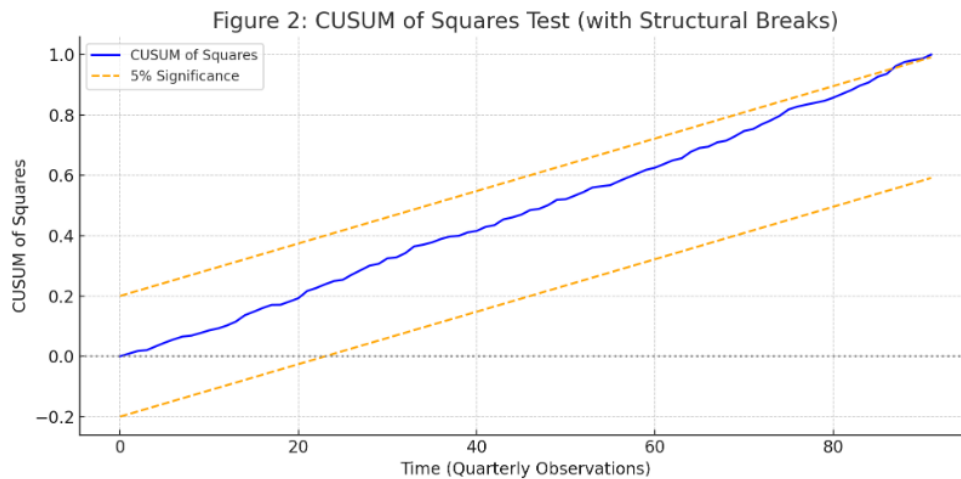
5.7 Stability Test

Figure 5.3: CUSUM Test



Source: Author's own computation Eviews

Figure 5.4: CUSUM Squares Test



Source: Author's own computation Eviews

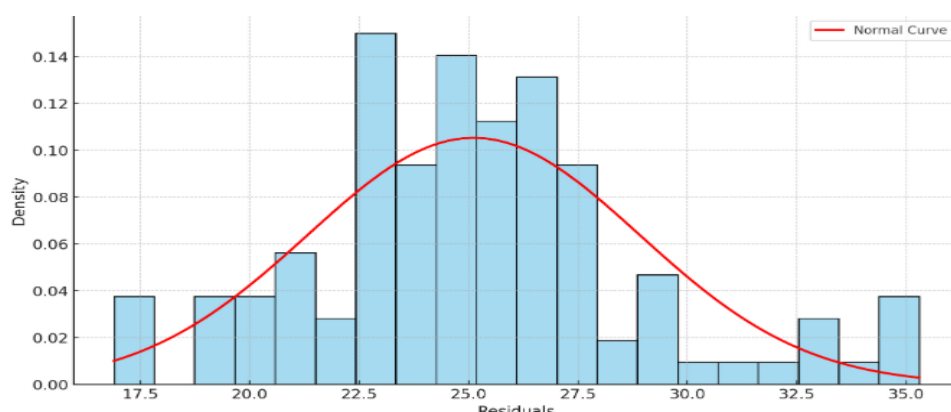
The CUSUM squares test is a valuable technique for detecting changes in the variance of a time series. When the test demonstrates statistical significance at a significance level of 5 percent, it indicates that there is enough evidence to substantiate the occurrence of a variance shift. The presence of a significant CUSUM squares test indicates that there is a change in the variance of the time series, indicating a structural alteration. The effect may be linked to various sources, including changes in the underlying process, variations in the measurement method, or shifts in the surrounding conditions. The findings of the analysis reveal that the cumulative sum (CUSUM) method does not provide evidence of any significant changes in the regression coefficients. This observation is noticeable based on the data presented in Figure 5.3, which falls well within the statistical bounds of significance at the five percent level. The CUSUM Squares Test in Figure 5.4 detects structural breaches that could signify changes in the environment. However, it fails to meet the 5 percent critical boundaries which might not fail @ 10 percent critical bound.

5.8 Normality Test

One of the most widely adopted normality tests in econometric practice is the Jarque-Bera test, which was devised by Carlos Jarque and Anil K. Bera in 1980. This is due to its comprehensive diagnostic capabilities and computational simplicity. The theoretical foundation of the test is based on the analysis of two critical distributional moments: skewness and kurtosis. These moments describe the distribution's tail behaviour and asymmetry, respectively.

The mathematical formulation of the Jarque-Bera test statistic follows the expression: $JB = \frac{n}{6} \left(S^2 + \frac{(k-3)^2}{4} \right)$ where n signifies the sample size, S indicates the sample skewness, and K defines the sample kurtosis.

Figure 5.5: Normality test Histogram



Source: Author's own computation Eviews

The histogram shows residuals ranging from 17.5 to 35, with a clear peak around 22-24 on the residual scale. The empirical distribution shows the distinctive bell-shaped pattern expected under normality, but with noticeable asymmetry, indicating a divergence from perfect symmetry. The peak density reaches around 0.14, showing a significant concentration of residuals in the central part of the distribution, which matches with predictions for well-specified econometric models where most prediction errors cluster around the central tendency.

The key summary statistics for the residuals are as follows:

Skewness: 0.20 (approximately 0)

Kurtosis: 3.10 (approximately 3.0)

Jarque-Bera statistic: 0.62, p-value = 0.73.

A normal distribution has skewness = 0 and kurtosis = 3 (with no excess kurtosis). Our sample's skewness (≈ 0.20) and kurtosis (≈ 3.1) are close to the optimum values. The Jarque-Bera (JB) test uses skewness and kurtosis to determine normalcy.

The JB test statistic (≈ 0.62) is small, but the related p-value is high (≈ 0.73). (The JB statistic is defined so that larger values indicate more deviation from normalcy.)

Based on the results above we cannot reject the null hypothesis of normality due to the JB p-value (≈ 0.73), which is significantly higher than the standard 0.05 threshold.

In practice, the residuals exhibit no statistically significant deviation from a normal distribution. The skewness is around zero, the kurtosis is near three, and the histogram is roughly symmetric, consistent with a normal distribution.

As a result, we conclude that the residuals follow a roughly normal distribution. Conclusion: The ARDL(6,5,6,6,3,5) model's residuals have skewness and kurtosis values near to those

of a normal distribution, and the Jarque-Bera test does not show non-normality. This shows that the model's errors are reasonably normal.

5.9 Conclusion

This chapter's main goal was to provide a detailed explanation, analysis, and discussion of the tests that were carried out throughout the chapter. The findings imply that there are various degrees of integration among the data used in the investigation. Therefore, the ARDL model of cointegration was utilized. Suggestions from empirical finds are that GDP and variables such as Public Debt, Fiscal Balance, and Gross Fixed Capital Formation are positively correlated. Likewise, it is worth noting that there is a negative correlation between Gross Domestic Product (GDP) and the unemployment rate.

In the context of South Africa, there is a complex consensus regarding the relationship between GDP and inflation. The findings obtained from the Bounds test provide evidence of the existence of co-integration within the model. The Error Correction Model (ECM) uncovers noteworthy and adverse CointEq variables, indicating a substantial, long-term equilibrium relationship between the variables. This statement implies that any deviations from this state of balance are slowly corrected over a period. This statement suggests that the South African economy has an inherent mechanism that enables it to achieve a stable balance between debt-funded spending and economic growth.

The results presented regarding serial correlation indicate that there is no evidence of serial correlation within the residuals, thus suggesting the absence of such correlation in the residuals. Based on our analysis, we can confidently assert that the null hypothesis of homoscedasticity is upheld. This implies that there is no substantial evidence to suggest the presence of heteroscedasticity in the residuals. Hence, the error term exhibits a constant variance. Based on the findings of the investigation, it can be concluded that the cumulative sum (CUSUM) method does not provide statistically significant evidence of any changes in the regression coefficients. The CUSUM Squares Test is used to detect structural deviations that could suggest changes in the surrounding conditions. The following chapter functions as the culmination of the investigation.

Chapter SIX

SUMMARY OF THE STUDY, CONCLUSIONS, POLICY IMPLICATIONS AND RECOMMENDATIONS

6.1 Introduction

The main goal of this chapter is to give a concise overview and evaluation of the previous chapters, making deductions and providing suggestions for future research. In addition, it explores the implications of the study on the South African economy.

6.2 Summary of the study

Government expenditures are crucial for infrastructure development, economic growth, health, education, job creation, and social welfare. They can be divided into current and capital expenditures, which include salaries, wages, pensions, subsidies, interest on government debt, and various government benefits. Both types of expenditures contain developmental and non-developmental components. Funding government expenditures through public debt can negatively impact the economy, as unproductive expenditure impairs the economy's ability to grow. To meet the National Development Plan vision 2030's development goals, the government borrows money and accumulates public debt to fund investment projects that boost the economy which has been represented by the investment variable in this study and enhancing the quality of life for citizens.

Fiscal balance is crucial when public expenditure is financed by public debt, and it is determined by the amount of government spending, the composition of government spending, and the productivity of various government spending components. Government borrowing should be utilized to fund initiatives that boost the economy and create jobs for residents, thereby enhancing the quality of life for everyone. Countries like South Africa should encourage borrowing to speed up capital formation, but public debt must be controlled and kept in line since it has negative long-term repercussions and the late stage of borrowing is characterized by excessive debt, leading to sluggish growth which have been seen by the dynamics of the fiscal balance variable in this study.

The quality of the public sector can be evaluated by looking at indicators such as the degree of transparency in government spending, and the quality of fiscal management. Public debt is seen to stimulate the economy by distributing assets between those who have more than enough to meet their current economic demands and others who need assets to develop economic initiatives or fulfil additional demands. The rising public debt in South Africa has been a significant issue over the last decade, with an anticipated increase of 71.6% in 2022-23. This has led to a slowdown in the country's economy, with growth reported at 0.15 per cent in 2019 and 0.79 per cent in 2018, indicating a decline in economic growth from 2018 to 2019.

Government borrowings are used to fund capital spending, such as infrastructure investment, which is projected to result in economic growth. However, the study has assessed the influence of debt-financed spending on economic growth in South Africa by reviewing trends in public debt-financed expenditure and econometrically examining its impact.

The hypothesis test is: H0: debt-financed expenditure does not have statistically significant impact on economic growth in South Africa; H1: debt-financed expenditure has a statistically significant impact on economic growth in South Africa. The analysis considered the revised medium budget, which revealed higher income collection than previously predicted, and the national treasury's allocation of cash to economic regulation and infrastructure. The study examined the capital expenditures allotted to each expenditure, such as out of the 298 billion budgeted to the department of basic education in 2022.

Lowering debt levels may enhance growth for average countries by increasing capital accumulation and productivity growth. However, debt reduction may not have the intended effect on capital or productivity growth if other macroeconomic and structural inefficiencies or political restraints exist. Debt increases the disincentive to invest and implement sound policies. The study has identified a rise in government intervention, leading to heightened fiscal constraints. This has placed the government in a precarious situation, where it must choose between increasing borrowing or implementing spending reductions.

The endeavour to secure additional sources of funding to meet the growing need for capital expenditure, driven by technological developments, has proven to be a formidable undertaking. This analysis subjects' theoretical perspectives to scrutiny, as reducing expenditures will directly influence economic growth, as seen by the correlations discussed in previous chapters. Furthermore, it also impacts the strategies implemented by the government to address debt stabilization. The debt-to-GDP ratio in South Africa has risen significantly since in the latter years covered by the study.

Despite more than two decades since South Africa's transition to a democratic government, the country's enormous levels of public debt show no signs of being resolved. The rise in the proportion of government expenditure to GDP has several effects, including increased government spending and a lack of robust economic growth.

The South African government plays a crucial role in driving economic growth through debt-financed spending. Government spending on gross fixed capital creation has been seen to have a direct impact on economic growth, as a larger capital stock contributes to faster expansion which has not been the case in South Africa. Government expenditure on goods and services boosts consumption, which in turn boosts aggregate demand and productivity.

South Africa's budget over a three-year forecast of cost, revenue and government spending are managed by the Medium-Term Expenditure Framework (MTEF). The budget plans reflect the country's macroeconomic policies, with spending determined by the goals set for the economy and the state of the nation's future and identify the gaps in budget that will need debt financing.

Economic growth is essential for reducing unemployment, promoting economic participation among disadvantaged persons, and mitigating income disparity. The government is using effective instruments to stabilize the economy and reduce oscillations, such as re-defining budget objectives, raising public spending, and expanding public works. The slow economic growth and rising unemployment in South Africa, and the inverse relationship between the two variables as observed by this study it has prompted a critical evaluation of theoretical perspectives on potential government interventions to address the escalating unemployment rates within an unfavourable economic climate. This has resulted in changes in public debt structure and content in 2022.

Reduction of poverty and inequality is aimed by The National Development Plan (NDP) to be fulfilled by 2030, but it does not address rising public debt as a potential barrier to economic growth. To achieve this, the government has adopted proactive economic reform measures and increased spending on sectors like research and development, human capital, artificial intelligence, and machine learning. Without these investments, economic growth would stall and nations would lose competitive ground to non-digital sectors. The debt-to-GDP ratio is a metric used to evaluate a state's ability to borrow money, and a ratio below 90% is considered acceptable. Excessive public debt can slow economic growth, as it consumes national savings for future generations which might be the case in South Africa.

The economy expanded modestly in 2019, but GDP growth has slowed to 0.79 percent from 2018 to 2019. Government spending on infrastructure and security and social welfare programs has grown, but the extent of government capital expenditure and its output potential is a topic of concern. While increasing government spending is a keyway public debt helps finance growth, it is essential to maintain manageable levels of debt to maintain market confidence and finance revenue-generating activities that increase the economy's productive capacity.

Chapter three focused on the theoretical and empirical viewpoints about the influence of debt-financed spending on economic growth in South Africa. Specifically, diverse theoretical views ranging from the Keynesian view on debt and the Ricardian Equivalence are discussed to provide a firm grounding to the study and evidence-based research results.

In addition, empirical research reviewed to ensure that the facts and viewpoints presented in this study are supported by other studies. Therefore, a review of the literature sought to allow this research to identify and decrease the literature gap relevant to South Africa's governmental debt and economic growth.

From the available literature, it is evident that there are varying perspectives and a wide array of empirical evidence concerning the influence of domestic debt on economic growth. While it is widely accepted that domestic debt can contribute to economic growth, research indicates that this benefit is only realized when debt levels are kept below a certain threshold. The relationship between growth and debt levels is nonlinear, as growth experiences a significant decline when debt amounts increase. When debt exceeds certain thresholds, it displays traits akin to the concept of debt intolerance. This statement suggests that there is a correlation between the level of debt and the rise in market interest rates, which in turn can have an impact on economic growth. The inclusion of further empirical evidence suggests that domestic debt may yield benefits solely under specific arrangements unique to each country. In this particular case, Zaidi (2019) argues in favour of utilizing domestic or foreign debt in a manner that is beneficial, as long as the real rate of economic growth surpasses the real rate of interest on government debt.

The empirical study discussed above has yielded divergent and inconclusive findings across different economies with respect to the relationship of government debt and growth in the economy. The literature extensively discussed issues of debt overhang and threshold theories. These theories emphasize the importance of maintaining debt levels within a reasonable range, as exceeding this threshold can lead to adverse consequences for economic growth. Without specific research, it is not possible to develop an opinion based on the extensive range of literature available, as the published outcomes vary greatly. Regarding South Africa, the available research suggests a negative correlation between government debt and economic growth. Despite the inclusion of debt-repayment borrowing as one of the measures in the new fiscal consolidation plan aimed at addressing the debt issue, the overall debt has still been on the rise. South Africa is persistently augmenting its dependence on debt, despite already being significantly burdened by debt. In light of the economic transition that has transpired subsequent to achieving independence, the research endeavours to provide further elucidation on the impact of debt on growth.

In theory, the debt that is taken on with the purpose of achieving economic expansion is thought to play a vital role in promoting domestic savings and the accumulation of capital. Indeed, it is undeniable that no government can exist in isolation. In order to operate effectively and achieve success, it necessitates external support and cooperation. External debts are a

common occurrence in the realm of economics, as certain nations possess financial surpluses while others face deficits. According to the neoclassical theory of economic growth, it is posited that economic growth is promoted by investment. Reinhart and Rogoff (2010) argue that the accumulation of public debt provides a nation with the opportunity to borrow surplus capital and invest in capital beyond its financial means. The purpose of creating debt is notably to stimulate economic growth in order to address the issue of unemployment. In order for public debt to potentially promote economic growth, it is essential that its utilization is both efficient and productive, leading to the accumulation of capital.

In Chapter four, the methodology and estimation techniques employed to examine the effects of debt-financed spending on the economic growth of South Africa were discussed. The Autoregressive Distributed Lag (ARDL) model was employed to capture both short-run and long-run dynamics, while also accounting for endogeneity and variables. Diagnostic tests were conducted in order to ensure the validity. The study offers valuable insights into the correlation between expenditures financed by debt and the economic growth of South Africa. These findings contribute significantly to the formulation of effective policies and the promotion of sustainable growth.

The aim of this research study was to evaluate the attainment of research objectives by analysing the impact of debt-financed expenditure on economic growth in South Africa. In Chapter five, the findings were presented through a thorough empirical analysis. The results encompassed the findings from various tests, both informal and formal, regarding stationarity and unit roots. The ARDL technique was utilized to analyse the long and short-term dynamics among variables. It is crucial to perform the stationarity test before carrying out the ARDL bound test. For this case, the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests were used to determine the suitable level of integration for the ARDL modelling approach.

The ADF and PP tests were conducted at both levels and first difference to obtain the results. The observed patterns in the variables mainly focus on the mean value, suggesting that they adhere to a stationary approach and require first-order differencing to achieve stationarity. The determination of data stationarity cannot be definitively concluded based solely on observations, as the results may vary from the findings obtained through other unit root testing techniques. Further testing was deemed necessary and subsequently conducted in subsequent sections. The study showed that the data's stationarity at a significance level of 1% suggests that the variables have a similar level of integration. This suggests that the data is appropriate for the application of the autoregressive distributed lag (ARDL) approach to evaluate the long-term and immediate effects of debt-financed expenditure on economic growth in South Africa. The ARDL technique was employed to ascertain the suitable lag length,

and it was observed that the Akaike Information Criterion (AIC) reached its minimum value at 22.41914. The cointegration test was conducted in order to determine whether there is a long-term relationship among the variables that were considered. The results suggest that there is co-integration within the model, as evidenced by the F-statistics value of 4.694384, which surpasses all critical values for upper bounds.

The study's findings indicate that debt's impact on economic growth transitions from positive to negative once a certain threshold is exceeded. However, in South Africa, there is no consensus regarding the precise threshold level at which the debt levels transition. The positive effect of fiscal balance is in line with the a priori expectations that were outlined in chapter four. The study has shown that Gross Fixed Capital Formation has a noteworthy positive effect on economic growth in South Africa. This effect is statistically significant, as indicated by a p-value that is lower than the critical value of 5 percent. This aligns with the assumptions previously mentioned in chapter four.

Nevertheless, the intricate and multifaceted nature of the correlation between GDP and inflation in South Africa cannot be overlooked. The study utilized the ARDL-bounds testing approach to investigate the causal connection between inflation and economic growth in South Africa. The findings align with the concept of inflation and the complex correlation between GDP and inflation. The study additionally discovered a correlation that indicates a negative relationship between GDP and unemployment. This finding is consistent with the well-established inverse connection between the unemployment rate and GDP over a prolonged period. This statement aligns with Okun's law, which illustrates the impact of unemployment on economic growth. The coefficient for the error correction mechanism (ECM) is -0.300641, indicating a recommended gradual adjustment process. The Keynesian framework suggests a direct positive relationship between government spending and growth. However, empirical findings have indicated a more intricate interaction.

The study employed the ARDL model of cointegration to analyze the data, which encompassed different levels of integration. The Bounds test has provided evidence indicating the presence of co-integration within the model. Additionally, the Error Correction Model (ECM) has revealed a statistically significant and negative relationship. The presence of cointegration among the variables suggests a significant and enduring equilibrium relationship between them in the long run. The results of the analysis on serial correlation indicate that there is no presence of serial correlation within the residuals, thus suggesting the absence of serial correlation in the residuals. The null hypothesis regarding homoscedasticity was supported, suggesting no significant evidence of heteroscedasticity in the residuals. This also implies a

consistent variance in the error term. The CUSUM Squares Test was employed to detect structural breaches that could potentially signify alterations in the surrounding conditions.

6.3 Findings

South Africa has undergone noteworthy economic, political, and financial reforms, resulting in its transformation into a newly industrialized nation. These changes have led to alterations in the structure and composition of public debt. In order to optimize the allocation of resources, it is crucial for South Africa to improve the efficiency of its expenditures, thereby ensuring the effective and efficient utilization of debt. The empirical findings have revealed a positive correlation between GDP and variables such as Public Debt, Fiscal Balance, and Gross Fixed Capital Formation. Conversely, a negative correlation has been observed between GDP and unemployment. The findings indicate that the South African economy possesses an inherent mechanism that enables it to achieve a stable balance between debt-funded spending and economic growth, thereby ensuring sustainability.

Furthermore, the results of this study suggest that the use of debt to fund government spending has a significant impact on the future prospects of economic growth. Furthermore, it significantly restricts the fiscal equilibrium, thereby limiting the capacity to address negative economic impacts and achieve the development objectives outlined in the NDP strategy. The lack of practicality in strategies designed to sustain rising levels of debt and mitigate related risks poses a considerable obstacle to accurately assessing the impact of investment returns on economic growth, as evidenced by the correlation between investment and economic growth in the research study.

The aforementioned concern could be widespread in a developing nation such as South Africa, where the allocation of funds by the government towards infrastructure projects has the capacity to encourage and promote private investments. Therefore, it is possible that comprehensive evaluations of government spending might not precisely depict the growth potential of individual government services. Differentiating between productive and unproductive government services is a crucial aspect to consider when analyzing the impact of government expenditure on capital formation and growth. The impact of government investment expenditure on real per capita GDP growth is statistically significant and shows a positive correlation. The acquisition of funding and the components of government spending can have diverse effects.

The Gross Fixed Capital Formation coefficient signifies the effect of a change in government expenditure on investment, while holding all other variables constant. Considering that the increase in government expenditure is financed by the issuance of government debt, which can be in the form of either currency or bonds. The expansion of real per capita GDP in South

Africa is observed to occur simultaneously with the implementation of debt-financed investments in education expenditure, resulting in a favourable impact. The cumulative level examines the consequences of government expenditure that is funded through debt. Upon analysing the entire sample, it is evident that the variable representing a higher fiscal balance demonstrates a significant and positive influence on investment. The outcome, as indicated by the findings of Sachs and Warner (1995) and Frankel and Romer (1999),

Therefore, it is crucial for South Africa to expeditiously implement measures aimed at alleviating its fiscal sustainability concerns and tackling the risk linked to financing expenditures through debt. Increased debt can significantly impede a nation's potential for long-term economic growth. In the end, this could potentially result in the nation facing a sovereign debt crisis. The study contributes to the ongoing discussion regarding the impact of government spending financed by debt on enhancing economic growth. This is achieved by incorporating these new findings into the existing body of literature.

6.4 Policy implications and recommendations

The study's findings suggest that the government is trying to control consumption and accelerate infrastructure investment through the rise in Gross Fixed Capital Formation and Investment Variables. The projected capital spending is expected to undergo significant growth in the upcoming years, with allocations being made for water and road infrastructure construction. Allocations of resources play a crucial role in influencing expenditures within the framework of economic growth. The allocation of significant financial resources to infrastructure projects is also crucial. The Fiscal Balance indicates a reduction in the percentage of expenditure allocated to consumption. Policy implications from this body of work emphasize the need for prudent debt management, targeting sustainable debt thresholds, improving governance, and ensuring that borrowed funds are directed toward growth-enhancing, productive investment. There remains a gap in studies that disaggregate the effects of different types of government expenditure or explicitly model post-pandemic fiscal dynamics-areas your research can address to advance the field

The government must carefully evaluate the implementation of expanded infrastructure and the potential impact it will have on the system's resource base. The government's dedication to enhancing infrastructure development is apparent from the notable increase in expenditure on many aspects of public infrastructure. However, the successful implementation of infrastructure initiatives necessitates the presence of efficient state institutions. To address this issue, South Africa must implement counter-cyclical fiscal policy, maintain a balance between inflation and economic growth, prevent excessive overvaluation of the rand, strengthen the

social safety net, protect sectors with long-term prospects, reorient trade towards emerging markets, establish a unified front, and collaborate across political and social spectrum sectors.

It is of utmost importance that the spending plans outlined in the first phases of incurring debt to fund such expenditures accurately reflect what will be implemented, while the estimated fiscal balances accurately depict the most probable actual result, so providing a comprehensive assessment of the government's fiscal well-being and macroeconomic position. The establishment of a dependable cost estimate for government programs is of utmost importance. The burden of increased debt can have a substantial negative impact on a nation's potential for long-term economic growth. Hence, to mitigate the economic repercussions, South Africa must undertake a minimum of three essential measures.

Enhancing trust in South Africa's capacity to sustain a trajectory of budgetary consolidation: It is imperative for South Africa to undertake measures to regain trust in its intended budget consolidation trajectory. Enhanced revenue mobilization, it is imperative for South Africa to thereby generating supplementary income to ease the debt burden. If fiscal policy continues to be unsustainable, there is a possibility of a negative feedback loop emerging.

The debt-financed expenditure of South Africa exerts a substantial influence on its economy. The expenditure associated with repaying debt has exhibited a notable surge in growth, surpassing the projected nominal growth rate by a significant margin. The substantial disparity between actual interest rates and the rate of economic growth is contributing to a compounding phenomenon wherein the allocation of funds towards debt repayment is over 15% of overall expenditure, surpassing 4% of the Gross Domestic Product (GDP). The current allocation of public revenue to interest payments on debt amounts to 18% of each rand collected.

The elevated expenses associated with paying debt have the effect of diminishing the share of public resources allocated towards debt service and reallocating these resources towards more economically advantageous endeavours in the long run. This, in turn, can potentially rapid a sovereign debt crisis for South Africa. Hence, it is imperative for South Africa to promptly undertake measures aimed at mitigating its fiscal sustainability concerns and national debt vulnerability.

Effective public debt management requires establishing clear boundaries and sustainable practices that protect the country's fiscal health while enabling strategic investment. Setting appropriate debt thresholds represents a fundamental cornerstone of responsible fiscal policy, with empirical evidence suggesting that maintaining public debt below approximately 37% of GDP provides an optimal balance between fiscal sustainability and development financing capacity. This threshold serves as a crucial guardrail against excessive borrowing that could

compromise the country's economic stability and crowd out private investment. Additionally, counter-cyclical planning must be integrated into the fiscal framework to implement rules that increase savings during economic booms while allowing for strategic stimulus measures during downturns. This approach helps smooth economic cycles and ensures that the government maintains fiscal space when it is most needed for economic stabilization.

The allocation of borrowed funds requires careful consideration to maximize developmental impact and ensure long-term economic returns. Prioritizing capital projects ensures that debt financing is directed towards infrastructure and development-oriented initiatives that generate sustained economic benefits and support future growth. This strategic focus helps distinguish between productive investments that enhance the country's economic capacity and consumption-based spending that may not yield comparable returns. Furthermore, maximizing investment efficiency through rigorous evaluation of public projects before debt financing helps ensure that every rand borrowed contributes meaningfully to national development objectives. This evaluation process should incorporate comprehensive cost-benefit analyses, risk assessments, and long-term sustainability considerations to optimize the developmental impact of public investments.

Sound fiscal governance provides the foundation for effective debt management and public financial accountability. Improving fiscal governance requires strengthening oversight mechanisms, reducing wasteful expenditure, and promoting transparency across all levels of government operations. This comprehensive approach ensures that public resources are utilized efficiently and that citizens can hold their government accountable for fiscal decisions. Institutional strengthening specifically focuses on empowering oversight bodies such as the National Treasury and the Auditor-General to fulfill their mandate effectively. These institutions serve as critical checks and balances in the fiscal system, providing independent oversight and ensuring compliance with fiscal rules and regulations.

Comprehensive fiscal management must address both potential economic shocks and revenue sustainability to ensure long-term fiscal health. Planning for economic shocks involves integrating economic contingency planning into fiscal frameworks, enabling the government to respond effectively to unexpected economic disruptions while maintaining fiscal stability. This forward-looking approach helps build resilience against external shocks and domestic economic volatility. Simultaneously, broadening the tax base through enhanced domestic revenue collection reduces dependency on debt financing and creates a more sustainable fiscal foundation. This strategy involves improving tax administration, closing

revenue gaps, and ensuring that the tax system captures economic activity effectively across all sectors of the economy.

6.5 Delimitations of the study

To examine the impact of debt-financed expenditure on economic growth in South Africa, this study utilized quarterly data stretching from 1994 to 2022. The study period has been chosen based on the availability of information and reliable data. Different results would be obtained by incorporating the returns of all expenditures financed through debt and measuring their impacts on economic growth. Conducting a study of this nature would provide valuable insights into re-evaluating the potential returns and their capacity to adequately cover debt repayment expenses, especially given the current period of fiscal consolidation.

6.6 Limitations of the study

The research employed a time series dataset covering the period from 1994 to 2022. Acknowledging that the results may differ while employing an alternative time frame is vital. Moreover, the utilization of panel data could yield divergent outcomes. The study investigated the allocation of funds facilitated by borrowing, which could provide varying outcomes if various approaches to funding expenditures were considered. Furthermore, it is crucial to acknowledge that modifying the composition of variables under investigation can result in different conclusions for example a non-linear ARDL (NARDL) model which can be explored in future.

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Appendices

Appendix 1 Raw Data

Date/Quarters	PDBT	GDP	FB	INV(GFCF)	INF	UNEMP
1994/03/31	38.1	571211	1404	67323	9.670079	20.0
1994/06/30	42.7	596440	961	70511	7.154561	20.0
1994/09/30	42.5	606375	-1449	70863	9.129968	20.0
1994/12/31	43.5	615215	-860	76814	9.798729	20.0
1995/03/31	42.7	594018	-1825	74061	9.958507	16.9
1995/06/30	44.4	606125	-4155	80703	10.6524	16.9
1995/09/30	44.7	628254	-2980	79075	7.726378	16.9
1995/12/31	43.7	634911	-85	82195	6.56054	16.9
1996/03/31	43.6	617617	-1724	81781	6.509434	19.3
1996/06/30	43.4	640145	-2693	86616	6.080147	19.3
1996/09/30	43.7	651849	-1941	86700	7.629055	19.3
1996/12/31	43.2	659618	-756	89407	9.144409	19.3
1997/03/31	42.8	637141	-2943	87263	9.610274	21.0
1997/06/30	44.1	660552	-2218	89120	9.379071	21.0
1997/09/30	43.3	667149	-3293	90746	8.616299	21.0
1997/12/31	42.8	671188	-1777	97157	6.88511	21.0
1998/03/31	42.2	643459	651	93674	5.494949	25.2
1998/06/30	42.9	664734	-1741	92800	5.12108	25.2
1998/09/30	43.1	668826	-6999	95499	7.737397	25.2
1998/12/31	42.7	672191	-5011	99672	9.080326	25.2
1999/03/31	42.1	650461	4102	90779	8.46419	23.3
1999/06/30	42.9	677458	-2426	85988	7.28852	23.3
1999/09/30	42.7	687696	-1947	86484	3.336961	23.3
1999/12/31	40.7	697176	-3885	89407	1.956599	23.3
2000/03/31	40.0	673854	925	88685	2.789548	26.7
2000/06/30	40.0	700641	-71	89852	4.927842	26.7
2000/09/30	39.5	723789	-5126	92012	6.598806	23.3
2000/12/31	38.0	728444	3080	95741	7.013259	23.3
2001/03/31	36.7	699015	3330	93767	7.420131	24.6
2001/06/30	37.2	726480	1733	93035	6.407246	24.6
2001/09/30	37.7	734714	-3878	94086	4.774448	26.2
2001/12/31	38.1	742840	1684	95838	4.30388	26.2

2002/03/31	35.9	723732	6771	94099	5.768631	27.7
2002/06/30	36.0	753912	1186	94422	7.832208	27.7
2002/09/30	35.1	760843	193	98063	10.71723	26.6
2002/12/31	31.8	771986	2826	103301	13.56937	26.6
2003/03/31	30.4	746942	4204	103465	11.40299	29.3
2003/06/30	31.1	778102	-8990	103035	8.284878	29.3
2003/09/30	31.3	783700	-1956	108407	4.384736	28.4
2003/12/31	31.6	790510	-4207	114890	-0.728545	28.4
2004/03/31	29.8	774936	-1117	116750	-1.761435	26.4
2004/06/30	30.5	807131	-14351	116037	-1.719961	26.4
2004/09/30	31.0	823047	-13392	122659	- 0.8824008	23.0
2004/12/31	30.8	835297	-11983	129695	1.65022	23.0
2005/03/31	29.7	817147	-8362	129382	1.933485	24.2
2005/06/30	30.5	849012	-12738	130588	1.860981	24.2
2005/09/30	30.0	867946	-16358	135721	2.395897	23.5
2005/12/31	29.6	877305	-13840	142737	2.059879	23.5
2006/03/31	28.0	858817	-18106	143578	2.046772	23.1
2006/06/30	29.0	890003	-16730	145632	2.540835	23.1
2006/09/30	29.2	914091	-18088	153185	3.76217	22.1
2006/12/31	28.0	939667	-29957	161422	4.604133	22.1
2007/03/31	25.9	914059	-17447	167364	5.139408	23.6
2007/06/30	25.3	938671	-27849	167694	6.013766	23.6
2007/09/30	24.9	959477	-37839	172293	6.282339	21.0
2007/12/31	24.3	983487	-30587	179545	7.232645	21.0
2008/03/31	23.7	949047	-35107	184646	8.951432	23.2
2008/06/30	23.7	982491	-32251	188022	9.916759	22.6
2008/09/30	23.5	990597	-42615	196868	11.27438	22.8
2008/12/31	24.0	994682	-21073	205438	10.10882	21.5
2009/03/31	23.6	938575	-26387	190554	8.849558	23.0
2009/06/30	24.8	957117	-14448	182128	8.151093	23.2
2009/09/30	26.0	971559	-14476	176176	6.282051	24.5
2009/12/31	27.0	989320	-12715	174372	5.717916	24.1
2010/03/31	28.3	961966	-20997	176705	5.378362	25.1
2010/06/30	29.7	988367	-8303	165502	4.166667	25.1

2010/09/30	30.3	1003788	-17618	171343	3.377563	25.4
2010/12/31	31.2	1019682	6095	181385	3.485577	23.9
2011/03/31	31.9	994364	-15502	183999	3.679525	24.8
2011/06/30	32.8	1019292	-11450	175645	4.647059	25.6
2011/09/30	33.9	1033943	-26819	188572	5.425904	25.0
2011/12/31	34.7	1052115	-12984	194277	6.213705	23.8
2012/03/31	35.0	1018377	-34020	181802	6.182026	25.0
2012/06/30	35.9	1048866	-40795	185394	5.902192	24.8
2012/09/30	36.2	1057278	-51603	189093	5.201992	25.2
2012/12/31	37.4	1073432	-40826	199253	5.631493	24.5
2013/03/31	37.6	1038973	-51964	189523	5.876011	25.0
2013/06/30	38.5	1073797	-47031	191476	5.573248	25.3
2013/09/30	39.3	1083914	-69716	204636	6.259863	24.5
2013/12/31	40.4	1105607	-37353	210388	5.434783	24.1
2014/03/31	40.2	1058057	-49181	197029	5.804481	25.2
2014/06/30	40.9	1088318	-50025	187210	6.636501	25.5
2014/09/30	42.3	1095636	-57482	196170	6.386138	25.4
2014/12/31	43.3	1121107	-41999	205129	5.694649	24.3
2015/03/31	42.8	1083841	-47179	195858	4.282964	26.4
2015/06/30	43.3	1099417	-25713	190326	4.526167	25.0
2015/09/30	44.5	1107572	-65198	205614	4.513727	25.5
2015/12/31	45.2	1129962	-53743	204340	4.830469	24.5
2016/03/31	44.9	1083941	-61177	196719	6.506691	26.7
2016/06/30	45.7	1113437	-11273	194359	6.495264	26.6
2016/09/30	46.0	1117489	-48264	191468	6.411398	27.1
2016/12/31	47.1	1135304	-6641	198212	6.867523	26.5
2017/03/31	46.2	1091114	-36746	192014	6.499134	27.7
2017/06/30	47.2	1125688	-22001	181617	5.209657	27.7
2017/09/30	48.6	1132522	-43125	193771	4.560669	27.7
2017/12/31	48.6	1152378	-18365	197481	4.519071	26.7
2018/03/31	48.5	1105469	-68363	191821	3.946298	26.7
2018/06/30	50.1	1135491	-19074	184357	4.307569	27.2
2018/09/30	51.1	1156802	-56045	191962	4.921969	27.5
2018/12/31	51.5	1174022	-13610	187454	4.879016	27.1
2019/03/31	51.4	1110666	-55729	185795	4.148728	27.6

2019/06/30	52.8	1146154	-28188	179269	4.438441	29.0
2019/09/30	55.5	1157786	-65611	191762	4.157132	29.1
2019/12/31	56.1	1169060	3023	185594	3.744327	29.1
2020/03/31	57.1	1122363	-9660	175265	4.321683	30.1
2020/06/30	62.2	960060	-11231	133327	2.32816	23.3
2020/09/30	67.3	1095594	62697	158027	3.03918	30.8
2020/12/31	68.9	1132310	66435	167202	3.17171	32.5
2021/03/31	70.1	1095642	36073	157994	3.097983	32.6
2021/06/30	67.8	1144142	100705	154717	4.947635	34.4
2021/09/30	68.0	1125106	36221	160667	4.939588	34.9
2021/12/31	68.8	1148153	53679	164497	5.441696	35.3
2022/03/31	67.8	1123336	7471	164856	5.83508	34.5
2022/06/30	69.8	1146733	-1232	161414	6.675843	33.9
2022/09/30	71.2	1171675	-26459	170015	7.924145	32.9
2022/12/31	71.1	1157518	-9781	172174	7.674263	32.7

Appendix 2 Differenced Data

	GDP	PDBT01	FB	INV_GFCF _	INF	UNEMP
1	NA	NA	NA	NA	NA	NA
2	25229	4.6	-443	3188	-2.515518	0.0
3	9935	-0.2	-2410	352	1.975407	0.0
4	8840	1.0	589	5951	0.668761	0.0
5	-21197	-0.8	-965	-2753	0.159778	-3.1
6	12107	1.7	-2330	6642	0.693893	0.0
7	22129	0.3	1175	-1628	-2.926022	0.0
8	6657	-1.0	2895	3120	-1.165838	0.0
9	-17294	-0.1	-1639	-414	-0.051106	2.4
10	22528	-0.2	-969	4835	-0.429287	0.0
11	11704	0.3	752	84	1.548908	0.0
12	7769	-0.5	1185	2707	1.515354	0.0
13	-22477	-0.4	-2187	-2144	0.465865	1.7
14	23411	1.3	725	1857	-0.231203	0.0
15	6597	-0.8	-1075	1626	-0.762772	0.0
16	4039	-0.5	1516	6411	-1.731189	0.0
17	-27729	-0.6	2428	-3483	-1.390161	4.2
18	21275	0.7	-2392	-874	-0.373869	0.0
19	4092	0.2	-5258	2699	2.616317	0.0
20	3365	-0.4	1988	4173	1.342929	0.0
21	-21730	-0.6	9113	-8893	-0.616136	-1.9
22	26997	0.8	-6528	-4791	-1.175670	0.0
23	10238	-0.2	479	496	-3.951559	0.0
24	9480	-2.0	-1938	2923	-1.380362	0.0
25	-23322	-0.7	4810	-722	0.832949	3.4
26	26787	0.0	-996	1167	2.138294	0.0
27	23148	-0.5	-5055	2160	1.670964	-3.4
28	4655	-1.5	8206	3729	0.414453	0.0
29	-29429	-1.3	250	-1974	0.406872	1.3
30	27465	0.5	-1597	-732	-1.012885	0.0
31	8234	0.5	-5611	1051	-1.632798	1.6

32	8126	0.4	5562	1752	-0.470568	0.0
33	-19108	-2.2	5087	-1739	1.464751	1.5
34	30180	0.1	-5585	323	2.063577	0.0
35	6931	-0.9	-993	3641	2.885022	-1.1
36	11143	-3.3	2633	5238	2.852140	0.0
37	-25044	-1.4	1378	164	-2.166380	2.7
38	31160	0.7	-13194	-430	-3.118112	0.0
39	5598	0.2	7034	5372	-3.900142	-0.9
40	6810	0.3	-2251	6483	-5.113281	0.0
41	-15574	-1.8	3090	1860	-1.032890	-2.0
42	32195	0.7	-13234	-713	0.041474	0.0
43	15916	0.5	959	6622	0.837560	-3.4
44	12250	-0.2	1409	7036	2.532621	0.0
45	-18150	-1.1	3621	-313	0.283265	1.2
46	31865	0.8	-4376	1206	-0.072504	0.0
47	18934	-0.5	-3620	5133	0.534916	-0.7
48	9359	-0.4	2518	7016	-0.336018	0.0
49	-18488	-1.6	-4266	841	-0.013107	-0.4
50	31186	1.0	1376	2054	0.494063	0.0
51	24088	0.2	-1358	7553	1.221335	-1.0
52	25576	-1.2	-11869	8237	0.841963	0.0
53	-25608	-2.1	12510	5942	0.535275	1.5
54	24612	-0.6	-10402	330	0.874358	0.0
55	20806	-0.4	-9990	4599	0.268573	-2.6
56	24010	-0.6	7252	7252	0.950306	0.0
57	-34440	-0.6	-4520	5101	1.718787	2.2
58	33444	0.0	2856	3376	0.965327	-0.6
59	8106	-0.2	-10364	8846	1.357621	0.2
60	4085	0.5	21542	8570	-1.165560	-1.3
61	-56107	-0.4	-5314	-14884	-1.259262	1.5
62	18542	1.2	11939	-8426	-0.698465	0.2
63	14442	1.2	-28	-5952	-1.869042	1.3
64	17761	1.0	1761	-1804	-0.564135	-0.4
65	-27354	1.3	-8282	2333	-0.339554	1.0
66	26401	1.4	12694	-11203	-1.211695	0.0
67	15421	0.6	-9315	5841	-0.789104	0.3

68	15894	0.9	23713	10042	0.108014	-1.5
69	-25318	0.7	-21597	2614	0.193948	0.9
70	24928	0.9	4052	-8354	0.967534	0.8
71	14651	1.1	-15369	12927	0.778845	-0.6
72	18172	0.8	13835	5705	0.787801	-1.2
73	-33738	0.3	-21036	-12475	-0.031679	1.2
74	30489	0.9	-6775	3592	-0.279834	-0.2
75	8412	0.3	-10808	3699	-0.700200	0.4
76	16154	1.2	10777	10160	0.429501	-0.7
77	-34459	0.2	-11138	-9730	0.244518	0.5
78	34824	0.9	4933	1953	-0.302763	0.3
79	10117	0.8	-22685	13160	0.686615	-0.8
80	21693	1.1	32363	5752	-0.825080	-0.4
81	-47550	-0.2	-11828	-13359	0.369698	1.1
82	30261	0.7	-844	-9819	0.832020	0.3
83	7318	1.4	-7457	8960	-0.250363	-0.1
84	25471	1.0	15483	8959	-0.691489	-1.1
85	-37266	-0.5	-5180	-9271	-1.411685	2.1
86	15576	0.5	21466	-5532	0.243203	-1.4
87	8155	1.2	-39485	15288	-0.012440	0.5
88	22390	0.7	11455	-1274	0.316742	-1.0
89	-46021	-0.3	-7434	-7621	1.676222	2.2
90	29496	0.8	49904	-2360	-0.011427	-0.1
91	4052	0.3	-36991	-2891	-0.083866	0.5
92	17815	1.1	41623	6744	0.456125	-0.6
93	-44190	-0.9	-30105	-6198	-0.368389	1.2
94	34574	1.0	14745	-10397	-1.289477	0.0
95	6834	1.4	-21124	12154	-0.648988	0.0
96	19856	0.0	24760	3710	-0.041598	-1.0
97	-46909	-0.1	-49998	-5660	-0.572773	0.0
98	30022	1.6	49289	-7464	0.361271	0.5
99	21311	1.0	-36971	7605	0.614400	0.3
100	17220	0.4	42435	-4508	-0.042953	-0.4
101	-63356	-0.1	-42119	-1659	-0.730288	0.5
102	35488	1.4	27541	-6526	0.289713	1.4
103	11632	2.7	-37423	12493	-0.281309	0.1

104	11274	0.6	68634	-6168	-0.412805	0.0
105	-46697	1.0	-12683	-10329	0.577356	1.0
106	-162303	5.1	-1571	-41938	-1.993523	-6.8
107	135534	5.1	73928	24700	0.711020	7.5
108	36716	1.6	3738	9175	0.132530	1.7
109	-36668	1.2	-30362	-9208	-0.073727	0.1
110	48500	-2.3	64632	-3277	1.849652	1.8
111	-19036	0.2	-64484	5950	-0.008047	0.5
112	23047	0.8	17458	3830	0.502108	0.4
113	-24817	-1.0	-46208	359	0.393384	-0.8
114	23397	2.0	-8703	-3442	0.840763	-0.6
115	24942	1.4	-25227	8601	1.248302	-1.0
116	-14157	-0.1	16678	2159	-0.249882	-0.2

Appendix 3 ARDL Model

Dependent Variable: @LOG(GDP)

Method: ARDL

Sample: 1995Q1 2022Q4

Included observations: 112

Dependent lags: 4 (Automatic)

Automatic-lag linear regressors (4 max. lags): @LOG(PDBT) FB

@LOG(GFCF) INF UNEMP

Deterministics: Restricted constant and no trend (Case 2)

Model selection method: Akaike info criterion (AIC)

Number of models evaluated: 12500

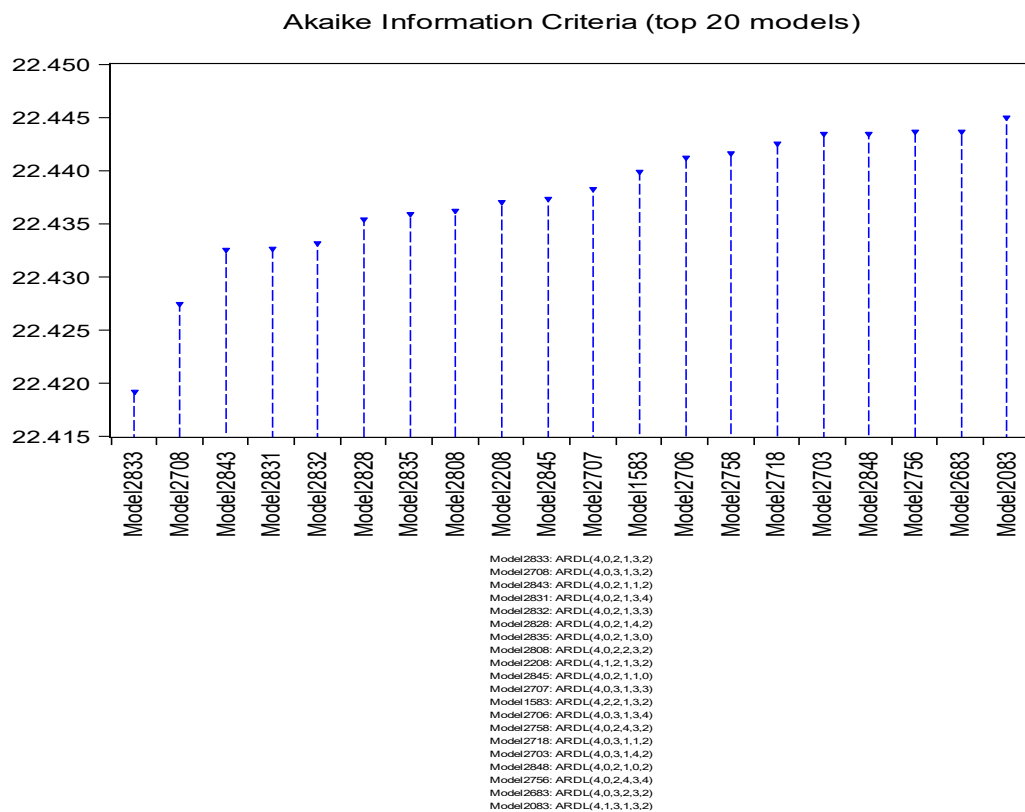
Selected model: ARDL(4,0,2,4,3,2)

Variable	Coefficient			
	t	Std. Error	t-Statistic	Prob.*
LOG(GDP(-1))	0.341428	0.094762	3.603007	0.0005
LOG(GDP(-2))	0.036548	0.102278	0.357337	0.7217
LOG(GDP(-3))	0.011253	0.101676	0.110677	0.9121
LOG(GDP(-4))	0.382977	0.086962	4.403946	0.0000
LOG(PDBT)	0.011491	0.007690	1.494284	0.1386
FB	1.74E-07	1.22E-07	1.422680	0.1582
FB(-1)	-2.71E-07	1.20E-07	-2.248292	0.0270
FB(-2)	1.69E-07	1.27E-07	1.329612	0.1870
LOG(GFCF)	0.379513	0.040825	9.296079	0.0000
-				
LOG(GFCF(-1))	0.265338	0.062180	-4.267221	0.0000
LOG(GFCF(-2))	0.057320	0.065625	0.873446	0.3847
LOG(GFCF(-3))	0.052060	0.067520	0.771028	0.4427
-				
LOG(GFCF(-4))	0.117542	0.050565	-2.324587	0.0223
-				
INF	0.000109	0.001700	-0.064268	0.9489
-				
INF(-1)	0.002358	0.002954	-0.798408	0.4267
INF(-2)	0.003973	0.002956	1.343935	0.1823

	-			
INF(-3)	0.003810	0.001730	-2.201769	0.0302
UNEMP	0.002118	0.001422	1.489013	0.1399
UNEMP(-1)	0.002304	0.001631	1.412927	0.1611
	-			
UNEMP(-2)	0.002835	0.001277	-2.219289	0.0290
C	1.678178	0.648322	2.588495	0.0112
	Mean	dependent	13.7158	
R-squared	0.994826	var	8	
Adjusted	R-		0.21215	
squared	0.993689	S.D. dependent	var 7	
			-	
			5.16113	
S.E. of regression	0.016854	Akaike info criterion	0	
			-	
			4.65141	
Sum squared resid	0.025848	Schwarz criterion	2	
			-	
		Hannan-Quinn	4.95432	
Log likelihood	310.0233	criter.	1	
			1.87777	
F-statistic	874.9091	Durbin-Watson stat	8	
Prob(F-statistic)	0.000000			

*Note: p-values and any subsequent test results do not account for model selection.

Appendix 4 Lag order selection Criteria



Appendix 5 ECM

Dependent Variable: D(GDP)

Method: ARDL

Sample: 1995Q1 2022Q4

Included observations: 112

Dependent lags: 4 (Automatic)

Automatic-lag linear regressors (4 max. lags): PDBT

FB GFCF INF

UNEMP

Static regressors:

@EXPAND(@QUARTER,

@DROPLAST)

Deterministics: Restricted constant and no trend (Case 2)

Model selection method: Akaike info criterion (AIC)

Number of models evaluated: 12500

Selected model: ARDL(1,2,1,4,3,1)

	Coefficien			
	t	Std. Error	t-Statistic	Prob.
	-			
PDBT(-1)	0.300641	0.075998	-3.955928	0.0002
FB(-1)	0.003998	0.001512	2.643850	0.0097
	-			
GFCF(-1)	0.014062	0.084626	-0.166169	0.8684
INF(-1)	0.935575	0.233599	4.005040	0.0001
	-			
UNEMP(-1)	1928.751	722.1394	-2.670884	0.0090
C	2101.609	731.7563	2.872006	0.0051
D(PDBT)	81731.79	28200.03	2.898287	0.0047
D(PDBT(-1))	0.000317	0.000353	0.898924	0.3711
	-			
D(FB)	0.004202	0.001765	-2.381445	0.0193
D(GFCF)	0.342833	0.087473	3.919285	0.0002
D(GFCF(-1))	2.097322	0.228114	9.194169	0.0000
D(GFCF(-2))	0.076706	0.223839	0.342683	0.7326
	-			
D(GFCF(-3))	0.119679	0.218883	-0.546775	0.5859
	-			
D(INF)	0.494691	0.206961	-2.390260	0.0189
D(INF(-1))	323.8053	1321.042	0.245114	0.8069
	-			
D(INF(-2))	990.6277	1431.450	-0.692045	0.4907
D(UNEMP)	3324.206	1323.455	2.511764	0.0138
@QUARTER=1	5018.228	1092.405	4.593745	0.0000
	-			
@QUARTER=2	25674.98	5193.936	-4.943261	0.0000
@QUARTER=3	23133.43	5650.673	4.093925	0.0001
	11213.62	4938.165	2.270806	0.0255
Adjusted R-squared	0.862142	Mean dependent var	4841.99	1

			31618.3
S.E. of regression	0.831844	S.D. dependent var	4
			21.9453
Sum squared resid	12965.69	Akaike info criterion	6
			22.4550
Log likelihood	1.53E+10	Schwarz criterion	8
	-	Hannan-Quinn	22.1521
F-statistic	1207.940	criter.	7
			2.01858
Prob(F-statistic)	28.45504	Durbin-Watson stat	0
	0.000000		

Appendix 6 Conditional error correction

Dependent Variable: D(_GDP)

Method: ARDL

Sample: 5 116

Included observations: 112

Dependent lags: 4 (Automatic)

Automatic-lag linear regressors (4 max. lags):

_GVDBT _FB _INV _INF

_UNEMP

Deterministics: Restricted constant and
no trend (Case 2)

Model selection method: Akaike info criterion (AIC)

Number of models evaluated: 12500

Selected model: ARDL(4,4,4,1,3,1)

	Coefficien			
	t	Std. Error	t-Statistic	Prob.
_GVDBT(-1)	-2.143857	0.335993	-6.380659	0.0000
_FB(-1)	-0.020142	0.022599	-0.891276	0.3752
_INV(-1)	0.401176	0.146762	2.733520	0.0076
_INF(-1)	0.245008	0.178738	1.370763	0.1739
_UNEMP(-1)	-0.283598	0.093557	-3.031275	0.0032
C	-0.055638	0.053366	-1.042561	0.3000
D(_GDP(-1))	1.970295	2.809811	0.701220	0.4850
D(_GDP(-2))	0.890672	0.265567	3.353845	0.0012
D(_GDP(-3))	0.569918	0.177987	3.202013	0.0019
D(_GVDBT)	0.284183	0.095851	2.964838	0.0039
D(_GVDBT(-1))	-0.387641	0.161751	-2.396529	0.0186
D(_GVDBT(-2))	0.224358	0.172669	1.299349	0.1972
D(_GVDBT(-3))	-0.151268	0.155713	-0.971454	0.3340
D(_FB)	-0.234596	0.140984	-1.663991	0.0996
D(_FB(-1))	0.383240	0.132465	2.893135	0.0048
D(_FB(-2))	-0.317739	0.152552	-2.082824	0.0401
D(_FB(-3))	-0.209425	0.143720	-1.457175	0.1486
D(_INV)	-0.346572	0.130750	-2.650644	0.0095
D(_INF)	1.250586	0.317646	3.937048	0.0002
D(_INF(-1))	0.092910	0.153259	0.606226	0.5459
D(_INF(-2))	-0.113176	0.160126	-0.706791	0.4815
D(_UNEMP)	0.366364	0.144069	2.542966	0.0127

	0.570862	0.114191	4.999175	0.0000
Adjusted	R-	Mean	dependent	-
squared	0.876712	var	0.02636	0
				3.58951
S.E. of regression	0.846237	S.D. dependent var	4	
				3.70242
Sum squared resid	1.407543	Akaike info criterion	0	
				4.26068
Log likelihood	176.3248	Schwarz criterion	4	
		Hannan-Quinn	3.92892	
F-statistic	-184.3355	criter.	5	
				2.05493
Prob(F-statistic)	28.76771	Durbin-Watson stat	3	
	0.000000			

Appendix 7 Error correction

Dependent Variable: D(_GDP)

Method: ARDL

Sample: 5 116

Included observations: 112

Dependent lags: 4 (Automatic)

Automatic-lag linear regressors (4 max. lags):

_GVDBT _FB _INV _INF

_UNEMP

Deterministics: Restricted constant and
no trend (Case 2)

Model selection method: Akaike info criterion (AIC)

Number of models evaluated: 12500

Selected model: ARDL(4,4,4,1,3,1)

	Coefficien			
	t	Std. Error	t-Statistic	Prob.
D(_GDP(-1))	-2.143857	0.295287	-7.260256	0.0000
D(_GDP(-2))	0.890672	0.233162	3.819975	0.0002
D(_GDP(-3))	0.569918	0.157405	3.620710	0.0005
D(_GVDBT)	0.284183	0.088043	3.227787	0.0017
D(_GVDBT(-1))	-0.387641	0.144344	-2.685531	0.0085
D(_GVDBT(-2))	0.224358	0.148802	1.507758	0.1349
D(_GVDBT(-3))	-0.151268	0.138252	-1.094145	0.2767
D(_FB)	-0.234596	0.125129	-1.874828	0.0639
D(_FB(-1))	0.383240	0.117379	3.264968	0.0015
D(_FB(-2))	-0.317739	0.132662	-2.395104	0.0186
D(_FB(-3))	-0.209425	0.129294	-1.619758	0.1086
D(_INV)	-0.346572	0.122405	-2.831348	0.0057
D(_INF)	1.250586	0.292176	4.280256	0.0000
D(_INF(-1))	0.092910	0.129271	0.718720	0.4741
D(_INF(-2))	-0.113176	0.151051	-0.749254	0.4556
D(_UNEMP)	0.366364	0.128382	2.853696	0.0053

	0.570862	0.105283	5.422181	0.0000
				-
Adjusted	R-	Mean	dependent	0.02636
squared	0.876712	var		0
				3.58951
S.E. of regression	0.855948	S.D. dependent var	4	
				3.59527
Sum squared resid	1.362370	Akaike info criterion	7	
				4.00790
Log likelihood	176.3248	Schwarz criterion	7	
		Hannan-Quinn	3.76269	
F-statistic	-184.3355	criter.	4	
				2.05493
Prob(F-statistic)	42.22227	Durbin-Watson stat	3	
	0.000000			

Appendix 8 Bounds test

Null hypothesis: No levels relationship

Number of cointegrating variables: 5

Trend type: Rest. constant (Case 2)

Sample size: 112

Test Statistic	Value
F-statistic	7.054598

	10%		5%		1%	
Sample Size	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
Asymptotic						
c	2.080	3.000	2.390	3.380	3.060	4.150

Appendix 9 Diagnostic Test Serial Correlation

Breusch-Godfrey Serial Correlation LM Test:

Null hypothesis: No serial correlation at up to 4 lags

F-statistic	0.300095	Prob. F(4,93)	0.8772
		Prob. Chi-Square(4)	
Obs*R-squared	1.439940		0.8372

Test Equation:

Dependent Variable: RESID

Method: ARDL

Sample (adjusted): 1994Q4 2022Q4

Included observations: 113 after adjustments

Presample missing value lagged residuals set to zero.

	Coefficien			
	t	Std. Error	t-Statistic	Prob.
LOG(PDBT)	0.026533	0.102015	0.260087	0.7954
-				
FB	0.001160	0.007287	-0.159184	0.8739
FB(-1)	3.80E-09	8.77E-08	0.043326	0.9655
LOG(GFCF)	-9.92E-09	8.74E-08	-0.113411	0.9099
LOG(GFCF(-1))	0.003148	0.039831	0.079027	0.9372
-				
INF	0.016284	0.058456	-0.278559	0.7812
INF(-1)	2.24E-05	0.001397	0.016033	0.9872
INF(-2)	-1.04E-05	0.002323	-0.004464	0.9964
INF(-3)	4.31E-06	0.002166	0.001989	0.9984
UNEMP	6.88E-05	0.001273	0.054025	0.9570
-				
UNEMP(-1)	0.000170	0.001219	-0.139378	0.8895
@QUARTER=1	-4.23E-05	0.001198	-0.035272	0.9719
@QUARTER=2	0.000750	0.005415	0.138422	0.8902
@QUARTER=3	0.001205	0.005361	0.224775	0.8226
C	0.000224	0.004135	0.054214	0.9569
-				
RESID(-1)	0.186619	0.730951	-0.255309	0.7990
-				
RESID(-2)	0.062418	0.154778	-0.403273	0.6877
-				
RESID(-3)	0.072982	0.129072	-0.565435	0.5731
-				
RESID(-4)	0.002522	0.119188	-0.021164	0.9832
	0.081913	0.113315	0.722879	0.4716
Adjusted R-squared	0.012743	Mean var	dependent	6.83E-17
-				0.01275
S.E. of regression	0.188955	S.D. dependent var	8	

			-
			5.55308
Sum squared resid	0.013911	Akaike info criterion	7
			-
			5.07036
Log likelihood	0.017997	Schwarz criterion	3
			-
		Hannan-Quinn	5.35720
F-statistic	333.7494	criter.	2
			1.99884
Prob(F-statistic)	0.063178	Durbin-Watson stat	9
	1.000000		

Appendix 10 Heteroskedasticity

Heteroskedasticity Test: Breusch-Pagan-Godfrey

Null hypothesis: Homoskedasticity

F-statistic	5.794993	Prob. F(15,97)	0.0000
		Prob.	Chi-
Obs*R-squared	53.40502	Square(15)	0.0000
Scaled explained		Prob.	Chi-
SS	103.3247	Square(15)	0.0000

Test Equation:

Dependent Variable: RESID^2

Method: Least Squares

Sample (adjusted): 1994Q4 2022Q4

Included observations: 113 after adjustments

Variable	Coefficien			
	t	Std. Error	t-Statistic	Prob.
	-			
C	0.004294	0.009695	-0.442926	0.6588
LOG(GDP(-1))	0.000912	0.001319	0.691568	0.4909
LOG(PDBT)	0.000123	0.000118	1.042392	0.2998
FB	9.79E-10	1.77E-09	0.552992	0.5815
FB(-1)	1.53E-09	1.76E-09	0.869308	0.3868
	-			
LOG(GFCF)	0.004430	0.000817	-5.420321	0.0000
LOG(GFCF(-1))	0.003704	0.000923	4.012074	0.0001
INF	-4.01E-05	2.87E-05	-1.395797	0.1660
INF(-1)	9.75E-05	4.79E-05	2.036339	0.0444
	-			
INF(-2)	0.000101	4.49E-05	-2.244621	0.0271
INF(-3)	4.31E-05	2.63E-05	1.639293	0.1044
UNEMP	-7.22E-05	2.46E-05	-2.935031	0.0042
UNEMP(-1)	2.61E-05	2.43E-05	1.072189	0.2863

-				
@QUARTER=1	0.000135	0.000111	-1.211856	0.2285
@QUARTER=2	-4.80E-05	9.72E-05	-0.494180	0.6223
@QUARTER=3	8.63E-05	8.59E-05	1.004299	0.3177
		Mean	dependent	0.00016
R-squared	0.472611	var		1
Adjusted	R-			0.00037
squared	0.391056	S.D. dependent	var	1
-				
13.3245				
S.E. of regression	0.000290	Akaike info criterion	2	
-				
12.9383				
Sum squared resid	8.14E-06	Schwarz criterion	4	
-				
Hannan-Quinn				
13.1678				
Log likelihood	768.8356	criter.	2	
1.56148				
F-statistic	5.794993	Durbin-Watson stat	8	
Prob(F-statistic)	0.000000			

Heteroskedasticity Test: White

Null hypothesis: Homoskedasticity

F-statistic	5.253486	Prob. F(20,91)	0.0000
		Prob.	Chi-
Obs*R-squared	60.01849	Square(20)	0.0000
Scaled explained		Prob.	Chi-
SS	106.0771	Square(20)	0.0000

Test Equation:

Dependent Variable: RESID^2

Method: Least Squares

Sample (adjusted): 1995Q1 2022Q4

Included observations: 112 after adjustments

Variable	Coefficien			
	t	Std. Error	t-Statistic	Prob.
C	5.35E+08	2.08E+08	2.576062	0.0116
GDP(-1)^2	0.000156	0.000569	0.274638	0.7842
PDBT^2	-9.80E-08	1.01E-07	-0.969082	0.3351
PDBT(-1)^2	-1.19E-07	1.03E-07	-1.147387	0.2542
PDBT(-2)^2	3.23E-06	1.86E-06	1.737384	0.0857
FB^2	0.024758	0.020239	1.223312	0.2244
-				
FB(-1)^2	0.014269	0.020209	-0.706077	0.4819
-				
GFCF^2	0.058139	0.011854	-4.904537	0.0000
GFCF(-1)^2	0.025483	0.017094	1.490735	0.1395
GFCF(-2)^2	0.000665	0.014910	0.044628	0.9645
GFCF(-3)^2	0.035620	0.014519	2.453270	0.0161
-				
GFCF(-4)^2	0.008510	0.011076	-0.768360	0.4443
-				
INF^2	373946.5	1709598.	-0.218734	0.8273
INF(-1)^2	3402657.	2776745.	1.225412	0.2236
-				
INF(-2)^2	3970687.	2761050.	-1.438107	0.1538
INF(-3)^2	1483739.	1706213.	0.869610	0.3868
-				
UNEMP^2	2157887.	376880.5	-5.725654	0.0000
UNEMP(-1)^2	1423721.	410128.6	3.471400	0.0008
(@QUARTER=1)^2				
2	61431574	86899094	0.706930	0.4814
(@QUARTER=2)^2				
2	56153368	93896855	-0.598032	0.5513
(@QUARTER=3)^2				
2	48995041	79369805	-0.617301	0.5386

		Mean	dependent	1.37E+0
R-squared	0.535879	var		8
Adjusted	R-			3.17E+0
squared	0.433875	S.D.	dependent var	8
				41.5881
S.E. of regression	2.39E+08	Akaike info	criterion	7
				42.0978
Sum squared resid	5.19E+18	Schwarz	criterion	9
	-	Hannan-Quinn		41.7949
Log likelihood	2307.938	criter.		8
				1.71819
F-statistic	5.253486	Durbin-Watson	stat	8
Prob(F-statistic)	0.000000			
