

All changes undertaken as per examiner comments and approved.

A handwritten signature in black ink, appearing to read 'Pundy Pillay', written in a cursive style.

Professor Pundy Pillay, Supervisor

5 April 2023

**Measuring the Fiscal Space for South Africa to Support Economic
Growth and Development**

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A research report submitted to the Faculty of Commerce, Law and Management,
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Abstract

A number of developing and emerging market economies are faced with economic challenges that will require governments to access additional resources in order to invest in their economies. This thesis seeks to answer two research questions: 1) Should governments increase fiscal spending or government debt to finance the investment in the productive capacity of the economy in order to support and drive economic growth? and 2) Will an increase in government debt reduce investment and economic growth? Time series data of emerging market economies were used from the period 1994 – 2017 to answer the research questions. The key findings from the emerging market economies analysis confirm the positive relationship between government debt and economic growth across all the identified countries. The research findings indicate that in the identified emerging market economies, economic growth was high, showing an average growth of 5.0% when debt levels were below the 90% ratio. For debt levels above 90% of GDP, economic growth was significantly low, averaging 0.5%. The study's findings indicate that the emerging market economies showed an average public sector investment to GDP ratio of 23.6% at debt levels below 90% of GDP. For debt above 90% of GDP, public sector investment to GDP was slightly lower, averaging 15.3%.

The key findings with regard to measuring debt sustainability using the debt limit of 68% to 97% to GDP as calculated by Ganiko, Melgarejo and Montoro (2016), is that all the emerging market economies have significant room to increase their debt levels, with South Africa obtaining an average debt ratio of 41% for the study period. The findings from the emerging market economies support the themes in the literature review that government debt can influence economic growth through the total factor productivity channel. This will entail increased government investment in infrastructure development, industrial development, education, health and nutrition. The thesis acknowledges that increases in debt levels will increase interest rates, thus reducing the fiscal space available to government. The increase in interest rates calls for a more effective utilisation of monetary policy instead of fiscal policy via the reduction of interest rates and purchasing of zero interest rate government bonds. To achieve this, this study calls for the increased role of monetary policy to use interest rates to achieve debt sustainability and to support economic growth. The thesis provides the policy direction for both fiscal and monetary

policy on how to increase the ‘fiscal space’ available to government to raise additional resources to support economic growth and development.

The study’s contribution to knowledge is the call for a change to the orthodox paradigm and narrative that debt is bad for economic growth and to promote the policy direction of using debt and increased spending to get economies to full employment. The policy directive seeks to support the use of government debt to fund structural reforms, to recapitalise State-Owned Entities, to support industrial development as well as to promote infrastructure and human capital development, with the objective to support economic growth. The thesis argues that debt is not harmful if directed towards the productive side of the economy. The paradigm is embedded within the Keynesian approach which is supported by the new growth theory, functional finance and modern monetary theory on fiscal stimulus and how to finance it. The paradigm shift also talks to moving away from conventional monetary policy and recommends that central banks decrease interest rates, monetise government debt, and create sovereign money in order to support government debt sustainability.

The paradigm shift also seeks to change the conventional policy direction of central banks of increasing money supply indirectly using the banking sector, to directly increase money supply through fiscal policy in order to support economic growth. This will give central banks the tool to direct and influence spending in the economy to meet the objectives of economic growth and job creation. As argued by various economists, this can be achieved through better policy coordination between monetary and fiscal policy, and improved institutional arrangements which will ensure that the creation of money is directed towards economic growth and job creation.

Declaration

I hereby declare that this report is my own and unaided work. It is submitted in fulfilment of the requirements for a PhD in the University of Witwatersrand. It has not been submitted before for any degree or examination in any other university.

Dikgang Motsepe

March 2023

Dedication

I would like to thank the Lord our God and my ancestors for allowing me to undertake this journey and for being with me throughout the PhD journey. I dedicate the PhD to Remogolo Ditlotswane Motsepe and Nkoko Sarah Maisaka Motsepe, badimo ba Motsepe and ba Mamabolo. To my mother who always encouraged and supported me, and my wife and kids who walked the journey with me, this is your PhD.

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Table of Contents

Chapter 1: Introduction

1.1	Introduction	10
1.2	Background	10
1.3	Problem Statement	15
1.4	Purpose of the Study	19
1.5	Research Questions	19
1.6	Structure of the Report	19
1.7	Conclusion	21

Chapter 2: Literature Review

2.1	Introduction	22
2.2	Theoretical Review on Government Debt	22
2.2.1	Neoclassical Approach	22
2.2.2	Ricardian Approach	23
2.2.3	Keynesian Approach	24
2.2.4	Post-Keynesian Approach: Functional Finance	25
2.2.5	Alternative Macroeconomic Policy	26
2.3	Assessment of Fiscal Sustainability	29
2.3.2	Assessment of Government Debt Sustainability	30
2.4	Role of Credit Ratings Agencies	31
2.5	Optimal Fiscal Policy	35
2.5.1	Economic Framework	35
2.5.2	Government Debt Limit - Theoretical Framework	37
2.5.3	Determination of the Debt Limit	38
2.5.4	Defining Fiscal Space	39
2.6	Alternative Approaches to Fiscal Space	41
2.7	Debt Limits and Structure of Government Debt	47
2.7.1	Fiscal Space in Emerging Market Economies	50
2.8	Government Spending and Quality of Fiscal Institutions	57
2.9	Using Debt to Finance Economic Development	60
2.9.1	Liquidity Channel of Using Government Debt	63
2.9.2	Monetary and Fiscal Policy Coordination	69
2.9.3	Sovereign Money	73
2.10	Conclusion	76

Chapter 3: Research Methodology	80
3.1 Introduction	80
3.2 Econometric Approach to Measure Fiscal Space / Debt Limit	80
3.3 Approaches to Measure Debt Sustainability	81
3.4 Approaches to Addressing the Research Questions	82
3.4.1 Debt sustainability	83
3.5 Building a case for South Africa	84
3.6 Testing of Model and Data	85
3.6.1 Normality Test	85
3.6.2 Stationary Test	85
3.7 Limitations of the Study	85
3.8 Contribution to Knowledge	85
3.9 Conclusion	86
Chapter 4: Building a Case for South Africa's Debt Position	87
4.1 Introduction	87
4.2 Impact of Public Debt to Economic Growth.....	87
4.2.1 Impact of Public Debt to Economic Development	92
4.3 Impact of Public Debt to Public Sector Investment	94
4.3.1 Contribution of Government Debt to Public Investment and Development	99
4.4 Using Interest Rates to Accumulate Debt.....	102
4.4.1 Using Interest Rates to Accumulate Investment.....	107
4.5 Opportunity to Increase Debt Levels	112
4.5.1 South Africa's Bond Market	112
4.5.2 Interest Payment to GDP and Export Revenue.....	114
4.5.3 Liquidity Risk	116
4.5.4 Bonds held by non-residents.....	117
4.6 Conclusion	118
Chapter 5: Data Presentation and Analysis for the Emerging Market Economies	124
5.1 Introduction	124

5.2	Will the Increase in Government Debt Reduce Economic Growth?	125
5.2.1	Government Debt and Economic Growth	125
5.2.2	Government Debt and GDP per Capita Growth	128
5.2.3	Emerging Market Country Covariance Analysis	130
5.2.3.1	Government Debt and Economic Growth	130
5.2.4	Summary Analysis	132
5.3	Should Governments Increase Fiscal Spending or Government Debt to Finance Investment in the Productive Capacity of the Economy to Support and Drive Economic Growth?	135
5.3.1	Government Fixed Capital Formation Analysis	135
5.3.2	Emerging Market Country Covariance Analysis	138
5.3.2.1	Public Sector Investment and Economic Growth	138
5.3.2.2	Debt Ratio and Public Sector Investment	140
5.3.2.3	Debt Ratio and Government Spending	143
5.3.2.4	Government Spending and Economic Growth	145
5.3.3	Summary Analysis	147
5.4	Will the increase of government debt crowd out private sector investment?	150
5.4.1	Emerging Market Country Covariance Analysis	152
5.4.1.1	Interest Rates and Private Sector Investment	152
5.4.1.2	Private Sector Investment and Economic Growth	154
5.4.1.3	Debt Ratio and Private Sector Investment	156
5.4.1.4	Public Sector Investment and Private Sector Investment	158
5.4.3	Summary Analysis	159
5.5	Debt Determinants and Fiscal Sustainability	161
5.5.1	Measuring Fiscal Sustainability	161
5.5.2	Measuring Default Risk	163
5.5.3	Debt Sustainability	166
5.6	Conclusion	169
	Chapter 6: Conclusions and Recommendations	173
6.1	Introduction	173

6.2	Research Findings	175
6.2.1	Should Governments Increase Fiscal Spending or Government Debt to Finance the Investment in the Productive Capacity of the Economy in order to Support and Drive Economic Growth?	175
6.2.2	Will an Increase in Government Debt Reduce Investment and Economic Growth?	176
6.3	Debt Sustainability	178
6.4	Policy Recommendations	179
6.5	Contribution to Knowledge.....	183
	References	184
	Annexure	193

Chapter 1: Introduction

1.1 Introduction

This thesis highlights key theoretical and empirical issues relating to fiscal sustainability, the theory of government debt limits and the measurement of fiscal space, with the objective of measuring the ‘fiscal space’ that South Africa has in order to support and drive economic development. This chapter describes the problem statement, reviews the current challenges faced by developed and developing countries regarding fiscal sustainability, clarifies the relationship between fiscal policy and government debt, and defines ‘government debt limit’ and ‘fiscal space’. Botev, Fournier and Mourougane (2016) define ‘fiscal space’ as the resources available to support government policy objectives and increase spending to support the productive capacity of the economy.

This chapter provides an overview of the research questions to be addressed by the thesis after taking into account the purpose of the study.

1.2 Background

Fiscal sustainability is one of the most debated issues in macroeconomics, taking into account the high debts levels experienced by a number of developed economies since the 1980s. The concerns about increasing government debt and budget deficits, and their potentially negative effect on macroeconomic stability has led to increased interest in the academic literature and in fiscal policy debate. Auerbach (2015) states that high budget deficits during the global recession of 2007 – 2009 contributed to the economic weakness in many of the developed economies, which gave rise to expansionary fiscal measures aimed at stimulating economic growth. This left a number of developed countries with higher levels of government debt, above the recommended 60% threshold. Apart from expansionary fiscal policy measures, developed economies are also facing fiscal challenges over the long run driven by a number of factors such as demographic change and the rising cost of providing old age social security and other priority programmes (Auerbach, 2015).

One of the roles of government in driving economic development is macroeconomic management, which relates to managing budgets and budget deficits. Weiss (1995) states that there is no theoretical prescription for an optimal size of the budget deficit, however,

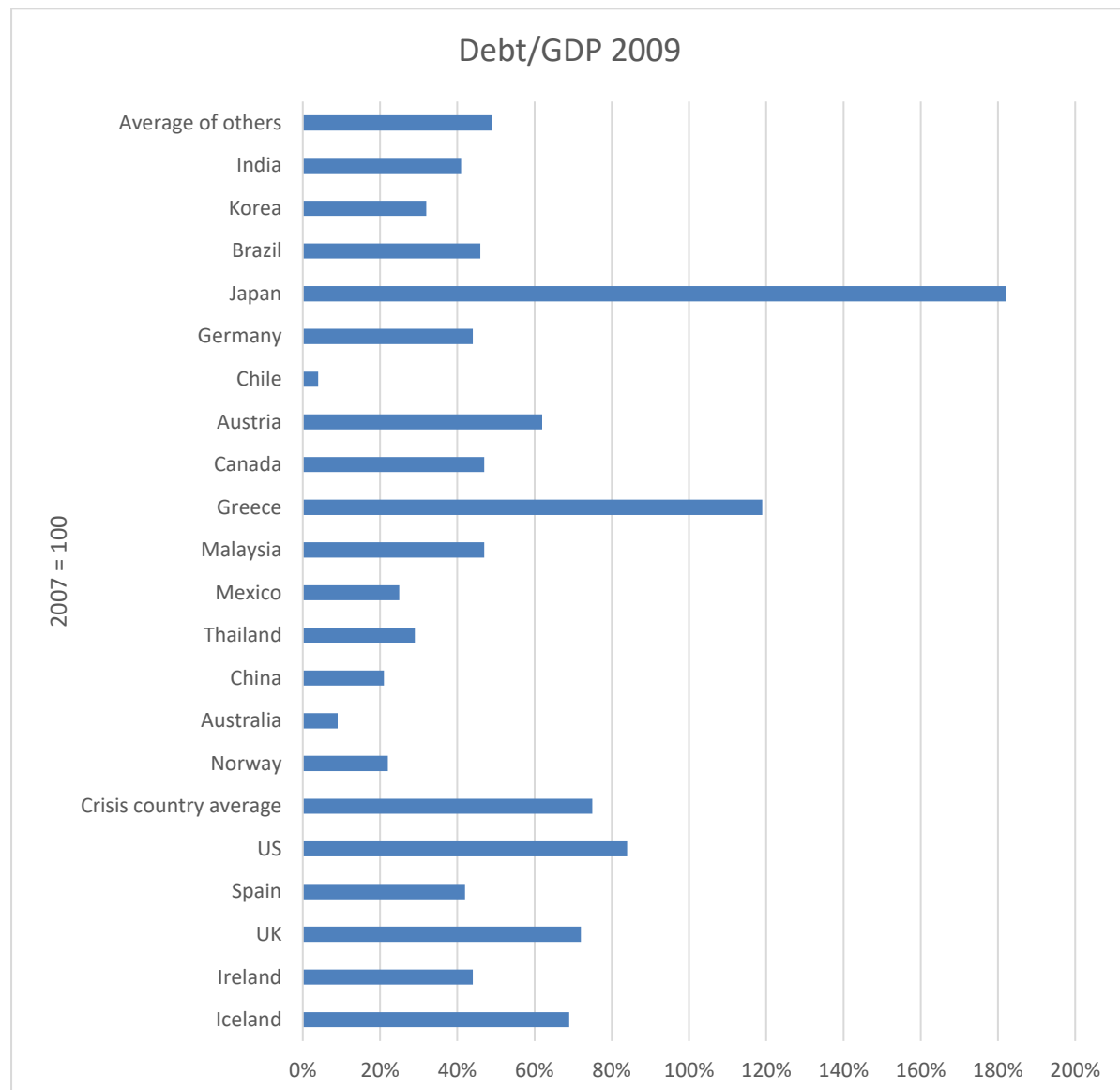
sound fiscal policy does require that budget deficits are not so high as to stimulate inflation, crowd out private sector investment and/or create unsustainable debt levels.

Calitz, du Plessis and Siebrits (2013) reflect on the fiscal discipline of industrialised countries as confirming and guided by the Maastricht Treaty's requirements for European Monetary Union (EMU) member countries, that government debt as a percentage of Gross Domestic Product (GDP) should not exceed 60% and a budget deficit as a percentage to GDP ideally should not be greater than 3%. Southern African Development Community (SADC) member countries have also agreed to a target of 60% government debt as a percentage to GDP (Calitz et al, 2013). The guidelines are recommended to prevent governments from reaching an unsustainable debt position.

A sustainable debt position as defined by the International Monetary Fund (IMF, 2015) is one in which a borrower is expected to be able to continue to service its debt without having to make drastic budget cuts or increase taxes to service its debt. It is also important to indicate that markets can also decide what is sustainable and what is not, and if the markets 'turn against a country's debt', it will lead to an increase in borrowing costs which could lead to an unsustainable position, as issuing new debt becomes expensive and often unaffordable (IMF, 2015).

Ostry, Ghosh and Espinoza (2015) indicate that the current high government debt in advanced economies was a result of the 2007 – 2008 global financial crisis. The average government debt rose by 86% within three years after the financial crisis (Reinhart & Rogoff, 2010). Reinhart and Rogoff (2010) further indicate that some advanced economies (Iceland, Ireland, Spain, the United Kingdom (UK) and United States (US)) on average increased their government debt-to-GDP ratio between 2007 and 2009, to about 75%. This significant increase was a result of the government bailouts, the introduction of stimulus packages in response to the global financial crisis and recession, and the decline in government revenue in many of the advanced and emerging economies (Reinhart & Rogoff, 2010). Figure 1.1 provides further details, for a sample of both advanced and emerging economies.

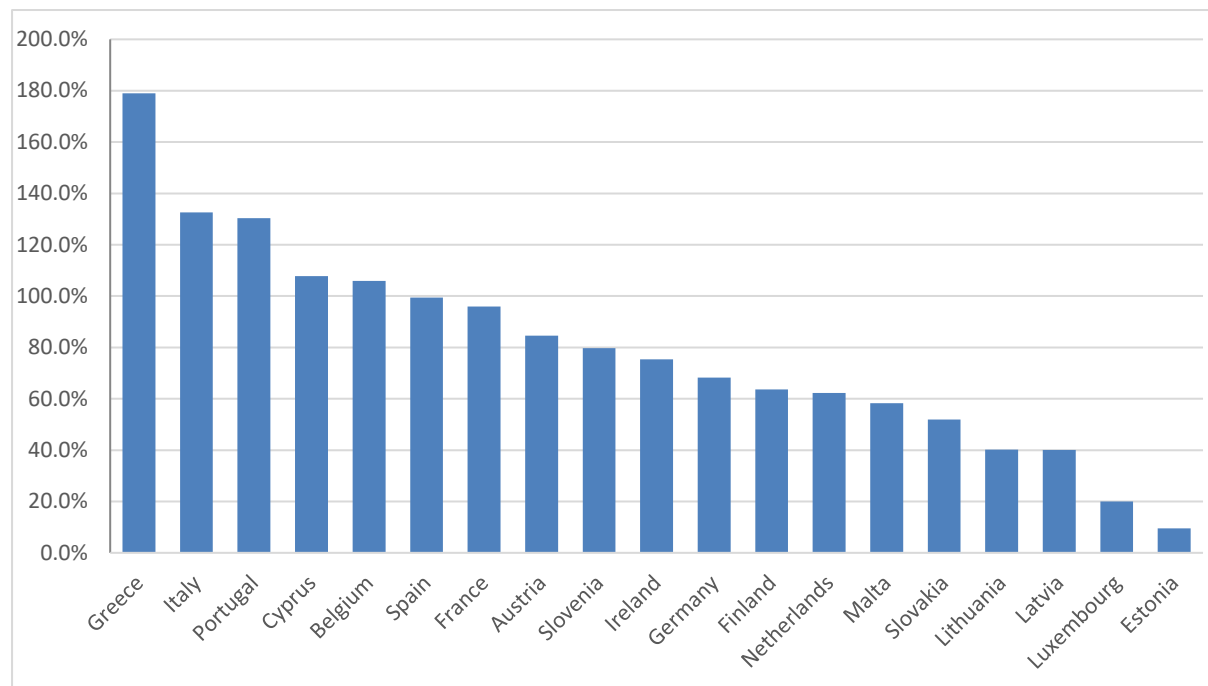
Figure 1.1: Cumulative Increase in Real Government Debt to GDP, 2007 – 2009, Selected Countries



Source: Reinhart and Rogoff (2010:5)

In 2016, the majority of the members of the EMU debt levels were above the 60% threshold. The PIIGS countries (Portugal, Ireland, Italy, Greece and Spain) experienced the highest levels of debt-to-GDP ratio, with Greece recording a high of 179%, followed by Italy and Portugal (132% and 130%, respectively), and Spain (99%). Even Germany exceeded the recommended EMU level of 60%, with only six countries managing to keep their debt levels below the 60% threshold, as indicated in Figure 1.2.

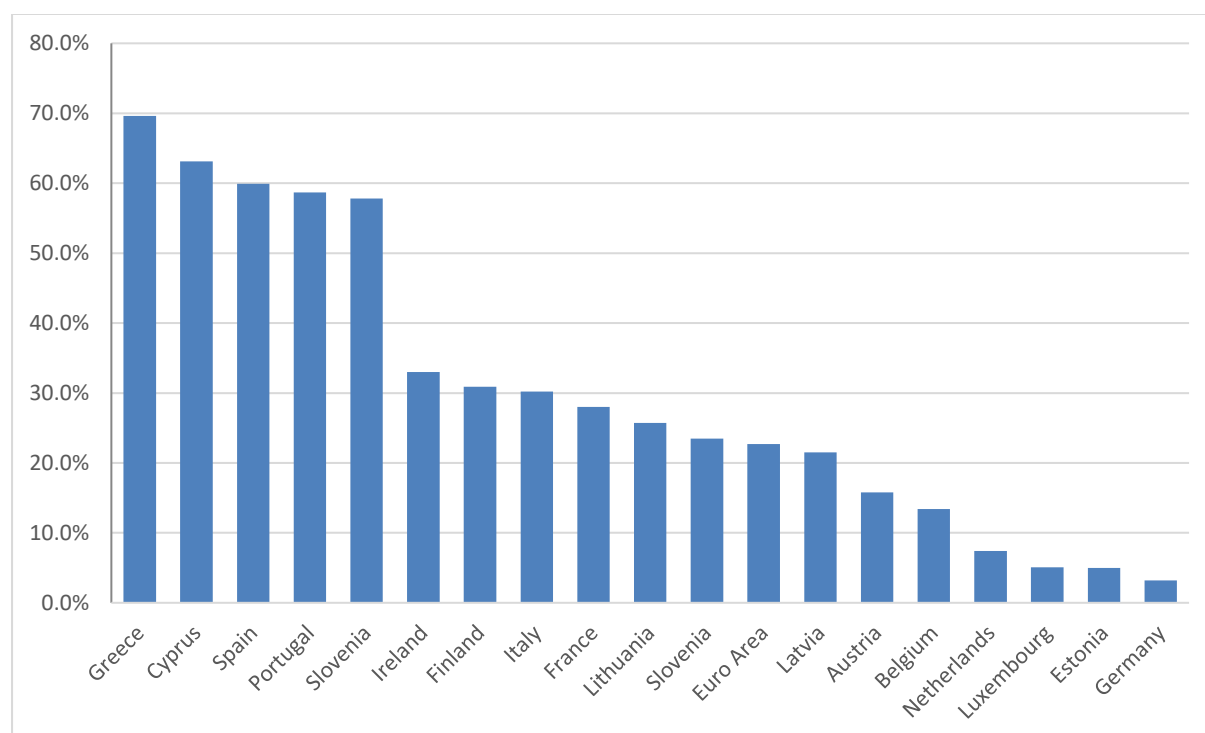
Figure 1.2: Members of the EMU, Debt-to-GDP Ratio (%GDP), 2016



Source: Ministry of Economy and Finance, Italy (2017:5)

Looking at the PIIGS countries in Figure 1.3 below, Greece experienced the highest growth in debt-to-GDP ratio of 69.6% between 2009 and 2016, followed by Spain (59.9%), Portugal (58.7%), and Ireland and Italy (33% and 30.2%, respectively). The Euro area experienced a growth rate of 22.7%, while Germany recorded the lowest growth of debt-to-GDP ratio of 3.2%.

Figure 1.3: Members of the EMU, Debt-to-GDP ratio growth, 2009–2016 (% points, base year, 2008)



Source: Ministry of Economy and Finance, Italy (2017:5)

However, in emerging economies and low-income countries, Ostry et al (2015) state that they are experiencing a depletion of government capital stock, despite facing infrastructure bottlenecks and deficiencies, which is affecting their economic development. Ostry et al (2015) also indicate that governments will need to increase debt in order to deal with such challenges in emerging economies. They further indicate that despite the problem of reducing government debt, governments will need to invest in economic infrastructure and human capital, which should be financed by debt rather than taxes (Ostry et al, 2015).

The economic model applied by Ostry et al (2015) focuses on how government debt, public sector investment and economic growth interact in economies that may not be at full employment with room for ‘fiscal space’, even if there is significant government debt. The model does call for increased government debt to fund public sector investment, which will in turn support economic growth and development (Ostry et al, 2015). This is

supported by the argument that higher debt levels will require higher taxation to service the debt if economic growth is not generated (Ostry et al, 2015).

1.2 Problem Statement

Since the dawn of democracy in 1994, the South African government has focused on improving its credit standing in order to access international capital markets to finance investment needs, economic growth, and development of the country (Kganyago, 2017). Kganyago (2017) further states that any downgrade in sovereign ratings will lead to disinvestment by foreign investors in the South African financial markets, making it difficult to finance the current account deficit. In addition, markets can turn against South Africa's debt as a result of a downgrade, which will lead to an increase in interest rates and investors charging a premium in order to hold government debt. In 2017, 41% of South African government debt was in foreign hands (National Treasury Budget Report, 2018), making the country highly sensitive to global financial pressures and economic shocks. The reliance on foreign investment to finance the country's investment needs has resulted in policy makers being fixated with sovereign ratings and the need of having to please 'the markets'. Kganyago (2017) states that this has led to an obsession with improving sovereign ratings, which has put the country's growth and fiscal performance under the scrutiny of foreign investors.

South Africa's debt as a percentage of GDP was below the 60% threshold for most of the study period; however, it has increased significantly over the past six years following the global financial crisis, due to low economic growth and the introduction of counter-cyclical fiscal stimulus. As a result, the budget deficit as a percentage to GDP increased to levels close to -4%, and the country's debt ratio rose from 21.8% in 2008/09 to 43.5% in 2015/16 financial year (National Treasury Budget Report, 2015/16). Debt levels increased above the 60% threshold in 2019/20 to 63.3% in 2019/20 and reached highs of 80.3% in 2020/21 as a result of government's intervention in the COVID-19 pandemic (National Treasury Budget Report, 2021). National Treasury estimates that debt levels will stabilise at 88.9% in 2025/26 as government continues to respond to the health and economic impact of the pandemic (National Treasury Budget Report, 2021).

Economic theory does indicate that high government spending as a percentage of GDP can harm economic growth, as it may lead to increases in taxes to finance the budget deficit or increases in debt borrowing, which will lead to a ‘crowding out’ (of private sector investment) effect. This is the view of the Neoclassical and Ricardian approaches to government debt, which is discussed in detail in the literature review section. The alternative economic approaches seek to encourage the increased participation of government in the economy and state that governments should not fear increased budget deficits and interest rate payments, but should use the deficit to balance the economy and get the economy to full employment. The alternative approaches challenge the conventional Neoclassical approach of using government debt and increased spending to drive economic growth and development.

The South African economy is constrained by low economic growth, high unemployment, increasing poverty and high levels of inequality, and for the government to address these issues, it will need to increase its fiscal spending to upgrade industrial and infrastructure development, and invest in social programmes. This should provide the necessary stimulus to drive economic growth and drive industrial development that will lead to job creation and income generation. Lin (2011) states that the lack of infrastructure is a constraint to economic growth in developing countries and that governments need to provide the necessary infrastructure to facilitate economic development. The investment by government will drive short-term demand and promote long-term growth (Lin, 2011). Lin (2011) further states that government investment can increase economic growth rates and generate tax revenue in the future to finance the investment.

The World Bank stated in its 2018 report on South Africa that the economy is far from reaching the desired 5% economic growth rate and the required 8% growth to achieve the objectives of the National Development Plan (World Bank Group, 2018). The report further indicated that productivity declined by 6% between 2007 and 2016 due to a lack of private sector investment in innovation (World Bank Group, 2018). The report recommended that the South African economy would need to increase its investment spending and innovation in order to attain positive economic growth (World Bank Group, 2018). This investment could be realised through increased government spending in the economy,

which could then result in the required investment in infrastructure, human capital development, research and development.

Given the economic challenges faced by the South African government and the role government can play in driving economic development through increased investment and spending, this study seeks to determine the optimal debt position or limit for South Africa to support economic growth and development. In the long run, if the economy grows faster than government debt, the risk to government solvency falls away. Thus, the focus here will be mainly on achieving the long-run economic objectives of reaching full employment, rather than the impact of increased government spending and debt on economic growth in the short run. South Africa has maintained fiscal discipline since 1994; however, there is an opportunity to consider introducing the necessary fiscal space that will allow government to address the stated economic development challenges. As stated by Nerlich and Reuter (2015), increased gap between government debt and the debt limit would give rise to the “fiscal space” of a country.

India is a case where government debt to GDP averaged 73% from 1991 to 2016, reaching a high of 84% in 2003 and a low of 66% in 1996 (Trading Economics, 2017). The study undertaken by Mohanty and Mishra (2016) concluded that the high debt levels had a positive and significant impact on economic growth. Expansionary debt policy was helpful to the Indian economy, as it subsequently generated higher levels of economic growth, which led to increased provision of institutional credit to the private sector that in turn increased economic growth (Mohanty & Mishra, 2016).

In support of the ‘fiscal space’ argument, strict fiscal rules will assist in promoting investor confidence by signalling to the market that government is serious about maintaining sound public finances (Nerlich & Reuter, 2015). Nerlich and Reuter (2015) provide the evidence (from a study that looked at 27 EMU countries for the period 1990 – 1994) for fiscal rules (fiscal frameworks such as laws that govern the fiscus, e.g., balanced budget rules, debt rules, expenditure rules) being associated with higher fiscal space, i.e., fiscal rules will keep the debt levels under control by promoting credibility and encouraging governments to reduce their debt and interest payments, which will assist in reducing the debt level and increase the debt limit. Nerlich and Reuter (2015:5) define ‘fiscal space as

the financial resources available to government, to support fiscal policy and invest in physical and human capital, using debt to finance such investments without prejudicing the long-run sustainability of its fiscal position’.

Heller (2005) states that governments have argued for relaxed fiscal measures that will enable them to issue more debt to finance infrastructure projects. Such projects are seen to support the productive capacity of the economy and generate higher economic growth that will be used in turn to finance the debt. In conclusion, this will ensure that government debt can support and drive economic growth and development. South Africa has been experiencing stagnant economic growth since 2010 and high levels of unemployment. The current environment of low interest rates and low levels of inflation in South Africa should be used to increase government debt to invest in the required infrastructure and productive capacity to support economic growth. There is thus a strong case to build for South Africa to use government debt and increased government spending to support economic growth and development.

The thesis argues for the alternative thinking of using government debt and increased government spending to support economic growth and development. In addition, the research brings in the theory of the fiscal space available to government and alternative policies available to government to increase the fiscal space needed to support economic growth.

1.3 Purpose of the Study

As indicated by Ostry et al (2010), many economies are confronted by challenges that will require governments to have more room for fiscal manoeuvre or space. This research discusses what ‘fiscal space’ is, how it is measured, alternative fiscal space measures available to government, and alternative policies available to government to increase the fiscal space needed to support economic growth.

The knowledge contribution of the study is to add to the debate relating to ‘fiscal space’ and the use of government debt to support economic growth and development in the context of South Africa and emerging market economies. Moreover, the purpose of the

research is to add to the alternative thinking of using government debt and increased government spending to support economic growth and development.

1.4 Research Questions

The key area of the research is to determine the “fiscal space” and the use of government debt to support economic growth and development in South Africa and emerging market economies. The focus area raises critical policy questions to be addressed in this research: 1) Should governments increase fiscal spending or government debt to finance the investment in the productive capacity of the economy in order to support and drive economic growth? and 2) Will an increase in government debt reduce investment and economic growth?

1.5 Structure of the Report

This report is presented in six chapters as follows:

Chapter 1: Introduction

This chapter highlights the background to the research study, takes the reader through the problem to be researched and provides an overview of the purpose of the study and the research questions the study seek to address.

Chapter 2: Literature review

The literature review covers the theory on government debt and provides a perspective on the different schools of thought / approaches to government debt and spending in the economy before unpacking the concept of ‘fiscal space’. A theoretical overview of government’s debt limit and the measurement of fiscal space is provided. This covers the different methods of measuring fiscal space and provides an empirical review of the experience in this regard in both developed and developing countries. In addition, the review highlights lessons from both sets of economies regarding the use of government spending and increased government debt to drive economic growth. This chapter also analyses the alternative policy approaches available to government to fund economic growth and finance its debt.

Chapter 3: Methodology

The methodology builds on the literature review, with this chapter providing an overview of the approaches to be used to measure fiscal space and investigate the relationship between government debt and economic growth and development. In addition, the intention is to investigate the relationship between government debt and investments, looking at South Africa and the identified emerging economies.

Chapter 4: Case for South Africa

The chapter provides a time series analysis to build a case for South Africa to increase government debt and spending in order to support economic growth and development. The chapter analyses data from the South African Reserve Bank for the period 1994 to 2017 with the focus on debt ratios and public sector investment. It also reviews the growth of public sector fixed capital formation in relation to government debt and total government spending and assesses the impact of government debt on economic growth. An analysis of the South African bond market and liquidity risks is undertaken to measure government's ability to borrow and issue more debt.

Chapter 5: Data presentation and analysis

The data presentation is per the methodological approaches followed in chapter 3. Time series data is presented for the South African economy and the set of emerging market economies. The analysis is guided by the research questions and the interpretation of the econometric results.

Chapter 6: Conclusion

The conclusion highlights the key findings of the research and provide policy recommendations in relation to the fiscal space of the South African government and how the government can use increased spending and debt to support economic growth and development.

1.6 Conclusion

This chapter provided an overview of the theoretical understanding of government debt and its application to support economic growth, as well as enhancing the understanding and measurement of ‘fiscal space’. The literature review expands on the issues raised here and provide detailed theoretical and empirical evidence, supported by tools and models used to measure ‘fiscal space’.

Chapter 2: Literature Review

2.1 Introduction

This literature review focuses on providing a theoretical review of government debt, the theory on fiscal sustainability, and a theoretical framework underpinning the optimal fiscal policy that investigated the following areas: the economic framework, determination of the debt limit, and defining the fiscal space. Empirical evidence provided on the determination of the debt limit, the estimated fiscal space, and the impact of GDP growth on the levels of government debt for both developed and emerging countries. In addition, this chapter provides some empirical evidence by examining the experience of China and India on how the two economies used debt to drive economic development. An alternative approach is discussed to assist governments in increasing their fiscal space to fund economic growth and development using sovereign money and monetising of government debt by the central bank.

2.2 Theoretical Review of Government Debt

The theoretical foundation of government debt builds from three schools of thought: Neoclassical, Keynesian and Ricardian. The Neoclassical view is essentially that increasing government debt would have a negative effect on economic growth, while the Keynesians believe that it would be positive in stimulating economic growth during a recession, and contrary to both schools of thought, the Ricardian school assumes a neutral effect (Szabo, 201).

2.2.1 Neoclassical Approach

The Neoclassical approach argues that increasing government debt will increase consumption in the economy and lead to a reduction in savings (Szabo, 2013). The reduction in savings will lead to an increase in interest rates in order to attract more savings, which will result in a fall in investment and a slowdown in economic growth (Szabo, 2013). This phenomenon is also known as the ‘crowding out’ effect of private sector investment. The effect on economic growth will also be driven by the rise in taxes to finance government debt, which will lead to a reduction in incomes, savings and private investment (Szabo, 2013). The “crowding out” effect is seen to have a negative effect on

economic growth as government's increase in debt levels will lead to an increase in interest repayments resulting in less funds available to support human capital and infrastructure development. In addition, increased debt repayments will lead to a rise in interest rates and increase the cost of private sector borrowing. As a result, economic activity is expected to slow down driven by the misdirection of government spending in the economy and the increase in interest rates that discourages private sector investment. The approach seeks to support lower government debt levels that will result in lower interest rates and more government funding directed towards the productive side of the economy, which is key to attracting or "crowding in" private sector investment and supporting economic growth.

Holfrerich (2014) provides an explanation for and a critique of the views of the Neoclassical approach. First, increases in government debt usually happen in emergency situations such as financing wars (Holfrerich, 2014). The increase in debt for unproductive activity is seen to distort capital investment in the market 'by lowering private investment' (Holfrerich, 2014). Second, the Neoclassical view that government activity is unproductive is not always correct (Holfrerich, 2014). Government activity does contribute to increasing the private sector's productivity; for example, government's purchase of goods and services leads to the demand for factors of production (e.g., labour, capital) in the provision of goods and services to its citizens (Holfrerich, 2014).

Kobayashi (2015) explains that the non-Keynesian effects of increased government spending on the economy will lead to a decrease in consumption in the economy, as the market will factor in the future increase in taxes to fund the spending/budget deficit. This will lead to a loss in wealth in the economy, which will slow down aggregate demand and lead to a decline in economic activity. In addition, Kobayashi (2015) explains that the 'wealth effect' will cause people to increase their savings now at the expense of consumption and economic growth. The argument is similar to the Ricardian approach discussed below.

2.2.2 Ricardian Approach

The Ricardian approach states that when government debt increases, market players will factor in a rise in taxes in the future to finance the debt, which will lead to an increase in savings (rather than an increase in consumption and investment) (Szabo, 2013). This approach will then neutralise the impact of the fiscal stimulus (Szabo, 2013). The Ricardian equivalence theorem, as stated in Otaki (2015), argues that the issuing of government debt to finance expenditure will be cancelled out by the future rise in taxes. As a result, the increase in government debt will become a burden on future generations (Otaki, 2015).

In rejecting the burden of government debt on future generations, Otaki (2015) states that increases in government debt to finance expenditure mean that the older generations can enjoy the current consumption financed through the issuing of government debt that will lead to an increase in aggregate demand that will enrich the young generation. However, this does not take away the fact that the younger generations will also carry the burden of the debt created by the older generation.

The Ricardian approach can be summarised as follows, the increase in government debt levels will result in less government spending on human capital and infrastructure development, which will result in lower economic growth. This approach supports the conventional economic approach that argues against high levels of government debt which will have a negative impact economic growth and argues for measures that will restrict fiscal policy through the promotion of fiscal consolidation in order to reassure market confidence and to promote economic growth (Panizza and Presbitero, 2013)

In explaining the Ricardian equivalence on debt, Ricciuti (2003) states that debt should be seen as “deferred taxes”. He further explains that an increase in government debt or budget deficits to finance government spending, will force government to increase taxes in the future to finance its debt repayment, which will reduce consumption in the economy and lead to economic slowdown (Ricciuti, 2003). In assessing the Ricardian equivalence, Ricciuti (2003) states that the theory holds when economic growth is less than real interest rates. As long as economic growth is greater than real interest rates, the assumption is that government will be in a better position to generate more tax revenue to be used to finance budget deficits and thus deferring future tax increases.

2.2.3 Keynesian Approach

The Keynesian approach directly links budget deficits and government debt to a rise in aggregate demand that leads to an increase in economic growth (Szabo, 2013). Szabo (2013) states that the increase in debt may lead to investments in infrastructure development that will “crowd in” private sector investment. Infrastructure development should be supported by increased investment in human capital, which should lead to increased labour productivity and demand for labour. These developmental approaches are supported by the new growth theory of fiscal stimulus advocated by Szabo (2013), which seeks to support productive capacity in the economy and increases in economic activity and growth.

Holtfrerich (2014) states that government debt can be used to finance investments, administrative reforms and activities that support the productivity of private sector investments, which will lead to an increase in the demand for labour – arguments that are supported by Adam Smith’s ‘invisible hand’ theory. Holtfrerich (2014) explains this by indicating that the debt will be used to purchase factors of production for infrastructure investment, building of schools and hospitals, improvements in the judicial system and the protection of property rights and the rule of law. Such purchases will lead to an increase in the demand for labour and employment generation, which leads to an increase in incomes and savings in the economy (Holtfrerich, 2014). The increase in incomes and savings will be utilised to increase investments in the government bonds issued to finance the purchase of factors of production without reducing the pool of savings in the capital market (Holtfrerich, 2014).

In addition, Holtfrerich (2014) states that an increase in government debt should be seen as an investment opportunity to mobilise capital from the private sector when government yields offer more favourable returns. Investors in government bonds will hold the debt stock at high returns until a more favourable private investment opportunity arises (Holtfrerich, 2014). The Keynesian approach sees government debt as a positive accumulation of private capital or savings in the economy. Stein (1886), quoted in Holtfrerich (2014), states that debt financing of government expenditure is harmless and

sustainable if it leads to an increase in productive capacity and economic growth that would ultimately cover the financing of the debt.

Holtfrerich (2014) summarises the views on government debt as having a positive impact on employment creation and that it gives government the opportunity to access capital to drive economic development by investing in infrastructure, human capital, State-Owned Enterprises (SOEs), and spending on administrative and judicial reforms. The Keynesian approach argues against fiscal consolidation which results in less government spending on the productive side of the economy and a slowdown in economic activity.

2.2.4 Post-Keynesian Approach: Functional Finance

The post-Keynesian approach to fiscal policy relates to the ‘functional finance’ of Lerner, which states that an increase in government spending is needed to get the economy to full employment (Tcherneva, 2008). The primary objective of fiscal policy, applying the functional finance approach, is to get to full employment by creating jobs and closing the output gap through increased aggregate demand (Tcherneva, 2008). Tcherneva (2008) also states that the output gap should be seen as a function of government spending which seeks to stimulate investment and increase the productive capacity of the economy, with the objective of generating higher economic growth. This approach is further discussed in section 2.8 and looks into how China and India used government debt to finance economic development.

Woodford as quoted in Tcherneva (2008) provides an alternative argument to financing government debt, via a ‘wealth effect’. The argument is supported by the following assumptions: first, people are willing to buy government debt due to an increase in their net wealth as a result of holding government bonds; second, it is reasonable to assume that people will buy government bonds, but if they do not, the central bank will purchase them; and thirdly, ‘crowding out’ should be avoided, given that interest rates can be managed and reduced by the central bank (Tcherneva, 2008).

Black, Calitz and Steenekamp (2018) explain ‘crowding out’ as the slowdown of private sector expenditure and investment in the economy caused by an increase in interest rates in the capital market as a result of an increase in government issuing more debt to finance

its spending. If governments decide to increase spending via debt financing, the central bank will act as the remaining buyer of the debt and influence market interest rates to avoid the ‘crowding out’ effect (Tcherneva, 2008). In addition to the Woodford argument, Tcherneva (2008) discusses the functional finance approach via aggregate demand, which seeks to reject the crowding out effect. Tcherneva (2008) states that if there is an output gap, savings will be greater than investments in an economy, and as a result, budget deficits could be used to take up the excess savings via the issuance of government bonds to finance public sector investment and the purchase factors of production, which will close the output gap.

Tcherneva (2008) views government spending and/or the budget deficit as an instrument to get the economy to full employment. The functional finance approach can be used to stimulate aggregate demand via the stimulation of public sector investment in the economy that will drive future productive capacity through investment in infrastructure and other productive activities (Tcherneva, 2008). This argument is supported by Arestis and Sawyer (2008), who link the functional finance approach and the use of budget deficits to close the gap between savings and investments, and allow for government to invest in the productive side of the economy, which will lead to an increase in incomes and savings. The argument supports the use of increased government debt to increase its spending on human capital and infrastructure development, which is key to attracting private investment, that will lead to an increase in aggregate demand and economic growth.

2.2.5 Alternative Macroeconomic Policy

The new paradigm or approach to macroeconomic policy as described by Arestis and Sawyer (2008) argues for the use of budget deficits to support aggregate demand and economic growth. The need for budget deficits is premised on the relationship between savings and investments, where the difference between savings and investments creates the opportunity for the budget deficit (Arestis and Sawyer, 2008). This is further explained by equating the budget deficit, where the **“budget deficit = savings – investments = savings – (private + public investments)”**, which is referred as the ‘golden rule’ (Arestis and Sawyer, 2008:2). Arestis and Sawyer (2008) indicate that the UK and Germany have

been applying the ‘golden rule’ since the 1990s, with both economies experiencing budget deficits and increased borrowing to fund public sector investments.

The new paradigm borrows from the ‘functional finance’ view of Lerner, where budget deficits enable savings (when savings is greater than investments), and is expressed as follows:

$$“G - T = S(Y_f) - I(Y_f) + M(Y_f) - X(WT)”$$

“where G is government expenditure, T is taxes, S is savings, I is investment, Q is imports, X is exports, Y_f is full employment of income, and WT is world trade” (Arestis and Sawyer, 2008:3).

Arestis and Sawyer (2008) note that the current policy debates are pushing for the reduction of budget deficits and the enforcement of balanced budgets no matter what happens to economic growth. For instance, Germany sought to achieve a budget deficit of 0.35% to GDP by 2016 and United Kingdom a zero budget deficit by 2016. Arestis and Sawyer (2008) illustrate the negative impact of this policy to achieve a zero-budget deficit on economic activity using the above equation.

The zero-budget deficit is formulated as:

$$“S(Y^*) - I(Y^*) + M(Y^*) - X(WT) = 0”$$

“where * is potential GDP” (Arestis and Sawyer, 2008:4). To get to zero-budget deficits, the following will be required: reduction in savings, increase in investments, and a current account surplus (Arestis and Sawyer, 2008). However, Arestis and Sawyer (2008:4) note that many countries have experienced increases in budget deficits, which is formulated as:

$$“S(Y^*) - I(Y^*) + M(Y^*) - X(WT) > 0”$$

As many economies are experiencing current account deficits, the focus will be on reducing savings and increasing investments (Arestis and Sawyer, 2008). As argued by Techeneva (2008), savings can be reduced by increasing budget deficits to fund the increase in government spending to be directed towards the productive side of the economy, key to supporting economic growth. However, as argued by the Neoclassical

and Ricardian approach, an increase in budget deficits will lead to an increase in interest rates and force government to re-prioritise spending to offset the increase in costs, and ultimately reduce aggregate demand and economic growth. The alternative, as argued by the Keynesian approach, achieving zero-budget deficits will lead to a slowdown in economic activity.

Svaljek (1997) states that the issuing of government debt needs to be consistent with the macroeconomic goals of balancing the current account, growing private sector investments, controlling inflation, and maintaining external credibility. Svaljek (1997) assumes that investments should equal savings, and as a result, a zero-budget deficit will not hold, given that budget deficits are required to balance savings in the economy. Svaljek's (1997) assumptions are discussed further in section 2.3.2.

In summary, this body of literature argues for an alternative approach to macroeconomic policy, namely using debt to finance economic growth, building from the post-Keynesian approach. This will require an engagement on government's ability to take up more debt by looking at fiscal sustainability and understanding "fiscal space".

2.3 Assessment of Fiscal Sustainability

"Fiscal sustainability is defined as the ability of government to meet its current and future financial obligations" (Buckle & Cruickshank, 2013:3). These authors further indicate that government's spending commitments are determined by the amount of tax revenue it collects, government spending priorities and the level of government debt. Fiscal sustainability refers to whether governments can maintain their policies without significantly changing their position on tax, spending and borrowing, or whether increases in government spending and budget deficits may lead increased government debt (Buckle & Cruickshank, 2013).

Chalk and Hemming (2000) state that the assessment of fiscal sustainability must focus on the growth of government debt levels, and assess whether the current fiscal policy can be pursued without threatening government solvency. Chalk and Hemming (2000) also define the parameters to measure a country's fiscal sustainability position, which entails following the proposed three steps as outlined below. As argued by (Ricciuti, 2003), fiscal

sustainability may be achieved as long as economic growth is greater than real interest rates, as this will assist in deferring future tax increases in order to finance budget deficits.

Firstly, the macroeconomic data needs to be projected over a five-year period, assuming that the current policies are maintained: GDP growth, investment, inflation, trade account and reserve account, balance of payments money supply, domestic credit, interest rates, revenue, non-interest expenditure, and interest payments (Chalk & Hemming, 2000). Secondly, fiscal projections will be used to measure the amount of monetary financing required to cover future fiscal deficits, which will also include the projection of government debt (Chalk & Hemming, 2000). The debt ratio will be used to assess fiscal sustainability, and the general assumption is that an increasing debt ratio is regarded as a cause for concern, as it will be accompanied by low growth, rising inflation, increasing external debt and falling reserves over the medium term (Chalk & Hemming, 2000). Thirdly, to deal with unfavourable debt positions, alternative adjustment scenarios will have to be introduced to bring stability over the medium term that will support the macroeconomic variables indicated above (Chalk & Hemming, 2000). The focus will be on meeting the debt target and introducing fiscal measures to achieve the target, thus looking at the effect of fiscal adjustment on economic variables, i.e., economic growth and interest rates, as they have a direct influence on sustainability calculations.

Buckle and Cruickshank (2013) state that fiscal sustainability can influence both interest rates and the risk premium charged on government debt, and government's ability to issue more debt or access capital markets, i.e., if unsustainable, it will increase the country's risk profile, which will lead to increased costs of borrowing / issuing of new debt and financing current debt.

The hypothesis provided by Afonso and Jalles (2013) is that fiscal policy sustainability relates to the condition that the macroeconomic variables should not be affected by government's choice to increase debt or taxes to finance the budget deficit.

2.3.1 Assessment of Government Debt Sustainability

Buckle and Cruickshank (2013) apply the Long-Term Fiscal Model to determine if government will need to increase taxes or reduce spending in order to meet fiscal

sustainability condition, by projecting budget information taking into account forecasted data relating to the economy, demographics, government spending, transfers, taxation, assets and liabilities. The model is also used to assess the future sustainability of government's fiscal position by projecting governments operating balance, primary balance, gross debt, net debt or net worth of the fiscus (Buckle & Chricksbank, 2013). The key assumption is that government expenditure grows according to historical growth pressures. Below, Buckle & Cruickshank (2013) provide a summary of the measures and indicators to be considered.

Table 2.1: Measures and Indicators of Fiscal Sustainability

Measure	Definition	Best measure
Operating balance	Projected governed revenue less projected expenditure	Size and time profile of government budgets, fiscal imbalances, including debt financing costs
Primary balance	Projected operating balance less projected interest payments and unrealised valuation gains or losses on financial assets	Size and time profile of budget deficits
Gross debt	Projected debt issued less settlement cash	Sustainability of government finances over the long-term, if current policies are maintained
Net debt	Projected gross debt less projected financial assets	Sustainability of government finances over the long-term, if current policies are maintained, taking into account government's balance sheet
Net worth	Projected assets and liabilities	Projected balance sheet

Inter-temporal infinite horizon fiscal gap	Projected estimates to reduce government spending or increase in taxes to pay off all government debt over an infinite timeframe	Extent of adjustment required in a single indicator. Different adjustment scenarios and extent of adjustment required
Inter-temporal finite horizon fiscal gap	Projected estimates to reduce government spending or increase in taxes to meet projected debt target at a targeted timeframe	Extent of adjustment required in a single indicator. Different adjustment scenarios and extent of adjustment required

Source: Buckle & Cruickshank (2013:9)

The proposed model seeks to direct fiscal policy programmes via government spending to deal with economic shocks using budget deficits and taxes (Buckle & Cruickshank, 2013). Afonso & Jalles (2013) identifies other main drivers affecting fiscal sustainability i.e. population growth and increased social security, with reference to developed economies i.e. Euro area, UK and Japan. Auerbach (2015) conducted an analysis of developed economies facing large fiscal gaps and confirmed that the long-run fiscal gaps will be driven by the rising pension and health costs associated with aging economies. Afonso & Jalles (2013) provide a historical perspective to increases in government debt, which was correlated with times of increased military expenditure during the two World Wars; the 1970s oil crisis which saw an increase in government spending in an effort to secure energy supplies at increasing costs; Asian financial crisis that saw Japan increase their debt trend growth rates; and the recent global recession, all highlighting the influence of business cycles on government debt in order to respond to shocks in the economy.

Marini and Piergallini (2008) use interest rates and economic growth to determine fiscal sustainability, which seek to imply that budget deficits can be financed as long as economic growth is greater than the real rate of interest. Marini and Piergallini (2008) model measures sustainability by applying a co-integration analysis of fiscal variables. They conclude that when tax generation has reached its peak, increases in government spending would lead to unsustainable fiscal position (Marini and Piergallini, 2008).

Svaljek (1997) supports the view of government debt having a positive impact on the economy, and stating there is no prescriptive limit to the size of government debt level. The debt limit will be reached until the additional government expenditure increases the use of productive capacities, improves production capabilities of the economy, and achieves the desired income distribution (Svaljek, 1997).

Svaljek (1997) assumes that all investments in the economy should equal savings (domestic and foreign), and the issuing of new government debt to finance budget deficit needs will be balanced by the savings in the economy and by the balance of payments deficit. However, the issuing of new government debt will depend on the level of private savings and desired investments, and the desired balance of payments deficit (Svaljek, 1997). This follows Arestis and Sawyer's (2008:2) approach that the:

“Budget deficit = (savings – investments) + (imports – exports)”

where the domestic capital market will finance domestic debt and the current account finances the foreign debt.

Svaljek (1997) provides the following indicators to be applied to measure the sustainability of issuing government debt: interest paid on public debt to taxes, to measure the interest burden covered by tax revenue; interest paid by government expenditures, to measure the share of expenditure tied to debt repayments; interest rate – economic growth differential, to measure if economic growth can cover debt obligations; new debt to government expenditure ratio; share of budget deficit to economic growth; share of total debt to economic growth; and for external debt, external debt to exports, since the debt can be serviced by export revenue. These indicators will not show if the debt limit has been reached, but can be used to monitor the dynamics of government borrowing over a medium to long-term period (Svaljek, 1997).

Svaljek (1997) argues that unsustainable debt levels will lead to a decline in the demand for government debt and an increase in interest rates in the capital market. This indicates that the fiscal space available to government is also dependent on its ability to access the capital market.

2.4 Role of Credit Rating Agencies

Elkhoury (2008) states that credit rating agencies play a critical role in reducing asymmetry of information in the financial markets to the lenders and the investors regarding the creditworthiness of companies and countries. The agencies provide information for assessing debt risk which entails the following: economic risk; political risk; fiscal and monetary policy positions, and default risk on government debt (Elkhoury, 2008).

Del Castillo (2004) states that investors who purchase government bonds also need to evaluate risk by taking into perspective the economic and financial issues affecting a country and in the context of the political environment, institutional and socio-economic conditions. In addition, they must assess policy flexibility in dealing with economic shocks and policy consistency with regard to macroeconomic policy convergence (del Castillo, 2004).

Del Castillo (2004) indicates that ratings agencies provide credit ratings outlook as either positive, stable or negative. Del Castillo (2004) states that in assigning credit ratings, agencies need to view the assessment through economic, political, credit and commodity cycles, which should indicate to markets that an economic recession or decline in global economic activity, should not lead to a downgrade.

Rating agencies have played a critical role in directing capital flows to emerging markets since the 1990s; however, they failed to predict Mexico's economic crisis in 1994/5, and failed to detect the Asian crisis in 1997/8 (Larrain, Reisen & von Maltzan, 1997; del Castillo, 2004). Del Castillo (2004) also states that ratings agencies gave limited warning signals to the market before the Asian crisis and overreacted once the crisis emerged – agencies follow the market rather than lead. Larrain et al (1997) stated that when the devaluation of the Mexican Peso affected the global financial markets, Standard & Poor's had assigned Mexico a positive investment grade outlook. Larrain et al (1997) further state that agencies were seen to react to economic events rather than to predict them, thus affecting their credibility in providing assessments on developing countries.

Elkhoury (2008) states that the rating agencies' failure to predict the Mexican, Asian and Russian crises was due to their lack of consideration of key economic variables such as

contingent liability, international liquidity considerations, interest rate differentials, and real exchange rates. Elkhoury (2008) defines that a failed rating is one that has been changed up or down by three or more notches in a period of 12 months – also known as Bhatia’s definition. Del Castillo (2004) provides some historical analysis of Table 2.1, indicating that Uruguay was left on an investment grade (BBB-) by the two agencies until February 2002, four months before the peak of the country’s banking crisis, ignoring the contagion effect from Argentina and Brazil, the lack of fiscal flexibility, and the failure of government to implement structural reforms.

Table 2.2: Sovereign Credit Ratings Failure, 1997 – 2002

Failure	Failed ratings & date	Corrected ratings & date	Notches adjusted	Key factor
Standard & Poor’s				
1997: Thailand	A (3 Sept 1997)	BBB- (8 Jan 1998)	4 downgrades (0.97)	Evaporation of reserves
1997: Indonesia	BBB (10 Oct 1997)	B- (11 March 1998)	7 downgrades (1.40)	Collapse of asset quality
1997: Rep. of Korea	AA- (24 Oct 1997)	B+ (22 Dec 1997)	10 downgrades (5.26)	Evaporation of reserves
1997: Malaysia	A+ (23 Dec 1997)	BBB- (15 Sept 1998)	5 downgrades (0.57)	Collapse of asset quality
1998: Rep. of Korea	B+ (18 Feb 1998)	BBB- (25 Jan 1999)	4 upgrades (0.36)	Reserves replenishment
1998: Romania	BB- (20 May 1998)	B- (19 Oct 1998)	3 downgrades (0.61)	Evaporation of reserves
1998: Russian Federation	BB- (9 June 1998)	B- (13 Aug 1998)	3 downgrades (1.43)	Evaporation of reserves
2000: Argentina	BB (14 Nov 2000)	B- (12 July 2001)	4 downgrades (0.50)	Fiscal slippage
2002: Uruguay	BBB- (14 Feb 2002)	B (26 July 2002)	5 downgrades (0.94)	Evaporation of reserves
Moody’s				
1997: Thailand	A2 (8 April 1997)	Ba1 (21 Dec 1997)	5 downgrades (0.68)	Evaporation of reserves
1997: Rep. of Korea	A1 (27 Nov 1997)	Ba1 (21 Dec 1997)	6 downgrades (7.83)	Evaporation of reserves
1997: Indonesia	Baa3 (21 Dec 1997)	B3 (20 March 1998)	6 downgrades (2.05)	Collapse of asset quality
1997: Malaysia	A1 (11 May 1997)	Baa2 (14 Sept 1998)	4 downgrades (0.46)	Collapse of asset quality
1998: Russian Federation	Ba2 (11 March 1998)	B3 (21 Aug 1998)	4 downgrades (0.75)	Evaporation of reserves

1998: Moldova	Ba2 (14 July 1998)	B2 (14 July 1998)	3 downgrades (90.00)	Evaporation of reserves
1998: Romania	Ba3 (14 Sept 1998)	B3 (6 Nov 1998)	3 downgrades (1.76)	Evaporation of reserves
2002: Uruguay	Baa3 (3 May 2002)	B3 (31 July 2002)	6 downgrades (2.07)	Evaporation of reserves

Source: Bhatia (2002) in Elkhoury (2008:10)

Del Castillo (2004) categorised the criticisms levelled against agencies into three groups: the impact of ratings on capital flows; the uncompetitive or oligopolistic nature of the agencies' business and the lack of incentives for good performance; and the way agencies are financed.

Impact on capital flows: if ratings are credible, and one follows rational expectations, during economic booms they should attract capital inflows when ratings are improved, and during economic contractions they should lead to downgrades and panic in the market that will lead to capital outflow (del Castillo, 2004).

Uncompetitive or oligopolistic nature: del Castillo (2004) states that industry is highly protective of the Big Three (Moody's, Standard & Poor's, and Fitch) agencies and this has led to uncompetitive behaviour and complacency by the Big Three. Del Castillo (2004) supports this statement by indicating the Big Three's role in the collapse of Enron, i.e., the agencies kept Enron on an investment grade until four days before it filed for bankruptcy, while a non-certified ratings agency (Egan-Jones Rating Co.) downgraded Enron to junk a month before the big agencies.

Elkhoury (2008) states that the Nationally Recognised Statistical Ratings Organisations, which are regulated ratings agencies, created the barriers to entry which ensured that there is a lack of competition in the sector. In addition, the lack of competition has led to charging of high prices by the Big Three, lack of innovation, compromised quality of ratings, and failure to address the conflict of interest (Elkhoury, 2008).

Conflict of interest: del Castillo (2004) notes the potential conflict of interest exist and can influence the objectivity of rating reports. The conflict of interest may arise when agencies offer consultancy services to the same institutions they provide ratings services (del Castillo, 2004). Elkhoury (2008) indicates that agencies are reliant on issuer-free revenue, thus creating opportunities for favourable ratings and providing parallel consultancy

services to clients. This practice takes place because the agencies are not regulated, and there is no framework to protect investors when such practices lead to ratings failure (Elkhoury, 2008). Elkhoury (2008) concludes that the lack of accountability by the agencies for their mistakes may affect their credibility in the market.

Larrain et al (1997) also support the conflict of interest of rating reports, stating the uncompetitive behaviour of the Big Three has created a fear of losing fee income from governments by delaying ratings downgrade during cyclical changes.

2.5 Optimal Fiscal Policy

2.5.1 Economic Framework

Ostry et al (2015) state that inherited government debt represents a deadweight burden to an economy, affecting future investment and economic growth. They suggest that higher debt levels will make an economy poorer given the present value of taxes needed to service the debt. As a result, the higher the debt ratio, will require governments to increase taxes in order to finance the debt, which will lower investment in the economy and lead to a slowdown in economic growth (Ostry et al, 2015). In addition, economies that are highly indebted will tend to invest less in public infrastructure than less indebted economies (Ostry et al, 2015). These are views that are supported by the Neo-classical school of thought.

On the contrary, Ostry et al (2015) state that economies with fiscal space should not aim to pay off their debt, but should instead allow the debt ratio to decline through increased economic growth and finance it through increased tax revenues. They hold a strong view that there is no need to reduce government debt through an increase in taxes or reducing government spending, which will lead to a slowdown in economic activity (Ostry et al, 2015). As indicated above, the increased taxation needed to pay down the debt will be more harmful to economic growth than living with the debt, and the reduction in sovereign risk will yield smaller economic returns than the distortive cost involved in paying down the government debt (Ostry et al, 2015).

Government debt should be used to smooth the taxes needed to finance high levels of discretionary government expenditure, for example, public sector investment, and the debt financing of such projects will need to generate a social return higher than the government debt increases (Ostry et al, 2015).

Ostry et al (2015) explain that the ‘golden rule’ to government debt dynamics is as follows: the issuing of debt to finance public investment seeks to correct the decline in public expenditure. The investment will support economic growth and lead to an increase in tax revenue. Ostry et al (2015) acknowledge the positive relationship between public sector investment and cumulative primary deficits, meaning that as payments for government expenditure increase, more debt will need to be raised to finance it. Furthermore, public investment should be financed by debt financing, which should be issued to a point where its marginal return is equal to the market interest rate on the debt (Ostry et al, 2015).

The economic theory applied by Ostry et al (2015) seeks to support the findings of Tasos (2012) and Christensen (2007), who looked at China, and Kaur and Kaur (2015), who looked at India, the two economies which used debt to finance economic development (refer to the discussions in section 2.7 below). They all indicate that one should allow economies to raise their debt levels to drive investment and economic growth, given that the debt will be financed by the future economic growth and increased tax revenues.

A study undertaken by Fincke and Greiner (2014) looked at government debt and economic growth in emerging market economies (Brazil, Indonesia, India, Mexico, Malaysia, Thailand, Turkey and South Africa) over the period 1980 to 2012. They found a positive relationship between government debt and economic growth. Their study shows debt having a positive effect on investment, which drives and supports future economic growth (Fincke & Greiner, 2014). The authors conclude that emerging market economies have not reached the peak where government debt will have a negative effect on economic growth when compared to developed economies which have breached their 60% threshold (Fincke & Greiner, 2014). Table 2.2 below shows the average debt ratio in emerging market economies.

Table 2.3: Average Debt Ratio (1980 – 2012)

Brazil	Indonesia	India	Mexico	Malaysia	Thailand	Turkey	South Africa
61%	41.7%	64.9%	47.4%	57.2%	39.1%	41.7%	35%

Source: Fincke and Greiner (2014:14)

2.5.2 Government Debt Limit – A Theoretical Framework

Ghosh, Kim, Mendoza, Ostry and Qureshi (2013) provide a model to explain government sovereign debt limits, starting with government budget constraints:

$$“d_{t+1} - d_t = (r_t - g)d_t - s_{t+1}”$$

“where d is one period debt as a percentage of GDP at the end of the period, g is the real GDP growth rate, which is assumed to be exogenous and constant, s is the primary balance (deficit) as a percentage of GDP, and r is the on government debt issued in period t and due in period $t+1$ ” (Ghosh et al, 2013:7). Interest rates are endogenous, and will either be greater than or equal to the risk-free interest of r^* depending on the probability of government defaulting – the assumption is that debt will not increase if $r=r^*$ (Ghosh et al, 2013). The model indicates that when interest rates are greater than GDP, government will need to reduce budget deficits or realise budget surplus to ensure the sustainability of that debt.

The model makes three assumptions¹:

Assumption 1: Fiscal reaction function under fiscal fatigue

The fiscal reaction function seeks to look at the response of the budget deficit to the lagged government debt (Ghosh et al, 2013):

$$“s_{t+1} = \mu + f(d_t) + \varepsilon_{t+1}”$$

“where μ is the driver of the budget deficit, i.e., standard cyclical effects from GDP growth and reduction in tax revenue, fiscal effects from changes in inflation, real

¹ Ghosh et al (2013)

exchange rates, and current account deficits; $f(d)$ is the response of the budget deficit to lagged debt; ε is an independent and identically distributed shock to the budget deficit with a distribution function $G(\varepsilon)$ – assuming that the government debt does not exceed 100% of GDP” (Ghosh et al, 2013:8).

The drivers of the budget deficit relate to the macroeconomic shocks experienced in the economy that will affect GDP growth, which in turn will lead to a reduction in tax revenue collection. Higher inflation will increase the size of government expenditure in the provision of public goods and services, which will lead to an increase in the budget deficit. Both the depreciation of the exchange rate and the current account deficit will affect government’s ability to service foreign-issued debt.

Assumption 2: Default rule

Government will default if debt exceeds the debt limit ($\bar{d}$), which is the maximum sovereign debt that government can raise and be in a position to finance the budget deficit (Ghosh et al, 2013:). The default rule takes the following form (Ghosh et al, 2013:9):

$$D_{t+1} = \begin{cases} 1 & \text{if } d_t + 1 > \bar{d} \\ 0 & \text{otherwise} \end{cases}$$

“where D is an indicator equal to one if government defaults and zero otherwise” (Ghosh et al, 2013:9).

Assumption 3: Risk-neutral creditors

According to Ghosh et al (2013), creditors are risk neutral, and will lend to government under the following key assumptions: first, that the debt ratio is not on an unsustainable upward trend, and second, there is a risk premium to be charged towards government debt to deal with possible endogenous risk default factors. The equation is formulated as follows:

$$1 + r^* = (1 + p_{t+1})(1 + r_t) + p_{t+1} \theta (1 + r^*)$$

“where p_{t+1} is the probability of default in the next period when debt matures and θ is an assumed recovery value in the event of a default” (Ghosh et al, 2013:9). If the probability of default increases, the market will factor this in by increasing interest rates or adjusting the risk premium to be charged on government debt.

2.5.3 Determination of the Debt Limit

Ghosh et al (2013) define the debt limit as the maximum sovereign debt that government can raise and be able to honour its obligation. The equation used to determine the debt limit is as follows (Ghosh et al, 2013:16):

$$\mu + f(d) = (r^* - g) \bar{d}$$

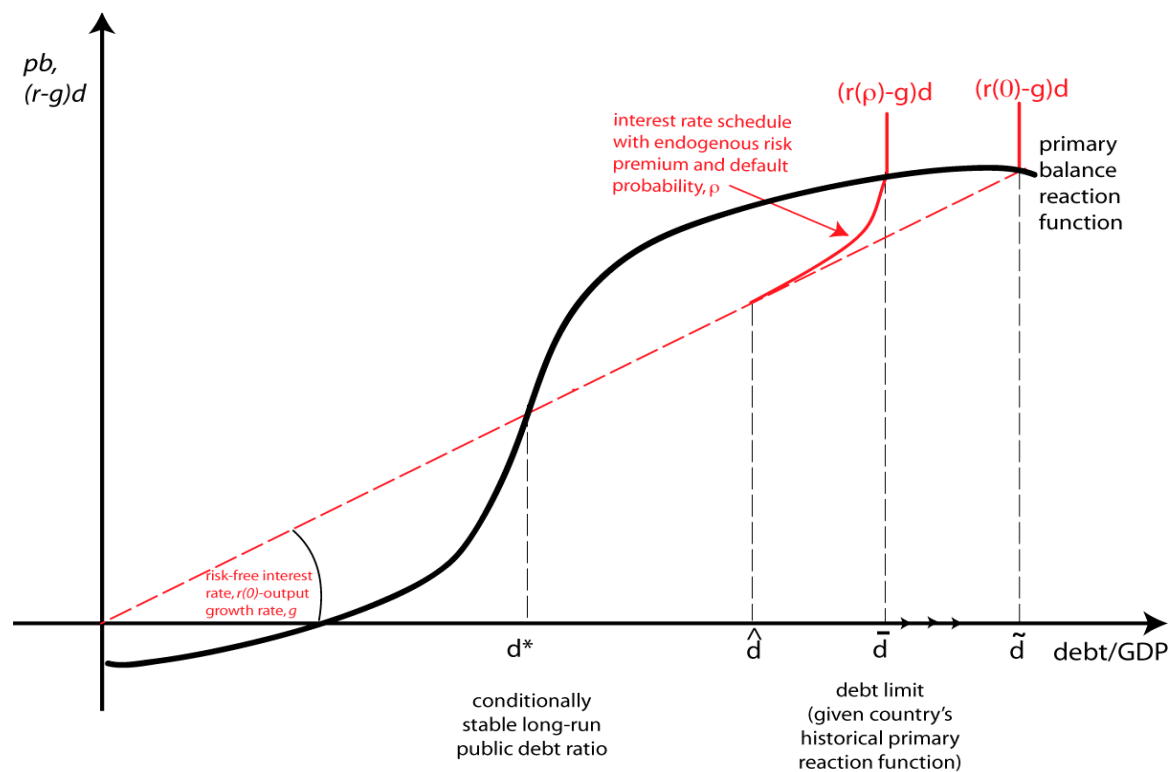
In determining the debt limit, Ghosh et al (2013) state that at any point beyond the $\bar{d}$, the budget deficit will not be sufficient to cover the interest rate payments, and force government to increase debt. When debt continuous to grow, it will increase the probability for government to default and increase the risk premium charged on government debt (Ghosh et al, 2013). This is depicted in Figure 2.1 below, indicating that the market will lend at risk-free interest rates up to the point $\hat{d}$, and interest rates will increase as the risk of default increases between points $\bar{d}$ and $\tilde{d}$ (Ghosh et al, 2013). As the probability to default increases, the market will charge a higher risk premium to hold government debt, and this increase in interest rates will lead to government being shut out of the market (Ghosh et al, 2013).

2.5.4 Defining Fiscal Space

Nerlich and Reuter (2015) define fiscal space as the resources available to government to support and drive economic growth by investing in infrastructure development and human capital, which government can finance through issuing more debt without affecting its fiscal sustainability. Ostry et al (2010) define fiscal space as the ability for government to finance the budget deficit without significant increases in interest rates that will lead to a ‘crowding out’ of the private sector investment. Interest rates will increase as the risk to hold government debt increases and the probability of government default increases. Ostry et al (2010) states that the measured point of

government default should be considered as the debt limit, and the fiscal space will be the distance between the current debt level and the projected debt limit. With reference to Figure 2.1 below, the fiscal space as defined by Ostry et al (2015) is the gap between the actual debt-to-GDP ratio and the debt limit.

Figure 2.1: Debt Limit Determination



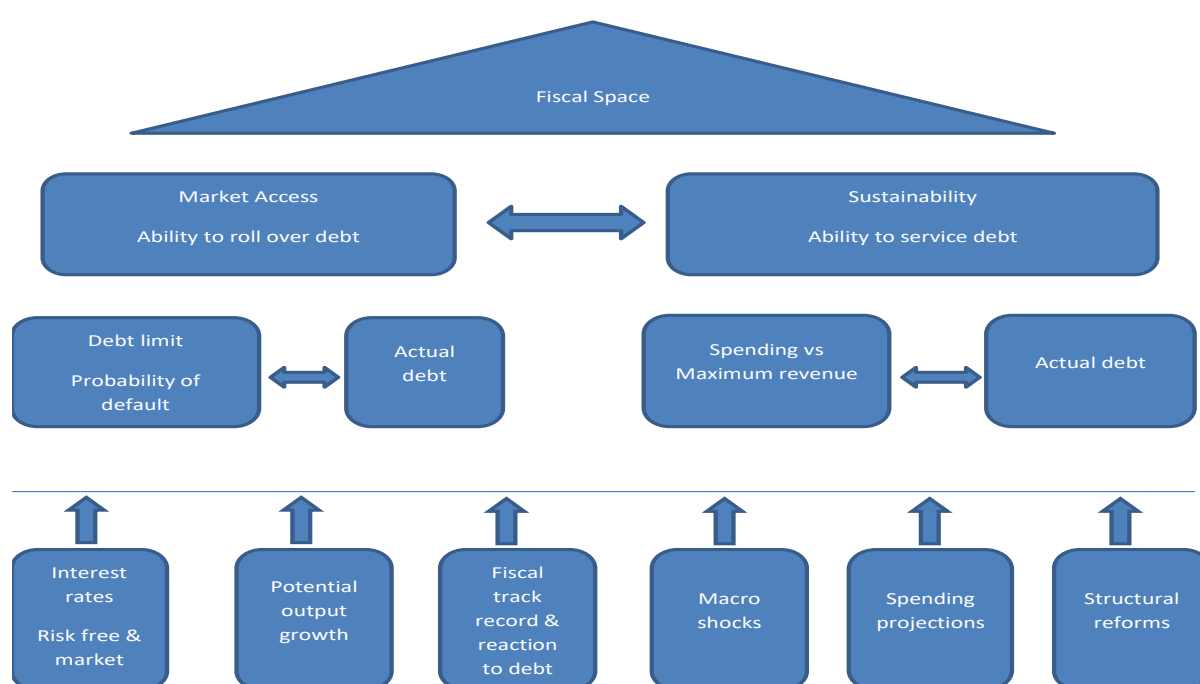
Source: Ostry et al (2010: 8)

Note: 'The graph illustrates the determination of the debt limit, with the solid line representing the reaction of the primary balance to rising public debt (as a percentage of GDP) and the broken line the effective interest payment schedule, given by the differential between the interest rate (r) and the output growth rate (g), multiplied by the debt ratio (d). The lower intersection, d^* , is the long-run debt ratio where the economy will converge, conditional to debt not exceeding the debt limit. Abstracting from endogeneity of the interest rate to the risk premium, there is a second intersection of the risk-free interest rate-growth rate schedule ($r(0)-g$) and the primary balance reaction function. Taking into account the endogeneity of the interest rate to the rising default risk, the market charges a risk premium when debt exceeds $\hat{d}$. The interest rate schedule ($r(\rho)-g$) slopes upward with rising default risk (ρ) as debt approaches its limit, where the position of the limit is itself endogenous to the behaviour of the interest rate' (Ostry et al, 2010: 8).

Botev et al (2016) define fiscal space as the gap between the current government debt level and the projected maximum debt, which is the position where government will lose market access and its ability raise more debt in the capital market. Botev et al (2016)

provide two different approaches to measuring fiscal space, focusing on government's ability to access markets or by measuring the long-term fiscal sustainability of government borrowing. According to Botev et al (2016), fiscal space will be influenced by the above-mentioned endogenous variables. This is highlighted in the Figure 2.2 below.

Figure 2.2: Determinants of Fiscal Space



Source: Botev et al (2016:10)

The key message regarding the advocacy of fiscal space is that it gives fiscal policy the necessary room to increase government spending to support productive capacity and long-term economic growth (Botev et al, 2016). In addition, low interest rates provide the opportunity for governments to issue more debt without losing market access and borrowing without affecting fiscal sustainability (Botev et al, 2016). Panizza and Presbitero (2013) also support this argument, stating that in a low interest environment, governments can run budget deficits and increase debt, and fiscal expansion will be self-financed when the economy grows.

2.6 Alternative Approaches to Fiscal Space

Heller (2007) provides policy alternatives to creating fiscal space which look into how governments can **improve tax revenue as a percentage of GDP** by: increasing tax revenue by looking at eliminating tax exemptions, tax deductions, tax credits, and limiting tax incentives to individuals and companies; strengthening tax collection and administration, which will also result in an increase in the tax base; and increasing excise duties on alcohol, tobacco and fuel. Governments can **limit the debt ratio to 60%** by reprioritising government expenditure, addressing the inefficiency in SOEs, and reducing government guarantees to SOEs (Heller, 2007). Lastly, governments need to **reduce subsidies** by reducing government guarantees to SOEs and the **sale of government's non-core assets**, including SOEs (Heller, 2007).

The IMF (2016) proposed several revenue reforms that seek to support economic growth. This entails the reduction of taxes on capital and labour to incentivise the increase in private sector investment and demand for labour (IMF, 2016). The loss in tax revenue should be offset by the proposed increase in indirect taxes, property taxes, environmental taxes and excise duties (IMF, 2016). However, in the medium term, when economic activity picks up and more people are employed, government will be able to generate more tax revenue. The IMF highlights the importance of improving tax administration by increasing compliance, broadening the tax base, and simplifying the compliance process and tax laws (IMF, 2016). In addition, governments should consider reducing subsidies on energy and increasing carbon taxes to protect the environment (this tax has the potential to raise an estimated 2.9% of global GDP) (IMF, 2016).

In re-prioritising spending as proposed by Heller (2007), the IMF (2016) proposed the reduction of the government wage bill and subsidies, while improving targeted social spending by dealing with leakages and improving access to services for the targeted population. As noted by Heller (2007), in reducing government subsidies and addressing the inefficiency challenges of SOEs, the IMF (2016) proposed that governments should look to reduce government projects that will require a high import component, and to rather promote projects that will support local content and production, reduce the

funding of inefficient projects and, as a last resort, look at privatising inefficient SOEs in order provide fiscal savings.

Building from Heller (2007) and the IMF's proposals, Ortiz, Cummins and Karunanethy (2017) provide the following options for governments to increase their fiscal space. They suggest re-allocating government spending by replacing high-cost and low-impact projects with projects that will yield higher socio-economic impact, in addition to addressing inefficiencies in spending and tackling corruption (Ortiz et al, 2017). In tackling corruption, this will allow for governments to access resources to finance economic development. It is estimated that 5% of world GDP (US\$ 2.6 trillion) and 25% of GDP in Africa (US\$ 148 billion) is lost due to corruption (Ortiz et al, 2017). Ortiz et al (2017) support the call to close tax loopholes that lead to tax evasion, an estimated revenue loss of US\$189 billion annually in developing countries. In addressing these loopholes, governments will need to develop tax collection capacity and broaden the tax base (Ortiz et al, 2017).

For countries that are net exporters of natural resources, such as South Africa, Ortiz et al (2017) propose that governments need to look at taxing the natural resources profits and saving this tax revenue in a resource fund, similar to Norway's petroleum fund, used to save revenue collected from taxing oil profits and, in Peru, where government increased taxes on mining companies and invested the revenue into health and education programmes. In the case of South Africa, the funds can be earmarked to support economic growth and development.

Ortiz et al (2017) provide another source of fiscal space, which is to eliminate illicit financial flows such as money laundering, bribery, trade mispricing and tax evasion, where the net financial flows out of developing countries and Africa totalled an estimated US\$970 billion and US\$37 billion, respectively, in 2014.

As a last resort, Ortiz et al (2017) state that governments can tap into their fiscal saving and foreign exchange reserves and restructure existing debt by looking at both domestic and foreign borrowing at low financing cost. Lastly, Ortiz et al (2017) propose that governments need to adopt accommodating macroeconomic frameworks that will allow for increased budget deficits and higher inflation rates without affecting macroeconomic stability, with the objective of growing the economy and increasing government tax

revenue. This will allow for governments to increase their tax revenue as a percentage to GDP, as proposed by Heller (2007).

Ortiz et al (2017) provide a matrix for alternative fiscal space options, implemented in certain countries. Table 2.3 indicates that 89% of the identified countries have opted to increase tax revenue and restructure existing debt in order to increase their fiscal space. While less than 50% of the countries opted to re-allocate government spending, 33% applied for a more accommodative macroeconomic framework and tapped into their fiscal savings and foreign exchange. Given the different options available to countries, South Africa opted for three options when compared to Iceland that opted for 5 options and Namibia for 1 option. All these options may be implemented simultaneously.

Table 2.4: Matrix of Fiscal Space

	Bolivia	Botswana	Brazil	Costa Rica	Lesotho	Iceland	Namibia	South Africa ²	Thailand
Re-allocation of government spending				X	X	X		X	
Increase tax revenue	X	X	X		X	X	X		X
Restructure existing debt	X	X	X	X	X	X		X	X
Eliminate illicit flows						X			
Tap into fiscal savings and foreign exchange reserves	X	X	X						
More accommodative macroeconomic framework	X		X			X			

Source: Ortiz et al (2017:3)

² South Africa instituted an increase in VAT from 14% to 15% effective April 2018

South Africa is faced with the challenge of increasing or broadening its tax base, as it sees any increases in taxes as constraining economic activity and growth. As per the stated proposal above, the tax base should be broadened by first stimulating economic growth that will lead to increased employment, rather than to increase taxes. A study undertaken by UNICEF (2017) provides an analysis of South Africa's fiscal space and highlights that corporate income tax has been declining since 2007/08 due to the fall in commodity prices and a slowdown in global economic activity; between 2001/02 and 2006/07 corporate income tax grew by 23% of GDP but fell to 6% between 2011/12 and 2015/16. The study also indicates that while personal income tax has grown between 2006/07 and 2015/16 by 12% of GDP, it was a result of increased wage settlements above the inflation rate (UNICEF, 2017). VAT also experienced a decline in growth contribution from highs of 17% of GDP between 2001/02 and 2006/07 to 10% of GDP between 2011/12 and 2015/16 driven by the decline in economic activity (UNICEF, 2017). The study proposes that South Africa can increase revenue by increasing the following taxes: fuel levy, 'sin' taxes, property transfers and capital gains tax, and introducing a sugar tax (UNICEF, 2017).

The core of this research talks to the need for South Africa to adopt a more accommodating macroeconomic framework by moving away from the orthodox fiscal policy approach and adopting the alternative approach of using government debt and increased budget deficits and/or increasing government spending to support and accelerate economic growth. Kobayashi (2015) states that countries need to be careful of declining economic growth rates, which will affect their fiscal position due to a decline in tax revenue. Such fiscal deterioration will lead to lower economic activity as governments will have less revenue to spend in the economy (Kobayashi, 2015). Kobayashi (2015) concludes that fiscal management should not be the core focus of government; instead, it should be on how government can support economic growth and development.

Other measures to be considered for South Africa as an alternative approach will be to address the irregular spending, defined by the Auditor-General (AG) as unauthorised expenditure and/or expenditure undertaken in contravention of the Public Finance Management Act, which increased from R16 billion in 2016 to R28.4 billion in 2017, an increase of 75% in local government only (AG, 2018). The AG report also indicated that unauthorised expenditure amounted to R43.5 billion and fruitless and wasteful

expenditure amounted to R4.24 billion in local government (AG, 2018). In government departments and SOEs, the AG reported irregular expenditure to an amount of R72.6 billion in 2017/18 financial year, an increase of 70% from R42.8 billion the previous financial year (Omarjee, 2018). The AG (2018) states that if government addresses its accounting failures by applying and enforcing proper accounting and management systems, it will generate additional revenue to government. Further measures are discussed in section 2.7, which looks at government spending and the quality of fiscal institutions.

In addition to accounting failures, another saving for the South African government will come from project cost overruns. Project cost overruns are a global challenge and are caused by a number of factors, e.g., a lack of proper planning, slow decision-making, insufficient production rates, payment difficulties, government bureaucracy, delays in project implementation, and project mismanagement (Mthethwa, 2018). It should be noted that this is not the core of this research project, and the literature will only provide estimated figures of possible savings in relation to government spending to highlight the alternative approaches to fiscal space for South Africa. Table 2.4 provides a summary of the project cost overruns in South Africa.

Table 2.5: Project Costs Overruns in South Africa

Project	Procurement model used	Initial budget (R billions)	Estimated or final cost (R billions)	Over budget
Gautrain	PPP	R25,1	R30,5	21%
Kusile	Corporate financing and government guarantees	R90	R121	34%
Medupi	Corporate financing and government guarantees	R33,6	R105	213%
Gauteng Toll Roads	Corporate financing and government guarantees	R6,3	R90	1,329%
NMPP	Corporate financing and government contribution	R11,1	R23,4	111%
OR Tambo	Government funding	R5,2	R8,5	64%
De Hoop Dam	Government funding	R7,9	R20	153%
FIFA Stadiums	Government and municipal funding	R8,1	R18,4	126%
N4 Toll Roads	PPP	R2	R3	50%
Standard Bank Building in Rosebank	Private sector funding	R1,1	R2	82%

Source: Mabuza, Zaakirah, Kaveshin and Siyavuya (2014:581)

With reference to the above figures, government could have saved an estimated R230.5 billion. The National Treasury states that the project cost overruns are caused by inadequate budget, lack of adequate cost controls, and project delays (National Treasury, 2018).

Heller (2007) proposes the reduction of government guarantees to SOEs, which are seen as legal obligation or a hidden subsidy for government if state entities fail to meet their debt commitments, as an alternative approach to fiscal space. National Treasury's Budget Review (2018) highlights that the South African government guarantees to SOEs amounted to R466 billion, with 74% issued to Eskom (R350 billion) in the 2017/18 financial year. Another significant guarantee is issued for Eskom's power-purchase agreements with the Independent Power Producers amounting to R200.2 billion in the 2017/18 financial year (National Treasury Budget Review, 2018). The World Bank Report (2019) proposes measures to countries to work on improving SOEs revenue generation by reporting surpluses through improved efficiency and governance systems. In addition, current and new commitments of government guarantee to SOEs should be supported with creditable business plans with detailed feasibility analysis (World Bank Report, 2019).

Ensor (2017) in a *Business Day* article indicates that the South African government has developed a new framework which seeks to impose stricter conditions and penalties to the issuing of guarantees to SOEs, with the objective of trying to reduce fiscal risk and size of guarantees. Some of the issues highlighted in the framework entail the following: government to no longer issue guarantees for operational expenditure; no guarantees for social projects; guarantees to be issued for capital projects; and SOEs will need to apply for new guarantees on maturity (Ensor, 2017).

The management of government guarantees will seek to reduce the fiscal risks created by the hidden subsidy that will force governments to increase their borrowing to meet the obligations of state entities when they fail to meet their debt commitments. If guarantees are limited, it will give government the ability to access the debt market and increase its 'fiscal space' to support economic growth.

2.7 Debt Limits and Structure of Government Debt

Reinhart and Rogoff (2010), who examined economic growth in a time of increasing debt levels, concluded that there is a positive relationship between government debt and economic growth. Their findings indicate that debt ratio above 90% would result in a significant slowdown in economic growth for both developed and emerging countries (Reinhart & Rogoff, 2010). Reinhart and Rogoff (2010) conclude that over the past two centuries, a debt ratio above 90% for advanced countries has been associated with an average economic growth rate of 1.7% and an average economic growth rate of 3.7% when debt is below 30%, and average growth rates of 3% when debt is sitting between 30 and 90%. Reinhart and Rogoff (2010) note that advanced countries did experience high growth and high debt after World War II.

Table 2.6: Real GDP Growth as the Level of Government Debt Varies: Selected Advanced Countries, 1790–2009 (in annual percentage changes)

Country	Period	Below 30%	30% – 60%	60% – 90%	90% and above
Australia	1902-2009	3.1	4.1	2.3	4.6
Austria	1880-2009	4.3	3.0	2.3	n.a.
Belgium	1835-2009	3.0	2.6	2.1	3.3
Canada	1925-2009	2.0	4.5	3.0	2.2
Denmark	1880-2009	3.1	1.7	2.4	n.a.
Finland	1913-2009	3.2	3.0	4.3	1.9
France	1880-2009	4.9	2.7	2.8	2.3
Germany	1880-2009	3.6	0.9	n.a.	n.a.
Greece	1884-2009	4.0	0.3	4.8	2.5
Ireland	1949-2009	4.4	4.5	4.0	2.4
Italy	1880-2009	5.4	4.9	1.9	0.7
Japan	1885-2009	4.9	3.7	3.9	0.7
Netherlands	1880-2009	4.0	2.8	2.4	2.0
New Zealand	1932-2009	2.5	2.9	3.9	3.6
Norway	1880-2009	2.9	4.4	n.a.	n.a.
Portugal	1851-2009	4.8	2.5	1.4	n.a.
Spain	1850-2009	1.6	3.3	1.3	2.2
Sweden	1880-2009	2.9	2.9	2.7	n.a.
United Kingdom	1830-2009	2.5	2.2	2.1	1.8
United States	1790-2009	4.0	3.4	3.3	-1.8
Average		3.7	3.0	3.4	1.7
Median		3.9	3.1	2.8	1.9
Number of observations	=2,317	866	654	445	352

Source: Reinhart and Rogoff (2010:12)

With regards to emerging countries, the Reinhart and Rogoff (2010) study concludes that the average economic growth rate is 4.2% for debt levels below 90% of GDP, and at debt levels above 90%, economic growth rate slows down to an average of 1.0% (Reinhart & Rogoff, 2010). It should be noted that these economies do experience positive economic growth rates at debt levels above 90%, despite being at lower levels. In addition, the study alludes to the fact that emerging countries are dependent on foreign borrowing to fund their development, and the default of more than half of all countries since the 1970s was a result of debt levels above 60% (Reinhart & Rogoff, 2010). The findings from Table 2.6 indicate that debt levels above 90% have been associated with the lowest average economic growth of 1.0% when compared to an average economic growth rate of 4.2% when debt levels are between 60% and 90%.

Table 2.7: Real GDP Growth as the Level of Government Debt Varies: Selected Emerging Countries, 1900–2009 (in annual percentage changes)

Country	Period	Below 30%	30% – 60%	60% – 90%	90% and above
Argentina	1900-2009	4.3	2.7	3.6	0.5
Bolivia	1950-2009	0.7	5.2	3.7	3.9
Brazil	1980-2009	3.2	2.3	2.6	2.3
Chile	1900-2009	4.0	1.0	7.5	-4.5
Colombia	1923-2009	4.3	3.0	n.a.	n.a.
Costa Rica	1950-2009	6.9	5.0	3.4	3.0
Ecuador	1939-2009	5.3	5.0	3.2	1.5
El Salvador	1939-2009	3.6	2.6	n.a.	n.a.
Ghana	1952-2009	n.a.	4.6	4.7	1.9
India	1950-2009	4.2	4.9	n.a.	n.a.
Indonesia	1972-2009	6.6	6.3	-0.1	3.1
Kenya	1963-2009	6.3	4.2	2.3	1.2
Malaysia	1955-2009	2.0	6.2	6.9	5.5
Mexico	1917-2009	4.1	3.4	1.2	-0.7
Nigeria	1990-2009	5.4	10.6	11.2	2.6
Peru	1917-2009	4.3	2.9	2.7	n.a.
Philippines	1950-2009	5.0	3.8	5.1	n.a.
Singapore	1969-2009	n.a.	9.5	8.2	4.0
South Africa	1950-2009	2.0	3.5	n.a.	n.a.
Sri Lanka	1950-2009	3.3	3.7	4.2	5.0
Thailand	1950-2009	6.1	6.6	n.a.	n.a.
Turkey	1933-2009	5.4	3.7	3.2	-6.4
Uruguay	1935-2009	2.1	3.1	3.2	0.0
Venezuela	1921-2009	6.5	4.1	3.2	-6.5
Average		4.3	4.1	4.2	1.0
Median		4.5	4.4	4.5	2.9

Number of observations	=1,397	686	450	148	113
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Source: Reinhart and Rogoff (2010:15)

In their critique, Reinhoff and Rogoff (2010) conclude that the relationship between government debt and economic growth is weak at debt levels above 90%, with the average growth rate declining significantly to levels of 1.7% and 1% for both advanced and emerging market economies, respectively. Their findings conclude that average economic growth rates are higher when debt levels are between 60% and 90% to GDP, than at levels between 30 and 60% to GDP for both advanced and emerging market economies (Reinhoff & Rogoff, 2010). This finding supports the theory that government debt can be used to drive economic growth. The intention in this study is to determine how these debt levels might affect the South African economy and its growth trajectory.

A study by Bell, Jonston and Jones (2018) found that the average economic growth rate for countries having a debt-to-GDP ratio greater than 90% is 2.2%, instead of the negative decrease of 0.1% claimed by Reinhart and Rogoff. The Bell et al (2018) study alludes to the different theories on government debt, stating that increasing government debt to stimulate the economy during a prolonged recession can be a positive exercise in the short run, while governments need to manage market sentiments regarding defaults in the long run.

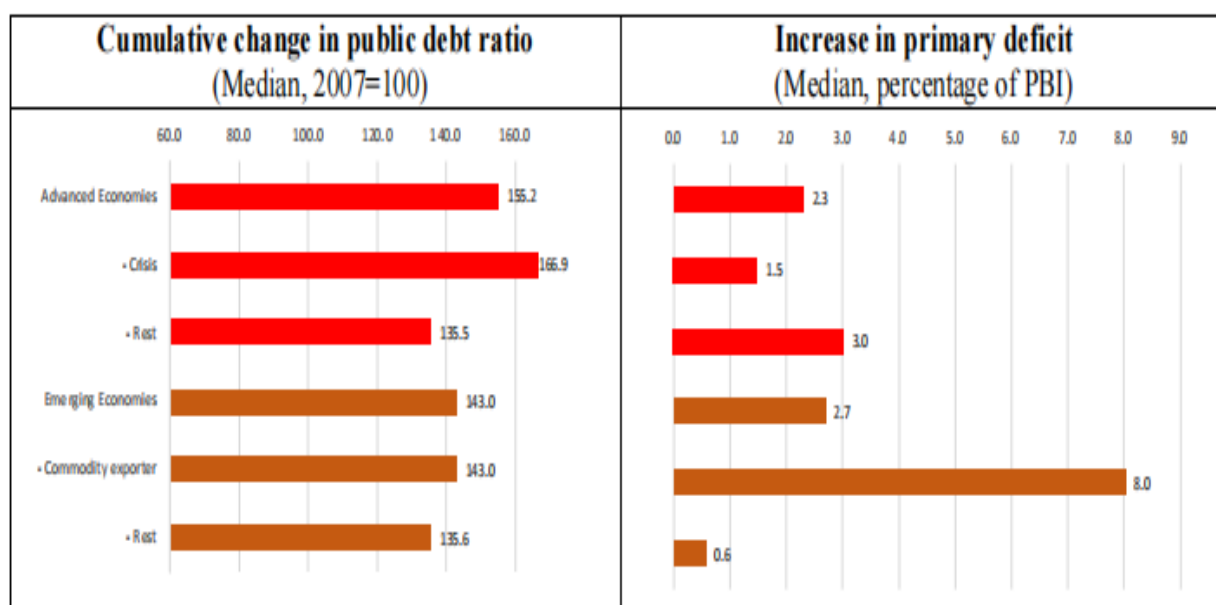
Egert (2014) looked at the nonlinear effects on government debt and economic growth and concluded that there is an inverse relationship when debt is between 20% and 60% to GDP, and positive when debt is above the Reinhart and Rogoff estimated debt levels of 90% to GDP. For emerging economies, Egert (2014) concluded that economic growth remains stable below the 90% debt level and economic activity declines by small margins above the 90% debt level.

2.7.1 Fiscal Space in Emerging Market Economies

Ganiko et al (2016), in their study looking at fiscal space in emerging market economies for the period 2000 to 2015, state that government debt levels have been increasing since 2007 by 55% on average for advanced economies and by 43% for emerging market economies. They also looked at commodity export countries and found that budget

deficits increased by 8% driven by the fall in commodity prices, which led to the fall in fiscal revenue (Ganiko et al, 2016).

Figure 2.3: Cumulative Change in Public Debt Ratio and Increase in Primary Deficit: 2015 vs 2007



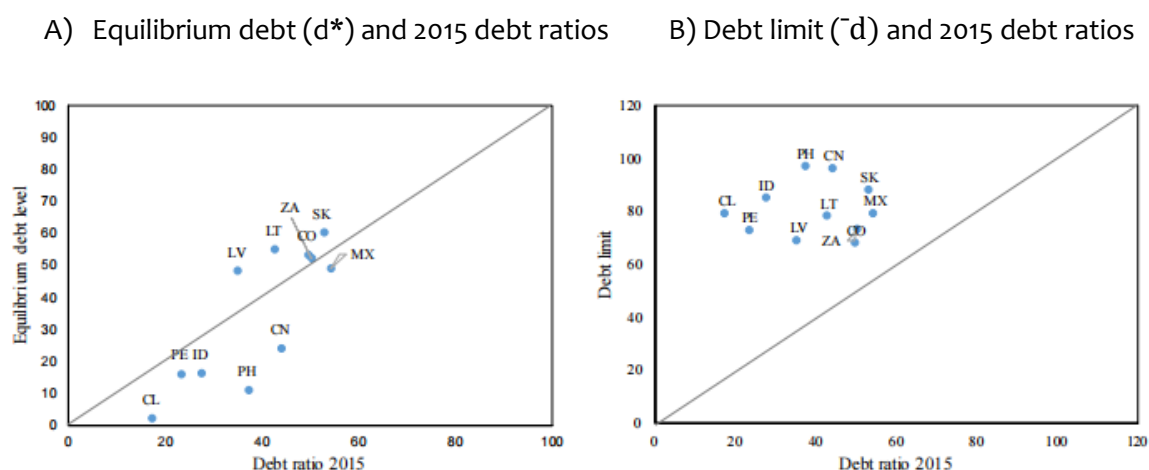
Source: Ganiko et al (2016:1)

The study cited above followed the proposed method of Ghosh et al (2013) to estimate the debt limit in 26 emerging market economies. The study took into account the following driving factors: “i) commodity dependency to fiscal revenue; ii) financing costs to government debt ratio and market conditions (volatility of international capital markets and changes in risk-free interest rates); iii) exchange rate; and iv) the uncertainties of macroeconomic and financial conditions and their effect on the debt limit estimate” (Ganiko et al, 2016:3).

Their findings are summarised as follows: the debt limit and fiscal space in emerging market economies is sensitive to domestic and global market conditions such as increases in budget deficits, low economic growth, and high interest rates (Ganiko et al, 2016). These variables will affect the movements of the primary balance reaction function curve discussed in Figure 9 below. Their study calculated debt limit for emerging market economies to be between 68 and 97% to GDP (Ganiko et al, 2016). A number of emerging market economies (Brazil, Croatia, Hungary, India, Poland, Romania and Turkey) will

experience fiscal fatigue as governments struggle to manage the growth of debt levels due to increases in budget deficits, high interest rates, and low economic growth (Ganiko et al, 2016).

Figure 2.4: Deterministic Stable Equilibrium and Debt Limit in Emerging Economies³



Source: Ganiko et al (2016:18)

The deterministic fiscal space (DFS) is defined by Ganiko et al (2016) as the difference between the debt ratio and the maximum amount of debt that government can raise. Their study concludes that the DFS ranges between 19 and 62% and the debt limit ranges between 60 and 100% for emerging market economies (Ganiko et al (2016)). The study also concludes that the fiscal space in emerging market economies is influenced by changes in “commodity prices, the value of the exchange rate, risk premium charged on government debt, international interest rates and volatility of international capital markets” (Ganiko et al, 2016:23). These variables will affect government’s ability to finance its foreign denominated debt and increase the cost of government borrowing, i.e., the increase in commodity prices will increase the country’s export revenue, which will enable government to finance foreign debt; depreciation of the exchange rate will increase the cost of servicing foreign debt; increase in international interest rates will increase the cost of foreign borrowing and servicing foreign debt; and volatility in global capital markets will lead to the net sale of government bonds, which will lead to an increase in borrowing costs

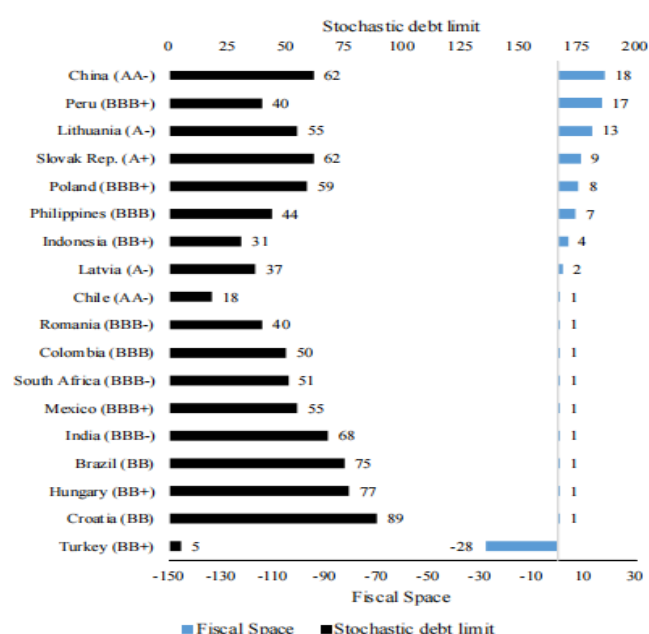
³ Note: Chile (CL), China (CN), Colombia (CO), Indonesia (ID), Latvia (LV), Lithuania (LT), Mexico (MX), Peru (PE), Philippines (PH), Slovakia (SK) and South Africa (ZA)

(bond rates) and depreciation of local currency, thus increasing the cost servicing foreign debt.

The study by Ganiko et al (2016) concluded that countries with higher fiscal space will tend to generate better credit ratings as this indicates to the market that government has not reached its debt limit and the risk of default is low, while countries with lower fiscal spaces generate low credit ratings due to the increased default risk. As can be seen for South Africa, the limited or low fiscal space generated a low rating (BBB-) in 2015 (Ganiko et al, 2016).

The study shows that South Africa's debt limit in 2015 was 51 percentage points with a credit rating of BBB-, lowest when compared to India's 68 percentage points (BBB-), Brazil's 75 percentage points (BB), and China's 62 percentage points (AA-) (Ganiko et al, 2016). The low credit ratings signal to the market the perceived debt risk to the identified emerging market economies except for China, which will increase the cost of government borrowing in these countries and lead to the reduction of the debt limit. The increase in interest rates will affect the financing of government debt and limit government's ability to borrow more in order to finance the growth of budget deficits.

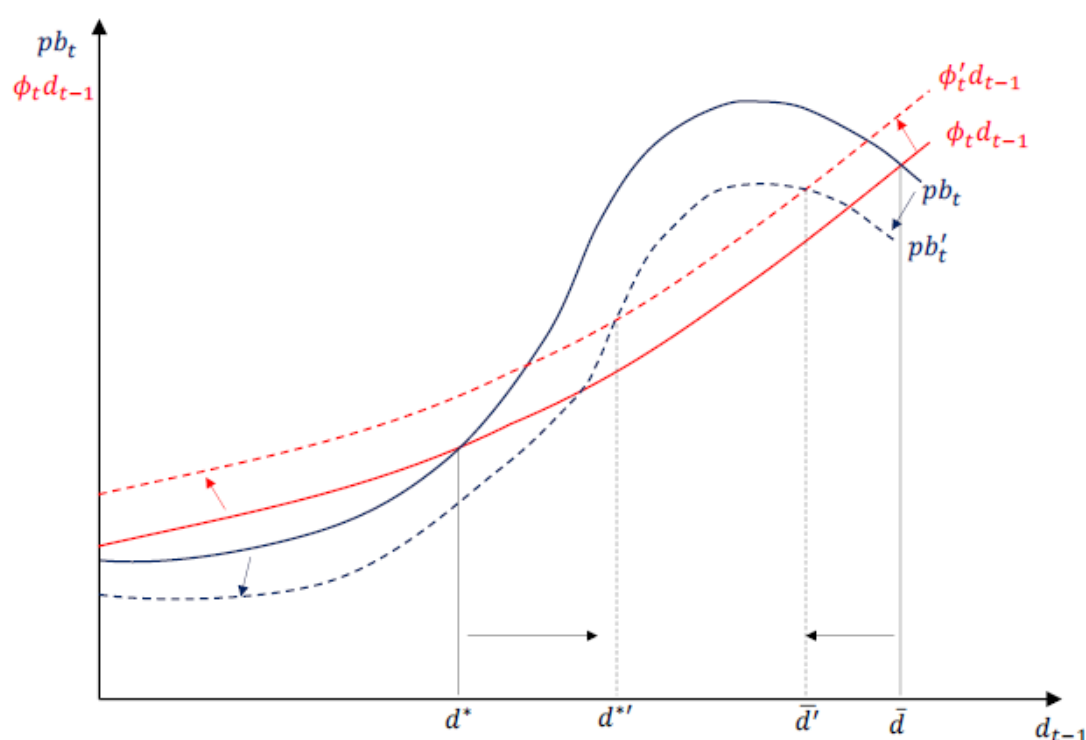
Figure 2.5: Deterministic Fiscal Space in Emerging Economies (% of GDP)



Source: Ganiko et al (2016:21)

Ganiko et al's (2016) study shows the effects of international capital market volatility and a country's risk premium on the financing costs, where an increase in volatility or risk premium will shift the interest rate schedule ($r(p)-g$) upwards and increase the financing cost of government debt (Ganiko et al, 2016). In addition, a decrease in the output gap and a decline in commodity prices will lead to an increase in the budget deficit that would shift the primary balance reaction function curve downwards (Ganiko et al, 2016). The stated changes will affect government revenue and/or the financing costs of government debt, which will then lead to the reduction of the debt limit (Ganiko et al, 2016). Figure 9 illustrates the shifts in the primary balance reaction function curves.

Figure 2.6: Comparative Public Debt Dynamics



Source: Ganiko et al (2016:6)

In conclusion, their study shows how the macroeconomic and financial conditions (high budget deficits, low economic growth, and high interest rates), and how investor confidence and their reaction to increases in government debt can influence a country's debt limit and fiscal space (Ganiko et al, 2016). Ganiko et al (2016) conclude that commodity

prices, exchange rates, risk premium, and volatility of international capital markets are the variables that influence the fiscal space in emerging economies.

Ganiko et al (2016) build on the Ghosh et al (2013) methodology and applied the following framework of the debt limit for emerging market and developing countries, based on the determinants of government debt dynamics:

$$d_t = \emptyset_t d_{t-1} + pb_t$$

“where d_t is the debt-to-GDP ratio, $\emptyset_t = r_t - g_t / 1 + g_t$ which is the growth-adjusted interest rate, where r_t is the nominal interest rate, g_t is the nominal GDP growth rate and pb_t is the budget deficit as a percentage of GDP” (Ganiko et al, 2016:4). Ganiko et al (2016) explain that the equation measures the growth in government debt by measuring the difference between financing costs and the budget deficit as a percentage of GDP.

Ganiko et al (2016) assume that the financing costs depend on the lagged debt ratio, which measures the relationship between nominal interest rates and the government debt ratio driven by the increase in the risk perception in emerging economies:

$$r_t = r(d_{t-1}, \text{controls})$$

“where controls are the dependent variables that affect the nominal interest rate such as the risk-free international interest rate, the global financial volatility, and the exchange rate, where currency fluctuations will affect the financing costs of foreign debt” (Ganiko et al, 2016:4).

In addition, they assume that the budget deficit depends on the level of economic growth, assuming that economic growth rates above 3% will increase government revenue and will lead to budget surplus (Ganiko et al, 2016):

$$pb_t = pb(d_{t-1}, \text{controls})$$

“whereas indicated above, a decrease in the output gap and a decline in commodity prices will lead to an increase in budget primary balances that would shift the primary balance reaction function curve downwards, where the changes will affect government revenue

and/or the financing costs of government debt, which will then lead to the reduction of the debt limit and cause a downward shift of the pb_t curve” (Ganiko et al, 2016:4).

Kose, Kurlat, Ohnsorge and Sugawara (2017) provide alternative measures of fiscal space that should be considered as variables that affect the availability of fiscal space. These variables include “government debt sustainability, balance sheet composition, foreign and private sector debt, and market perceptions of a country’s sovereign risk” (Kose et al, 2017:3).

With regard to government debt sustainability, Kose et al (2017) state that institutional weakness in the tax or revenue collection process and a low tax base will affect government’s ability to service its debt, which can be measured as government debt and budget deficit to government tax revenue. Kose et al (2017) highlight the debt dependency variables to also include the growth and financing costs of government debt, in addition to the common debt and budget deficit variables.

The balance sheet composition focuses on short-term and foreign debt issuance that has the potential to create currency risks and liquidity risk driven by a larger share of foreign investors holding local government debt due to a global liquidity crisis and/or loss in foreign investor confidence (Kose et al, 2017). This is measured by using the following variables: “foreign currency debt to total government debt; bonds held by non-residents to total bonds issued; debt held by non-residents to government debt; and government debt maturing in 12 months to GDP” (Kose et al, 2017:7).

Building from the balance sheet composition, the foreign and private sector debt looks at the size and composition of foreign debt in relation to foreign exchange reserves and private sector liabilities (Kose et al, 2017). The variables used to measure this are: “private foreign debt to GDP; credit extension to local private sector to GDP; short-term external debt to total reserves and total foreign currency debt; total foreign currency debt to foreign exchange reserves and reserves excluding gold” (Kose et al, 2017:7). Kose et al (2017) state that private sector debt can affect fiscal sustainability via government guarantees when governments assume the debt of SOEs when they fail to pay. The increase in private sector debt will affect the financing cost of government debt.

The market perception looks at sovereign risk, access to markets and government's ability to service debt (Kose et al, 2017). The variables used to measure this are the "five-year sovereign credit default swap spread and ratings on foreign debt by ratings agencies" (Kose et al, 2017:9).

2.8 Government Spending and Quality of Fiscal Institutions

Given the inter-relationship between fiscal sustainability and "fiscal space", this section of the literature seeks to highlight the importance of the quality of the government spending to drive economic growth and development, and the quality of institutions from a theoretical and empirical evidence perspective. It further builds on the fiscal rules stated by Nerlich and Reuter (2015), indicating that the fiscal rules will keep the debt levels in check by promoting fiscal credibility and encouraging governments to reduce debt and interest payments, which will assist in reducing the debt ratio and increase the "fiscal space".

Chong and Gradstein (2007) state that high taxation and increased government participation in the economy can distort choices, which can lead to corruption and rent seeking, factors seen to have a negative effect on economic growth. Their study also concluded that there is limited evidence in developed countries that economic growth is affected by increased government participation with commitments to public health, education, infrastructure development, and provision of social security (Chong & Gradstein, 2007). The conclusion is supported by the institutional quality promoted in developed countries that reinforces the efficiencies in the functioning of government that will seek to crowd in private sector participation in the economy (Chong & Gradstein, 2007). Measuring the quality of fiscal institutions seeks to determine the efficiency of government in the delivery of public services (Chong & Gradstein, 2007). Chong and Gradstein's (2007) results clearly indicated that there is a positive relationship between the quality of institutions and the efficiency in the delivery of public goods and services, especially in an environment that is more stable and has a predictable policy environment, less corruption and a more reliable judicial system (Chong & Gradstein, 2007).

Garayeva and Tahirova (2017) relate the issue of effective government spending and quality of fiscal institutions to discretionary fiscal policy. The more discretionary the fiscal

policy is, the more it tends to be procyclical, which will lead to increases in budget deficits, interest rates and increased taxes that will undermine economic growth (Garayeva & Tahirova, 2017). These authors focus on the quality of institutions as a driver of fiscal policy cyclicity, i.e., low institutional quality undermines the effectiveness of government spending, making spending more procyclical and volatile, which will impede economic growth (Garayeva & Tahirova, 2017). This study showed that in developing countries, fiscal policy is procyclical due to the low levels of financial depth, which forces governments to increase taxes in order to repay their debts, while on the other hand, in developed countries, fiscal policy is countercyclical (Garayeva & Tahirova, 2017).

The findings by Garayeva and Tahirova (2017) support the theory that more public investment leads to a crowding out effect of private sector investment in countries with underdeveloped financial markets, where governments can only finance expansionary fiscal policy through increases in taxes. This study concluded that for a developing country's fiscal policy to move from procyclical to countercyclical, there needs to be an improvement in the quality of institutions in the form of promoting and driving fiscal rules (Garayeva & Tahirova, 2017).

Garayeva and Tahirova (2017) explain procyclical fiscal policy as follows. First, the quality of fiscal policy and political institutions in an environment of low-quality institutions will force governments to spend more during booms. The political pressure, in the absence of fiscal rules and other fiscal constraints, creates an opportunity for policy makers to freely manipulate government spending (Garayeva & Tahirova, 2017). Second, financial constraints are challenges faced by governments to access the financial market and acquire resources during economic recessions, and if they fail, they will have no other option of raising revenue other than to cut spending or increase taxes (Garayeva & Tahirova, 2017).

In conclusion, Garayeva and Tahirova (2017) confirm that when the quality of institutions is low, it will lead to procyclical fiscal policy, reducing government efficiency and quality of spending. Albuquerque (2012), in a study undertaken in the EU countries, concludes that there is an inverse relationship between the quality of institutions and government spending volatility, i.e., countries with more checks and balances tend to make it difficult

for governments to change their fiscal policy for reasons unrelated to their domestic economic conditions and level of economic activity. This is also supported by Morozumi and Veiga (2014), who state that in order for public policies to have the desired outcomes, they will need to be supported by a capable state machinery that seeks to promote good governance and accountable.

The variables used to measure the quality of fiscal institutions include “the assessment of corruption within the political system, the strength and impartiality of the judicial systems, the assessment of the protection of the rule of law and enforcement of the law, and the institutional strength and quality of the bureaucracy”, as taken from the International Country Risk Guide (Chong & Gradstein, 2007:13).

Garayeva and Tahirova (2017:10) used six variables taken from the World Bank Worldwide Governance Indicators to measure the quality of institutions: “voice and accountability, political stability and absence of violence, government effectiveness, regulatory quality, rule of law, and control of corruption”.

Albuquerque (2012) proposes several measures to improve the quality of institutions in line with the variables used to measure it, which include the following: “to increase government accountability and promote a transparent policy environment, implementation of fiscal rules, and to improve the mechanisms and rules that govern the budget process, with the objective to develop checks and balances over public finances” (Albuquerque, 2012:60).

Bova, Carcenac and Guerguil (2013), in their study focusing on fiscal rules in developing countries, conclude that fiscal rules were introduced to address the issues of increasing government debt and financing costs in mainly Latin American and South Asian countries. Countries would adopt fiscal rules during periods of fiscal crisis and debt crisis, which led to the introduction of medium-term expenditure frameworks (Bova et al, 2013). The study further concludes that fiscal rules have contributed to the reduction of procyclical fiscal policy due to improved institutions (Bova et al, 2013). The improved institutions were a result of improved law and order, bureaucratic efficiency and low levels of corruption, and the introduction of checks and balances across the different stages of the budget process (Bova et al, 2013).

The AG proposes the need to increase internal controls with accountability structures to ensure that financial management is adhered to in dealing with irregular, unauthorised, and fruitless and wasteful expenditure in South Africa (AG, 2018). In addition, the AG calls for instituting budget reporting and performance budgeting targets, and consequences for mismanagement and non-performance (AG, 2018).

The Keynesian approach does support the use of budget deficits to undertake administrative reforms, which talks to creating quality institutional structures to ensure the effective use of government expenditure in the economy. An example relates to improving the tax administration system, which can lead to improved tax compliance and revenue collection.

2.9 Using Debt to Finance Economic Development

The Harrod-Domar growth model provides the basic principles for economies to stimulate economic development through the mobilisation of domestic and foreign savings to accumulate capital stock or to generate investment stock in order to drive economic growth (Todaro, 1994). In order to accumulate capital stock, governments will need to borrow more by mobilising more domestic and foreign savings in the capital market. The model also indicates that for economies to experience higher economic growth rates, they will need to increase their savings and investments (Todaro, 1994). If a country has limited domestic savings, it will have to mobilise foreign savings through aid or foreign direct investments (Todaro, 1994).

A study undertaken by Tasos (2012) looked at how China's debt influenced economic growth, and concluded that debt does influence economic growth through the total factor productivity channel. Tasos (2012) applied the productivity theory to link debt and economic growth. Abbas and Christensen (2007) quoted in Tasos (2012) looked at 93 developing countries over the period 1975 to 2004 and confirmed that government debt played a significant role in driving economic development. Macroeconomic theory does indicate that government expenditure should have a positive influence on economic growth, and Freeman and Webber (2009) quoted in Tasos (2012) found that expenditure that is productive, i.e., education, health and nutrition, can lead to positive economic growth and returns. Such expenditure will have an influence on the well-being of the

citizens, which will lead to higher economic growth levels (Tasos, 2012). This is also supported by the findings in Fincke and Greiner (2014), where government debt used to finance public sector investment had a positive effect on economic growth.

Public sector investment should be used to crowd in the private sector by investing in road infrastructure to connect businesses and move goods and services, and by investing in education and infrastructure which has the potential to increase the human and physical capital stock needed to drive economic growth (Fournier, 2016). Fournier (2016) argues that the positive effects are supported by the endogenous growth theory and the Solow model, which states that public sector investment can increase the production side of the economy. In the same vein, it can be argued that an accumulation of infrastructure stock can support economic growth in the long run. Ter-Minassian, Hughes and Hajdenberg (2008) in their study on creating sustainable fiscal space for infrastructure found that investing in telecommunications, road and electricity networks will lead to positive economic growth driven by the increased capital stock of factors of production.

Barik (2012) looked at how government debt was used to drive planned investments to drive economic growth in India for the period 1981 – 2012. Barik (2012) highlights the rise in India's government debt: it averaged 56% in the 1980s, rose to 63% in the 1990s and reached a high of 81.4% in 2003 – 2004. During the same period, investment as a percentage to GDP averaged 25% between 1981 and 2010 and rose to 35% in 2010 – 2011 (Barik, 2012). Barik's study concludes that government debt was positive in driving economic growth through the productive channel, as debt was used to finance investment (Barik, 2012). Barik (2012) states that India's planned development since 1951 was driven by government's use of debt to finance investment.

In support of the above empirical studies, Kaur and Kaur (2015) state that developing economies need to mobilise resources to fund their development plans. They used India as a case, stating that the country after independence followed a centralised planning system to drive economic development, which was driven by the increased role of government debt (Kaur & Kaur, 2015). They applied the Keynesian theory of government debt 'no burden thesis' by looking at the positive effects of government borrowing, which will allow government to access the financial market / savings streams and use the

resources to drive productivity and capital formation, which increased economic growth and national income, for the period 1981 – 2011 (Kaur & Kaur, 2015).

Their findings indicate an indirect relationship between government debt and economic growth driven by investment (Kaur & Kaur, 2015). The positive relationship implied that a rise in government debt resulted in an increase in investment that finally led to an increase in economic growth (Kaur & Kaur, 2015). Kaur and Kaur (2015) also caution that a significant increase in government debt may lead to sustainability problems if the debt is not utilised for productive purposes.

India's debt sustainability improved significantly in 2016/17, driven by high economic growth rates and fiscal consolidation (Deccan Chronicle, 2017). This supports the findings of Kaur and Kaur (2015), by confirming that if increased debt is accompanied by increased economic growth, governments will be able to finance their debt and bring down their debt levels. Das (2017) quoted in the *Deccan Chronicles* confirms this, stating that the high economic growth rates experienced in India led to improved debt level ratios in the medium term, i.e., debt-to-GDP ratio declined significantly from 84% in 2005/06 to 70% in 2016/17.

Building from the findings by Fincke and Greiner (2014), where government debt can be used to finance public sector investment, Fournier (2016) provides the empirical evidence for the positive effect on economic growth and labour productivity. This evidence should be used by emerging and developing countries to speed up their catch-up to developed economies. The empirical analysis looked at a panel of OECD countries to determine the effects of human capital and physical investment on long-run economic growth (Fournier, 2016). The findings of the study indicate that public sector investment in the defence force, education, health, housing and recreational facilities, community services, and culture and religion had a positive effect on economic growth (Fournier, 2016). The effect was stronger for health which talks to the well-being of the labour force and improvements to labour productivity (Fournier, 2016). The defence force expenditure also had a strong effect via the research and development in this sector, with reference to the US economy (Fournier, 2016). Research and development enable business or entrepreneurs to be innovative and develop new technologies to drive productivity. The findings of the study also indicate the

positive effects of public sector investment on employment creation (Fournier, 2016). The study concludes that an increase in public sector investment to GDP by 1% would increase economic growth by 5% (Fournier, 2016).

The post-Keynesian approach argues that government spending should be used to stimulate investment in the economy so that there will be an increase in the productive capacity of the economy, which is key to supporting positive economic growth rates. Jayadev and Mason (2018) state that modern monetary theory builds on from the functional finance theory, arguing for fiscal policy to be used to close the output gap irrespective of government debt levels and budget deficits. They argue that central banks have the power to control market interest rates, giving governments the power to undertake countercyclical fiscal policy while managing debt levels and avoiding unsustainable debt levels (Jayadev & Mason, 2018). They base their assumptions on the following: lower interest rates and higher budget deficits will lead to an increase in aggregate demand and economic activity, while higher interest rates and smaller budget deficits will lead to a fall in aggregate demand and economic activity (Jayadev & Mason, 2018).

Their assumptions are formalised into the following equation (Jayadev & Mason, 2018:3):

$$1) \quad "P = P(Y - Y^*) + P^*"$$

where " $P(0) = 0, P_y - y^* > 0$ "

$$2) \quad "Y = A - niY - \alpha bY"$$

$$3) \quad "\Delta d = (1 - g / 1 + g) * d - b"$$

"The first equation assumes that inflation is a positive function of economic activity, P is the inflation rate and P^* is the expected inflation rate, Y is economic activity (GDP) and Y^* is the potential GDP, and in the long run $Y = Y^*$ with reference to the AS/AD model" (Jayadev & Mason, 2018:3). The second equation assumes that economic activity is negatively affected by interest rates and positively affected by budget deficits via a multiplier effect α (government spending or tax), "where A is government spending when interest rate and budget deficit are zero, i is the real interest rate on government debt, and n is the percentage change in GDP as a result of changes in interest rates, b is the budget

balance with + indicating a surplus and – a deficit” (Jayadev & Mason, 2018:3). The second equation provides policy options available to government to get the economy to full employment, where governments can use interest rates and/or increase budget deficits.

The third equation states that in the long run, debt is equal to initial issued debt plus accumulated budget deficits and interest payments “where i is interest rates, d is debt ratio, b budget balance (deficit or surplus), and g is the real GDP growth rate” (Jayadev & Mason, 2018:4). In order to close the output gap in the economy and achieve debt sustainability, the equation indicates that interest will need to be reduced and budget deficits increased.

Jayadev and Mason (2018) argue that the broad macroeconomic policy objective is to get the economy to full employment (zero output gap), with the economy achieving low levels of unemployment and inflation. Equation 2 indicates that governments will have two policy instruments (interest rates and increased budget deficits) to achieve a zero-output gap. As a result, it creates two policy targets of ‘price stability’ and ‘debt sustainability’ which are to be managed by monetary policy and fiscal policy, respectively. Jayadev and Mason (2018) state that governments will use both monetary and fiscal policy tools to achieve the two policy targets. This increases the role of monetary policy to also focus on and achieve a zero-output gap using interest rates, and fiscal policy to achieve debt sustainability using budget controls (Jayadev & Mason, 2018). However, equation 2 assumes that both monetary and fiscal policy should be used to achieve a zero-output gap and debt sustainability. The argument increases the role of monetary policy and the use of interest rates to achieve both debt sustainability and price stability (Jayadev & Mason, 2018).

Going beyond the conventional macroeconomic policy of price stability and debt sustainability, equation 3 looks at how to achieve full employment using government debt, and the role of monetary policy in setting interest rates to allow for governments to borrow (Jayadev & Mason, 2018). Jayadev and Mason (2018) refer to the US economy post WW II where the Federal Reserve held down borrowing costs in response to the high debt ratio. Developed economies have used debt to propel the economy to full employment; the recent experience immediately after the global financial crisis is such a case. In

conclusion, Jayadev and Mason (2018) argue that when monetary policy fails to get the economy to full employment, fiscal policy through increased government debt should be used. This is also supported by the evidence experienced in developed economies over the last 10 years where these economies experienced higher debt levels to get the economies to full employment, which did not lead to increased inflation, or hyperinflation as the conventional economic theory predicts (Jayadev & Mason, 2018).

As argued by Holtfrerich (2014), using the Keynesian approach, debt financing of government expenditure is harmless and sustainable if it leads to an increase in productive capacity and economic growth that would ultimately cover the financing of the debt.

The high levels of unemployment in South Africa and persistent stagnant economic growth rate since 2010 strengthens the case for government to use fiscal policy to increase capital accumulation that will stimulate the productive capacity of the economy as discussed above.

2.9.1 Liquidity Channel of Using Government Debt

The study undertaken by Grobety (2017) argues that government debt can support economic growth via the liquidity channel by providing liquid assets to financially constrained industries, which will drive private sector investment by issuing domestic debt and not foreign debt. The liquidity channel relates to the private sector using government bonds as collateral when in need of investment financing from the financial sector (Grobety, 2017). Government debt will lead to an increase in the supply of liquid assets, which the private sector can use to finance its productive investment (Grobety, 2017). The argument builds on the relationship between corporate cash holdings and government debt, where debt is seen as safe money (Grobety, 2017).

The liquidity channel is seen to improve the liquidity requirements in the financial system, where banks will hold government debt to meet liquidity requirements and use the debt instrument as borrowing collateral to meet the demand deposit withdrawals (Grobety, 2017). This will increase the bank's lending capacity to meet private sector investment for those who also hold government debt (Grobety, 2017). This liquidity channel also provides investment financing to financially constrained private firms in need of funding. The Indian

case of using government debt to drive economic growth can also be explained by the argument and findings of Grobety's (2017) liquidity channel.

Kobayashi (2015) provides an overview of the liquidity channel, stating that government debt can improve the efficiency of the economy and lead to an increase in production when households and businesses purchase government debt. Kobayashi (2015) argues that households and businesses facing a liquidity risk will purchase government bonds as a means of savings, and their savings will be used to support economic activity and economic production. Kobayashi (2015) explains this by stating that government bonds should be regarded as liquid assets that can be used to make payments when businesses face liquidity challenges. In addition, when households purchase government bonds, it will lead to an increase in their wealth effect that will increase their future consumption in the economy, leading to an increase in economic activity and an increase in production to meet expected future consumption (Kobayashi, 2015). During economic booms and bubbles, the issuing of government bonds can also be used to cushion the financial crisis, as the market will be given a financial asset to protect their wealth, thus allowing households to continue to consume and for production to remain at current levels (Kobayashi, 2015). Kobayashi (2015) concludes that government debt can support economic activity when fiscal spending is driven by the issuance of government bonds via the explained liquidity channel.

In applying the functional finance theory, Reinhoff and Rogoff (2010) argue that the limit to government spending should not be determined by the lack of financing, given that budget deficits can be used to absorb the private sector's willingness to save and buy government bonds. The limit to government spending should be determined by inflation, i.e., if total spending in the economy is greater than total production, it will lead to inflation, and this will force government to reduce its spending or increase taxes to slow down the spending in the economy (Reinhoff & Rogoff, 2010). The issue of inflation is further explained by Chudik, Mohaddes, Pesaran and Raissi (2015) in relation to emerging market economies that have limited access to international capital markets, where inflation will be the only variable to constrain economic growth and not government debt when budget deficits are financed by creating money via the issuing of domestic debt.

Irons and Bivena (2005) in their study looking at government debt and economic growth state that countries need to limit their exposure to currency risks by issuing domestic debt in their local currency. The currency risk is a significant factor when it comes to increasing the probability of government default (Irons & Bivena, 2005). Their study looked at the United States and concluded that government debt above 90% will not affect economic growth or slow down economic growth due to the country's ability to borrow in their currency; they also have independent monetary and exchange rate policies, and have a liquid and transparent US treasury market (Irons & Bivena, 2005). Reinhoff and Rogoff (2010) also support this view, stating that foreign currency denominated debt can be problematic when governments run out of foreign currency to repay foreign debt, creating solvency risk and not sustainability risk. A good example would be the Argentinian debt crisis between 1977 and 1982, which saw the government accessing international capital markets and financing its budget deficit with foreign debt or borrowings (Buera, Nicolini, della Paolera & Guidotti, 2001). This situation forced the Argentinian government to insure banking deposits and issue exchange rate guarantees, which led to an increase in their contingent debt (debt increased from US\$ 20 billion in 1975 to US\$ 50 billion in 1980) which was financed by issuing foreign debt (Buera et al, 2001). More than 90% of Argentinian debt was indexed to the US Dollar and with foreign debt being sensitive to currency movements, when the Argentinian government defaulted in 1982, this led to the depreciation of the peso and the balance of payments crisis in the economy (Buera et al, 2001).

Lopez and Nahon (2017) state that a number of emerging market economies experienced significant increases in debt levels in the 1990s as governments borrowed in foreign markets to finance balance of payment deficits, to generate foreign reserves needed to finance foreign denominated debt and to support local currency from depreciation. The decline in economic growth and increases in debt levels triggered the emerging market crisis in the 1990s with reference to the Mexican peso crisis in 1994, Asian financial crisis in 1997, Russian crisis in 1998, Brazilian crisis in 1999, which had a contagion effect on Argentina in 2001 and defaulted on its debt (Lopez and Nahon, 2017). Risk premiums increased in emerging market economies which led to capital outflows, disinvestments by foreign investors and the devaluation of local currencies (Lopez and Nahon, 2017). As a

result, this increased the cost foreign debt repayments which led to the debt crisis (Lopez and Nahon, 2017). The debt crisis in Turkey as explained by Govdeli (2019) was caused by the increase in foreign denominated debt which reached a peak of 56% in 2001, which led to the debt crisis in 2008. In addition, the crisis had a negative impact on Turkish economic growth, experiencing a negative GDP growth of 6 percent in 2001 and -5 percent in 2008, which led to capital outflow and the depreciation of the local currency (Govdeli, 2019). Buch, Heinrich, Lusinyan, and Schrooten (2000) state that the Russian crisis in 1998 was a result of the increased foreign denominated debt that was accrued following the fall of the Soviet Union in 1991 and the depreciation of the local currency which worsened the country's foreign debt position. The risk of foreign denominated debt led to the debt crisis in a number of emerging market economies, which exacerbated capital outflows and currency crisis or depreciation of local currencies, and finally led to economies defaulting on their foreign debt.

Where foreign currency can be generated through capital inflows and exports, the depreciation of the currency will lead to increased capital outflows, and increase the costs of financing foreign debt. This will lead to a deficit in the capital account and, if the trade account is in a deficit, government will not be able to finance its foreign debt, thus leading to a balance of payments crisis, depreciation of local currency and thus increased risk of default.

Presbitero (2012) observes the positive effect of the liquidity channel on economic growth in a number of developing and emerging economies, which led to these economies substituting foreign denominated debt with domestic debt since the 1990s. As a result, the share of domestic debt to total government debt increased significantly from 38% in 1990 to 58% in 2004 (Presbitero, 2012). Several emerging market economies are issuing debt in local currencies, e.g., in South Africa, China and Brazil more than 90% of debt issuance is in local currency, with Mexico at 80%, Russia at 70%, and Turkey at 63% (Ullrich, 2018).

Andreas (2021) uses the concept of the “Original Sin” to explain the importance for emerging economies to issue debt in local currency in order to reduce the risks associated with foreign debt and increased risk of default as a result of currency depreciations and lack of foreign currency to meet repayment requirements. Currency depreciations have

triggered the default risk of foreign denominated debt and debt crisis in a number of emerging market economies (Latin America, Russia, Turkey, to mention a few) Andreas (2021) uses an index to measure “Original Sin” ranging from zero to one (closer a country is to one, means foreign currency denominated debt and will suffer from “Original Sin”).

Table 2.8: Emerging Market Economies Original Sin index

Country	OSIN₃ 1999 - 2007	OSIN₃ 2008 - 2014	OSIN₃ 2015 - 2019
South Africa	0.07	0.00	0.22
China	0.95	0.18	0.34
India	0.99	0.91	0.66
Brazil	0.94	0.70	0.78
Turkey	0.89	0.63	0.81
Russia	0.96	0.76	0.87
Mexico	0.94	0.80	0.89
Thailand	0.88	0.49	0.68
Peru	0.98	0.82	0.73
Uruguay	0.94	0.75	0.78
Indonesia	0.96	0.78	0.87
Poland	0.56	0.79	0.88
Colombia	0.95	0.78	0.88
Saudi Arabia	0.93	0.60	0.89
Egypt	0.92	0.82	0.92

Source: Andreas (2021)

The results from Andreas (2021) index clearly indicate that South Africa was the only country that did not suffer from “Original Sin” across all the periods, with China achieving low risk in second and third period. The index shows that across all the periods, the remaining the identified emerging market economies apart from South Africa and China suffer from “Original Sin” – exposure to foreign denominated debt, debt crisis and risk of default. Andreas (2021) states that underdeveloped local capital markets and poor institutions are the two major causes of the “Original Sin” that many emerging market

economies are suffering, thus being forced to borrow in foreign denominated debt. The results call for a policy shift of raising debt in local currencies to avoid future debt crisis in emerging market economies. As argued by de Jong and Fabozzi (2022) sovereign bond markets and indexes have attracted new foreign capital into developing economies such as South Africa, Mexico, Malaysia, and Poland as they tend to offer favourable investment returns. Thus, indicating an appetite by foreign investors to hold emerging market economies local currency debt.

Reinhoff and Rogoff (2010) state that the issuing of debt in local currency will place these economies in a position to issue more debt and to not fear default, given that governments can repay their debt by issuing new money. Reinhoff and Rogoff (2010) state that government debt issued in local currency can be purchased by both local and foreign investors, and governments can repay their debt by issuing new money. Andreas (2021) states that countries with lower “Original Sin” index are in a better position to develop their countries using local capital markets to raise funding to support economic development. The development of local bond markets and creditable institutions that support the achievement of sound macroeconomic objectives of low inflation and increased economic growth is key to addressing the “Original Sin” problem (Andreas, 2021). Nersisyan and Wray (2010) also support the policy shift towards debt denominated in local currency to deal the “Original Sin” problem and risks associated with foreign denominated debt. This should result in less currency and debt crisis as governments cannot default on its sovereign debt issuance.

In summary, modern monetary theory argues that the increase in sovereign debt or local currency denominated debt should not be seen as a problem given that a country cannot go insolvent if it issues local currency denominated debt. This means that governments can print money to finance their debt, and the only concern will be the increase in inflation, which will need to be managed by central banks using interest rates. The argument also calls for zero interest rate bond issues by government financed by the central bank to support the productive capacity of the economy, as prescribed by the functional finance theory. This will allow governments to increase budget deficits to be financed via the zero interest rate bonds to be purchased by the central bank.

2.9.2 Monetary and Fiscal Policy Coordination

The South African economic environment is experiencing low levels of inflation and interest rates are favourable to stimulus measures. Building from section 2.8.1 regarding the liquidity channel, this section will argue for the increased role that can be played by the central banks in pumping money into the financial sector to stimulate economic activity by purchasing government debt. This section will build the case for South Africa to use government debt and provide stimulus measures to support economic growth. This is not a new phenomenon given the global experience discussed in section 2.8, where central banks provide financial support to government's programme to drive economic and industrial development. The experience of India and China as discussed in section 2.8 shows how the central banks' mandate focused on the support for economic development by providing financial support to drive the productive side of the economy. This was undertaken through the development of financial institutions that enabled the financial sector to increase access to financial instruments to finance economic development projects such as infrastructure, technology development, and human capital investment. In this way, central banks can finance government investment in physical infrastructure and human capital investment via low interest rates or government issue of zero interest rate bonds. Low interest rates should be used to incentivise both public and private sector investment to finance their accumulation of fixed capital formation. Governments should use the availability of cheap credit via the monetary policy intervention to finance investment, physical infrastructure, human capital and industrial development and research and development (R&D) to support and drive economic growth. The low interest rate environment will give policy makers the tool to use fiscal stimulus to support economic growth and development.

Bhattarai, Eggertsson and Gafarov (2015) define this process as 'quantitative easing', when the central bank buys long-term government debt. Bhattarai et al (2015) explain this process as reducing the maturity of long-term government debt by exchanging it with the short-term government debt held by the private sector, households, institutional investors and banks. The main goal of quantitative easing, as experienced in the US following the global financial crisis, was to reduce interest rates with the objective of stimulating economic activity (Bhattarai et al, 2015). This will provide a signal to the market that the

central bank is determined to keep interest rates at low levels, which will seek to stimulate private sector investment spending and promote economic growth.

Faure (2020) explains quantitative easing using the experience of the US and European economies in response to the 2008/09 global recession, when interest rates fell to 0%, making interest rates an ineffective monetary policy instrument. Since interest rates cannot be reduced below 0%, the central bank will use its balance sheet to purchase government debt and other assets held by commercial banks to increase liquidity in the market (Faure, 2020). Central banks will review their policies to increase the size and composition of their balance sheets in order to increase liquidity (Faure, 2020). The assumption is that the increased liquidity will provide commercial banks with the liquidity to create money by issuing more loans to households and businesses (Faure, 2020).

Joyce, Miles and Vayanos (2012) define this as the unconventional monetary policy of the central banks using their balance sheet to purchase government bonds in an open market operation. Such a process will increase the balance sheet of the central bank as it purchases these instruments from the market or financial sector, which will then lead to an increase in reserves held by the banking sector. This can then be used as an injection of additional money into the private sector that was holding government bonds as investment (Joyce et al, 2012). The increase in money to the private sector will allow it to expand production or investment spending without having to issue new equity or to sell off their equity, which could prove to be difficult during an economic slowdown (Joyce et al, 2012). When the central bank purchases government bonds from the market, it will lead to an increase in bond prices and a decline in bond yields; this will reduce the burden for the private sector to raise funds as a result of the capital gains (Joyce et al, 2012). This capital gain also benefits households who are holding such assets, resulting in an increase in their wealth and consumption in the economy (Joyce et al, 2012). This process will lead to an increase in aggregate demand and economic activity. Joyce et al (2012) explain this as rebalancing the channel of asset purchases, which improves liquidity in the financial market when the central bank purchases bonds.

The argument above is supported by Zampolli (2012), who states that an increase in government debt via the issuing of bonds to the market will have a positive wealth effect

on households and the private sector. Zampolli (2012) states that central banks have been purchasing government bonds in response to the global financial crisis with the objective to drive economic activity and growth and avoid deflation in the economy. Sovereign debt management should be seen as a monetary policy tool to stabilise the economy via the central bank's open market operations, which seek to restructure and rebalance the stock of government debt in the financial sector held by banks, households, institutional investors, and the private sector (Zampolli, 2012).

Eric Monnet (2021) in an essay looking at why central bankers should read economic history alludes to the fact that central banks monetised government debt during the post-war period. The monetising of government debt was governed by law to ensure that governments do not depend on this type of financial arrangement (Monnet, 2021). He also states that central banks in the Euro zone and the United Kingdom were holding an estimated 30% of government debt and this figure was above 50% in Japan, with such figures increasing during an economic crisis (Monnet, 2021).

With regard to South Africa, Malikane (2020) looked at how the South African Reserve Bank (SARB) can purchase government debt to finance the budget deficit. The article also notes the potential to measure the additional fiscal space that can be made available to government by the SARB in order to support economic growth. The article indicates that the section 13 (f) of the SARB Act of (1989) gives the SARB the power to hold government debt issued directly by National Treasury, to a sum not exceeding one-third of the bank's balance sheet (Malikane, 2020). The article estimates that the SARB can hold government debt to the value R276 billion, thus giving government additional fiscal space to support economic growth (Malikane, 2020). He further argues that Section 13 (f) should be used to allow the SARB to monetise government debt and budget deficits, and for National Treasury to issue interest-free bonds to be taken up by the SARB (Malikane, 2020). The interest-free bonds will not find their way into the market and will be backed by the Act and the Bank's balance sheet. The SARB will act as the bank of last resort to government to raise additional resources to be directed towards economic development.

Joyce et al (2012) provide empirical evidence using the UK and US experiences following the 2007 global financial crisis that resulted in quantitative easing measures. The

quantitative easing improved the market lending conditions which led to an increase in corporate bonds and equity offering during 2009 (Joyce et al, 2012). This led to a positive economic environment, with economic growth showing signs of recovery in the second half of 2009 (Joyce et al, 2012). The quantitative easing provided the financial support and liquidity to the financial sector, which saw an increase in asset prices and a decline in government and corporate bond yields in the capital market (Joyce et al, 2012). Joyce et al (2012) confirm that the quantitative easing in the UK and US did assist in averting a prolonged economic contraction and the risks of deflation. In the US, a 0.50% reduction in interest rates increased the real GDP by 3%, while in the UK, it led to a 1.5% increase in real GDP (Joyce et al, 2012). This study concludes that the quantitative easing applied in the UK and US did work; it reduced bond yields and long-term interest rates, which had a positive effect on economic activity (Joyce et al, 2012). The reduction in interest rates worked as a stimulus to economic activity. Fawley and Neely (2013) explain that the asset price effect of quantitative easing will improve the willingness of banks to lend, stimulate private sector investment, and stimulate household consumption and/or increase their investment in the housing market. The reduction in real interest rates in the market will lead to improvements in economic activity and job creation (Fawley & Neely, 2013).

The decrease in bond yields signals to the market that future interest rates will be low or decline, which then incentivises the private sector to increase its investment spending and for government to borrow more, with the objective being to use the increased investment in the economy as a stimulus to economic activity. It should also signal to the fiscal space model an opportunity for government to issue more bonds, given the low interest rate environment to be experienced. As discussed above, government bonds should be regarded as deposits in the financial sector and treated as money. South Africa issues debt in its own currency in an open capital market and has a good functioning central bank, which gives government the opportunity to create money via the issuance of government bonds. This approach opens up government's fiscal policy to consider increasing its debt limit to support economic growth.

Debt levels in South Africa breached the 60% threshold in 2020, with National Treasury estimating that debt levels will stabilise at 88.9% in 2025/26 as government continues to respond to the socio-economic impact of the COVID-19 pandemic (National Treasury

Budget Report, 2021). Given this scenario, the proposed role of monetary policy would be to decrease interest rates and ensure that they remain low in order to support government's debt sustainability and to monetise government debt. As argued by Panizza and Presbitero (2013), low interest rate will also increase the fiscal space available to government to increase debt levels and budget deficits in order to adequately respond to the current economic impact of the pandemic.

2.9.3 Sovereign Money

In continuing with the above argument that gives government the tool to create money in order to support and stimulate growth, the creation of sovereign money will be proposed as an alternative monetary policy that seeks to support fiscal policy objectives.

Dyson, Hodgson and van Lerven (2016) provide a compelling argument for reviewing the current application of monetary policy that will allow central banks to create money rather than to focus on managing interest rates in order to influence borrowing in the economy by households and businesses. The conventional approach of monetary policy is to create money through the banking system (Faure, 2020).

Dyson et al (2016) argue that the current open market operation applied by monetary policy to create money through the banking system is not effective. The central bank will seek to influence aggregate demand by lowering interest rates, which will encourage the market to borrow more at lower interest rates (Dyson et al, 2016). The increased borrowing in the market is a form of money creation by commercial banks. As argued by Dyson et al (2016) and Faure (2020), the conventional approach of monetary policy leads only to the increased accumulation of debt by households and businesses. Dyson et al (2020) explain that for the conventional monetary policy to grow the economy, the banking system will increase borrowing through the reduction of interest rates by the central banks. This assumption might not be the case, given that the loans issued to households and businesses may result in the loans being directed into the property and financial asset markets rather than the real economy, leading to asset price bubbles (Dyson et al, 2016). Therefore, the economic impact is minimal in this regard. This has been the case in countries such as the UK and US, which have experienced booms in property and financial assets (Dyson et al, 2016).

The sovereign money approach seeks to change the conventional approach of monetary policy by proposing that the creation of money should be directed by the central banks and not commercial banks (Dyson et al, 2016). The sovereign money approach argues for the central bank to have direct control over the process and that it should no longer use interest rates to influence lending by commercial banks in order to create money (Dyson et al, 2016). The creation of money by the central bank will ensure that the funds are directed to National Treasury to finance spending in the economy through transfers to citizens, increased government spending to support the productive side of the economy, financing of tax incentives and reductions in taxes with the objective to stimulate aggregate demand in the economy, and to finance businesses through the banking system (Dyson et al, 2016). The approach and argument put forward for using sovereign money seeks to give the central banks control of creating new money in the economy and to direct the funds to support the productive side of the economy and directly support aggregate demand. This will ensure that the creation of money by the central banks does not lead to accumulation of debt in the economy, but will be directly transferred into the economy through government spending, as argued by Dyson et al (2016).

In summary, the sovereign money approach will ensure that money creation is directly influenced by the central bank and not by the conventional open market operations of using or managing interest rates (Dyson et al, 2016). This approach will ensure that the central bank's policy objectives are no longer limited to price stability, but also include supporting economic growth and job creation (Dyson et al, 2016). This approach gives central banks the tool to direct and influence spending in the economy to meet the objectives of economic growth and job creation. Monetary policy will create money to influence aggregate demand in the economy and to achieve the broader objective of economic growth and job creation. The role of National Treasury will be to allocate and distribute the new money to fund and support economic growth. The sovereign money can be used to close the output gap and be directed towards the sectors that are contracting.

The sovereign money approach will give central banks the direct tool to issue new money into the economy via government spending rather than relying on the current banking system (Dyson et al, 2016). This approach can be used to support governments to deal with

the slowdown in economic activity without affecting the fiscal space. Dyson et al (2016) further argue that the creation of money by the central bank will not be linked to interest rates, which will mean that the stock of money will be debt free. This approach further talks to the principles of quantitative easing, where central banks can use their balance sheet to purchase interest-free government bonds (Dyson et al, 2016). This means that there will be no need for increased borrowing by households and businesses in order to create money in the economy. This will lead to less borrowing in the economy, including government borrowing. Central banks will use their balance sheet to back sovereign money, so such borrowing will not find its way into the bond market and affect government's indebtedness. It should be noted that proposed monetisation of government debt should be seen as another form of government borrowing to fund its expenditure without raising more debt via the capital market or being forced to raise taxes.

Huber (2014) supports the argument for sovereign money and proposes reforms to the current monetary system and claims that the current system makes government depended on capital markets to raise funds. Huber (2014) states that the monetary reform proposals will ensure that the monetary function of creating money will be controlled by central banks, and banks will continue to provide the normal banking services. Prieg and Greenham (2011) support the proposed reforms and notes that this will encourage competition in the banking sector through the provision of transaction accounts and permit other players such as credit unions and building societies to be part of the broader banking system. The reforms will ensure that banks create money through new bank deposits made by clients and not by the reserve requirements (Prieg and Greenham, 2011). This will limit the use of open market operations to create money via the banking system when central banks buy debt or financial instruments from the banking system to increase money supply or sell the said instruments to reduce money supply in the banking system.

Dyson et al (2016) state that monetary and fiscal policy coordination will be key in order for the sovereign money approach to work and that institutional arrangements will need to be in place to ensure that the creation of money is directed towards economic growth and job creation. In this regard, the central bank will be responsible for determining the amount or level of money to be created and National Treasury will determine how the new

money will be allocated and distributed (Dyson et al, 2016). Huber (2014) states that governments will need money to support the demand side of the economy through budget deficits and supply side of the economy through the provision of tax relief and subsidies to the private sector. This will require government to run budget deficits and increase debt levels in order to fund government spending. Huber (2014) states that this is the mandate of both government and central banks which is supported by Acts of law that will govern the circulation of money via quantitative easing or allow for low market interest rates. The open market operation will continue to function between central banks and the banks in the provision of credit to the banking system, with interest rates influenced by business and financial cycles (Huber, 2014). Lastly, Huber (2014) states that sovereign money should be seen as reforming the monetary system and not the banking or financial system, and should not be a substitute for taxation and sovereign money should be used to support capital investment.

In 2020, the SARB decreased interest rates by 2% in response to the economic crisis and COVID-19 pandemic (SARB, 2020). It can be argued that during the current climate of economic recession and the closing of the economy during COVID-19, the decrease in the interest rate will not lead to increased borrowing by households and businesses. The use of interest rates to stimulate aggregate demand will not be sufficient to support economic growth in the current economic environment. The impact on stimulating aggregate demand will be minimal, therefore calling for the conventional approach of monetary policy to be reviewed. The sovereign money approach as argued by Dyson et al (2016) will give monetary policy and fiscal policy the direct tools needed to support economic growth more effectively. Fiscal policy and monetary policy responses will be expansionary, in this case applied via an increase in budget deficits or a decrease in interest rates in order to induce aggregate demand and investment in the economy, which should lead to an increase in economic activity and growth. When increased budget deficits are used to stimulate economic activity, it may lead to a reduction in fiscal space caused by the increase in government debt; in such a case, monetary policy should be used to support fiscal policy via a zero interest rate approach to finance government fiscal stimulus. However, governments will need to ensure that the machinery of the state is capable of

efficient and effective delivery to limit the mismanagement or under-utilisation of funds made available by the central bank.

2.10 Conclusion

This literature review has described and analysed the different views and arguments of using government debt to support economic growth. Government debt has been used in a number of developed and developing countries to deal with economic crises and to support economic growth, with lessons from the Global Recession and the Great Depression. The review has highlighted the positive effects of using government to finance public sector investment on long-run economic growth and labour productivity. The public sector investment will yield positive economic growth rates if directed towards health, human capital, infrastructure, and R&D. The literature review also provided an alternative view to government debt, arguing that it should be seen as new money to stimulate economic activity and growth. The approaches applied looked at the functional finance and credit channel approaches to get economies to full employment and close the output gap. These approaches provide an argument for governments to apply more accommodating macroeconomic policies that seek to support economic growth.

On the other hand, high levels of and increases in government debt have been empirically shown to lead to a decline in economic growth and therefore there is a need for fiscal consolidation. The negative impact results in an increase in interest rates that causes the crowding out of the private sector, which finally leads to a decline in private sector investment and economic output. This is supported by Kaur and Kaur (2015), who caution that increased government debt may lead to sustainability problems if the debt is not used to support the productive side of the economy.

This literature review has also argued against the use of orthodox macroeconomic policies comprising 'strict' fiscal and monetary policies, which tend to constrain economic growth. South African policy makers cannot continue to use these orthodox approaches if they are to get the economy out of its weak and stagnant growth trajectory. The pro-growth reforms advocated by the South African government will need increased government

debt, not for the government to be obsessed with fiscal consolidation and deterioration, especially when the debt ratio is below the 60% to GDP level. There is an opportunity to increase the debt ratio above the 60% levels as argued in the literature review.

The fiscal policy option for South Africa given poor economic growth will be to cut taxes in order to stimulate aggregate demand in the economy or increase spending on infrastructure development. Given the slowdown in tax revenue collection in addition to the poor growth rates, this option may not be considered. With regard to infrastructure spending, this will require government borrowing and for monetary policy to play a more accommodative approach by lowering interest rates via the purchasing of government debt. Debt levels in South Africa have not reached unsustainable levels and do not yet pose a risk to monetary policy. Inflation is below the targeted 6% outer limit, and given the sluggish consumption and aggregate demand in the economy, both fiscal and monetary policies will need to be applied to support economic growth. In the current economic environment, the SARB should not use inflation targeting as an instrument to deter government from increasing debt, but rather lower interest rates to encourage the accumulation of debt to finance the output gap.

Debt levels in South Africa breached the 60% threshold in 2020 and National Treasury estimates that debt levels will stabilise at 88.9% in 2025/26 as government continues to respond to the health and economic impact of the COVID-19 pandemic (National Treasury Budget Report, 2021). The policy stance of the SARB should be encouraged to support government's debt sustainability by lowering the interest rate. As argued by Panizza and Presbitero (2013), a low interest rate will also increase the fiscal space available to government to increase debt levels and budget deficits in order to adequately respond to the current economic impact of the pandemic.

This literature review has suggested that increased debt levels and budget deficits can be used to stimulate economic activity and that monetary policy should be used to support fiscal policy via a zero interest rate approach to finance government fiscal stimulus. However, governments will need to ensure that the machinery of the state is capable of efficient and effective delivery to limit the mismanagement or under-utilisation of funds made available by central banks.

Alternative approaches call on governments to fund their expenditure by issuing debt in their own currencies with proposals for central banks to monetise government debt to prevent the increase in interest rates in the capital market that will lead to the crowding out of the private sector. The argument supports the post-Keynesian approach, stating that if governments decide to increase spending via issuing of debt, the central bank can act as the remaining buyer of the debt and therefore control interest rates in the market (Tcherneva, 2008). The review has also discussed the policy option for emerging market economies to raise debt in their local currencies to deal with the “Original Sin” problem and risks associated with foreign denominated debt. As stated by Andreas (2021), countries with lower “Original Sin” index are in a better position to develop their countries using local capital markets to raise funding to support economic development.

With reference to the ‘golden rule’ theory, governments must embrace debt and ensure that debt is functional and used to finance investments in fixed capital formation, infrastructure, education, health, and R&D. Debt should be seen as an instrument to support and sustain economic growth and development. As indicated by Ostry et al (2015), positive economic growth can be used to reduce the debt levels in the medium to long run, as opposed to using distortionary policy measures to reduce debt levels. The level of government debt should not be the policy goal, but rather a country’s ability to finance its debt. As stated in the World Bank Report (2019), government debt will not be a threat, if it is used to finance the output gap.

This literature review assisted in understanding how fiscal space can be impacted by poor economic growth, which will force governments to increase budget deficits and debt levels to try and get the economy to full employment. At the same time, increases in budget deficits and debt levels will lead to increases in government debt ratios and unsustainable debt ratio levels that will decrease government’s fiscal space. Given this scenario, this literature review argued for additional options available to governments to increase their fiscal space via the creation of sovereign money. This option seeks to support the arguments made by the functional finance approach and modern monetary theory for greater fiscal and monetary policy coordination, where monetary policy should support fiscal stimulus via lower interest rates or purchase of government zero interest rate bonds and the creation of sovereign money. As advocated by Dyson et al (2016), the

sovereign money approach will ensure that money supply is directly influenced by central banks and not via the open market operations of managing interest rates. This approach, as argued in the literature, will give central banks the tool to direct and influence spending in the economy to support government to meet the objectives of economic growth and job creation.

The literature review has assisted in understanding ‘fiscal space’, how to calculate the debt limit and constraints to the debt limit. The literature findings will be used to guide the methodology section that will be applied to provide the theory to the equations and the econometric models to measure ‘fiscal space’. In measuring South Africa’s ‘fiscal space’, the research will use a quantitative methodology using the steps indicated in the following section, and it will apply the theories and models evaluated in this chapter.

Chapter 3: Research Methodology

3.1 Introduction

The study followed an econometric methodological approach that looked at the economic theory discussed in the previous chapter, which provided the econometric model, data specifications and access, and testing of the econometric model and the data (Gujarati, 1995).

A quantitative methodological framework was used to test the following research policy questions: 1) Should governments increase government debt to finance investment in the productive capacity of the economy in order to support and drive economic growth? and 2) Will an increase in government debt reduce investment and economic growth?

The proposed methodology was applied to address the research questions and to assess the debt sustainability in emerging market economies. The selection of countries to be assessed was based on the emerging market countries that suffer from “Original Sin” - with reference to the Andreas (2021) “Original Sin” index and countries that can reduce their exposure to debt crisis by raising debt in local currency as discussed in the literature review. The assessment was thus limited to the following emerging market economies: Brazil, China, India, Mexico, Russia, South Africa, and Turkey.

3.2 Econometric Approach to Measure Fiscal Space / Debt Limit

The key area of the research was to determine the required fiscal space to support economic growth and development in South Africa. Botev et al (2016) indicate that the debt limit needs to consider a number of factors, as stated in the literature review. In determining the debt limit, the model and theory applied by Ghosh et al (2013) was used to explain government debt limits, starting with government budget constraints:

$$“d_{t+1} - d_t = (r_t - g)d_t - s_{t+1}”$$

“where d is one period’s debt as a percentage of GDP at the end of the period; g is the real GDP growth rate which is assumed to be exogenous and constant; s is the primary balance (deficit) as a percentage of GDP; and r is the real interest rates on government debt issued in period t and due in period $t+1$. Interest rates are endogenous and are greater than or

equal to the risk-free interest of r^* – the interest rate will be an increasing function of the probability of government defaulting, and debt will not increase if $r=r^*$ ” (Ghosh et al, 2013:7).

Ghosh et al (2013) define the debt limit as the maximum debt that government can take and be able to honour. The equation to determine the debt limit is as follows:

$$“\mu + f(d) = (r^* - g) \cdot d”$$

“where any point beyond the $\bar{d}$, the primary balance will not be sufficient to cover the interest rate payments, and if debt continuous to grow, it will increase the probability for government to default” (Ghosh et al, 2013:10).

3.3 Approaches to Measuring Debt Sustainability

The key area of the research was to determine the fiscal space to support economic growth and development. In measuring debt sustainability, this section seeks to answer the following research question: Will an increase in government debt reduce investment and economic growth? The approach reviews the identified emerging market economies to enhance the comparative analysis and lessons to be learned, as well as tests the results against the findings of Reinhart and Rogoff (2010).

The measurement of fiscal space is guided by the principles of debt sustainability. The study applies the indicators discussed in Svaljek (1997) to measure debt sustainability for South Africa and the identified emerging economies over the same period, namely, interest to economic growth; interest–economic growth differential; share of budget deficit to economic output; share of total debt to economic output; and debt ratio and GDP per capita. The approach measures the linear relationship between economic output / growth and the debt ratio, and the relationship between the debt ratio and GDP per capita. Time series analysis and co-variance analysis were used to measure the relationship.

A debt threshold was also measured to determine the relationship between debt-to-GDP ratio and GDP growth. The relationship assisted in determining the effects of the debt ratio to GDP. Chudik et al (2015) state that in determining the effects, comparisons need to be undertaken to analyse the GDP growth rate differentials and the average debt ratio.

Chudik et al's (2015) findings claim that the peak of the growth differentials is reached when the debt ratio is between 90 and 100%, with strong reference to the Reinhart and Rogoff model. Ganiko et al (2016) state that fiscal sustainability will be reached when interest rates are below the economic growth rate, which gives governments the freedom to run budget deficits.

3.4 Approaches to Addressing the Research Questions

In responding to the research questions, the thesis analysed the relationship between government debt and economic growth by applying the Keynesian approach that sees government debt as a positive accumulation of private capital in the economy that will have a positive impact on employment creation and allow government the opportunity to access capital to drive economic development by investing in infrastructure, human capital (Holtfrerich, 2014). The model further builds on the functional finance approach and the use of budget deficits to close the gap between savings and investments, which will allow for government to invest in the productive side of the economy, and will lead to an increase in incomes and savings (Arestis and Sawyer, 2008). The argument supports the use of increased government debt to increase its spending on human capital and infrastructure development, which is key to attracting private investment, that will lead to an increase in aggregate demand and economic growth. As argued by Techeneva (2008), savings in the economy can be reduced by increasing budget deficits to fund the increase in government spending to be directed towards the productive side of the economy, key to supporting economic growth and crowding in private sector investment. The model further builds on the “golden rule” principle of increasing budget deficits and government borrowing to fund public sector investments, which is key to driving economic growth and crowding in private sector investment. To determine the impact of government debt on economic growth, the following estimation equation was applied:

$$Y_t = \beta_1 D_t + \beta_2 BD_t + \beta_3 GE_t + \beta_4 GFCFG_t + \beta_5 GFCFP_t + \beta_6 RI_t$$

Where Y is GDP growth (annual %), D is government debt to GDP ratio (% of GDP), BD is government budget deficits to GDP ratio (% of GDP), GE is government expenditure (% of GDP), GFCFG is gross fixed capital formation – public sector (% of GDP), GFCFP is gross fixed capital formation - private sector (% of GDP), and RI is real interest rates.

The first research question is: **Will an increase in government debt reduce economic growth?**

This question was addressed by looking at the relationship between government debt, economic growth and development (measured using GDP per capita). Covariance tests were run to determine the relationship between government debt and economic growth, and GDP per capita. Estimates were calculated for the identified emerging market economies at low debt levels (less than 30%), at medium (less than 60%), and at high (greater than 90%) levels, against the following variables: debt ratio, economic growth, and GDP per capita. In addition, average and median indicators were calculated to measure the impact of government debt on economic growth and economic development (measured using GDP per capita) at different debt ratios. Scatter diagrams were used to measure the relationship and a regression model was used to measure the strength of the relationships between the variables. The model measured the covariance, correlation and t-statistic.

Should governments increase fiscal spending or government debt to finance the investment in the productive capacity of the economy in order to support and drive economic growth?

To determine the impact of government debt on public sector investment, the following estimation equation was applied:

$$GFCFG_t = \beta_1 Dt + \beta_2 BD_t + \beta_3 GE_t + \beta_5 RI_t$$

This question was addressed by looking at the impact of government debt on public sector investment, and the impact of government spending on economic growth. Estimates were calculated for the identified emerging market economies at low (30%), medium (60%), and high (greater than 90%) debt levels against the following variables: debt ratio, public and private sector investment, and government spending. In addition, average and median indicators were calculated to measure the impact of government debt on public sector investment and government spending. Scatter diagrams were used to measure the relationship and a regression model was used to measure the strength of the relationships between the variables. The model measured covariance, correlation and t-statistic.

The second research question is: **Will the increase in government debt reduce investment?**

To determine the impact of government debt on public and private sector investment, the following estimation equation was applied:

$$GFCFG_t = \beta_1 D_t + \beta_2 BD_t + \beta_3 GE_t + \beta_5 RIt$$

$$GFCFP_t = \beta_1 D_t + \beta_2 BD_t + \beta_3 GE_t + \beta_4 GFCFG_t + \beta_5 RIt$$

This question was addressed by looking at the impact of government debt on public and private sector investment – to measure the impact on accumulating fixed capital formation and the crowding out effect of private sector investment. The impact was analysed by measuring and interpreting the covariance between government debt and fixed capital formation and private sector investment. Covariance analysis is presented and analysed per country to measure the relationship between government debt ratio and fixed capital formation and private sector investment. In addition, average and median indicators were calculated to measure the impact of government debt to fixed capital formation and private sector investment.

3.4.1 Debt sustainability

This was determined by identifying fiscal sustainability risks that would affect the fiscal space for the emerging market economies. The following variables were analysed: real interest rates, government debt ratios, budget deficits, and interest rate growth differential.

The interest-growth differentials were assessed for the identified emerging market economies to determine government's default risk.

In measuring the risks to fiscal sustainability, the Chalk and Hemming (2000) conditions were used to unpack the risks associated with rising debt ratios in a high interest rate environment, which will cause government debt levels to grow faster than economic growth. The conditions measured were as follows (Chalk & Hemming, 2000):

1. percentage change in debt levels < real interest rates, and;

2. percentage change in debt levels < GDP growth.

Data that was sourced from the World Bank include the following:

1. Debt-to-GDP ratio: Central government debt, total (% of GDP)
2. Gross fixed capital formation, private sector (% of GDP)
3. Gross fixed capital formation, public sector (% of GDP)
4. Real interest rates (%)
5. GDP growth (annual %)
6. Lending interest rate (%)
7. GDP per capita growth (annual %)
8. Government expenditure: Expense (% of GDP)

Data was also sourced from OECD (Budget Deficits to GDP) and Trading Economics (Government debt to GDP).

3.5 Building a case for South Africa

A case for the South African economy to issue more debt to support economic growth was assessed by looking at how government debt has influenced economic growth and economic development by reviewing data from the South African Reserve Bank (SARB) and World Bank for the period 1994 to 2017. The case relied on time series data used for the analysis of the debt ratios and public sector investment and for the review of the growth of public sector fixed capital formation in relation to government debt and total government spending, and assessed how it influenced economic growth. In addition, the time series data was also used to test the 'golden rule' theory discussed by Arestis and Sawyer (2008), which argues that budget deficits should be used to balance savings and investments in the economy, and by Ostry et al (2015), who argue that governments must embrace debt and use it to finance investments in fixed capital formation.

The following data was sourced from the SARB:

1. Debt-to-GDP ratio: Total gross loan debt as percentage of GDP
2. Budget deficit to GDP: National government deficit / surplus as a % of GDP

3. Government expenditure to GDP: National government expenditure as percentage of GDP
4. GDP: Expenditure on gross domestic product
5. GDP per capita: GDP per capita
6. Fixed capital formation: Ratio of gross fixed capital formation to GDP
7. Net purchase of bonds by non-residents
8. Gross savings to GDP

Real interest data was sourced from the World Bank.

3.6 Testing of Model and Data

The following tests were undertaken:

3.6.1 Normality Test

To test the adequacy of the model, a normality test was undertaken to measure whether the error term followed the normal distribution. The Pairwise Granger Causality test was used to test for normality. Please refer to the annexure for the test conducted and interpretation of results.

3.6.2 Stationary Test

A stationary test was undertaken to test for the stationarity of all the time series data. An autocorrelation function and correlogram was used to test for stationarity. Please refer to the annexure for the test conducted and interpretation of results.

3.7 Limitation of the Study

The methodology applied was limited to South Africa and the identified emerging market economies. The limitation to the study was the availability of economic data or variables to be tested for the study period 1994 – 2017 across all the emerging market economies. Reliance on World Bank data was key but had its limitations and was supplemented by accessing the OECD and Trading Economics data bases for countries that did not have data.

3.8 Contribution to Knowledge

The term ‘fiscal space’ is defined by Heller (2005) as the resources available to government to increase spending or government debt to finance the productivity of the economy without affecting the fiscal sustainability of government. As stated in the purpose statement, the contribution to knowledge is to add to the alternative thinking of using government debt and increased government spending to support economic growth and development.

To support the case of South Africa, an analysis was undertaken for emerging market economies that sought to answer these research questions: 1) Should governments increase debt to finance investment in the productive capacity of the economy in order to support and drive economic growth? and 2) Will an increase in government debt reduce investments and economic growth?

The key findings explored the alternative approaches to government debt and economic growth. In addition, the study explored how the South African government can use debt to finance infrastructure investment and human capital in order to raise the productive capacity of the economy and the economic growth required to address unemployment and underdevelopment in the country.

3.8 Conclusion

This section highlighted the methodological approach that was followed. The methodology follows two approaches: first, it builds a case for South Africa to issue more debt using time series analysis; second, it determines the relationship between debt ratio and economic growth and measures debt sustainability for the identified emerging market economies.

The following chapter seeks to build a case for South Africa to issue more debt to support economic growth by looking at how government debt has influenced economic growth and economic development by reviewing data from the SARB and World Bank for the period 1994 to 2017.

Chapter 4: Building a Case for South Africa's Debt Position

4.1 Introduction

This section of the thesis seeks to build a case for the South African government to issue more debt to support economic growth by looking at how government debt has influenced economic growth and economic development. This is done through reviewing the data from the South African Reserve Bank (SARB) for the period 1994 to 2017. This is further unpacked with an analysis of the debt ratios and public sector investment and a review of the growth of public sector fixed capital formation in relation to government debt and total government spending. Finally, this chapter assesses how government debt has influenced economic growth. An analysis of the South African bond market and liquidity risks is undertaken to measure government's ability to borrow and issue more debt. The findings from the literature review will be used to enhance the analysis of the issues listed above and build the argument for South Africa to issue more debt to support economic growth and development.

The time series data analysis will be presented to analyse the impact of government debt on economic growth and development; to test the 'golden rule' of using government debt to accumulate public investment in order to support economic growth; using interest rates to accumulate debt and investment, and; assess the opportunity to increase debt levels by looking at the South African bond market, analysing the interest payment ratios, liquidity risk, and bonds held by non-residents.

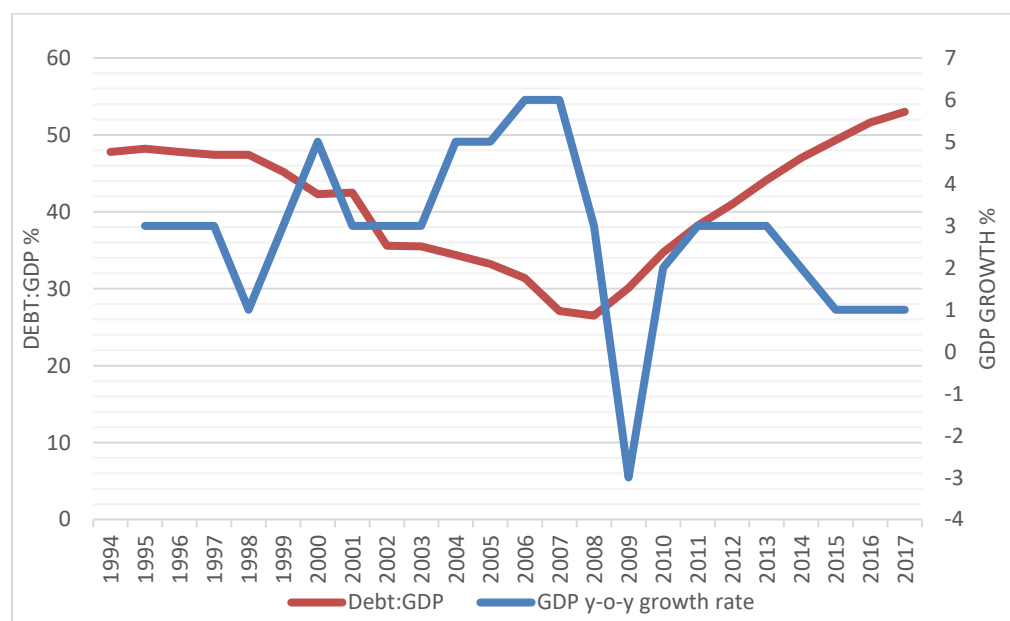
4.2 Impact of Public Debt on Economic Growth

Calitz et al (2013) provide an historical analysis of South African government debt levels between 1961 and 2008, indicating that the debt ratio ranged between 23.8% and 50.4% of GDP, which was below the prescribed 60%. Calitz et al (2013) conclude that the South African government practiced fiscal discipline during this period, and the same can be deduced from the study period of 1994 to 2017.

However, given the economic challenges of poor or low economic growth, high levels of unemployment, underdevelopment and underinvestment by the government, this South African case study analysis will seek to argue for increased government expenditure and debt levels to be used to support economic growth and development.

The empirical evidence provided in the literature review demonstrated that when the debt-to-GDP ratio is greater than 90%, it will lead to a slowdown in economic growth. It should be noted that for the period 1994 to 2017, the South African government debt-to-GDP ratio never reached the prescribed 60%. This is depicted in Figure 4.1 by the downward trend or decline in the debt ratio from 48% in 1994 to 27% in 2008. During the same period, the economy grew at average of 4%. South Africa then introduced counter-cyclical fiscal policy measures following the economic recession in 2009, when the economy grew by a negative 3%. There was a sharp increase in the debt ratio between 2009 and 2017, which saw the ratio increase from 30% in 2009 to 53% in 2017. During the same period, the economy only managed to grow by an average of 1%. The stimulus failed to get the economy out of the stagnant growth mode, as the economy only managed to grow at an average rate of 3% between 2011 and 2013.

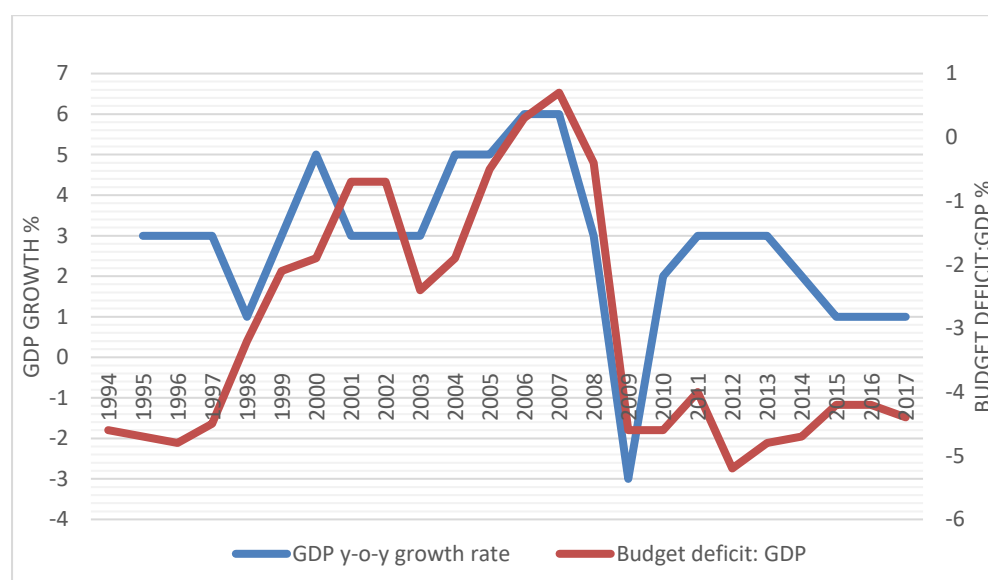
Figure 4.1: Debt Ratio and GDP



Source: SARB Data

The policy of fiscal consolidation during the periods 1994 to 2017 saw the budget deficit-to-GDP ratio experience a downward trend from a deficit of 4.6% in 1994 to a surplus of 0.7% in 2008. Figure 4.2 indicates that the economy achieved a surplus of 0.3% in 2007 and 0.7% in 2009, which corresponds to the highest economic growth experienced in South Africa of 6% each year during the two years. The economic downturn in 2009 saw the deficit increasing to 4% in 2009 and between 5% and 4% between 2009 and 2017. What is notable about the deficit management during the periods of stagnant economic growth between 2014 and 2017, is that the deficit was deliberately managed to improve from 4.8% to 4.1%. In addition, the increase in government budget deficit before 2009 indicates a deterioration in government finances, which mirrors the decline in economic growth.

Figure 4.2: Budget Deficit and GDP

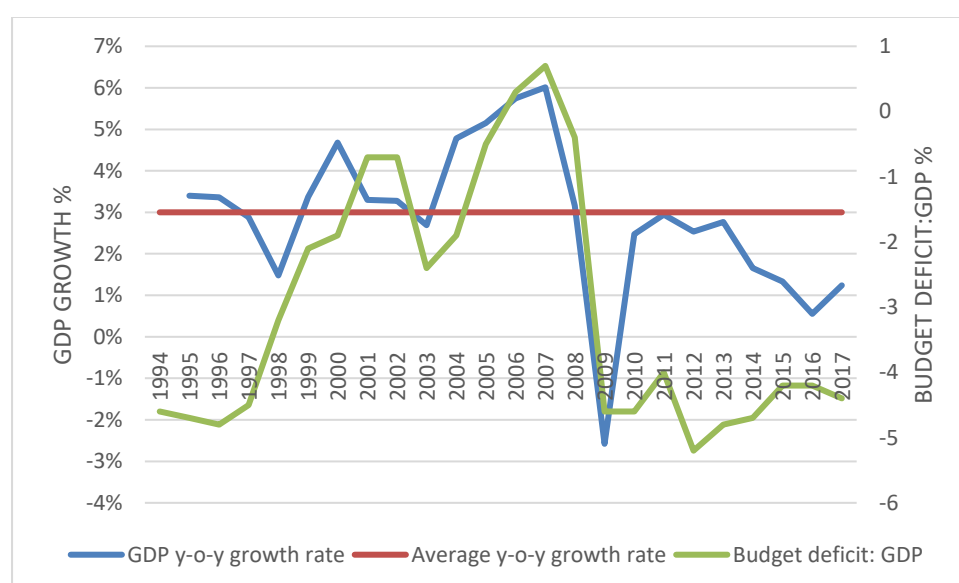


Source: SARB Data

As discussed in the literature review and argued by Kobayashi (2015), fiscal deterioration can lead to a slowdown in economic activity, as government will have less revenue to spend in the economy. This is the same period when the ratio of fixed capital formation to GDP declined (refer to Figure 4.8), indicating that the budget deficit was not used to accumulate the capital stock needed to support economic growth. This resulted in the significant decline in economic growth from a high of 6% year-on-year growth in 2007 to -3% year-on-year growth in 2009. The decline in government capital formation has contributed to the poor growth experienced since 2009.

The argument for not applying counter-cyclical policy consistently and therefore not yielding to economic recovery is clearly depicted from Figure 4.3. During periods of the output gap (when economic growth is below the average 3%), between 1997 and 1999, the budget deficit decreased from -3.2% to -2.1%. During the period between 2009 and 2017, the budget deficit increased from -4.6% and stabilised at 4.1% in 2017, but it failed to close the output gap or get the economy to grow above the average 3%. During the same period when economic growth was stagnant, the debt ratio increased from 30% in 2009 to 53% in 2017, despite the economy growing by an average of 1%.

Figure 4.3: Budget Deficit, GDP Growth and Output Gap



Source: SARB Data

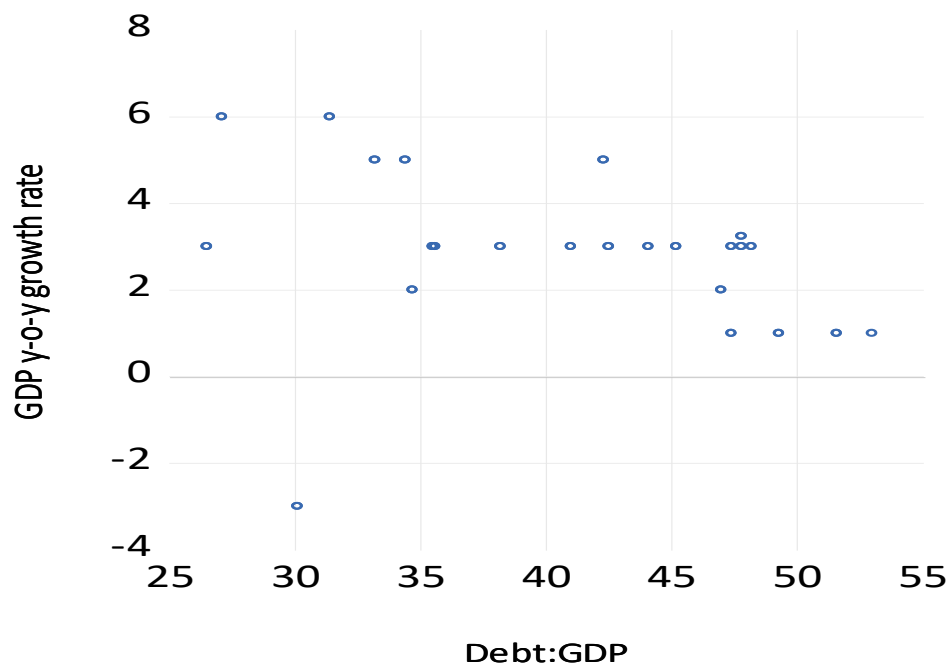
The danger with the current economic situation is that it could lead to a continued increase in the debt ratio if the South African government is to apply counter-cyclical fiscal policy. In addition, debt levels in South Africa breached the 60% threshold in 2020, with National Treasury estimating that debt levels will stabilise at 88.9% in 2025/26 as government continues to respond to the socio-economic impact of the COVID-19 pandemic (National Treasury Budget Report, 2021). Economic growth is expected to grow below 3% for 2022 and expected to grow at an average of 1.8% over the next three years, indicating an output gap till 2024/25 (National Treasury Budget Report, 2021). In dealing with the output gap, Jayadev and Manson (2018) argue that fiscal policy needs to be used to close the gap

regardless of the size of government debt levels. The continued poor economic growth will lead to fiscal deterioration and further economic deterioration.

The observation from the data is that there is no evidence that government debt is bad for South Africa's economic growth. There is a need to refocus the way government debt is viewed and how it can be applied to support economic growth. As Panizza and Presbitero (2013) argued in the literature review, running budget deficits and increasing government debt could lead to positive economic growth rates in the short to medium and long run. As argued by Jayadev and Manson (2018), interest rates need to be lowered and budget deficits increased in order to stimulate aggregate demand and economic activity. However, as stated by Kaur and Kaur (2015), governments need to ensure that the increased debt levels are used to support the productive side of the economy to avoid debt sustainability problems.

Figure 4.4 provides the sensitivity analysis between GDP growth and the debt: GDP ratio for the period 1994 to 2017. The analysis indicates that the average growth of 3% was reached with relatively low debt ratios of between 36% and 48% to GDP. The above average economic growth of 6% was reached with lower debt ratios of between 27% and 31% to GDP, thus supporting the economic theory that low debt ratios are necessary for achieving high economic growth rates. However, it should be noted that the above average growth rate was driven by the commodity boom and given that we are now in a commodity bust, fiscal policy will need to counter against this through expansionary measures. It is important to note that economic recovery has been fragile since 2009, and the South African government needs to continue to pursue expansionary fiscal policy to support growth and the productive capacity of the economy. It also calls for an increased and differentiated role for monetary policy when fiscal policy becomes overburdened.

Figure 4.4: GDP and Debt Ratio Scatter Diagram



Source: SARB Data

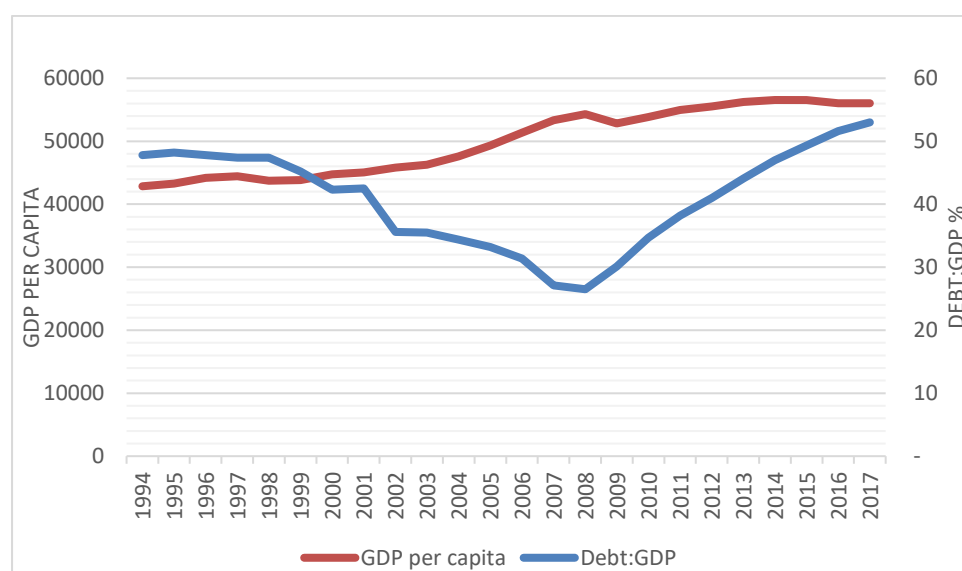
As stated by Kobayashi (2015), a slowdown in economic growth will affect the fiscal position of an economy caused by a decline in tax revenue, which will force governments to institute expansionary policy responses to rescue the economy, but with limited resources. This will force governments to either increase taxes or apply fiscal consolidation measures, which will lead to a further slowdown in economic activity (Kobayashi, 2015). The continued stagnant economic growth in South Africa will lead to the country's fiscal deterioration and force government to look at increasing taxes to fund the budget deficit, which will constrain aggregate demand and economic growth in the short to medium term. The policy objective should not be to focus on fiscal consolidation, but on getting to full employment by applying expansionary fiscal and monetary policy.

4.2.1 Impact of Public Debt on Economic Development

As discussed in the literature review, Holtfrerich (2014) views government debt as having a positive impact on employment creation by giving government the opportunity to access capital to drive economic development by investing in infrastructure, human capital, SOEs, and spending on administrative and judicial reforms. In relation to the South African analyses, as the debt ratio increased during counter-cyclical stages, GDP per capita

increased by a 24-year average of 1% between 1994 and 2017, with Figure 4.5 indicating that the increase in government debt failed to grow the economy and improve the economic welfare of its citizens.

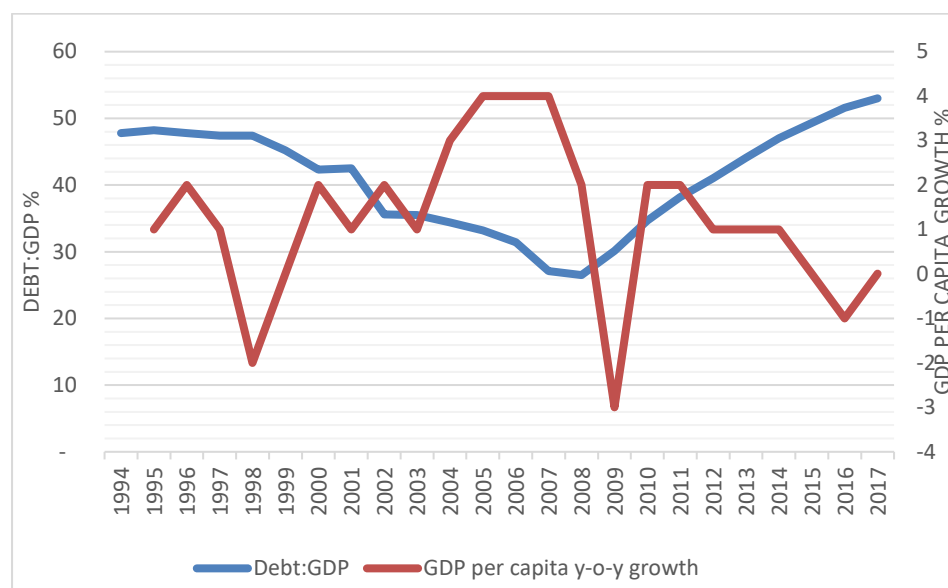
Figure 4.5: Debt Ratio and Development



Source: SARB Data

Figure 4.6 depicted that the debt ratio increased during counter-cyclical stages, and GDP per capita increased by an average of 1% between 1994 and 2017, indicating that the increase in government debt failed to grow the economy and improve the economic welfare of its citizens. The decrease in GDP per growth from 2007 to 2009 and again from 2011 to 2016 was a result of the poor economic growth experienced during these periods and the decrease in public sector investment. It can be depicted from Figure 4.6 that the increase in debt levels were not used to support economic growth. This is explained in section 4.4, which examines the relationship between public debt and public sector investment.

Figure 4.6: Debt Ratio and Impact on Development

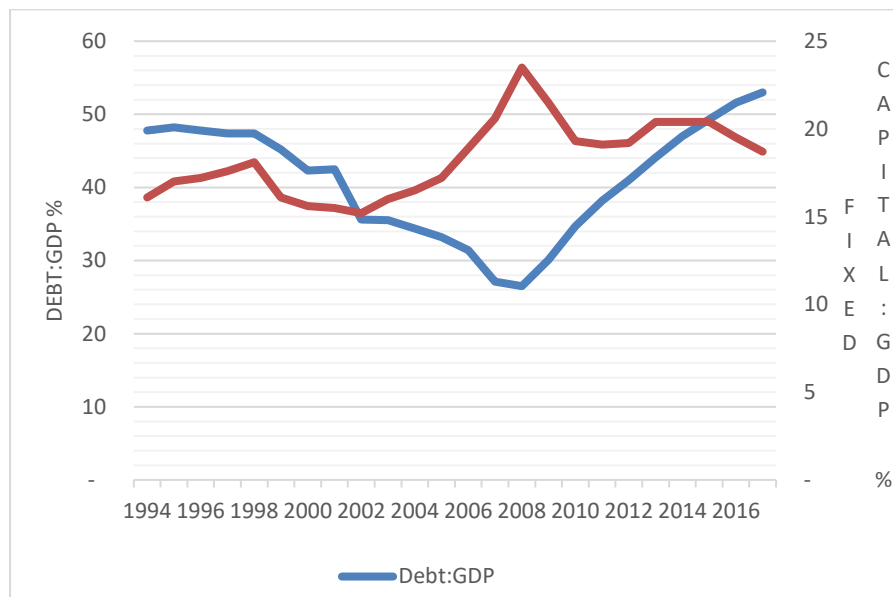


Source: SARB Data

4.3 Impact of Public Debt on Public Sector Investment

Following from the poor contribution of government debt to economic growth, the rise in public sector investment (fixed capital formation)-to-GDP ratio from 16% in 1994 to 24% in 2008, was accompanied by a decline in the debt ratio from 48% to 27%, respectively. Fixed capital formation experienced a slowdown in government investment from 24% in 2008 to 19% in 2017, but the debt ratio was on an upward trend from 27% in 2008 to 53% in 2017. The data indicates that government debt is not weighted towards public sector investment, which is key to driving economic growth.

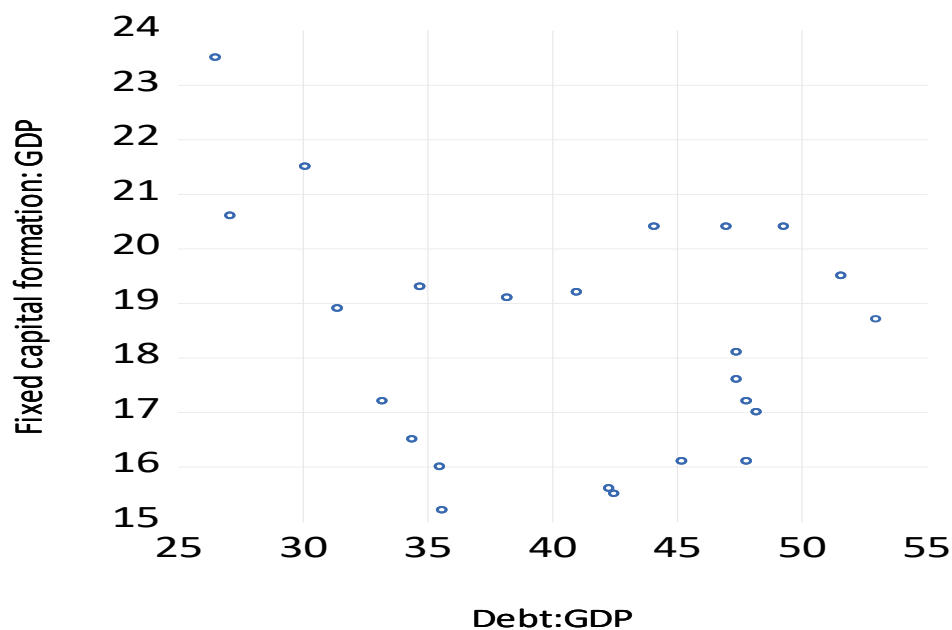
Figure 4.7: Debt Ratio and Public Investment



Source: SARB Data

The scatter diagram (Figure 4.8) clearly indicates that fixed capital formation was higher in South Africa (from 20.6% – 23.5% of GDP) when the debt ratio was below 30% of GDP, and as debt levels increased above 30% of GDP, fixed capital formation was slightly lower (between 15% and 20% of GDP). The lesson for South Africa is to encourage for the increased use of public sector investment to support economic growth by investing in human capital, infrastructure, industrial development, and research and development, as argued in the literature review.

Figure 4.8: Public Investment and Debt Ratio Scatter Diagram

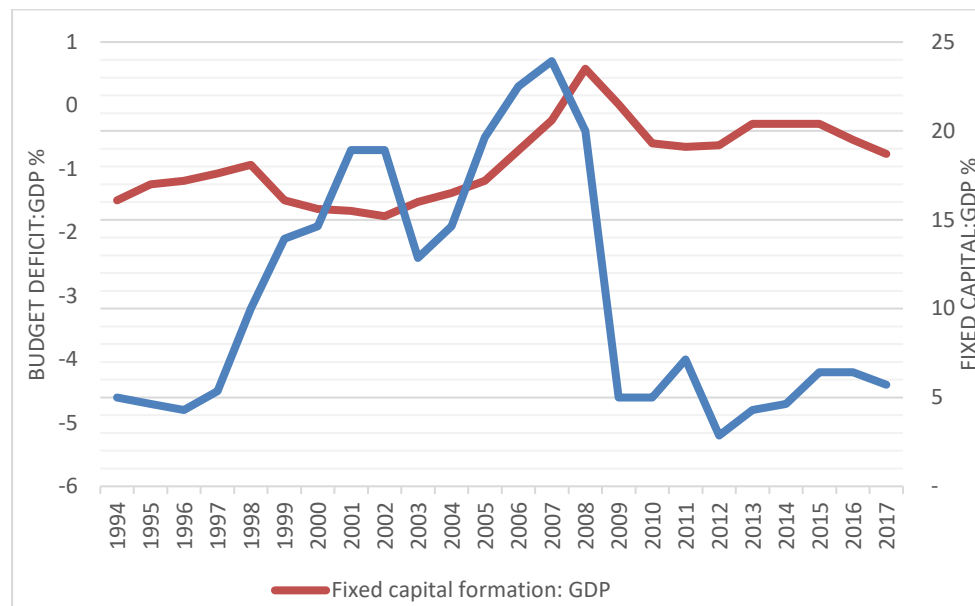


Source: SARB Data

As argued by Ostry et al (2015), the positive utilisation of government debt to fund public sector investment, which will lead to an increase in economic activity and job creation. The positive effects on economic activity should allow for governments to finance public investment by issuing debt. This is not the case for South Africa, with reference to Figure 4.8.

Economic theory would indicate that as public sector investment increases, the debt ratio and the budget deficit would increase, in order to finance public investment. In South Africa, the data in Figure 4.9 is to the contrary, indicating that the increase in fixed capital formation between 2002 and 2008 was not supported by the increases in budget deficits – in fact, budget deficits were decreasing, averaging -0.7% to GDP. When budget deficits increased between 2009 and 2017 (averaging -4.5% to GDP), public sector investment accumulation was on a decline.

Figure 4.9: Public Investment and Budget Deficit



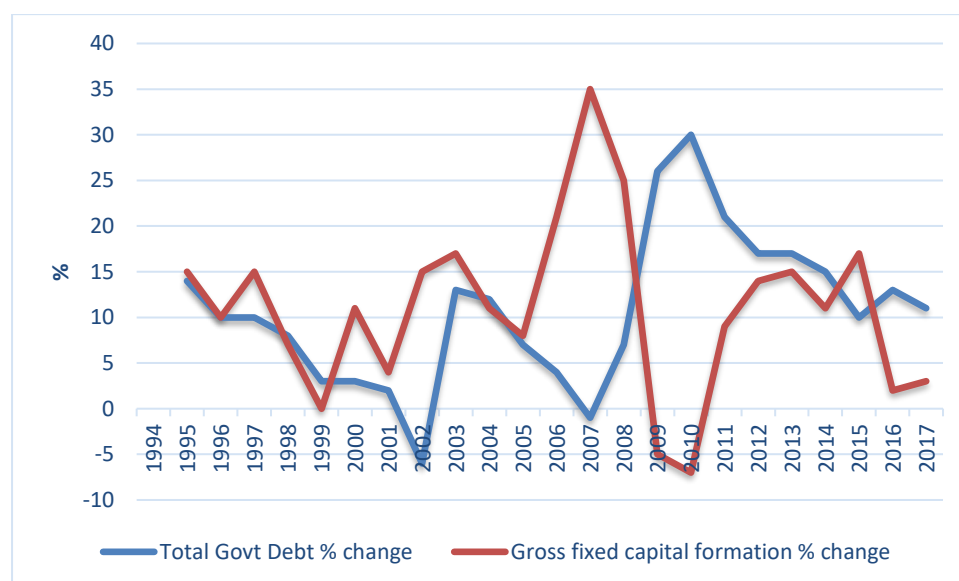
Source: SARB Data

As discussed in the literature review, Arestis and Sawyer (2008) argue that budget deficits should be used to balance savings and investments in the economy, while Ostry et al (2015) argue that governments must embrace debt and use it to finance investments in fixed capital formation. It is observed from the data that the South Africa government was conservative in using budget deficits to accumulate public investment and support economic growth. It is important to also highlight that infrastructure investment should support economic productivity and improve economic competitiveness. Higher budget deficits should be used to finance the infrastructure investment which will be beneficial to economic growth in the medium to long run.

The accumulation of government debt should lead to an accumulation of public sector investment in order to support and drive economic growth similar to countries such as India and China. The literature review showed that India increased government debt to GDP from 56% in the 1980s, rising to 63% in the 1990s and reaching a high of 81.4% in 2003 – 2004, while public investment as a percentage to GDP averaged 25% between 1981 and 2010 and rose to 35% in 2010 – 2011 (Barik, 2012).

For South Africa to reach and maintain public investment highs of 25% to GDP achieved in 2008 and continue to accumulate and increase its public sector investment, it will need to be financed by debt accumulation and debt financing for a longer period of between 10 and 15 years. The accumulation of public sector investment is key to supporting economic growth and economic productivity.

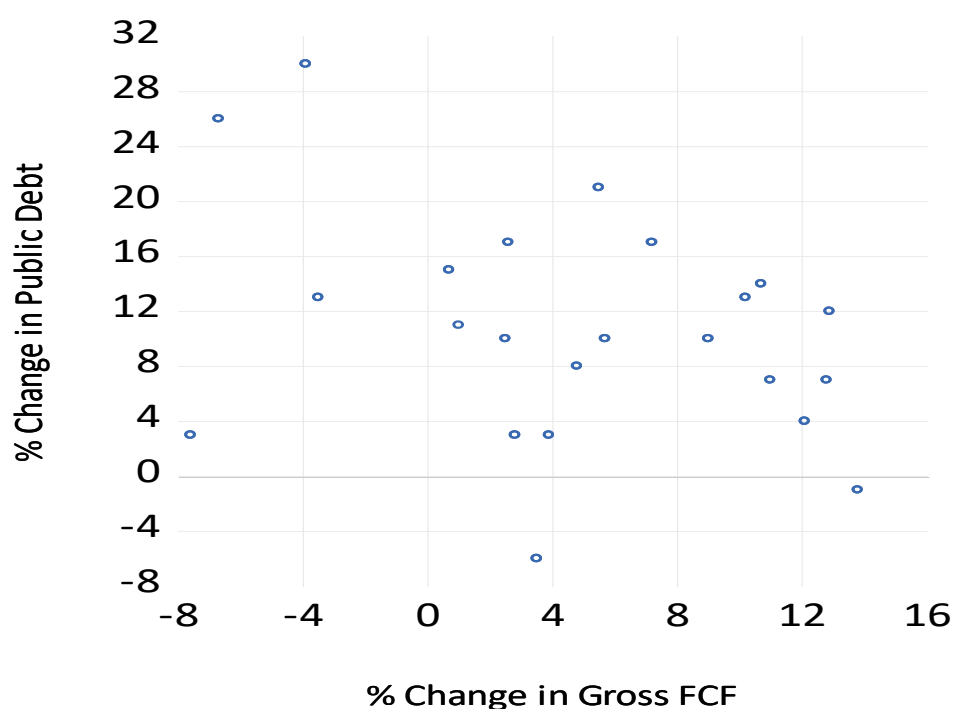
Figure 4.10: Growth in Debt Ratio and Public Investment



Source: SARB Data

Figure 4.11 depicts a negative policy relationship or response between the accumulation and growth of public sector investment to the accumulation and growth in government debt in South Africa. This is contrary to the theory discussed and the experiences of India and China in using government debt to fund public sector investment. However, between 1994 and 2001 the policy relationship or response between the two variables was in line with Ostry et al's (2015) argument. This is depicted by the fact that the decline in public investment is also driven by the decline in government debt.

Figure 4.11: Growth in Debt Ratio and Public Investment Scatter Diagram⁴



Source: SARB Data

4.3.1 Contribution of Government Debt to Public Investment and Development

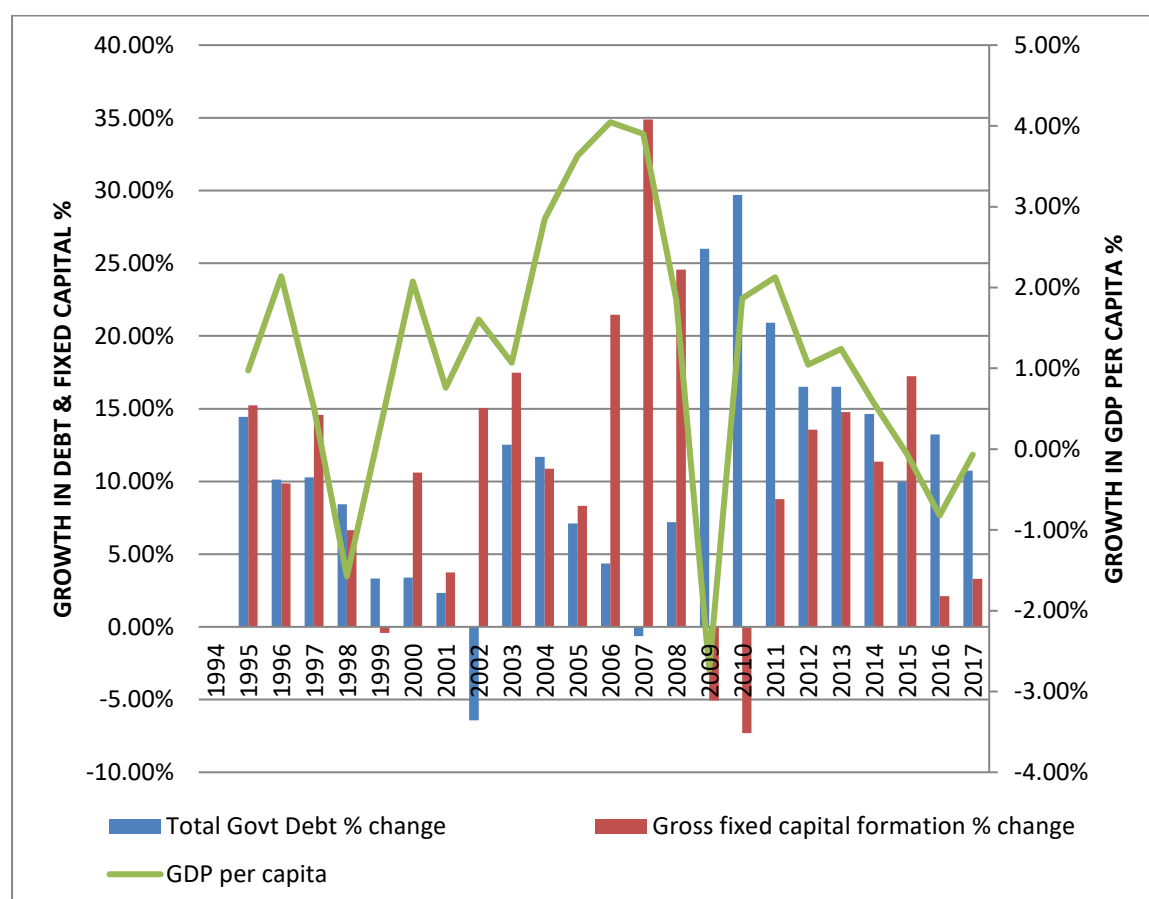
In trying to understand the impact of the growth in government debt on the production side of the economy, Egert (2015) states that GDP per capita can be applied to measure the production function of human and physical capital. GDP per capita averaged a growth rate of 1% between 1994 and 2017 (27-year average), an indication of poor investment on the production side of the economy by government. The period 2009 to 2017 saw a spike in government debt to GDP; however, GDP per capita 8-year average growth was 0.4% for the period and the average GDP per capita for the period was R55,393. This compared to the average for the 24-year period (1994 – 2017) of R49,943. For the period 2009 – 2017, the poor growth in GDP per capita can also be attributed to the low levels of fixed capital formation, which averaged 19.8%. Moreover, the growth in debt-to-GDP ratios during the period 2009 – 2017 was not used to increase investment in the human and physical stock,

⁴ Fixed Capital Formation (FCF)

which are key ingredients to driving the production side of the economy and therefore yielding positive and higher economic growth rates.

As shown in Figure 4.12, the average year-on-year percentage increase between the periods 1994 and 2017 in government debt and public sector fixed capital formation was 11%, while growth in GDP per capita averaged a mere 1% for the same period. The graph also depicts a lagged positive relationship between the three variables, i.e., the slowdown in government debt from 2003 – 2007 led to a slowdown in fixed capital formation and a decline in GDP per capita for the period 2007 – 2010. It can be further seen from 2007 – 2010 that the increase in government debt led to a positive increase in fixed capital formation and GDP per capita in the period 2009 – 2012, and the decline in government debt from 2010 – 2017 resulted in a decline of fixed capital formation and GDP per capita.

Figure 4.12: Growth in Debt Ratio, Public Investment and GDP Per Capita % Change



Source: SARB Data

Referring to Table 4.1 regarding the average growth in government debt, fixed capital formation and GDP per capita, it can be concluded looking at the impact on GDP, that the decline in the growth of public sector fixed capital formation between 2007 and 2010, and between 2010 and 2017, led to a slowdown in economic growth from an average 4.9% between 2003 and 2007, to growth rates of 2.3% and 1.9%, respectively, between the said periods.

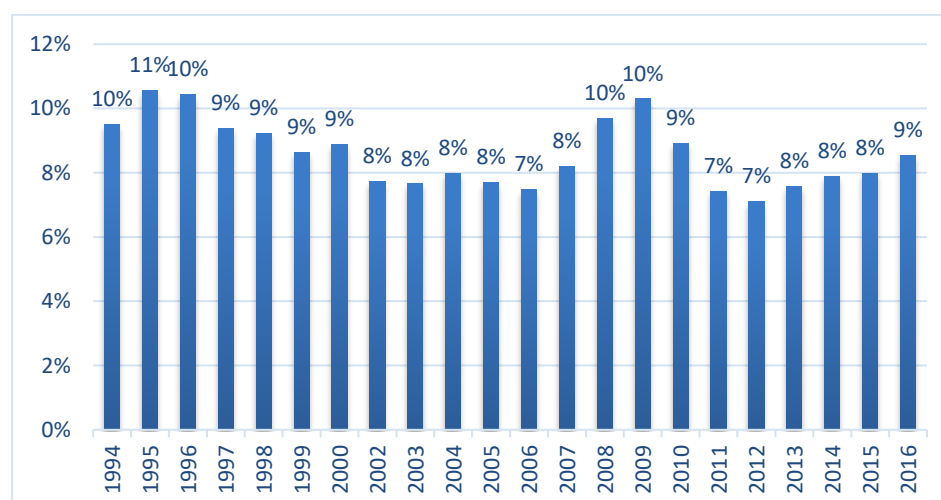
Table 4.1: Average Growth in Debt, Public Investment, GDP Per Capita and GDP

	Total Govt Debt average growth	Gross fixed capital formation (FCF) average growth	GDP per capita average growth	GDP average growth
1994-2002	6%	9%	1%	3.2%
2003-2007	7%	19%	3%	4.9%
2007-2010	16%	12%	1%	2.3%
2010-2017	17%	8%	1%	1.9%

Source: SARB Data and own calculations

The data in Figure 4.13 indicates that for the period 1994 to 2017, the accumulation of public sector investment as a percentage to total government spending stood at an average of 9% for the period. It can be concluded that the low public sector investment spending contributed to the low levels of capital accumulation and economic growth experienced in South Africa.

Figure 4.13: Fixed Capital Formation: Government Spending



Source: SARB Data

With reference to the Harrod-Domar growth model, South Africa has failed to mobilise the necessary savings to finance the accumulation of capital stock needed to drive economic growth. The literature review discussed the positive impact of public sector investment in supporting economic growth in the long run. This should support government's policy position to drive public sector capital stock formation financed via increased government debt. The positive impact on economic growth will allow for government to finance the debt. The accumulation of public sector capital stock should be used to crowd in private sector investment, which is key to supporting economic growth. The public sector investment drive should be used to support the supply side of the economy and drive the productive capacity needed to grow the economy, which talks to supporting industrial development, and accumulation of physical and human capital. The investments should ensure reliable energy supply and provision of economic infrastructure, increased investments in education in order to improve the educational outcomes and skills development, and increased investment in health services to support human capital. This level of public sector investment is key to supporting economic growth. The only barrier to government using debt to finance the investment will be its ability to access capital markets.

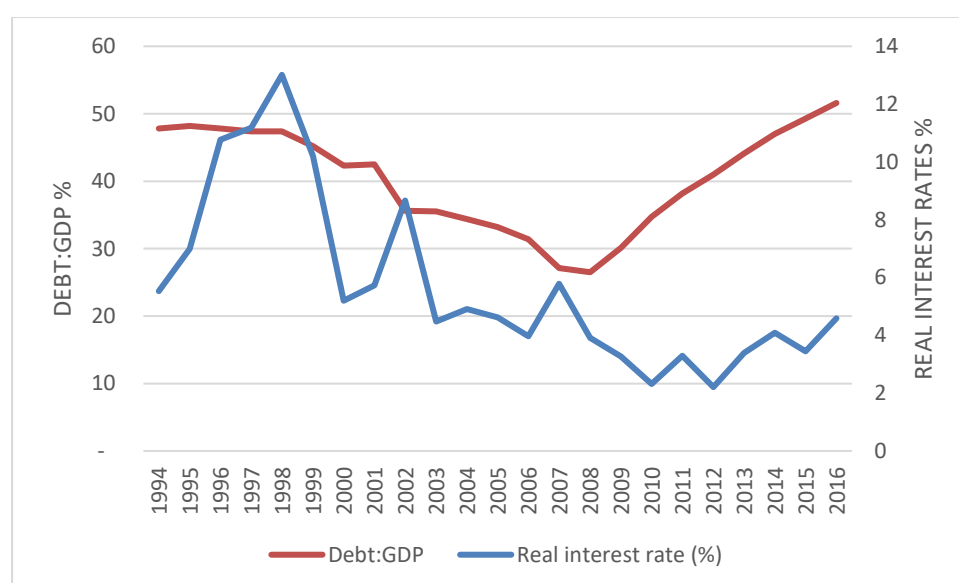
4.4 Using Interest Rates to Accumulate Debt

As Panizza and Presbitero (2013) argued, running budget deficits and increasing government debt has the potential to drive economic growth, and in an environment of low interest rates, expansionary fiscal policy should be pursued given that it will be self-financed when the economy grows. The South African government took a fiscal position to consolidate its finances and committed to reducing its debt ratio between 1994 and 2008, while taking advantage of the declining real interest environment. Real interest rates are at a low of 5% when compared to a high of 13% last seen in 1998, and this should give the South African government the opportunity to raise the debt ratio in order to get the economy to full employment. This is further argued below when analysing the interest-growth differential data.

Figure 4.14 depicts the conservative approach of the South African government, failing to take advantage of low interest rates and borrow more to fund the productive side of the

economy. Debt levels remained below the 60% threshold despite having real interest rates declining from a high of 12% in 1998 to reach lows of 2% in 2010 and 2012. As argued by Botev et al (2016), a low interest rates environment will give governments the opportunity to raise more debt without losing market access and affecting fiscal sustainability. Low interest rates create the opportunity to increase the fiscal space for governments to pursue the expansionary fiscal policy needed to support economic growth. It is argued that governments should not fear this policy approach, as the expansionary position will be financed by the increase in economic growth.

Figure 4.14: Debt Ratio and Real Interest rates in South Africa

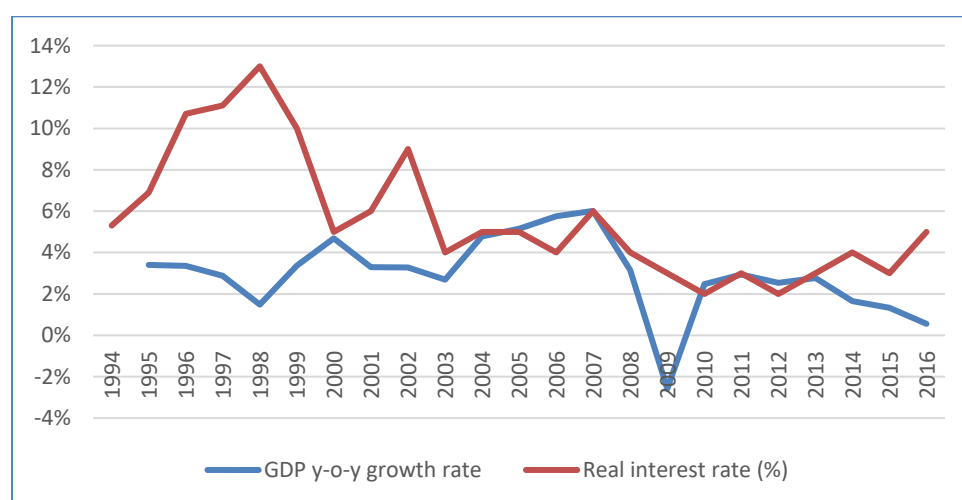


Source: SARB World Bank Data

The low real interest rate environment must be used to support the expansionary fiscal policy and not to reduce budget deficits and debt levels, in order to get the economy to full employment and close the output gap. As discussed in the literature review by Jayadev and Manson (2018), lower interest rates and higher budget deficits will lead to an increase in aggregate demand and economic activity, and the opposite for higher interest rates and smaller budget deficits. The argument supporting the functional finance approach suggests that when economies are experiencing stagnant or low economic growth rates, governments or policy makers should pursue expansionary fiscal and monetary policies to get the economy to full employment.

Barrett (2018) argued in the literature review that when interest rates are less than economic growth, governments will never default no matter the debt level. Referring to Figure 4.15, the South African government never defaulted in periods where interest rates were greater than the rate of economic growth, even at high debt ratios in the 1990s (average of 47% to GDP) and reaching a high of 51% to GDP in 2016. It should be noted that the two peaks in real interest experienced in the late 90s and early 2000 was a result of the emerging market crisis, in both Asia and Russia. (In the same period, South Africa experienced nominal interest rates of above 20%). In the two periods – between 2004 and 2007, and in 2012, interest rates were less than economic growth, and the debt ratio averaged 32% to GDP and increased to 41% to GDP in 2012 – still far below the recommended 60% to GDP. The data from Figure 4.14 indicates that there was room to increase the debt limit or fiscal space for South Africa by increasing the government debt ratio to accumulate the needed public sector investment to support economic growth. As argued by Barrett (2018) in the literature review, when interest rates are less than economic growth, governments will never default no matter the debt level.

Figure 4.15: GDP and Real Interest Rates

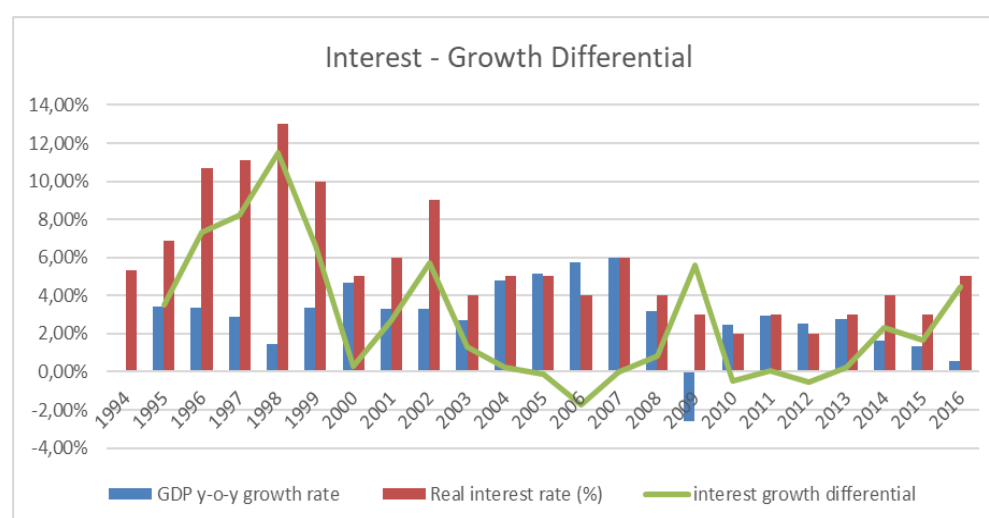


Source: SARb and World Bank Data

The data from Figure 4.16 indicates that for the majority of the study period, interest rates have been greater than economic growth, which increases the risk to fiscal sustainability and affects the fiscal space as discussed in the literature review. As argued by Calitz et al (2013), economic growth should be greater than real interest rates to ensure fiscal

sustainability. In support of this argument, the Ricardian equivalence as explained by Ricciuti (2003), the data should force the South African government to increase taxes in order to finance its budget deficits, which will affect consumption in the economy and lead to a slowdown in economic growth. To address this problem, as argued by Jayadev and Manson (2018), governments need to lower interest rates to support expansionary policies in order to increase economic growth.

Figure 4.16: Interest – Growth Differential

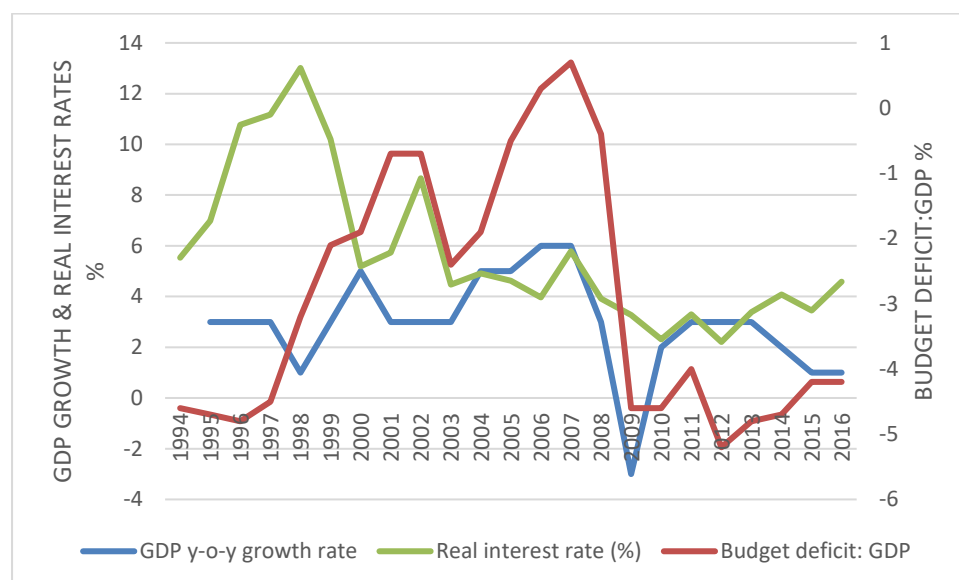


Source: SARB and World Bank Data

The case for South Africa with reference to Figure 4.17, for the period 1994 to 1997, is that the real interest rate averaged 8.6% and budget deficits averaged -4.7% to GDP and the economy grew by an average of 3%, clearly indicating the application of Jayadev and Manson's (2018) policy argument. For the period 1998 to 2008, the economy grew by an average of 4%, while real interest rates were declining and sitting on an average of 5.75%, and the budget deficit declining and averaging -0.96% to GDP. In this case, it can be depicted that the lower real interest contributed to the positive economic growth rate while government used the low real interest rate opportunity to consolidate its fiscal position – meaning that the declining budget deficit did not contribute to the positive economic growth rate, as the conventional Neoclassical policy would argue. It could be viewed as a missed opportunity to grow the economy at a much higher level than was actually experienced. This could be argued as fiscal mismanagement as described by

Kobayashi (2015), who calls for governments' core focus to be economic growth and not fiscal management.

Figure 4.17: GDP, Real Interest rates and Budget Deficit



Source: SARb and World Bank Data

For the period 2009 to 2016, the economy grew at an average of 2%, while real interest rates were continuing to decline and averaging 3.33%, and the budget deficit experiencing an increase and averaging -4.54% to GDP. For this period, economic growth was not supported by the low real interest rates nor by the increasing budget deficit. In fact, the economy failed to reach the 3% potential output. Given the low levels of interest rates in the market, this should have given government the opportunity to increase its spending to support economic growth, and for monetary policy to support the low interest rate environment by monetising government bonds to get the economy to full employment.

The approach here will seek to promote fiscal and monetary policy coordination as argued in the literature review, in order that it can be applied with reference to the lessons learned from the US and UK experience with quantitative easing in dealing with the financial crisis. The data indicates that for the period 2009 to 2016, the economy struggled to reach full employment. Based on the data, government should consider the following policy options of reducing interest rates and increasing budget deficit in order to increase/stimulate

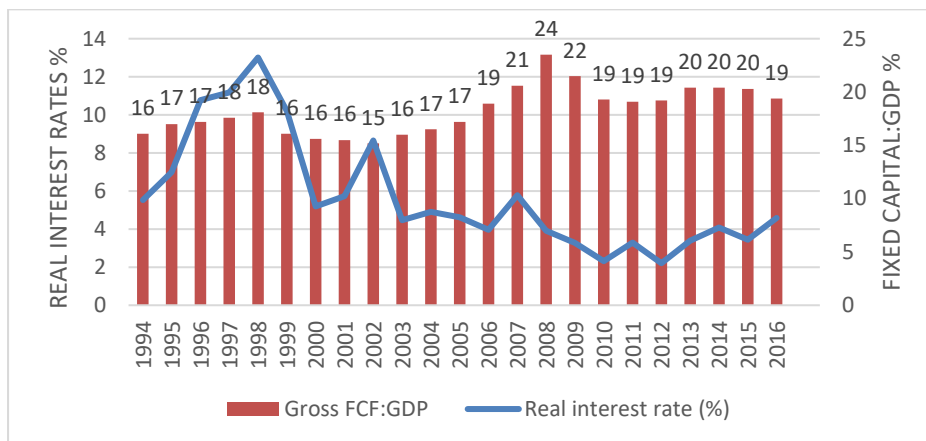
aggregate demand and economic activity that will finally get the economy to full employment. When the economy reaches full employment, it will be in a better position to finance the budget deficit.

The South African government ran budget deficits higher than the average -4.54% to GDP for only small periods, and quickly reverted to reducing the deficits, i.e., between 1994 and 1997, and again in 2009 and 2010, and 2012 to 2014. In comparison to emerging economies, Irons and Bivens (2010) state that higher budget deficits will cause interest rates to increase in the capital market, which will crowd out private sector investment and slowdown economic growth. This crowding out effect can be determined by analysing the trends in budget deficits and interest rates, where a rise in budget deficits will lead to an increase in interest rates (Irons & Bivens, 2010). It can be concluded using the above data that the rise in budget deficits during the periods 2009 to 2016 also led to the increase in real interest rates.

4.4.1 Using Interest Rates to Accumulate Investment

Despite experiencing a marginal increase in real interest rates, it should be noted with reference to Figure 4.18 that gross fixed capital formation, which is used to measure total investment in the economy, experienced a slowdown as a percentage of GDP from 23.5% in 2008 to 19.1% in 2011. For the same period, the real interest declined from 3.9% to 2.3%, and the economy failed to take advantage of the low real interest to increase investment and get the economy to full employment. The slowdown post 2010 was due to the slowdown in public investment and a fall in business confidence – driven by global financial crisis, the slowdown in economic growth, and political policy uncertainty, to mention a few.

Figure 4.18: Investment and Real Interest Rate



Source: SARB and World Bank data

In 2016, South African corporates recorded cash deposits in banks amounting to R725 billion, up from R670 billion in 2015 (Hogg, 2016). Hogg (2016) states that poor economic growth, policy uncertainty, and low business confidence are amongst the factors contributing to the increased savings by the private sector in South Africa. This calls on government to address the poor economic growth and constraints affecting the economy. As discussed in the literature review, government can mobilise the private sector savings through increased budget deficits to fund fixed capital formation. This should support the increased investment in infrastructure development, human capital, state reform, and purchase of factors of production to stimulate growth and drive the productive side of the economy. The economic reforms should be used to attract domestic private sector investments in order to get the economy out of its current poor growth levels. With reference to Svaljek (1997), government can use the budget deficit to balance savings in the economy, provided that government uses the additional fiscal resources to get the economy to full employment.

With reference to the ‘golden rule’ discussed by Arestis and Sawyer (2008), when savings are greater than investments in the economy, governments should increase budget deficits to balance out savings and investments and use the mobilised savings to fund public sector investment. Given the data from Table 4.2, it is clear that South Africa did not apply the ‘golden rule’ in cases where savings were greater than investments. Post 1994, government was committed to reducing budget deficits, as depicted by the decline in

budget deficits which was achieved between 1994 and 2002. Budget deficits started to increase pre-2010 in support of the World Cup infrastructure programme and remained above -4% since 2009. The poor economic growth experienced post 2010 also contributed to the increases in budget deficits, as government needed additional resources to fund its spending priorities.

Table 4.2: Savings, Investment and Budget Deficit

	Gross Savings: GDP	Gross Fixed Capital Formation: GDP	Budget deficit: GDP
1994	17,7	16,1	-4,6
1995	17,6	17	-4,7
1996	16,9	17,2	-4,8
1997	16,3	17,6	-4,5
1998	16,3	18,1	-3,2
1999	16,5	16,1	-2,1
2000	16,2	15,6	-1,9
2001	16	15,5	-0,7
2002	17,2	15,2	-0,7
2003	16,3	16	-2,4
2004	15,7	16,5	-1,9
2005	15,2	17,2	-0,5
2006	15,7	18,9	0,3
2007	15,6	20,6	0,7
2008	17,6	23,5	-0,4
2009	18	21,5	-4,6
2010	18	19,3	-4,6
2011	17,5	19,1	-4
2012	14,8	19,2	-5,2
2013	15,4	20,4	-4,8
2014	15,4	20,4	-4,7
2015	16,3	20,3	-4,2
2016	16,3	19,4	-4,2
2017	16,3	18,8	-4,4

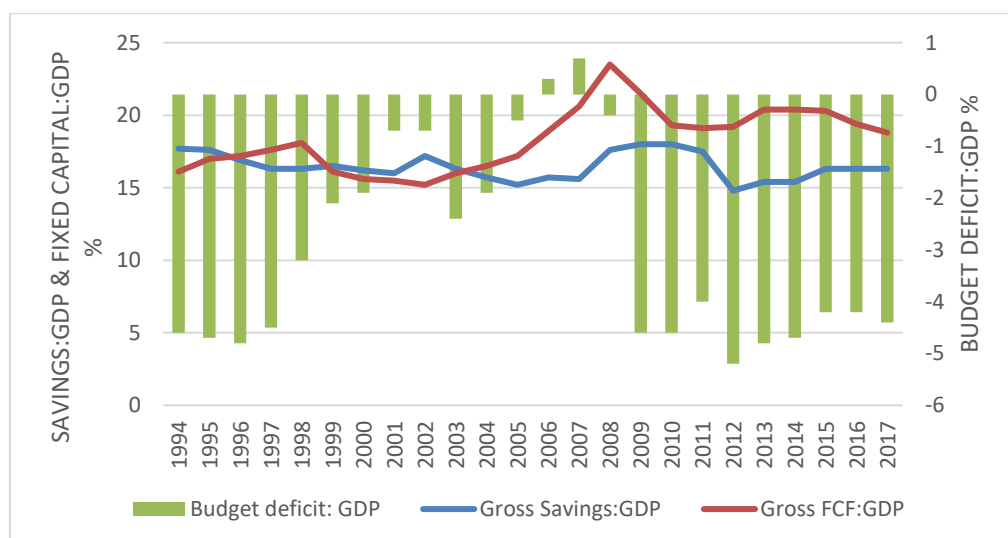
Source: SARB Data

However, during the period 2008 to 2017, the accumulation of fixed capital formation is depicted, which also caused the budget deficit to increase. This finding is explained by Ostry et al (2015) in their application of the ‘golden rule’, indicating that there should be a positive relationship between public sector investment and increases in budget deficits,

indicating that governments will need to increase their debt levels to finance the accumulation of public investment. Todaro (1994) highlights the importance of increasing savings and investments in order to support economic growth, noting that if domestic savings is limited, governments will need to mobilise foreign savings.

Given the country's low savings to GDP ratio in comparison to the higher fixed capital formation ratio, the South African government will need to either borrow more or attract foreign direct investment in order to finance fixed capital formation. The attraction of foreign investment has been a challenge for South Africa, which leaves no option to government but to increase government debt in order to finance the needed fixed capital formation to support economic growth. The data from Figure 4.19 shows that for the majority of the period, fixed capital formation was higher than the savings ratio, and budget deficits were high post 1994. The increase in fixed capital formation was driven by the government's infrastructure investment plan of R827 billion from 2008 to 2016 (South African Government, 2012). For the South African government to continue to invest in fixed capital formation given the limited savings and attraction of foreign direct investments, government will need to increase its debt levels. However, the increase in debt levels must be supported by the increased capacity or machinery of the state that will ensure that resources are efficiently allocated and effectively utilised. As discussed in the literature review, this will entail that implementing agencies must address the project cost overruns that are caused by inadequate budget, lack of adequate cost controls, and project delays (National Treasury, 2018). In addition, the World Bank (2019) proposes the need to ensure that implementing agencies develop creditable business plans with detailed feasibility analysis.

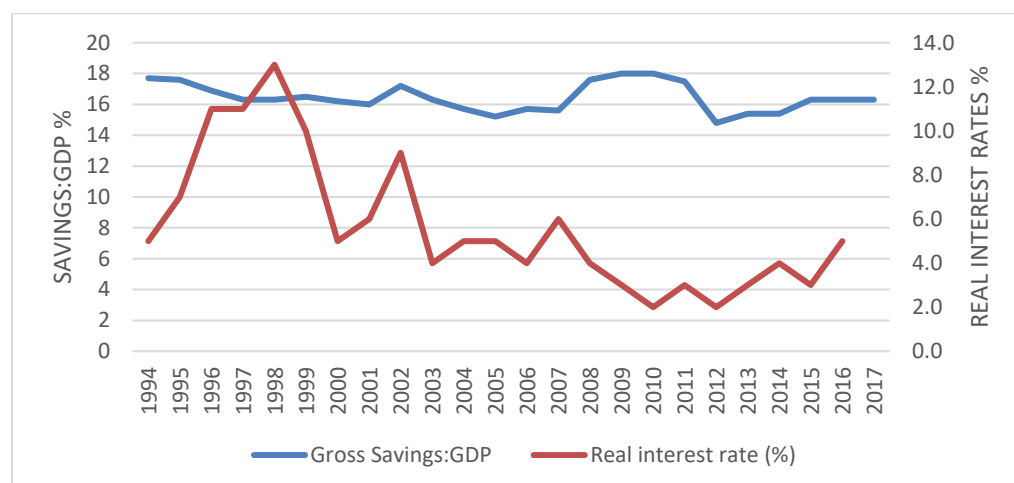
Figure 4.19: Savings, Investment and Budget Deficit



Source: SARB Data

It is evident from Figure 4.20 that the rise in real interest failed to encourage savings in South Africa; for the period 1994 to 2017, real interest rates averaged 5.7%, and gross savings to GDP remained at an average of 16.5%. Real interest rates experienced a downward decline post-1999 to reach a low of 2% in 2012, with the savings ratio reaching a low of 14.8%. It can also be depicted that when real interest rates declined, this was followed by a decline in the savings ratio. In addition, in the period of high real interest rates from 1994 to 1998 (during the period of the emerging market crisis), real interest rates averaged 9.5% and the savings ratio showed signs of decline averaging 16.8% for the period. The decline in the savings ratio continued until 2001.

Figure 4.20: Savings and Real Interest Rates



Source: SARB and World Bank Data

The high real interest failed to increase the savings ratio and had an adverse effect on economic growth. The high levels of interest rates increased the cost of borrowing for investment purposes, which affected total investment in the economy, slowed aggregate demand and economic activity, and thus contributed to unemployment in the economy. The increase in unemployment further contributed to the low savings ratio. The low levels of economic growth and the inability of the South African economy to achieve full employment also contributed to the low savings rate.

There have been calls for the SARB to abandon the high interest rate environment that has been constraining private sector investment and contributing to government's increased borrowing costs, which also limits its fiscal space. The high interest rates environment increases the cost of government borrowing and could price government out of the bond market and make it costly for government to raise money to fund its fixed capital formation. The high interest rates experienced in South Africa calls for alternative approaches to deal with the low savings ratio by drawing on government's ability to borrow in the capital market to finance future investments.

The alternative approach, as argued in the literature review, talks to the reduction of interest rates that will give government the opportunity to borrow cheaply in order to finance investments or the creation of sovereign money that will give government the opportunity to issue zero interest rate bonds to be purchased by the Reserve Bank. Low

interest rates should be used to support industrial development and the attraction of private sector investment. This investment is key to supporting economic growth, which will lead to job creation and increased incomes. The increase in incomes and household disposable incomes will allow for more people to save in the economy, and for the economy to generate the required saving to fund future investments in the country.

4.5 Opportunity to Increase Debt Levels

4.5.1 South Africa's Bond Market

According to Quantec's South Africa Bond Market 2019 February Quarterly Report, between 2000 and 2007, the bond market experienced a decline in bond yields due to a decline in government borrowing and lower inflation. This is the same period when interest rates were lower than economic growth, between 2004 and 2007 and the debt ratio averaged 32% to GDP, and the South African government did not default. The report further indicates that bond yields started to increase following the 2008 financial crisis, with another increase in bond yields experienced in 2015 driven by political factors or risks and the negative investor sentiments towards increasing government borrowings and poor economic growth (Quantec, 2019).

The increase in bond yields means that government will be paying more to issue more debt and increase the costs of repayment. Despite the increase in bond yields, it should be noted again that the South African government did not default and managed to increase its borrowing. The Quantec Report (2019) concludes that bond yields will continue to experience upward pressure as government implements counter-cyclical fiscal policy to get the economy to full employment (Quantec, 2019). Counter-cyclical fiscal policy will force government to borrow more to fund infrastructure investment, education, welfare and the health system (Quantec, 2019). The measures to increase infrastructure investment, as well as education, welfare and health sector investments as indicated in the Quantec Report (2019), talk to theoretical discussion in the literature review that increased government spending and borrowing can be positive to support economic growth when it leads to capital accumulation and increased productivity, and as the economy grows, government will be in a position to repay its debt.

The Quantec Report (2019) states that the South African bond market is well developed with an average of 39,500 secondary market transactions yielding R2.5 trillion per month, and in terms of monthly value traded, it is six times more than the equities market traded on the Johannesburg Stock Exchange (Quantec, 2019). An electronic trading platform was established in July 2018 to enhance the primary bond auctions and the secondary bond market, as indicated by National Treasury, which has been generating daily volumes of R2.2 billion (National Treasury National Budget, 2019). The volumes do indicate an increase in the local bond market liquidity and continued ability for government to issue more debt.

As discussed in the literature review and argued by Kobayashi (2015), government debt can support economic activity when fiscal spending is driven by the issuance of government bonds via the explained liquidity channel. South Africa is in a position to consider this policy directive, given that the position of government to consolidate its fiscal position during stagnant economic growth will further constrain economic activity and aggregate demand, and, in addition, affect the country's tax revenue that is needed to fund government spending and borrowing costs. It is argued by Kobayashi (2015) that the fiscal deterioration will lead to lower economic activity. In periods of poor economic growth, Kobayashi (2015) states that fiscal consolidation should not be the primary focus of government; rather, it should be about how government can get the economy to full employment.

As argued using the Keynesian approach, increasing government borrowing to finance government spending should be regarded as a positive fiscal response, and one which will be sustainable when the spending will lead to an increase in productive capacity and economic growth and enable government to cover the financing of the debt (Holtfrerich, 2014).

As discussed in the literature review, government bonds should be treated as injecting money into the financial sector. South Africa issues debt in its own currency in an open capital market and has a good functional central bank with significant reserves to the value of R276 billion to hold government debt. This gives government the opportunity to create money to fund infrastructure development and the productive side of the economy via the issuance of government bonds.

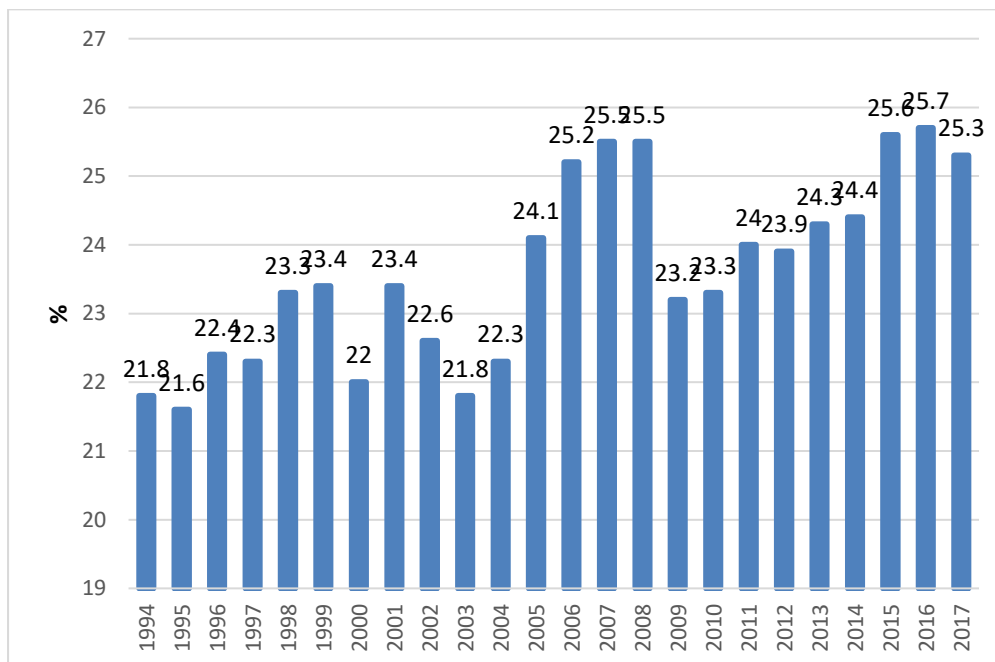
4.5.2 Interest Payment to GDP and Export Revenue

South Africa had an average debt service ratio to export earnings of 5.47% from 1994 to 2017. During the said period, the ratio was managed and declined from a high of 8.5% in 1999 to reach a low of 3.4% in 2010⁵, driven by government's position to lower the budget deficit in addition to the commodity boom that boosted export earnings. A rise in the debt service ratio is an indication to the market of looming economic crisis, and South Africa only experienced a rise in the ratio for short periods, i.e., 6.4% in 1994 to 8.5% in 1999, and again in 2016 (6%) and 2017 (6.8%). Moreover, between 2001 and 2014, the ratio was below the 5.4% 24-year average. This is a clear indication to the market that South Africa has not experienced a looming economic crisis, which should be seen as a positive indicator of the government's ability to manage the economy and its debt.

The debt service ratio was again supported by the rise in government revenue collection or generation during the period 2009 to 2017. Kose et al (2017) state that government's weakness or inability to collect tax will limit its ability to pay interest on the debt or service the debt. With reference to Figure 4.21, South Africa had an average revenue ratio to GDP of 23.6% from 1994 to 2017. For the period 2011 to 2017, the revenue ratio was above the 23.6% average for the period and was on an upward trend, reaching a high of 25.7% in 2016. The data does indicate the government's tax collection efficiency has been key to meeting the tax collection targets even during periods of stagnant economic growth from 2014 to date. This is another positive indicator of government's ability to repay and/or service its debt.

⁵ SARB data, and own analysis

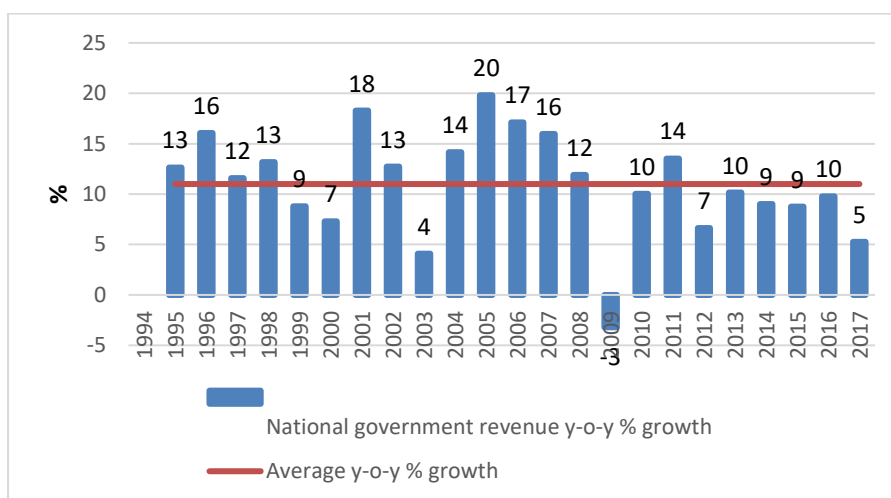
Figure 4.21: Government Revenue to GDP Ratio



Source: SARB Data

The slowdown in economic activity will remain a risk to the growth in tax revenue collection, as indicated in Figure 4.22, whereby South Africa experienced the longest period of revenue growth below the period's average of 11% from 2008 to 2017. Economic growth will be positive in supporting government to generate more tax revenue and also increase the tax base, which is key in ensuring government's ability to service its debt.

Figure 4.22: Growth in GDP and Government Revenue

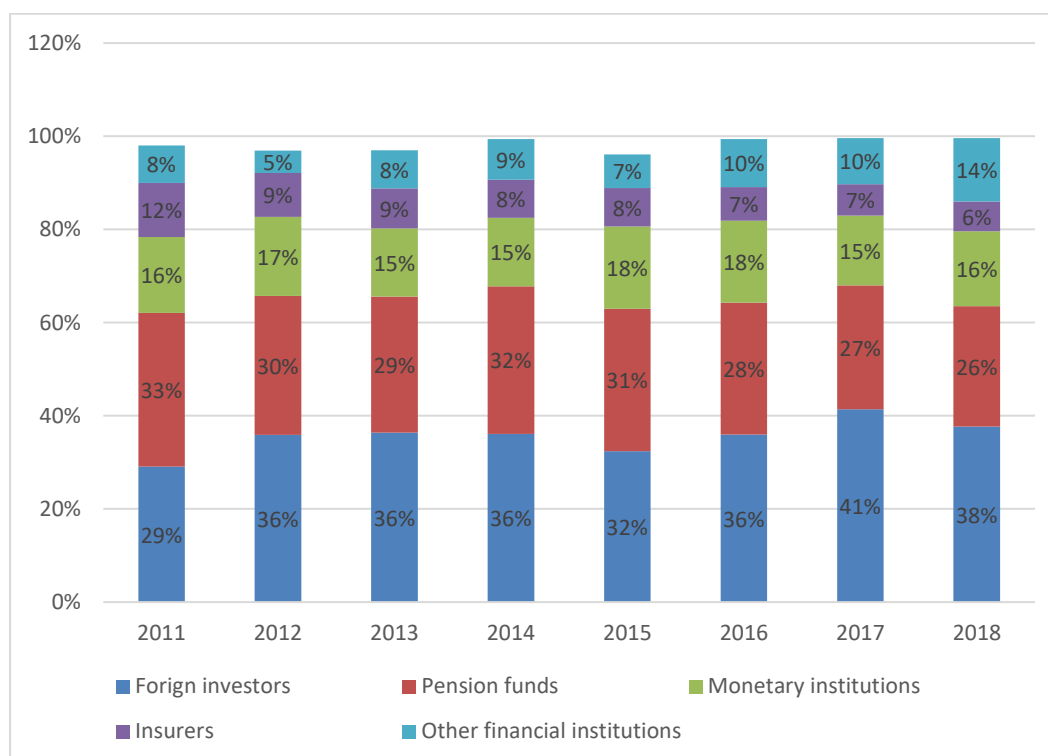


Source: SARB Data

4.5.3 Liquidity Risk

Kose et al (2017) indicate that currency and liquidity risks can be caused by non-residents holding a significant number of government bonds due to a global liquidity crisis and/or loss in foreign investor confidence. This would trigger the selling of government bonds by foreign investors which will lead to a depreciation of the local currency. The implication of a weaker rand will be imported inflation and increased debt repayment cost of foreign denominated debt. Non-residents held 38% or R712.9 billion of local bonds by December 2018 (National Treasury Budget Report, 2019). Figure 2.23 indicates that between 2011 and 2018, non-resident or foreign investors held on average 38% of local government bonds and the rest was held by pension funds, banks, insurance companies and other financial institutions. Figure 4.23 further shows the strong appetite of foreign investors in the local bond market from 29% ownership in 2011 to a high of 41% in 2017. This is discussed further in section 4.5.4.

Figure 4.23: Ownership of Government Bonds



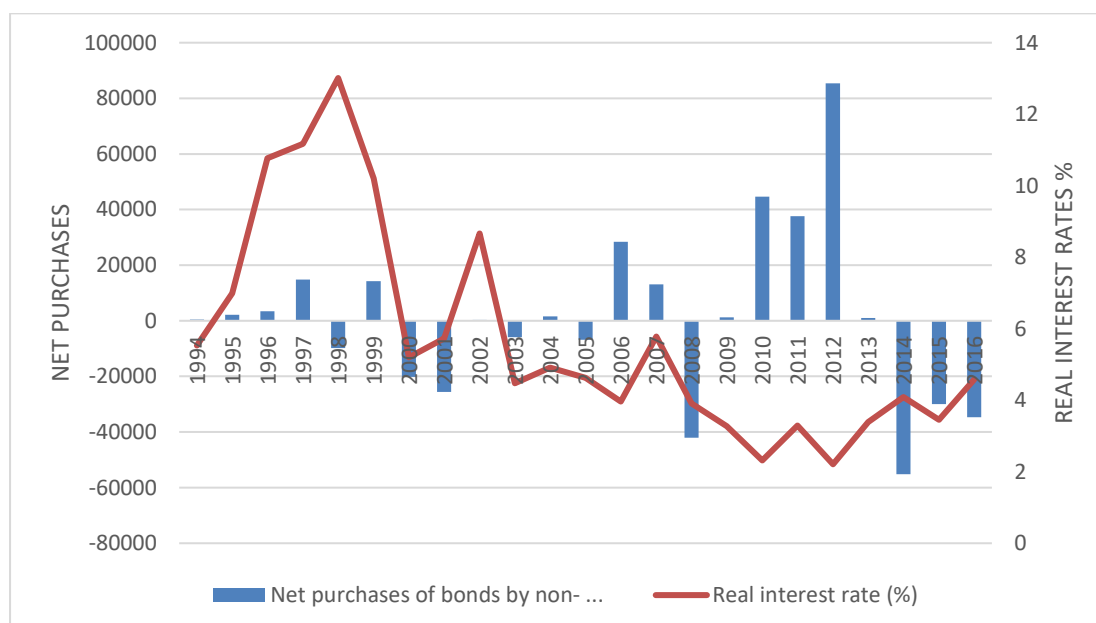
Source: National Treasury National Budget, 2019

4.5.4 Bonds Held by Non-Residents

Segal (2019) states that emerging market bonds face similar risks to developed economies in relation to economic and financial risks, in addition to the political and socioeconomic environment. Governments in emerging economies have issued a credit default swap to protect investors against the risks, which acts as a guarantee (Segal, 2019). Segal (2019) further notes that the yields of emerging market debt are relatively higher than US treasuries due to positive and high economic growth experienced in these economies. In addition, investors tend to use the bonds to hedge against currency risks. Segal (2019) explains that the investment decision is based on the yield spread between US treasuries and emerging bonds, thus the higher the emerging market yield to US treasuries, the greater the incentive to invest in emerging market bonds.

In the case of South Africa, increasing bond yields from 2009 and lower inflation have resulted in real interest rates being higher in South Africa than in the US, thus potentially attracting more foreign investors into the South African bond market (Quantec, 2019). This is depicted in Figure 4.24 by the sharp increase in net purchases between 2008 and 2012. The decline in net purchases in 2013 was a result of negative investor sentiments towards increasing government borrowings and the poor economic growth. However, there was an increase in net purchases from 2014 led by the rise in real interest from 2012. In comparison, the real interest in 2016 was at 4.56% in South Africa and 3.46% in the US (Quantec, 2019). As argued by Holtfrerich (2014), investors in government bonds will hold such instruments at a favourable return until a more favourable private investment opportunity arises. Higher real interest rates will continue to create the favourable return needed to attract foreign net purchases of South African government bonds, in addition to attracting local investment in government bonds.

Figure 4.24: Net Purchase of Bonds by Non-residents and Real Interest Rates



Source: SARB Data and World Bank Data

4.6 Conclusion

In addressing the research question, **‘Will the increase in government debt reduce economic growth?’** the data indicates that there is no evidence that government debt is bad for South Africa’s economic growth. Average economic growth rates of 3% were realised with debt levels between 36% and 48% to GDP, and average economic growth of 6% realised with lower debt levels of below 31%. However, the data does indicate that the increase in government debt was not channelled to support economic growth. The upward rise in the debt-to-GDP ratio during the period (2009 – 2017) was not used to increase the investment in the human and physical stock, which are key ingredients to driving the production side of the economy and therefore yielding positive and higher economic growth rates. The data indicates that public sector investment was high when debt levels were below 30% to GDP, an indication that the South African government is not using debt to accumulate the needed public sector investment to support economic growth. The low levels of public sector investment failed to support economic growth and improve the economic welfare. In addition, the decline in the growth of public sector fixed capital formation between 2007 and 2010, and between 2010 and 2017, led to low economic growth of 2.3% and 1.9%, respectively, for the two periods.

In addressing the following research questions, **‘Should governments increase fiscal spending or government debt to finance the investment in the productive capacity of the economy in order to support and drive economic growth?’** and **‘Will the increase in government debt reduce investment?’** the data indicates that the decline in government capital formation has contributed to the poor growth experienced since 2009. The findings indicate that government debt is not weighted towards public sector investment which is key to driving economic growth. The data further indicates that South Africa has a low savings to GDP ratio in comparison to the higher fixed capital formation ratio, and the South African government will need to issue more debt in order to finance public sector investment. With reference to the Harrod-Domar growth model, South Africa has failed to mobilise the necessary savings to finance the accumulation of capital stock needed to drive economic growth. Ostry et al (2015) in their application of the ‘golden rule’ propose that governments will need to increase their debt levels to finance the accumulation of public investment. As argued by Ostry et al (2015), there is a positive relationship between public sector investment and budget deficits, and the funding of public sector investment will lead to an increase in economic activity and job creation. Higher budget deficits should be used to finance public sector investment which will be beneficial to economic growth in the medium to long run. The chapter concludes that for South Africa to reach and maintain public investment highs of 25% to GDP achieved in 2008 and continue to accumulate and increase its public sector investment, it will need to be financed by debt accumulation and debt financing for a longer period of between 10 and 15 years. The accumulation of public sector investment is key to supporting economic growth and economic productivity.

Based on the economic models and theories discussed in the literature review, an opportunity arises for the South African government to drive economic growth by accumulating capital stock through issuing more government debt. The current environment of low interest rates should be used to mobilise domestic and foreign savings to stimulate economic development. The South African government has not defaulted for the study period (1994 – 2017) and should take advantage of the current situation to increase its debt to finance the accumulation of capital stock.

The policy options deliberated by Lerner's functional finance approach states that if governments cannot raise enough revenue through increases in taxes, monetary policy should be applied by lowering interest rates. This will create an opportunity for governments to issue new money / debt in the economy to finance economic growth. South African policy proposals have their own macroeconomic gaps and there is a need for government to review its debt threshold to support economic growth. South Africa needs to extricate itself from the low economic growth levels, as if it fails to do so, it will lead to a deteriorating fiscal position which will force government to either increase tax levels and/or increase debt levels to finance its budget deficit. Both options will have a negative effect on economic growth. As concluded in the literature review, debt levels are not important in and of themselves, and the focus should rather be on a country's ability to finance its debt and to use its debt to support economic growth. Economic growth is critical to achieving this, and this should be the focus of macroeconomic policy. As stated by Kobayashi (2015), countries need to be careful of declining economic growth as this will lead to fiscal deterioration. The South African government's core focus should be on how to support economic growth and not on fiscal management.

As discussed in the literature review, government bonds should be treated as injecting money into the financial sector. South Africa issues debt in its own currency in an open capital market and has a good functional central bank with significant reserves to the value of R276 billion to hold government debt (Malikane, 2020). This gives government the opportunity to create money to fund infrastructure development and the productive side of the economy via the issuance of government bonds.

High interest rates in South Africa will price government out of the bond market, making it costly for government to raise money to fund infrastructure development, human capital development, reforms needed to increase the capacity of the state, industrial development, small, medium and micro enterprises development, and R&D. The high interest rate environment will reduce the fiscal space of government and, given the low economic growth experienced in South Africa post 2010, the study proposes an alternative approach of creating sovereign money and/or government issuing zero interest rate bonds to be financed by central banks, as discussed in the literature review. The proposed approach seeks to create new money through the sovereign money and to channel the

funds to support the productive side of the economy and grow the economy. This approach seeks to propose to the SARB to purchase government debt and to make money available to the public and private sector through the decrease in interest rates. As stated by Fawley and Neely (2013), the reduction in real interest rates in the market will lead to improvements in economic activity as it will stimulate aggregate demand in the economy. Given the projected debt levels of South Africa which are predicted to stabilise at 88.9% in 2025/26 as government continues to respond to the socio-economic impact of the COVID-19 pandemic (National Treasury Budget Report, 2021), the SARB should be encouraged to support government's debt sustainability by lowering interest rates and monetising government debt. As argued by Panizza and Presbitero (2013), a low interest rate will also increase the fiscal space available to government to increase debt levels and budget deficits in order to adequately respond to the current economic stagnation and impact of the COVID-19 pandemic.

As stated by Malikane (2020) and with reference to the modern monetary theory, the South African government needs to consider alternative approaches of using monetary policy to support government to fund infrastructure development, human capital development, reforms, R&D, and industrial development. The alternative approaches call for greater fiscal and monetary policy coordination, where monetary policy should support fiscal stimulus via lower interest rates or purchase of government zero interest rate bonds and the creation of sovereign money. The sovereign money approach as discussed in the literature review and advocated by Dyson et al (2016), will ensure that money supply is directly influenced by central banks and not via the open market operations of managing interest rates. This approach will give the SARB the tool to direct and influence spending in the economy to support government to meet the objectives of economic growth and job creation.

The argument presented seeks to challenge the current conventional approach of fearing government debt and limiting government's access to the funds needed to support the productive side of the economy via the capital market. The capital markets have their own conditions for government to raise funds and uses risks and interest rates to reduce government's ability to raise funds. The focus of government should be on driving economic growth and not reducing government debt and budget deficits.

The conventional approach of accessing markets to raise funds has its limitations. The downgrading by credit ratings has led to an increase in interest rates charged on government borrowings; as borrowing increases to meet spending priorities, so do interest rates, which will lead to a reduction in fiscal space for government. Economies with limited fiscal space that need to invest more in infrastructure, human capital and industrial development, for example, can only do this through the creation of sovereign money or central banks buying government debt and creating a low interest rate environment that will crowd in private sector investment. The literature review has argued for an increased role of monetary policy that seeks to use interest rates to support economic growth and promote fiscal sustainability, while maintaining price stability. In conclusion, the SARB should consider a lower interest rate environment to promote fiscal sustainability and support economic growth.

As argued by Barrett (2018) in the literature review, when interest rates are less than economic growth, governments will never default no matter the debt level.

Chapter 5: Data Presentation and Analysis for the Emerging Market Economies

5.1 Introduction

This chapter presents the data for the sample of emerging market economies and provides an analysis of the findings in relation to answering the key research questions highlighted below.

Research Question 1: Will the increase in government debt reduce economic growth?

To respond to the research question, the thesis analysed the relationship between government debt and economic growth, and the following estimation equation was applied:

$$Y_t = \beta_1 D_t + \beta_2 BD_t + \beta_3 GE_t + \beta_4 GFCFG_t + \beta_5 GFCFP_t + \beta_6 RI_t$$

Where Y is GDP growth (annual %), D is government debt to GDP ratio (% of GDP), BD is government budget deficits to GDP ratio (% of GDP), GE is government expenditure (% of GDP), GFCFG is gross fixed capital formation – public sector (% of GDP), GFCFP is gross fixed capital formation - private sector (% of GDP), and RI is real interest rates.

In Addition, the question was addressed by looking at the impact of government debt on economic growth and development (measured using GDP per capita). Covariance tests were run to determine the relationship between government debt and economic growth on the one hand, and debt and GDP per capita, on the other. In addition, average and median indicators were calculated to measure the impact of government debt on economic growth and economic development at different debt ratios.

Research Question 2: Should governments increase fiscal spending or government debt to finance the investment in the productive capacity of the economy in order to support and drive economic growth?

To determine the impact of government debt on public sector investment, the following estimation equation was applied:

$$GFCFG_t = \beta_1 D_t + \beta_2 BD_t + \beta_3 GE_t + \beta_5 RI_t$$

In Addition, this question was addressed by looking at the impact of government debt (a) on public sector investment and (b) on economic growth. Covariance tests/analyses were run to determine the relationship between government debt and public sector investment, and economic growth. As with Research Question 1, average and median indicators were calculated to measure the impact of government debt on public sector investment at different debt ratios.

In addition, the research question will seek to address the following: **Will the increase in government debt reduce investment?**

To determine the impact of government debt on public and private sector investment, the following estimation equation was applied:

Public sector investment: $GFCFG_t = \beta_1 D_t + \beta_2 B D_t + \beta_3 G E_t + \beta_5 R I_t$

Private sector investment: $GFCFP_t = \beta_1 D_t + \beta_2 B D_t + \beta_3 G E_t + \beta_4 GFCFG_t + \beta_5 R I_t$

This question was addressed by examining the impact of government debt on public and private sector investment to measure the impact on accumulating fixed capital formation and the crowding out effect of private sector investment. This impact was analysed by measuring and interpreting the covariance between government debt and fixed capital formation and private sector investment. Covariance analysis is presented and analysed per country to measure the relationship between government debt ratio and fixed capital formation and private sector investment. In addition, average and median indicators are calculated to measure the impact of government debt on fixed capital formation and private sector investment.

In addition to addressing the research questions, this section will also measure the determinants of government debt and fiscal sustainability, and assess the default risk across the emerging market economies.

The data presentation and analysis are conducted as per the identified emerging market economies.

5.2 Will the Increase in Government Debt Reduce Economic Growth?

A Least Squared method was applied to investigate the relationship between economic growth and government debt. The interpretation of the regression results provides the estimates to determine the relationship between government debt and economic growth, the results are as follows. The relationship is moderately significant as depicted by the adjusted R squared of 0.43. The independent variables of government debt, government spending and public sector investment have a negative relationship indicating that a 1 percent increase debt will lead to 0.54 percent decline in GDP. In addition, an increase in government spending and public sector investment will lead to 0.07 percent and 1.09 percent decline in GDP respectively. However, with reference to the p-values, the null hypothesis is accepted, indicating that an increase in debt levels will lead to a decrease in economic growth.

Table 5.1: Brazil Regression results

Dependent Variable: GDP_GROWTH__ANNUAL__

Method: Least Squares

Date: 03/25/23 Time: 11:39

Sample (adjusted): 2006 2016

Included observations: 11 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	62.06666	57.47678	1.079856	0.3295
CENTRAL_GOVERNMENT_DEBT__TOTAL_ __OF_GDP__	-0.544805	0.601448	-0.905822	0.4066
BUDGET_DEFICIT_GDP	1.288113	1.085600	1.186545	0.2887
GOVERNMENT_SPENDING	-0.066982	0.480217	-0.139483	0.8945
GROSS_FIXED_CAPITAL_FORMATION__ __OF_GDP__	-1.087570	1.778353	-0.611560	0.5676
REAL_INTEREST_RATE__	0.084730	0.295694	0.286548	0.7860
R-squared	0.714559	Mean dependent var		2.267591
Adjusted R-squared	0.429118	S.D. dependent var		3.636019
S.E. of regression	2.747258	Akaike info criterion		5.161536
Sum squared resid	37.73714	Schwarz criterion		5.378570
Log likelihood	-22.38845	Hannan-Quinn criter.		5.024726
F-statistic	2.503348	Durbin-Watson stat		2.599466
Prob(F-statistic)	0.168342			

Source: World Bank, OECD, Trading Economics Data, and Own Analysis

Similar results are depicted for India, with data indicating the relationship to be significantly weak with reference to the 0.02 adjusted R squared. The data also depicts a negative relationship between government debt and private investment to GDP growth, where 1 percent increase in debt levels and public investment will lead to a 0.07 percent and 0.45 percent decline in GDP respectively. The data further indicates a positive relationship between budget deficit, government expenditure, public investment, and real interest rates. Given the p-values and F-statistic, the null hypothesis is accepted indicating that an increase in debt levels will lead to decrease in economic growth.

Table 5.2: India Regression Results

Dependent Variable: GDP_GROWTH__ANNUAL__
Method: Least Squares
Date: 03/25/23 Time: 11:22
Sample (adjusted): 1995 2017
Included observations: 23 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.178434	10.73351	-0.109790	0.9139
CENTRAL_GOVERNMENT_DEBT__TOTAL_ __OF_GDP__	-0.065885	0.109795	-0.600071	0.5569
BUDGET_DEFICIT_GDP	0.269329	0.300155	0.897300	0.3829
GOVERNMENT_SPEND_GDP	0.057711	0.644227	0.089581	0.9297
GROSS_FIXED_CAPITAL_FORMATION__ __OF_GDP__	0.708359	0.760081	0.931951	0.3652
GROSS_FIXED_CAPITAL_FORMATION_P RIVATE_SECTOR__OF_GDP__	-0.451941	0.855655	-0.528182	0.6046
REAL_INTEREST_RATE__	0.211785	0.306771	0.690370	0.4999
R-squared	0.285000	Mean dependent var		7.009372
Adjusted R-squared	0.016875	S.D. dependent var		1.967627
S.E. of regression	1.950954	Akaike info criterion		4.420304
Sum squared resid	60.89953	Schwarz criterion		4.765889
Log likelihood	-43.83349	Hannan-Quinn criter.		4.507218
F-statistic	1.062939	Durbin-Watson stat		1.890334
Prob(F-statistic)	0.423766			

Source: World Bank, OECD, Trading Economics Data, and Own Analysis

The results for China do indicate a statistically significant high relationship with an adjusted R squared of 0.64. Despite the indicated negative relationship between government debt and economic growth, that a 1 percent increase in debt will lead to 0.12 percent decline in economic growth. In addition, 1 percent increase in budget deficits and increase in real interest rates will lead to 0.70 percent increase and 0.21 decline in economic growth respectively. The null hypothesis is rejected based on the p-value and accept the alternative and indicating that an increase in budget deficits, will lead to an increase in economic growth. With regards to the significance of the model, the F-statistic falls below the 0.05 significant level and conclude that the model is significant.

Table 5.3: China Regression Results

Dependent Variable: GDP_GROWTH__ANNUAL__

Method: Least Squares

Date: 03/25/23 Time: 11:32

Sample (adjusted): 1995 2016

Included observations: 22 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	10.89500	6.259765	1.740481	0.1010
DEBT_GDP	-0.123997	0.078163	-1.586384	0.1322
BUDGET_DEFICIT_GDP	0.696892	0.226498	3.076817	0.0072
GOVERNMENT_SPENDING_GDP	0.713437	0.462494	1.542587	0.1425
GROSS_FIXED_CAPITAL_FORMATION__ _OF_GDP_	-0.159641	0.144844	-1.102154	0.2867
REAL_INTEREST_RATES	-0.208544	0.101904	-2.046468	0.0575
R-squared	0.722601	Mean dependent var		9.354855
Adjusted R-squared	0.635914	S.D. dependent var		1.877595
S.E. of regression	1.132932	Akaike info criterion		3.314496
Sum squared resid	20.53657	Schwarz criterion		3.612053
Log likelihood	-30.45946	Hannan-Quinn criter.		3.384592
F-statistic	8.335729	Durbin-Watson stat		2.114306
Prob(F-statistic)	0.000485			

Source: World Bank, OECD, Trading Economics Data, and Own Analysis

The results for Mexico do indicate a statistically moderate relationship with an adjusted R squared of 0.49. The data further indicates positive relationship between government debt and economic growth, that a 1 percent increase in debt will lead to 0.01 percent increase in economic growth. However, with reference the p-values, the null hypothesis is rejected, and that 1 percent increase in government spending and increase in real interest rates will lead to 1.04 percent and 1.04 decline in economic growth respectively. With reference to the F-statistic, we conclude that the model is significant.

Table 5.4: Mexico Regression Results

Dependent Variable: GDP_GROWTH__ANNUAL____
Method: Least Squares
Date: 03/25/23 Time: 11:48
Sample (adjusted): 1995 2017
Included observations: 16 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	20.22762	14.83275	1.363714	0.2026
DEBT_GDP	0.012195	0.091108	0.133852	0.8962
BUDGET_DEFICIT_GDP	-0.246076	0.626840	-0.392565	0.7029
GOVERNMENT_SPEND_GDP	-1.039435	0.340912	-3.048982	0.0123
GROSS_FIXED_CAPITAL_FORMATION____ _OF_GDP_	0.167501	0.668709	0.250484	0.8073
REAL_INTEREST_RATE____	-1.041375	0.317745	-3.277396	0.0083
R-squared	0.660195	Mean dependent var		2.555617
Adjusted R-squared	0.490293	S.D. dependent var		3.668785
S.E. of regression	2.619285	Akaike info criterion		5.043676
Sum squared resid	68.60652	Schwarz criterion		5.333397
Log likelihood	-34.34941	Hannan-Quinn criter.		5.058512
F-statistic	3.885730	Durbin-Watson stat		3.326515
Prob(F-statistic)	0.032308			

Source: World Bank, OECD, Trading Economics Data, and Own Analysis

The case for South Africa indicates a statistically low relationship with an adjusted R squared of 0.31. The data further indicates positive relationship between government debt, budget deficits, economic growth, and private sector investment that a 1 percent increase in debt will lead to 0.07 percent, 0.56 percent, and 2.98 percent increase in economic growth respectively. In addition, increase in government spending and public sector investment will lead to 0.22 percent and 2.26 percent decline in GDP respectively. With reference to the F-statistic, the model is considered significant.

Table 5.5: RSA Regression Results

Dependent Variable: GDP_Y_O_Y_GROWTH_RATE
Method: Least Squares
Date: 03/28/23 Time: 10:43
Sample (adjusted): 1995 2017
Included observations: 23 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	9.467741	7.314408	1.294396	0.2128
DEBT_GDP	0.072032	0.129751	0.555152	0.5860
BUDGET_DEFICIT__GDP	0.557527	0.374115	1.490255	0.1545
GOVERNMENT_SPEND_GDP	-0.216103	0.651644	-0.331628	0.7442
FIXED_CAPITAL_FORMATION__GDP	-2.258027	2.260544	-0.998886	0.3319
GROSS_FIXED_CAPITAL_FORMATION__P RIVATE_SECTOR____OF_GDP_	2.549247	2.872199	0.887559	0.3872
R-squared	0.467252	Mean dependent var		2.826087
Adjusted R-squared	0.310562	S.D. dependent var		1.945909
S.E. of regression	1.615735	Akaike info criterion		4.016916
Sum squared resid	44.38021	Schwarz criterion		4.313132
Log likelihood	-40.19453	Hannan-Quinn criter.		4.091413
F-statistic	2.982006	Durbin-Watson stat		1.565914
Prob(F-statistic)	0.041171			

Source: World Bank, OECD, Trading Economics Data, and Own Analysis

The data for Russia indicate a statistically significant high relationship with an adjusted R squared of 0.67. The data indicates a positive relationship between government debt and economic growth, that a 1 percent increase in debt will lead to 0.25 percent increase in economic growth. However, the study accepts the null hypothesis based on the F-statistic and p-values, indicating that an increase in debt levels, will lead to a decrease in economic growth.

Table 5.6: Russia Regression Results

Dependent Variable: GDP_GROWTH__ANNUAL__

Method: Least Squares

Date: 03/25/23 Time: 11:43

Sample (adjusted): 1998 2016

Included observations: 7 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-87.74286	134.0041	-0.654777	0.6309
CENTRAL_GOVERNMENT_DEBT__TOTAL_ ____OF_GDP_	0.246733	0.332300	0.742500	0.5934
BUDGET_DEFICIT_GDP	2.734886	2.223770	1.229842	0.4346
GOVERNMENT_SPEND_GDP	0.830189	1.392252	0.596292	0.6577
GROSS_FIXED_CAPITAL_FORMATION__ ____OF_GDP_	3.167568	4.786316	0.661797	0.6278
REAL_INTEREST_RATE__	-0.396293	0.494326	-0.801684	0.5698
R-squared	0.947797	Mean dependent var		1.510115
Adjusted R-squared	0.686780	S.D. dependent var		5.241969
S.E. of regression	2.933726	Akaike info criterion		4.758799
Sum squared resid	8.606746	Schwarz criterion		4.712436
Log likelihood	-10.65580	Hannan-Quinn criter.		4.185764
F-statistic	3.631167	Durbin-Watson stat		2.260031
Prob(F-statistic)	0.377836			

Source: World Bank, OECD, Trading Economics Data, and Own Analysis

The results for Turkey indicate a statistically significant low relationship with an adjusted R squared of 0.28. The data indicates a positive relationship between government debt and economic growth, that a 1 percent increase in debt will lead to 0.64 percent increase in economic growth. However, the study accepts the null hypothesis based on the F-statistic and p-values, indicating that an increase in debt levels, will lead to a decrease in economic growth.

Table 5.7: Turkey Regression Results

Dependent Variable: GDP_GROWTH__ANNUAL__

Method: Least Squares

Date: 03/25/23 Time: 11:53

Sample (adjusted): 2008 2017

Included observations: 10 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-107.6611	99.02657	-1.087194	0.3266
CENTRAL_GOVERNMENT_DEBT__TOTAL__ __OF_GDP__	0.638152	0.579346	1.101505	0.3209
BUDGET_DEFICIT__GDP	3.829207	6.406402	0.597716	0.5761
GOVERNMENT_SPEND_GDP	1.425873	2.165732	0.658379	0.5394
GROSS_FIXED_CAPITAL_FORMATION__ __OF_GDP__	1.870723	3.631897	0.515081	0.6285
R-squared	0.602710	Mean dependent var		5.087796
Adjusted R-squared	0.284878	S.D. dependent var		4.515242
S.E. of regression	3.818310	Akaike info criterion		5.824345
Sum squared resid	72.89744	Schwarz criterion		5.975638
Log likelihood	-24.12173	Hannan-Quinn criter.		5.658378
F-statistic	1.896316	Durbin-Watson stat		1.988792
Prob(F-statistic)	0.249393			

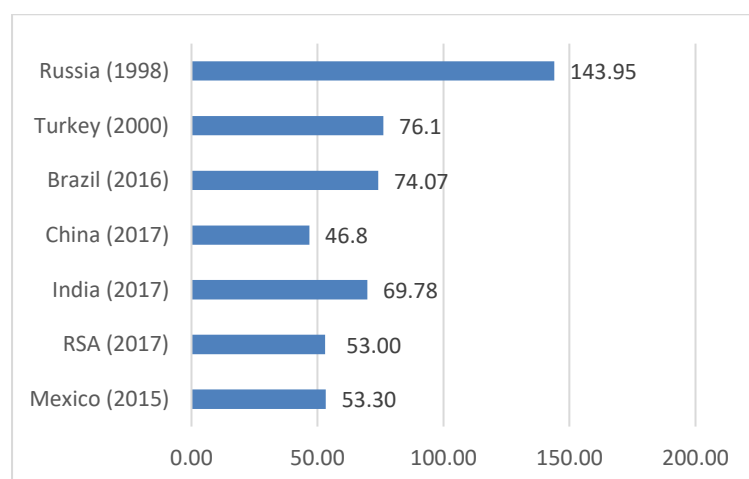
Source: World Bank, OECD, Trading Economics Data, and Own Analysis

Given that the model applied is significant for a number of countries, it will be applied to undertake further analysis of the variables. A detailed analysis looking into the trends of government debt and economic growth and all the identified independent variables and their effect on economic growth is provided below for all the emerging market economies, in addition to unpacking the causal relationship is discussed in the sections to follow below.

5.2.1 Government Debt and Economic Growth

There are significant differences in the sample of emerging market economies' debt levels, with Russia experiencing a high of 144% to GDP, and China indicating a low of 47% to GDP during the study period. Russia, Brazil and Mexico are the three economies that defaulted on their debt due to the debt crises of the 1980s and 1990s (Ullrich, 2018). Russia's debt levels reached a high of 143% to GDP in 1998, the highest debt level across the emerging market economies. In other economies that recorded high debt levels, this was mainly driven by poor economic growth and fiscal pressures experienced post the 2007 global financial crisis (Ullrich, 2018).

Figure 5.1: Emerging Market Country Peaks in Debt Ratio



Source: World Bank Data

The study by Reinhart and Rogoff (2010) for emerging countries (cited in Chapter 2) concluded that the median economic growth at debt levels below 90% was 4% and average economic growth was 4.5%. In addition, at debt levels above 90% of GDP, the median economic growth was 2.9% and average economic growth was 1.0% (Reinhart & Rogoff, 2010). The findings from Table 5.8 indicate that economic growth was positive and high at debt levels below 90% to GDP. In addition, the median economic growth was slightly higher at 5.2% and average economic growth was 5.0% when compared to Reinhart and Rogoff's (2010) findings. For debt above 90% of GDP, economic growth was significantly low, averaging 0.5%, when compared to Reinhart and Rogoff's (2010) findings of 1% economic growth. At debt levels above 90%, economic growth significantly declines by 4.5% from the

average 5%. This suggests that debt levels above 90% will have a significant impact on economic growth. It can be concluded that economic growth will be significantly affected at debt levels above 90%, resulting in emerging market economies growing at an average of 0.5%. The conclusion, therefore, is that debt levels below 90% had a positive effect on economic growth in the emerging market economies.

Table 5.8: Debt Ratio and GDP Growth Average and Median Levels

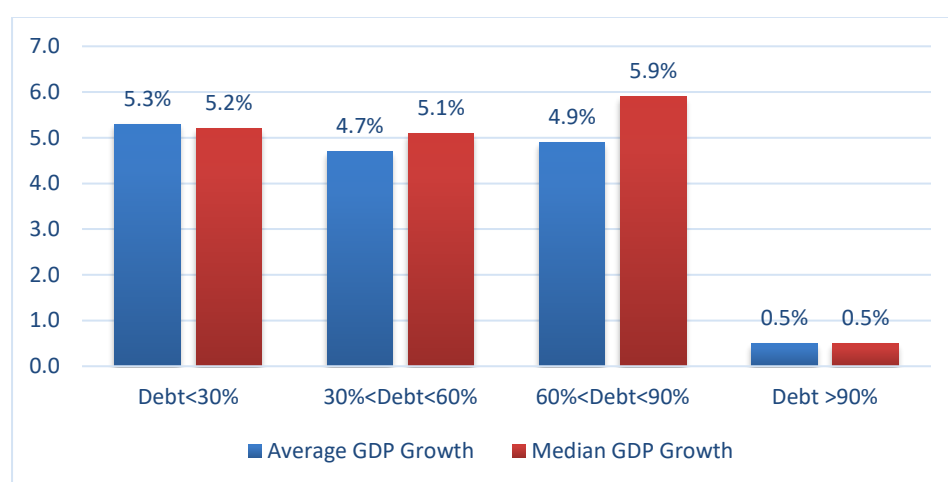
	Period	Debt Levels Below 30%	Debt Levels Below 30%	Debt Levels 30% - 60%	Debt Levels 30% - 60%	Debt Levels 60% - 90%	Debt Levels 60% - 90%	Debt Levels 90% and above	
Country		Average	Median	Average	Median	Average	Median	Average	Median
Brazil	1994 - 2017	n.a.	n.a.	2,4	2,5	2,1	2,5	n.a.	n.a.
China	1995 - 2017	10,0	9,9	8,4	7,9	n.a.	n.a.	n.a.	n.a.
India	1996 - 2017	n.a.	n.a.	6,3	6,9	7,2	7,9	n.a.	n.a.
Mexico	1997 - 2017	5,3	5,2	1,7	2,6	n.a.	n.a.	n.a.	n.a.
Russia	1998 - 2017	3,5	4,5	5,1	5,1	10	10	0,5	0,5
South Africa	1998 - 2016	2,3	3,2	2,9	2,8	n.a.	n.a.	n.a.	n.a.
Turkey	1995 - 2017	5,2	5,2	6,1	7,1	0,2	0,2	0,6	0,6
Average		5,3		4,7		4,9		0,5	
Median			5,2		5,1		5,2		0,5
Number of Observations = 278		74		164		36		4	

Source: World Bank, OECD, Trading Economics Data, and Own Analysis

The country findings from Table 5.1 indicate that at debt levels below 30%, the Chinese economy grew above the emerging market average of 5.3% to achieve an average growth of 10%. Mexico experienced its highest average economic growth of 5.3% at debt levels below 30%. South Africa experienced the lowest average economic growth rate of 2.3% at debt levels below 30%, far below the emerging market average of 5.3%, indicating that even at low debt levels, the South African economy was struggling to grow. At debt levels between 30% and 60%, the Chinese, Indian, Russian and Turkish economies grew above the emerging market average of 4.7% to achieve average growth rates of 8.4%, 6.3%, 5.1% and 6.1%, respectively. Turkey experienced its highest average economic growth at debt levels between 30% and 60%. South Africa experienced a marginally higher average economic

growth rate of 2.9% at debt levels between 30% and 60%; however, it was below the emerging market average. At debt levels between 60% and 90%, Russia experienced its highest average economic growth of 10%, followed by India (7.2%). In both countries, growth was above the emerging market average of 4.9%. Brazil and Turkey experienced their lowest average economic growth of 0.2% and 2.1%, respectively. Russia and Turkey were the only emerging market economies that experienced debt levels above 90%, and at these levels, these economies achieved their lowest average economic growth of 0.5% and 0.6%, respectively.

Figure 5.2: Emerging Market Debt Ratio and GDP Growth Average and Median Levels



Source: World Bank, OECD, Trading Economics Data, and Own Analysis

It can therefore be concluded that a major finding from the study of the identified emerging economies is that economic growth is high and stable when debt levels are below the 90% ratio. This finding is also supported by Egert's (2014) study on emerging economies, which concluded that economic growth remains stable and high below the 90% debt level.

The results are also supported by the findings of Fincke and Greiner (2014) in their study that showed that government debt had a positive effect on investment and economic growth in emerging market economies. They concluded that the emerging market economies have not reached the peak where government debt will lead to negative economic growth rates when compared to developed economies that have long breached their 60% threshold (Fincke & Greiner, 2014). The results from Table 5.1 confirm Fincke and

Greiner's (2014) findings, indicating that economic growth is significantly high (4.9%) at debt levels between 60% and 90%.

5.2.2 Government Debt and GDP per Capita Growth

The findings from the study period and identified emerging economies indicate that the economies experienced average growth in GDP per capita of 3.9% at debt levels below 90% of GDP. In addition, the average GDP per capita growth for the emerging countries was 3.9% for debt levels below 90%. For debt above 90% of GDP, GDP per capita growth was significantly lower, averaging 0.8%. The growth in GDP per capita significantly declined by 3.1% from the average 3.9%, indicating that debt levels above 90% will have a significant impact on economic development.

Table 5.9: Debt Ratio and GDP per Capita Growth Average and Median Levels

	Period	Debt Levels Below 30%	Debt Levels Below 30%	Debt Levels 30% - 60%	Debt Levels 30% - 60%	Debt Levels 60% - 90%	Debt Levels 60% - 90%	Debt Levels 90% and above	
Country		Average	Median	Average	Median	Average	Median	Average	Median
Brazil	2006 - 2017	n.a.	n.a.	1,4	1,6	1,1	1,5	n.a.	n.a.
China	1995 - 2016	9	9	7,9	7,3	n.a.	n.a.	n.a.	n.a.
India	1996 - 2016	n.a.	n.a.	4,6	4,9	5,7	6,2	n.a.	n.a.
Mexico	1997 - 2016	4	4	0,3	1,2	n.a.	n.a.	n.a.	n.a.
Russia	1998 - 2016	3	4	5,5	5,5	10,5	10,5	0,8	0,8
South Africa	1995 - 2017	1	2	1,4	1,1	n.a.	n.a.	n.a.	n.a.
Turkey	1995 - 2015	3	3	4,5	5,7	-1,2	-1,2	n.a.	n.a.
Average		4		3,7		4,0		0,8	
Median			3,0		4,9		3,9		0,8
Number of Observations = 278		74		164		36		4	

Source: World Bank, OECD, Trading Economics Data, and Own Analysis

At debt levels below 30%, the Chinese GDP per capita grew above the emerging market average of 4% to achieve its highest average GDP per capita of 9%, followed by Mexico (4%), Russia (3%) and Turkey (3%). Mexico experienced its highest average GDP per capita

growth at debt levels below 30%. South Africa experienced the lowest average economic growth rate (1%), far below the emerging market average of 4%. This suggests that the South African government will need to increase its investment to ensure higher economic growth rates, which will lead to higher GDP per capita growth rates. At debt levels between 30% and 60%, the Chinese, Indian, Russian and Turkish GDP per capita grew above the emerging market average of 3.7% to achieve average growth rates of 7.9%, 4.6%, 5.5% and 4.5%, respectively. Turkey experienced its highest average economic growth at debt levels between 30% and 60%.

South Africa experienced a marginally higher average GDP per capita growth rate of 1.4% at debt levels between 30% and 60%; however, this was below the emerging market average. At debt levels between 60% and 90%, Russia experienced its highest average GDP per capita growth of 10.5%, followed by India (5.7%). Both countries' growth was above the 4% emerging market average. Brazil and Turkey experienced their lowest average GDP per capita growth of 1.1% and -1.2%, respectively. At debt levels above 90%, Russia experienced its lowest average GDP per capita growth rate of 0.8%.

5.2.3 Emerging Market Country Covariance Analysis

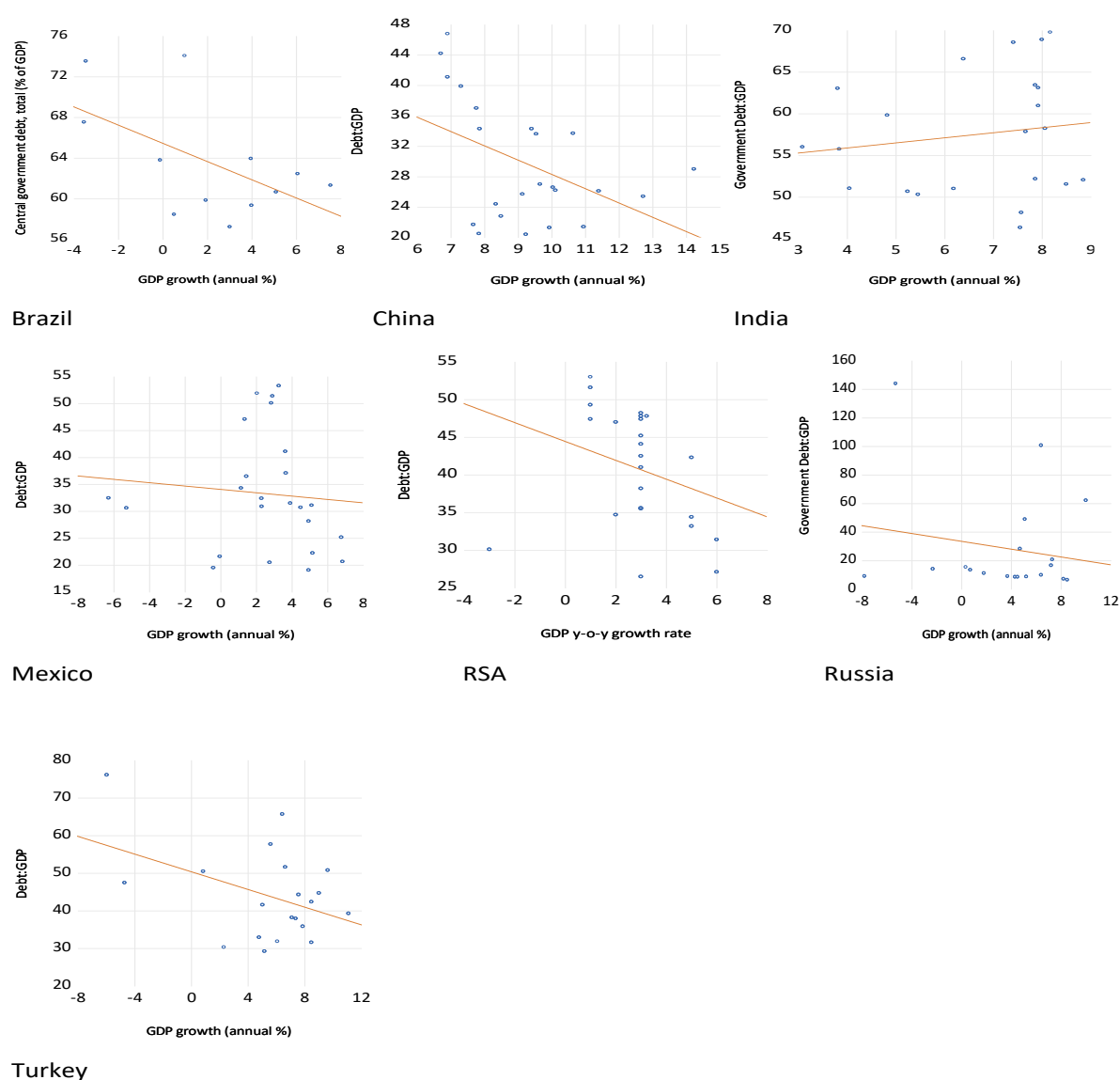
5.2.3.1 Government Debt and Economic Growth

The scatter diagram (Figure. 5.3) has established a form of technical correlation between the two variables, indicating an inverse relationship between government debt and economic growth for all the emerging market economies except India. The inverse correlation would indicate that increases in government debt would lead to lower economic growth rates. However, it can be depicted that even at higher debt levels, economic growth was positive in these emerging market economies. In the case of China, it can be explained by the fact that China experienced increases in public sector investment in the period 1975 – 2004, which contributed to the increase in economic growth in that country (Tasos, 2012). The increase in public sector investment was financed by increased government debt (Tasos, 2012).

In the case of India, the scatter diagram has also established a positive correlation, indicating that increases in government debt supported economic growth and would lead

to higher economic growth rates. It should be noted that India experienced increases in government investment in the period 1991 – 2016, which contributed to the increase in economic growth in that country (Trading Economics, 2017). In the said period, government debt played a significant role in financing the accumulation of capital stock needed to drive economic growth according to Mohanty and Mishra's (2016) findings.

Figure 5.3: Government Debt and Economic Growth Scatter Diagrams



Source: World Bank, OECD and Trading Economics Data

The results in Table 5.10 can be interpreted as follows: there is an inverse relationship between government debt and economic growth across the emerging market economies

except for India, which shows a positive relationship. Only the data for China is considered significant. However, it should be noted that with reference to the strength of the relationship and analysis of the Figure 5.4 scatter diagrams, economic growth was positive at high levels of government debt across the emerging market economies. It can be confirmed therefore that high debt levels in the emerging market economies yielded positive economic growth, which is in line with the Keynesian approach and the findings by Holtfrerich (2014), which showed the positive impact of government debt on the economy. This is also supported by the finding in Table 5.9 that confirms the positive relationship between government debt and economic growth in all the emerging market economies. It should be noted that high debt levels can lead to lower economic growth rates as indicated in the data for all the emerging market economies, due to increases in the cost of borrowing and resources being redirected towards debt repayment rather than supporting economic growth. In addition, low debt levels would mean less government spending on the productive side of the economy, thus leading to lower economic growth rates, as indicated in the data. Lastly, the data also indicates that during low levels of economic growth rates, debt levels were high, indicating that governments may have implemented counter-cyclical fiscal policy measures to cushion the economic impact and get their economies to full employment.

Table 5.10: Country Summary of Government Debt and Economic Growth Covariance Analysis⁶

Country	Co-variance	Correlation	Correlation strength	P-value
Brazil	-9.99	-0.56	Moderate	0.056
China	-6.52	-0.45	Moderate	0.031
India	1.34	0.10	Weak	0.636
Mexico	-2.98	-0.09	Weak	0.674
RSA	-4.35	-0.30	Weak	0.153
Russia	-22.60	-0.13	Weak	0.583
Turkey	-15.53	-0.25	Weak	0.222

Source: World Bank, OECD, Trading Economics Data, and Own Analysis

⁶ Refer to Annexure 1 for detailed presentation of country results

5.2.4 Summary Analysis

The key findings from the analysis confirm the positive relationship between government debt and economic growth in all the emerging market economies, as indicated in Table 5.9. This indicates that increases in debt can be used to support and drive economic growth, and that governments should not be afraid to use debt to support economic growth given this positive relationship.

Table 5.11: Summary of Results for Emerging Market Economies

Debt and economic growth	Debt and GDP per capita growth
Positive and average GDP growth of 5.0% at debt < 90%; High debt levels yielded positive economic growth	Positive and average GDP per capita growth of 3.9% at debt < 90%

Source: Own Analysis

This is supported by the findings of Holtfrerich (2014), who states that debt financing of government expenditure should be regarded as harmless and sustainable as it will lead to an increase in productive capacity and economic growth, which will be used to finance the debt. The findings are also in line with the Keynesian approach, which regards government debt as a positive accumulation of private capital or savings in the economy. Holtfrerich (2014), as discussed in the literature review, states that government debt will have a positive impact on economic growth, given that the debt will afford government the opportunity to access capital to drive economic development by investing in infrastructure, human capital, State-Owned Enterprises (SOEs), and spending on administrative and judicial reforms. The Keynesian approach as articulated by Szabo (2013) supports this, stating that an increase in government debt may lead to investment in infrastructure development, which is critical to crowding in private sector investment. Development should also be supported by increased investment in human capital, which should lead to increased labour productivity and demand for labour, thus leading to an increase in aggregate demand and economic growth. These developmental approaches, as discussed in the literature review, are supported by the new growth theory of fiscal stimulus advocated by Szabo (2013), which argues for the utilisation of government debt to support the productive capacity in the economy and increases in economic growth.

With reference to the country data presented so far, it can be concluded for South Africa that at debt levels below 30% and between 30% and 60%, economic growth remained relatively the same at below 3%. The findings dispute the Neoclassical view that high debt levels will lead to slower economic growth. On the contrary, low debt levels only led to lower economic growth rates for South Africa. The slow economic growth rates in South Africa can be attributed to a number of structural challenges affecting the economy, and for government to address the structural challenges, it will need to increase its spending and debt levels to implement the needed structural reforms, the lack of which have been impeding economic growth. It should be noted that South Africa and Brazil are the only two emerging market economies where economic growth remained relatively the same and below 3% when debt levels increased. It can be concluded from the data that as debt levels increased in both economies, the increased spending and debt was not used to support and drive economic growth. This would confirm Holtfrerich's (2004) analysis of the Neoclassical view, that government debt will have a negative effect on capital accumulation and economic development. However, the literature review has shown that governments need to be concerned about poor economic growth, which will lead to fiscal deterioration and further declines in economic activity (Kobayashi, 2015). Kobayashi (2015) further states that fiscal management should not be the core focus of government, but rather the focus should be on how government can support economic growth and development. This should be the case for South Africa and Brazil.

Mexico is the only country that experienced a significant decline in economic growth when debt levels increased, confirming the Neoclassical and Ricardian views that increases in debt will lead to an increase in savings in the economy, as people factor in a rise in future taxes to finance the debt (Szabo, 2013). This will lead to a loss in wealth in the economy, which will slow down aggregate demand and lead to a decline in economic activity.

China, India, Russia and Turkey, on the other hand, are the only emerging market economies that experienced an increase in economic growth when debt levels increased, confirming the argument that increased debt levels can be used to support economic growth. The functional finance of the Keynesian approach argues that increased government spending should be used to stimulate investment in the economy, which will lead to an increase in the productive capacity of the economy, resulting in positive

economic growth rates (Jayadev & Mason, 2018). These authors base their assumptions on the idea that lower interest rates and higher budget deficits will lead to an increase in aggregate demand and economic activity, while higher interest rates and smaller budget deficits will lead to a fall in aggregate demand and economic activity (Jayadev & Mason, 2018).

Across all emerging market economies, the findings do indicate that economic growth was positive even at high levels of government debt. It can also be concluded that increases in government debt levels did not hinder economic growth across the emerging market economies. This is contrary to the Neoclassical view that government debt is an unproductive use of capital by the private sector that will have a negative effect on capital accumulation and economic development (Holtfrerich, 2014).

Future research will need to be undertaken across the emerging market economies to interrogate the effects of increased government debt on spending priorities and to determine how government debt was accumulated to support the productive side of the economy.

5.3 Should Governments Increase Fiscal Spending or Government Debt to Finance Investment in the Productive Capacity of the Economy to Support and Drive Economic Growth?

This question will be addressed in two ways: firstly, the impact of government debt on public sector investment will be examined; secondly, the impact of government debt on government spending and impact of government spending on economic growth will be assessed. With reference to the functional finance theory highlighted by Jayadev and Mason (2018), increases in government spending can be used to stimulate investment in the economy to drive and increase the productive capacity of the economy, which is key to supporting positive economic growth rates.

A Least Squared method was applied to investigate the relationship between public sector investment and government debt.

The interpretation of the regression results provides the estimates to determine the relationship between government debt and public sector investment, the results are as follows. The relationship is significantly high as depicted by the adjusted R squared of 0.87. The independent variables of government debt and real interest investment have a negative relationship indicating that a 1 percent increase debt will lead to a 0.16 percent and 0.08 percent decline in public investment. In addition, an increase in government spending and budget deficit will lead to 0.10 percent and 0.42 percent increase in public sector investment respectively. The study rejects the null hypothesis based on the F-statistic, indicating that an increase in debt levels, will lead to an increase in public investment and conclude that the model is significant.

Table 5.12: Brazil Regression Results

Dependent Variable: GROSS_FIXED_CAPITAL_FORMATION____OF_GDP

Method: Least Squares

Date: 03/25/23 Time: 11:40

Sample (adjusted): 2006 2016

Included observations: 11 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	30.35204	4.534145	6.694105	0.0005
CENTRAL_GOVERNMENT_DEBT__TOTAL_ ____OF_GDP_	-0.160669	0.121496	-1.322424	0.2342
BUDGET_DEFICIT_GDP	0.422718	0.179797	2.351086	0.0570
GOVERNMENT_SPENDING	0.104347	0.101678	1.026248	0.3444
REAL_INTEREST_RATE____	-0.079718	0.059571	-1.338202	0.2293
R-squared	0.920538	Mean dependent var		19.06400
Adjusted R-squared	0.867563	S.D. dependent var		1.733008
S.E. of regression	0.630675	Akaike info criterion		2.218904
Sum squared resid	2.386508	Schwarz criterion		2.399766
Log likelihood	-7.203972	Hannan-Quinn criter.		2.104896
F-statistic	17.37685	Durbin-Watson stat		1.383853
Prob(F-statistic)	0.001887			

Source: World Bank, OECD, Trading Economics Data, and Own Analysis

The data depicts a significantly high relationship as depicted by the adjusted R squared of 0.86. The independent variables of government debt, budget deficit and government spending all have a positive relationship indicating that a 1 percent increase debt, budget deficits, and government spending will lead to a 0.45 percent, 0.91 percent, and 0.95 percent in public sector investment. In addition, a 1 percent increase in real interest rates, will lead to 0.07 percent decrease in public sector investment. The study rejects the null hypothesis based on the F-statistic, indicating that an increase in debt levels, will lead to an increase in public investment and conclude that the model is significant.

Table 5.13: China Regression Results

Dependent Variable: GROSS_FIXED_CAPITAL_FORMATION____OF_GDP

Method: Least Squares

Date: 03/25/23 Time: 11:33

Sample (adjusted): 1995 2016

Included observations: 22 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	14.55970	9.868981	1.475300	0.1584
DEBT_GDP	0.453974	0.070758	6.415853	0.0000
BUDGET_DEFICIT_GDP	0.914369	0.307666	2.971952	0.0086
GOVERNMENT_SPENDING_GDP	0.948704	0.739455	1.282977	0.2167
REAL_INTEREST_RATES	-0.073098	0.169711	-0.430723	0.6721
R-squared	0.883846	Mean dependent var		39.35338
Adjusted R-squared	0.856516	S.D. dependent var		5.008136
S.E. of regression	1.897049	Akaike info criterion		4.315192
Sum squared resid	61.17951	Schwarz criterion		4.563157
Log likelihood	-42.46712	Hannan-Quinn criter.		4.373605
F-statistic	32.33933	Durbin-Watson stat		1.102728
Prob(F-statistic)	0.000000			

Source: World Bank, OECD, Trading Economics Data, and Own Analysis

The data depicts a significantly moderate relationship as depicted by the adjusted R squared of 0.46. The independent variables of government debt positive relationship indicating that a 1 percent increase debt will lead to a 0.25 percent increase in public investment, in addition increase in budget deficit, government spending, and real interest rates will lead to a decline in public sector investment. The study rejects the null hypothesis based on the F-statistic, indicating that an increase in debt levels, will lead to an increase in public investment and conclude that the model is significant.

Table 5.14: India Regression Results

Dependent Variable: GROSS_FIXED_CAPITAL_FORMATION____OF_GDP

Method: Least Squares

Date: 03/25/23 Time: 11:23

Sample (adjusted): 1995 2017

Included observations: 23 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	36.33566	11.93607	3.044190	0.0070
CENTRAL_GOVERNMENT_DEBT__TOTAL_ ____OF_GDP_	0.253578	0.126344	2.007045	0.0600
BUDGET_DEFICIT_GDP	-0.543089	0.402011	-1.350929	0.1935
GOVERNMENT_SPEND_GDP	-1.093439	0.879749	-1.242898	0.2299
REAL_INTEREST_RATE____	-1.296687	0.293437	-4.418958	0.0003
R-squared	0.548276	Mean dependent var		29.51728
Adjusted R-squared	0.447893	S.D. dependent var		3.836488
S.E. of regression	2.850659	Akaike info criterion		5.122638
Sum squared resid	146.2726	Schwarz criterion		5.369484
Log likelihood	-53.91033	Hannan-Quinn criter.		5.184719
F-statistic	5.461846	Durbin-Watson stat		1.361235
Prob(F-statistic)	0.004648			

Source: World Bank, OECD, Trading Economics Data, and Own Analysis

The data depicts a moderate relationship as depicted by the adjusted R squared of 0.56. The independent variables of government debt and real interest investment have a negative relationship indicating that a 1 percent increase debt and real interest rates will lead to a 0.04 percent and 0.26 percent decrease in public investment. In addition, increase in budget deficit and government spending will lead to 0.06 percent and 0.16 percent in public sector investment respectively. The study rejects the null hypothesis based on the F-statistic, indicating that an increase in debt levels, will lead to an increase in public investment and conclude that the model is significant.

Table 5.15: Mexico Regression Results

Dependent Variable: GROSS_FIXED_CAPITAL_FORMATION____OF_GDP

Method: Least Squares

Date: 03/25/23 Time: 11:49

Sample (adjusted): 1995 2017

Included observations: 16 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	20.80786	2.316673	8.981786	0.0000
DEBT_GDP	-0.037019	0.039534	-0.936377	0.3692
BUDGET_DEFICIT_GDP	0.060631	0.282041	0.214973	0.8337
GOVERNMENT_SPEND_GDP	0.157902	0.146153	1.080382	0.3031
REAL_INTEREST_RATE____	-0.261795	0.119560	-2.189651	0.0510
R-squared	0.676665	Mean dependent var		21.25846
Adjusted R-squared	0.559089	S.D. dependent var		1.778580
S.E. of regression	1.180997	Akaike info criterion		3.420902
Sum squared resid	15.34230	Schwarz criterion		3.662336
Log likelihood	-22.36722	Hannan-Quinn criter.		3.433266
F-statistic	5.755114	Durbin-Watson stat		1.450495
Prob(F-statistic)	0.009488			

Source: World Bank, OECD, Trading Economics Data, and Own Analysis

The data depicts a significantly high relationship as indicated by the adjusted R squared of 0.81. The independent variables of government debt and real interest investment have a negative relationship indicating that a 1 percent increase debt will lead to a 0.21 percent decrease in public investment. While an increase in budget deficit, government spending, and real interest rates will lead to 0.49 percent, 1.42 percent, and 0.14 percent increase in public sector investment respectively. The study rejects the null hypothesis based on the F-statistic, indicating that an increase in debt levels, will lead to an increase in public investment and conclude that the model is significant.

Table 5.16: RSA Regression Results

Dependent Variable: FIXED_CAPITAL_FORMATION__GDP

Method: Least Squares

Date: 03/25/23 Time: 11:35

Sample (adjusted): 1995 2016

Included observations: 22 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-10.27641	4.543178	-2.261943	0.0371
DEBT_GDP	-0.206259	0.043468	-4.745124	0.0002
BUDGET_DEFICIT__GDP	0.486065	0.200034	2.429905	0.0265
GOVERNMENT_SPEND_GDP	1.417968	0.185748	7.633841	0.0000
REAL_INTEREST_RATE____	0.136436	0.090343	1.510198	0.1494
R-squared	0.845521	Mean dependent var		18.40000
Adjusted R-squared	0.809173	S.D. dependent var		2.210150
S.E. of regression	0.965475	Akaike info criterion		2.964324
Sum squared resid	15.84642	Schwarz criterion		3.212288
Log likelihood	-27.60756	Hannan-Quinn criter.		3.022737
F-statistic	23.26189	Durbin-Watson stat		1.643172
Prob(F-statistic)	0.000001			

Source: World Bank, OECD, Trading Economics Data, and Own Analysis

The data for Russia depicts a significantly high relationship with an adjusted R squared of 0.98. The independent variables of government debt, budget deficits, and government spending all have a negative relationship indicating that a 1 percent increase debt will lead to a 0.67 percent, 0.34 percent, and 0.22 decline in public investment. The study rejects the null hypothesis based on the F-statistic, indicating that an increase in debt levels, will lead to an increase in public investment and conclude that the model is significant.

Table 5.17: Russia Regression Results

Dependent Variable: GROSS_FIXED_CAPITAL_FORMATION____OF_GDP

Method: Least Squares

Date: 03/25/23 Time: 11:43

Sample (adjusted): 1998 2016

Included observations: 7 after adjustments

Variable	Coefficient	Std. Error	t-Statistic
C	27.53955	3.565431	7.724046
CENTRAL_GOVERNMENT_DEBT__TOTAL_ ____OF_GDP_	-0.068075	0.009643	-7.059256
BUDGET_DEFICIT_GDP	-0.343269	0.221392	-1.550505
GOVERNMENT_SPEND_GDP	-0.223146	0.131943	-1.691231
REAL_INTEREST_RATE____	0.094583	0.029330	3.224743
R-squared	0.993837	Mean dependent var	
Adjusted R-squared	0.981512	S.D. dependent var	
S.E. of regression	0.433414	Akaike info criterion	
Sum squared resid	0.375696	Schwarz criterion	
Log likelihood	0.304530	Hannan-Quinn criter.	
F-statistic	80.63285	Durbin-Watson stat	
Prob(F-statistic)	0.012287		

Source: World Bank, OECD, Trading Economics Data, and Own Analysis

The data depicts a significantly high relationship as indicated by the adjusted R squared of 0.97. The independent variable of government debt has a negative relationship indicating that a 1 percent increase debt will lead to a 0.13 percent decrease in public investment. While an increase in budget deficit and government spending, will lead to 1.55 percent and 0.39 percent increase in public sector investment respectively. The study rejects the null hypothesis based on the F-statistic, indicating that an increase in debt levels, will lead to an increase in public investment and conclude that the model is significant.

Table 5.18: Turkey Regression Results

Dependent Variable: GROSS_FIXED_CAPITAL_FORMATION___OF_GDP

Method: Least Squares

Date: 03/25/23 Time: 11:54

Sample (adjusted): 2008 2017

Included observations: 10 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	23.57494	5.592344	4.215573	0.0056
CENTRAL_GOVERNMENT_DEBT___TOTAL___OF_GDP	-0.133233	0.035811	-3.720477	0.0098
BUDGET_DEFICIT___GDP	1.546831	0.346110	4.469184	0.0042
GOVERNMENT_SPEND_GDP	0.385996	0.185558	2.080191	0.0827
R-squared	0.978450	Mean dependent var		27.59162
Adjusted R-squared	0.967675	S.D. dependent var		2.387234
S.E. of regression	0.429202	Akaike info criterion		1.435397
Sum squared resid	1.105287	Schwarz criterion		1.556431
Log likelihood	-3.176985	Hannan-Quinn criter.		1.302623
F-statistic	90.80843	Durbin-Watson stat		2.142852
Prob(F-statistic)	0.000022			

Source: World Bank, OECD, Trading Economics Data, and Own Analysis

A detailed analysis looking into the trends of government debt and public sector investment, including other identified independent variables and their effect on public sector investment is provided below for all the emerging market economies, in addition to unpacking the causal relationship is discussed in the sections to follow below.

5.3.1 Government Fixed Capital Formation Analysis

The research question to be addressed is as follows: Will the increase in government debt reduce public sector investment? The objective is to determine the relationship between changes in government gross capital formations and changes in public debt; changes in

government spending and changes in government debt; and change in gross fixed capital formation and changes in public debt. The variables analysed are government debt, public and private sector investment, and government spending.

For the study period and the identified emerging market economies, the findings from Table 5.5 indicate that the economies experienced median and average public sector investment to GDP of between 20.6% and 23.6%, respectively, for debt levels below 90% of GDP. In addition, the average public sector investment to GDP for the emerging market economies is 23.6% for debt levels below 90%. For debt above 90% of GDP, public sector investment to GDP is slightly lower, averaging 15.3%.

Table 5.19 also indicates that public sector investment declines by 8.3% from the average of 23.6%, indicating that debt levels above 90% will have a significant impact on public sector investment. The slowdown in public sector investment below the average 23.6% is also experienced when debt levels are between 60% and 90%. At debt levels above 90%, the slowdown in public sector investment can be explained by the analysis of Ostry et al (2015), which states that highly indebted economies will tend to invest less in public infrastructure than in less indebted economies. This explanation by Ostry et al (2015) is that economies will feel that they are poorer at higher debt levels and therefore force government to increase taxes and lower their investment to service their debts.

Table 5.19: Debt Ratio and Public Sector Investment Average and Median Levels

	Period	Debt levels Below 30%	Debt levels Below 30%	Debt levels 30% - 60%	Debt levels 30% - 60%	Debt levels 60% - 90%	Debt levels 60% - 90%	Debt levels 90% and above	
Country		Average	Median	Average	Median	Average	Median	Average	Median
Brazil	2006 - 2017	n.a.	n.a.	20,5	20,7	17,8	17,9	n.a.	n.a.
China	1995 - 2016	36	34	44,3	45	n.a.	n.a.	n.a.	n.a.
India	1996 - 2016	n.a.	n.a.	29,8	30	29,2	29,4	n.a.	n.a.
Mexico	1997 - 2016	20	21	21,2	21,6	n.a.	n.a.	n.a.	n.a.
Russia	1998 - 2016	20	21	16,8	16,8	15,1	15,1	15,3	15,3
South Africa	1995 - 2017	22	22	17,9	17,9	n.a.	n.a.	n.a.	n.a.
Turkey	1995 - 2015	29	29	25,8	26,4	18,4	18,4	n.a.	n.a.
Average		25,4		25,2		20,1		15,3	
Median			22,0		21,6		18,2		15,3
Number of Observations = 278		74		164		36		4	

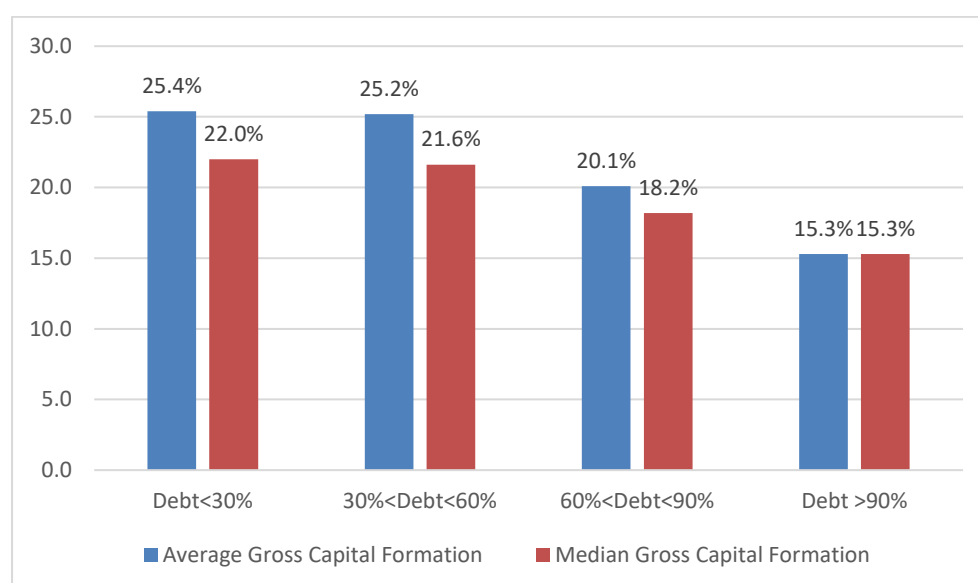
Source: World Bank, OECD, Trading Economics Data, and Own Analysis

At debt levels below 30%, Chinese public sector investment (36% to GDP) was above the emerging market average of 25.4% to GDP, followed by Turkey (29%) and South Africa (22%). South Africa and Turkey experienced their highest average public sector investment at debt levels below 30%. South Africa's public sector investment levels were slightly lower than the emerging market average of 25.4%. At debt levels between 30% and 60%, the Chinese and Indian economies recorded levels of public sector investment above the emerging market average of 25.8%. Both economies recorded their highest public sector investment average of 44.3% and 29.8%, respectively. South Africa experienced marginally lower public sector investment of 17.9% and below the emerging market average. The data indicates the need for governments to increase debt to finance public investment as experienced in China and India. At the same debt levels, Brazil and Mexico recorded their highest public sector investment levels of 20.5% and 21.2%, respectively. At debt levels between 60% and 90%, India recorded the highest public sector investment of 29.2% and above the emerging market average of 20.1%. Brazil, Russia and Turkey recorded their

lowest public sector investment levels of 17.8%, 15.1% and 18.4%, respectively. At debt levels above 90%, Russia managed to maintain its public sector investment levels of 15.3%.

The findings from the emerging market economies therefore support the finding in the literature review that government debt can influence economic growth through the total factor productivity channel. This will entail increased government investment in infrastructure development, industrial development, education, health and nutrition. Tasos (2012) states that such expenditure will have an influence on the well-being of the citizens and lead to higher economic growth levels. This is also supported by the findings by Fincke and Greiner (2014), where the use of government debt to finance public sector investment had a positive effect on economic growth. The argument can be further explained by Ostry et al (2015) in their application of the ‘golden rule’, indicating that governments will need to increase their debt levels to finance the accumulation of public sector investment. Low debt levels as advocated by the Neo-classical approach would mean less government spending on human capital and infrastructure development, which could result in lower economic growth. The thesis argues for using government debt to support economic growth and that increases in debt levels should be directed towards supporting the productive side of the economy in order to achieve economic growth.

Figure 5.4: Emerging Market Debt Ratio and Public Sector Investment Average and Median Levels



Source: World Bank, OECD and Trading Economics Data and Own Analysis

Holtfrerich (2014) summarises the Neoclassical view on government debt as an unproductive use of capital by the private sector that has a negative effect on capital accumulation and economic development. Holtfrerich's (2014) view, in contrast to the Neoclassical thought, is that government debt would lead to employment creation, increased incomes and savings, and result in less suffering of the working class. The principle assumes the direct relationship between the accumulation of capital stock and economic growth, i.e., increases in capital stock accumulation will lead to economic growth (Todaro, 1994). The Keynesian approach as advocated by Szabo (2013) seeks to support the accumulation of capital stock directed towards the investments in infrastructure development, which is key to crowding in private sector investment. If governments want to accumulate the capital stock, they will need to borrow more. As stated by Holtfrerich (2014), government debt should be regarded as harmless when used to increase the productive capacity of the economy and allow economic growth to be used to finance the debt.

With reference to the Harrod-Domar growth model discussed in the literature review, governments need to accumulate capital stock to drive economic growth (Todaro, 1994). As stated by Todaro (1994), governments will need to borrow to accumulate the capital stock needed to grow the economy.

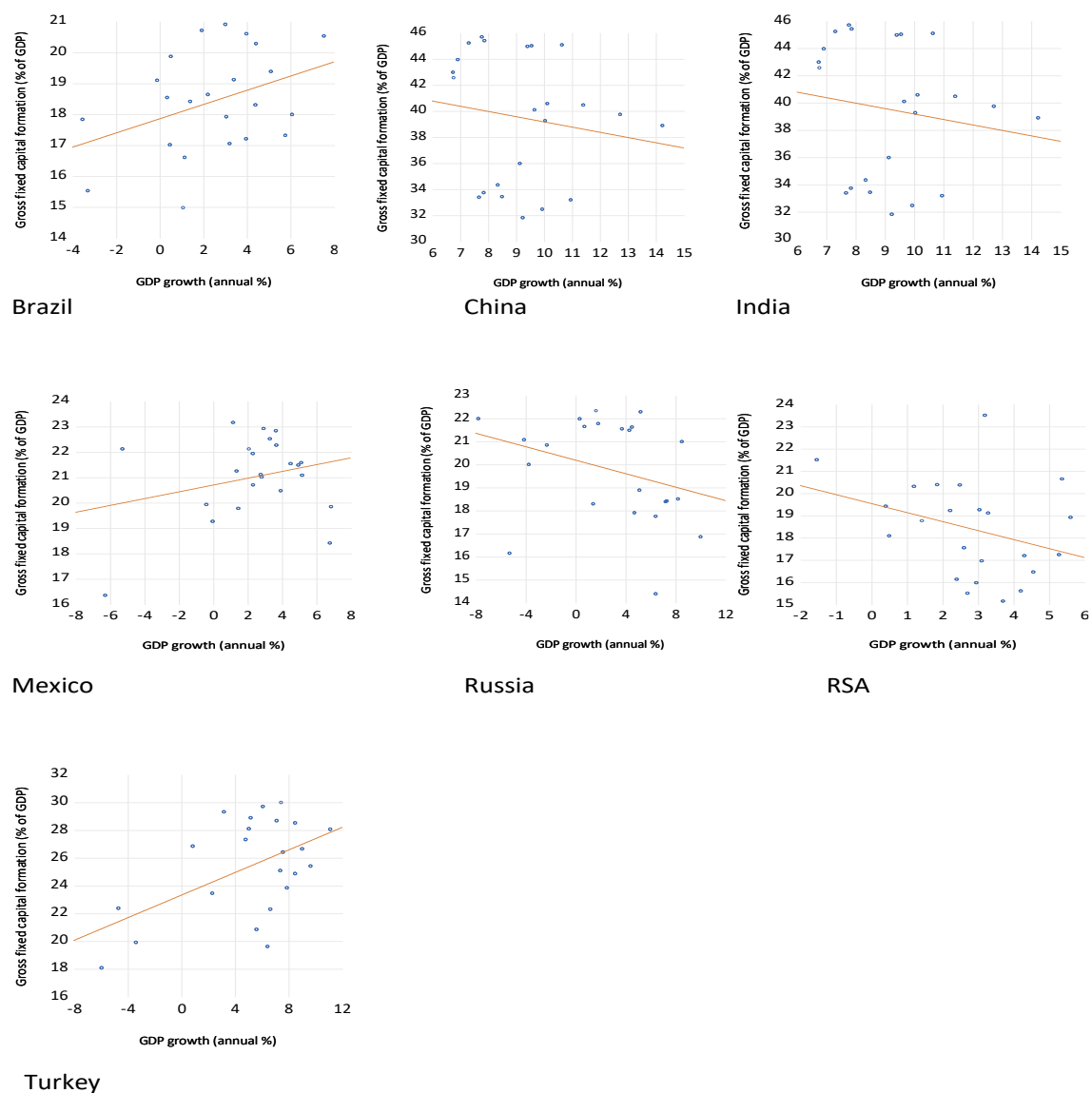
5.3.2 Emerging Market Country Covariance Analysis

5.3.2.1 Public Sector Investment and Economic Growth

As depicted in Figure 5.5, the technical correlation established between the two variables indicates a positive and an inverse relation between public sector investment and economic growth. The data for Brazil, Mexico and Turkey indicate a positive correlation, showing that increases in public sector investment would lead to an increase in economic growth, while the data for China, India, Russia and South Africa indicate an inverse relationship between public sector investment and economic growth. However, it can be deduced that at high public sector investment levels the economy experienced positive growth rates. For South Africa, the inverse correlation would indicate that the country experienced a public sector investment gap during the 90s and early 2000, which contributed to the low economic growth.

It should be noted that China experienced increases in public sector investment in the period 1975 – 2004, which contributed to the increase in economic growth in that country (Tasos, 2012). In addition, India also experienced increases in public sector investment in the period 1991 – 2016, which contributed to the increase in economic growth in that country (Trading Economics, 2017). Furthermore, when economic growth reached the desired levels in China and India, both governments started to reduce their investment in the economy, which explains the inverse relationship.

Figure 5.5: Emerging Market Public Sector Investment and Economic Growth Scatter Diagram



Source: World Bank, OECD and Trading Economics Data

As indicated in Table 5.20, Turkey is the only country with data indicating a moderate correlation strength and a P-value of less than the significance value of 0.05, which indicates that the data is significant. This confirms that increased public sector investment will lead to increased growth. Public sector investment should be regarded as a positive factor to increase the productive capacity of the economy. The data for the rest of the emerging market economies indicates a weak correlation strength and the data is not significant. However, it should be noted that with reference to the scatter diagram of Figure 5.5, the analysis indicates that increased public sector investment led to positive economic growth.

The findings across the emerging market economies confirm that increases in public sector investment supported economic growth. This confirms that an increase in public investment should be regarded as a positive factor to increase the productive capacity of the economy, which is key to supporting positive economic growth rates. This is further supported by the principles of the Keynesian approach, which advocates for increased government investment in infrastructure development, industrial development, education, health and nutrition in order to drive economic growth.

Table 5.20: Emerging Market Country Summary of Public Sector Investment and Economic Growth Covariance Analysis⁷

Country	Co-variance	Correlation	Correlation strength	P-value
Brazil	1.64	0.38	Weak	0.070
China	-1.39	-0.15	Weak	0.481
India	0.89	0.14	Weak	0.526
Mexico	1.30	0.27	Weak	0.215
Russia	-3.24	-0.31	Weak	0.144
RSA	-1.15	-0.32	Weak	0.134
Turkey	7.94	0.52	moderate	0.010

Source: World Bank, OECD, Trading Economics Data, and Own Analysis

5.3.2.2 Debt Ratio and Public Sector Investment

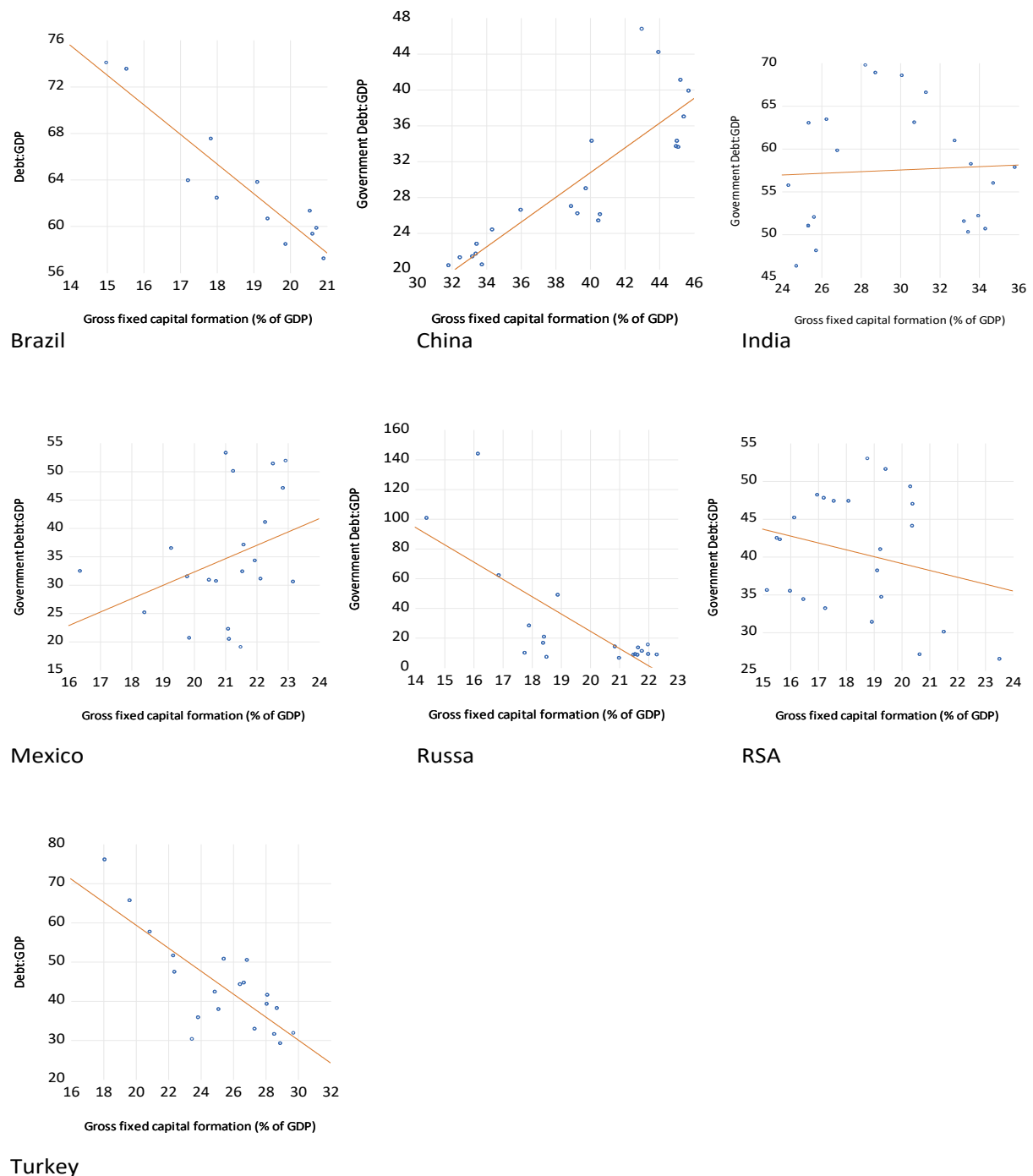
From Figure 5.6, it can be seen that the scatter diagram has established a form of technical correlation between the two variables, indicating an inverse relationship between

⁷ Refer to Annexure 1 for detailed presentation of country results

government debt levels and public sector investment for Brazil, Russia, South Africa and Turkey. The inverse correlation would confirm that increases in public sector debt levels would reduce government's ability to accumulate public sector investment needed to support economic growth. As governments increase debt levels, interest rates would increase in the capital market, making it costly for governments to borrow and limiting government's ability to borrow more, which will lead to the slowdown in public sector investment. In addition, it should be noted that post the Russian crisis, the country experienced significant declines in government debt in response to the crisis. This gave the Russian government the fiscal space it needed to increase capital formation. In the case of South Africa, it should be noted that the fiscal consolidation policy stance undertaken post 1994 contributed to the lack of public sector investment.

The relationship was positive for China, India, and Mexico, which would indicate that increases in public sector debt levels were used to accumulate the public sector investment needed to support economic growth. In addition, this confirms that the governments in these economies needed to borrow more to finance the accumulation of the capital stock needed to drive investment and expenditure towards the productive side of the economy, which led to sustainable economic growth rates. In the case for India, this confirms the findings of Mohanty and Mishra (2016) that the Indian government increased its debt levels to finance the accumulation of capital stock needed to drive investment in the local economy.

Figure 5.6: Emerging Market Country Debt Ratio and Public Sector Investment Scatter Diagram



Source: World Bank, OECD and Trading Economics Data

Table 5.21 can be interpreted as follows: there is a strong correlation relationship with reference to Brazil, China, Russia and Turkey and the data being significant. The following countries experienced an inverse relationship – Brazil, Russia, South Africa and Turkey,

indicating that high levels of government debt will lead to a slowdown in public sector investment or accumulation of government investment stock. This would increase the cost of government borrowing and limit government's ability to borrow more in order to finance public sector investment. In the case for China, India and Mexico, the data indicates a positive relationship and can be interpreted as follows: the increase in public sector investment was supported by increased government debt. This confirms the findings in the literature review that government debt should be used to direct spending towards economic growth through the total factor productivity channel. This is supported by the findings of Fincke and Greiner (2014), which indicated that the use of government debt to finance public sector investment will invariably have a positive effect on economic growth.

In addition, it should be noted with reference to the countries with a weak relationship and analysis of the scatter diagram that the data does indicate that an increase in public sector investment was supported by the accumulation of government debt. As discussed above, low debt levels would mean less government spending on human capital and infrastructure development. The data does indicate an indirect relationship between government debt and economic growth driven by public sector investment. The analysis confirms the positive effect of debt directed towards capital accumulation, which leads to economic growth.

Table 5.21: Emerging Market Country Summary of Debt Ratio and Public Sector Investment Covariance Analysis⁸

Country	Co-variance	Correlation	Correlation strength	P-value
Brazil	-9.62	-0.93	Strong	0.000
China	33.05	0.85	Strong	0.000
India	1.42	0.05	Weak	0.815
Mexico	5.96	0.35	Weak	0.113
Russia	-61.25	-0.74	Strong	0.000
RSA	-4.05	-0.24	Weak	0.256
Turkey	-30.33	-0.79	Strong	0.000

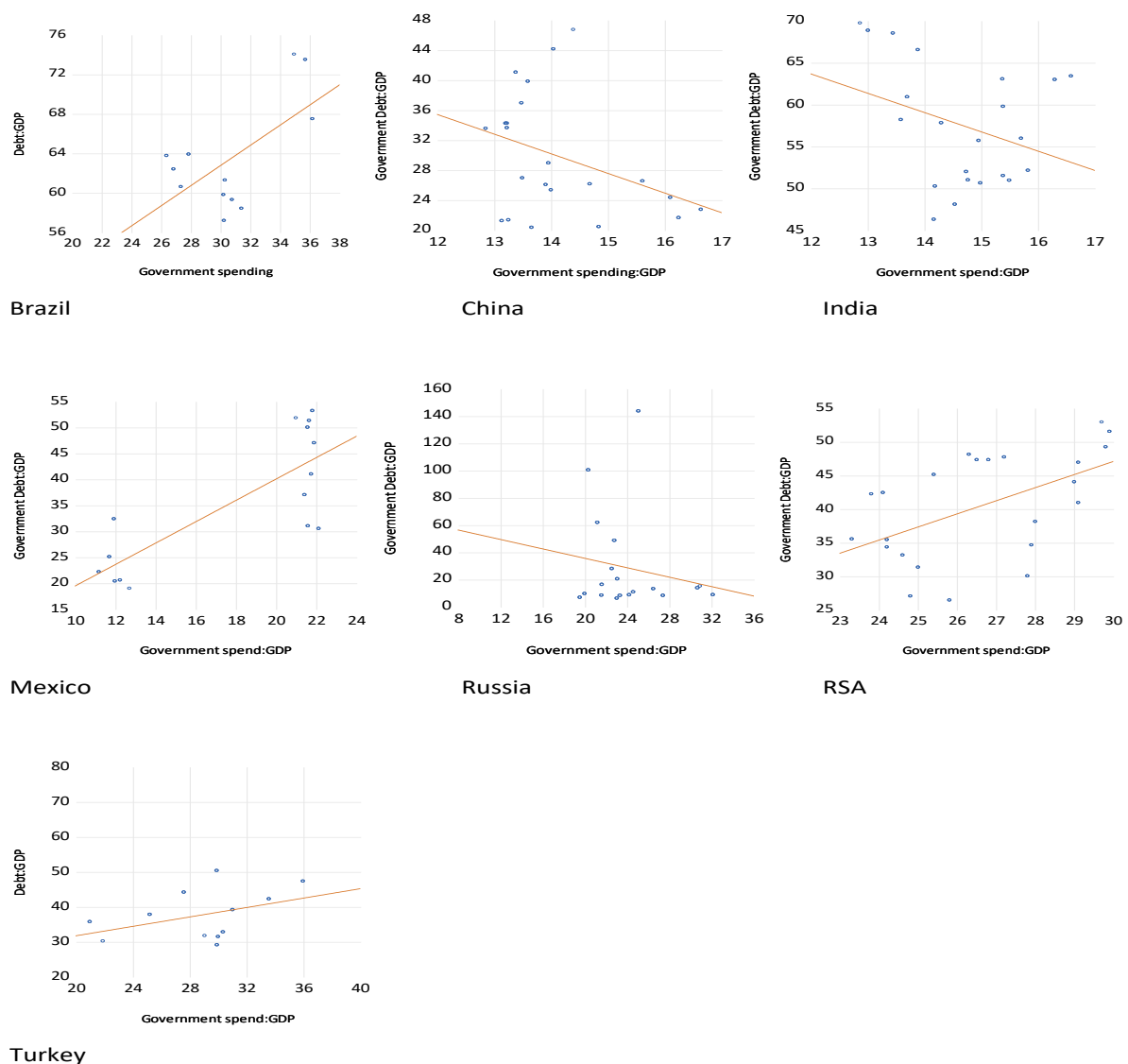
Source: World Bank, OECD, Trading Economics Data, and Own Analysis

⁸ Refer to Annexure 1 for detailed presentation of country results

5.3.2.3 Debt Ratio and Government Spending

Figure 5.7 shows a positive and inverse relationship between government debt levels and government spending. The positive correlation for Brazil, Mexico, South Africa and Turkey would indicate that increases in public sector debt levels would encourage government spending and lead to increases in government spending. The inverse correlation would indicate that increases in public sector debt levels would reduce government spending, as government would have to spend more to finance its debt. This was the case for China, India and Russia.

Figure 5.7: Debt Ratio and Government Spending Scatter Diagram



Source: World Bank, OECD and Trading Economics Data

Table 5.22 indicates that only the Mexican and South African data is significant and should confirm that the two governments use debt to support the increased spending in the economy. The positive correlation would suggest that government spending is positively driven by government's accumulation of debt. An inverse relationship was indicated for China, India and Russia, which would suggest that increases in government debt would reduce spending in the economy, as government would have to reprioritise spending in order to finance its debt.

Table 5.22: Debt Ratio and Government Spending Covariance Analysis⁹

Country	Co-variance	Correlation	Correlation strength	P-value
Brazil	10.84	0.62	Strong	0.029
China	-3.04	-0.35	Weak	0.102
India	-2.30	-0.32	Weak	0.137
Mexico	46.67	0.79	Strong	0.000
Russia	-22.93	-0.17	Weak	0.472
RSA	8.72	0.52	Moderate	0.009
Turkey	11.72	0.41	Weak	0.179

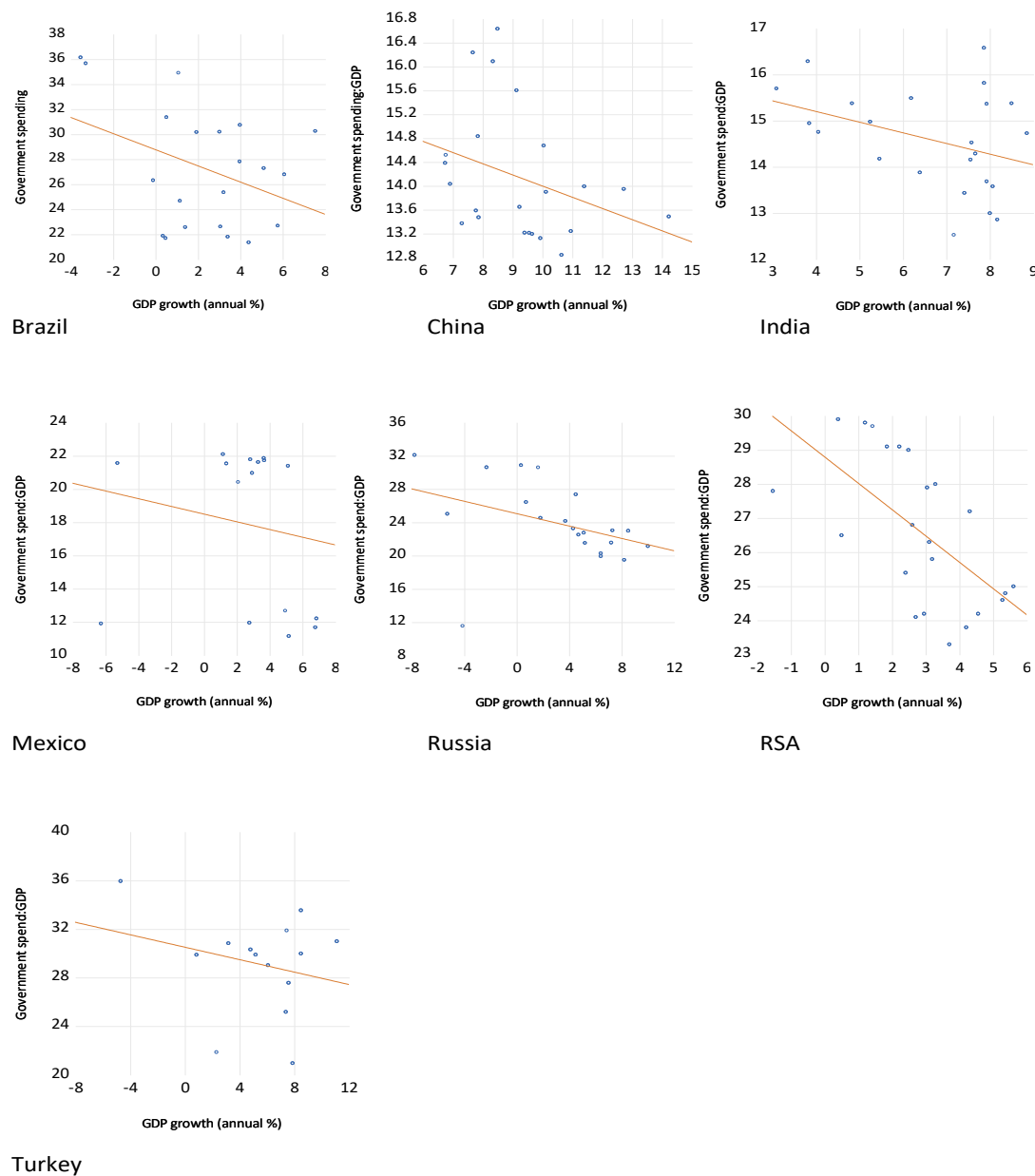
Source: World Bank, OECD, Trading Economics Data, and Own Analysis

5.3.2.4 Government Spending and Economic Growth

Figure 5.8 shows an inverse relationship between government spending and economic growth across all the emerging market economies. The inverse correlation would suggest that increases in government spending will lead to lower economic growth rates. However, it can be observed from Figure 5.8 that positive economic growth was realised at higher levels of government spending.

⁹ Refer to Annexure 1 for detailed presentation of country results

Figure 5.8: Government Spending and Economic Growth Scatter Diagram



Source: World Bank, OECD and Trading Economics Data

The results from Table 5.23 indicate that only the South African data is significant, and the correlation relationship is strong. This would suggest that decreases in government spending in South Africa would lead to higher economic growth rates. However, it should be noted that the findings from Figure 5.8 do indicate that increased public sector spending in the economy also led to positive economic growth across all the emerging market economies. This confirms that increased public sector spending should be used to increase government investment needed to support the productive capacity of the

economy, which is key to supporting positive economic growth rates. It should be noted that South Africa's fiscal consolidation policy stance would result in lower government spending towards human capital and infrastructure development, which led to lower levels of economic growth.

Table 5.23: Government Spending and Economic Growth Covariance Analysis¹⁰

Country	Co-variance	Correlation	Correlation strength	P-value
Brazil	-4.91	-0.37	Weak	0.090
China	-0.65	-0.33	Weak	0.123
India	-0.66	-0.36	Weak	0.086
Mexico	-2.92	-0.17	Weak	0.512
Russia	-8.18	0.37	Weak	0.092
RSA	-2.18	-0.61	Strong	0.001
Turkey	-3.82	-0.24	Weak	0.390

Source: World Bank, OECD, Trading Economics Data, and Own Analysis

5.3.3 Summary Analysis

The analysis confirms Fincke and Greiner's (2014) findings that emerging market economies are using government debt to finance public investment. The findings are also in line with the analysis of Ostry et al (2015), which stated that government debt should be used to fund government expenditure with the focus on driving public sector investment, and that the accumulation of public sector investment should be financed by government debt. The findings across the emerging market economies, as indicated in Table 5.9, indicate that increased debt levels were used to drive public sector investment and economic growth. The increase in debt levels were used to finance public sector investment and support the productive side of the economy and also lead to the crowding in of private sector investment. It can therefore be concluded that governments should increase their fiscal spending and debt levels to finance the investment in the productive capacity of the economy to support and drive economic growth.

Table 5.24: Summary of Results for Emerging Market Economies

Debt and public sector investment	Public sector investment and economic growth	Debt and government spending	Government spending and economic growth
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¹⁰ Refer to Annexure 1 for detailed presentation of country results

Positive relationship and average public investment: GDP was 23.6% at debt < 90%; Increase in public investment was supported by accumulation of government debt levels	Increased public sector investment led to positive economic growth	Positive relationship; Increase in government spending is driven by increase in government debt	Positive relationship; Increases in government spending led to an increase in economic growth
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Source: Own Analysis

With reference to country analysis, South Africa, Brazil and Turkey are the only emerging market economies that experienced a more than 3% decline in public sector investment when government debt increased. This raises the concerns as stated by Kaur and Kaur (2015) that increases in government spending may lead to sustainability problems if the debt is not used to support economic growth. The increase in debt levels should be used to increase the accumulation of public sector investment which will lead to an increase in economic growth. The increase in economic growth will enable government to finance its debt and bring down its debt level (Kaur & Kaur, 2015). As argued in the literature review and with reference to the ‘golden rule’ theory, governments must embrace debt and ensure that debt is functional and used to finance investments in fixed capital formation, infrastructure, education, health and R&D. Debt should be seen as an instrument to support and sustain economic growth and development. As indicated by Ostry et al (2015), the positive economic growth can be used to reduce the debt levels in the medium to long run, as opposed to using distortionary policy measures to reduce debt levels. The level of government debt should not be the policy goal, but rather a country’s ability to finance its debt, thus shifting the focus on a country’s ability to generate revenue to cover interest payments. It can be depicted from the data that China and India are the only emerging market economies that applied the ‘golden rule’ theory of using government debt to fund the accumulation of public sector investment to support economic growth. This is illustrated by Arestis and Sawyer (2008) using the UK and Germany economies which have been applying the same ‘golden rule’ theory since the 1990s, with both economies experiencing higher budget deficits and increased borrowing to fund public sector investments.

South Africa and Turkey experienced their highest average public sector investment at debt levels below 30%. The Chinese and Indian economies recorded their highest levels of public sector investment at debt levels between 30% and 60%. Brazil and Mexico also recorded their highest public sector investment levels at debt levels between 30% and 60%. The data supports the use of government debt to finance public investment as experienced in the emerging market economies, confirming the application of the 'golden rule' theory.

The Keynesian approach as advocated by Szabo (2013) was used to support the use of government debt to finance government expenditure. Government expenditure should be used to support the accumulation of public sector investment, and the accumulation needs to be funded by increased government debt levels. As stated by Holtfrerich (2014), government debt should be regarded as harmless when used to increase the productivity capacity of the economy, given that the economic growth will be used to finance the debt. In addition, the Harrod-Domar growth model articulates the importance of governments' ability to accumulate capital stock to drive economic growth and the need to borrow to accumulate the capital stock needed to grow the economy (Todaro, 1994). It can be confirmed across the emerging market economies that the accumulation of capital stock did lead to positive economic growth. It is within this economic approach that the research study seeks to argue and advocate for 'the use of government debt to support economic growth'. The research study has argued for the use of government expenditure to drive economic growth, with the expenditure to be directed towards the productive side of the economy, i.e., education, health, infrastructure development, industrial development and R&D. This is contrary to the Neoclassical view that government debt is an unproductive use of capital by the private sector that will have a negative effect on capital accumulation and economic development (Holtfrerich, 2014). The data analysis is supported by Ostry et al (2015), who state that governments need to finance their investment in infrastructure, productivity capacity and human capital by issuing debt rather than by increasing taxes. As stated by Holtfrerich (2014), government debt should be regarded as harmless when used to increase the productivity capacity of the economy, which will increase the economic growth needed to finance the debt.

5.4 Will the increase of government debt crowd out private sector investment?

This section seeks to answer the following key research question: **Will the increase in government debt crowd out private sector investment?**

A Least Squared method was applied to investigate the relationship between Private sector investment and government debt.

The model depicts a significantly high relationship as indicated by the adjusted R squared of 0.98 for India. The independent variables of government debt and public sector investment having a positive relationship indicating that a 1 percent increase debt and public investment will lead to a 0.88 percent and 0.05 percent increase in private sector investment. In addition, increase in government spending and real interest rates will lead to 0.04 percent and 0.10 percent decrease in private sector investment respectively. The null hypothesis is rejected based on the F-statistic, indicating that an increase in public sector investment and debt levels, will lead to an increase in private sector investment, and conclude that the model is significant.

Table 5.25: India Regression Results

Dependent Variable: GROSS_FIXED_CAPITAL_FORMATION__PRIVATE_SECTOR__OF_GDP__

Method: Least Squares

Date: 03/25/23 Time: 11:27

Sample (adjusted): 1995 2017

Included observations: 23 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-6.505119	1.810283	-3.593426	0.0021
GROSS_FIXED_CAPITAL_FORMATION__OF_GDP__	0.880428	0.043787	20.10683	0.0000
CENTRAL_GOVERNMENT_DEBT__TOTAL__OF_GDP__	0.052552	0.024793	2.119659	0.0482
BUDGET_DEFICIT_GDP	-0.035747	0.052769	-0.677418	0.5068
REAL_INTEREST_RATE__	-0.102297	0.080584	-1.269443	0.2205
R-squared	0.980756	Mean dependent var		22.05534
Adjusted R-squared	0.976480	S.D. dependent var		3.598238
S.E. of regression	0.551837	Akaike info criterion		1.838533
Sum squared resid	5.481437	Schwarz criterion		2.085379
Log likelihood	-16.14313	Hannan-Quinn criter.		1.900614
F-statistic	229.3409	Durbin-Watson stat		0.967591
Prob(F-statistic)	0.000000			

Source: World Bank, OECD, Trading Economics Data, and Own Analysis

The model depicts a significantly high relationship as indicated by the adjusted R squared data of 0.98 for Mexico. The independent variables of government debt and public sector investment having a positive relationship indicating that a 1 percent increase debt and public investment will lead to a 0.09 percent and 1.16 percent increase in private sector investment. In addition, increase in budget deficit, government spending and real interest rates will lead to 0.001 percent, 0.50 percent, and 0.09 decrease in private sector investment respectively. The null hypothesis is rejected based on the F-statistic, indicating that an increase in public sector investment and debt levels, will lead to an increase in private sector investment, and conclude that the model is significant.

Table 5.26: Mexico Regression Results

Dependent Variable: GROSS_FIXED_CAPITAL_FORMATION__PRIVATE_S
ECTOR__OF_GDP_
Method: Least Squares
Date: 03/25/23 Time: 11:50
Sample (adjusted): 1995 2017
Included observations: 16 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.138868	0.998054	-1.141089	0.2804
DEBT_GDP	0.091580	0.006130	14.93877	0.0000
BUDGET_DEFICIT_GDP	-0.005723	0.042178	-0.135697	0.8948
GOVERNMENT_SPEND_GDP	-0.502236	0.022939	-21.89439	0.0000
GROSS_FIXED_CAPITAL_FORMATION__ OF_GDP_	1.159019	0.044996	25.75852	0.0000
REAL_INTEREST_RATE____	-0.087995	0.021380	-4.115735	0.0021
R-squared	0.991761	Mean dependent var		17.45864
Adjusted R-squared	0.987641	S.D. dependent var		1.585358
S.E. of regression	0.176244	Akaike info criterion		-0.353895
Sum squared resid	0.310620	Schwarz criterion		-0.064175
Log likelihood	8.831163	Hannan-Quinn criter.		-0.339059
F-statistic	240.7425	Durbin-Watson stat		2.458248
Prob(F-statistic)	0.000000			

Source: World Bank, OECD, Trading Economics Data, and Own Analysis

In the case for South Africa, the model depicts a significantly high relationship as indicated by the adjusted R squared data of 0.99. The independent variables of government debt, budget deficits and real interest rates having a negative relationship indicating that a 1 percent increase debt and public investment will lead to a 0.02 percent, 0.2 percent and 0.2 percent decrease in private sector investment. In addition, increase in public sector investment will lead to 0.85 percent increase in private sector investment. The study rejects the null hypothesis based on the F-statistic and conclude that the model is significant. With reference to the p-values, the null hypothesis is also rejected and conclude that increase in debt levels and public sector investment, will lead to an increase in private sector investment.

Table 5.27: RSA Regression Results

Dependent Variable: GROSS_FIXED_CAPITAL_FORMATION__PRIVATE_S

ECTOR__OF_GDP_

Method: Least Squares

Date: 03/25/23 Time: 11:36

Sample (adjusted): 1995 2016

Included observations: 22 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.599991	0.469490	1.277963	0.2184
DEBT_GDP	-0.016533	0.007125	-2.320361	0.0330
BUDGET_DEFICIT__GDP	-0.021223	0.026195	-0.810182	0.4290
FIXED_CAPITAL_FORMATION__GDP	0.845680	0.018419	45.91411	0.0000
REAL_INTEREST_RATE__	-0.019429	0.013233	-1.468204	0.1603
R-squared	0.994922	Mean dependent var		15.44929
Adjusted R-squared	0.993728	S.D. dependent var		1.948089
S.E. of regression	0.154287	Akaike info criterion		-0.703294
Sum squared resid	0.404674	Schwarz criterion		-0.455330
Log likelihood	12.73623	Hannan-Quinn criter.		-0.644881
F-statistic	832.7408	Durbin-Watson stat		1.510545
Prob(F-statistic)	0.000000			

Source: World Bank, OECD, Trading Economics Data, and Own Analysis

A detailed analysis looking into the trends of government debt and public sector investment and all the identified independent variables and their effect on private sector investment is provided below for the identified emerging market economies, in addition to unpacking the causal relationship is discussed in the sections to follow below.

Only four countries were evaluated given the availability of data, namely: South Africa, India, Mexico and Russia. The following variables were analysed: government debt to GDP,

private sector investment to GDP, public sector investment, private sector investment, and bank lending rates to the private sector.

The findings from the study period and the identified emerging economies indicate that these economies experienced medium and average private sector investment to GDP ratio of 18.1% for debt levels below 90% of GDP. In addition, the average GDP per capita growth for the emerging countries was 3.9% for debt levels below 90%. For debt levels above 90% of GDP, private sector investment was significantly low, averaging 12.9%. At debt levels above 90%, the private sector investment ratio declines significantly by 5.7% from the average of 18.1%, indicating that debt levels above 90% will have a significant impact on private sector investment, which is needed to support and drive economic growth. The slowdown in private sector investment can be correlated with the low economic growth rates that averaged 0.5% for debt levels above 90%. As public and private sector fixed capital formation slows down and/or declines to lower levels, it will lead to a slowdown in economic activity.

Table 5.27: Debt Ratio and Private Sector Investment Average and Median Levels

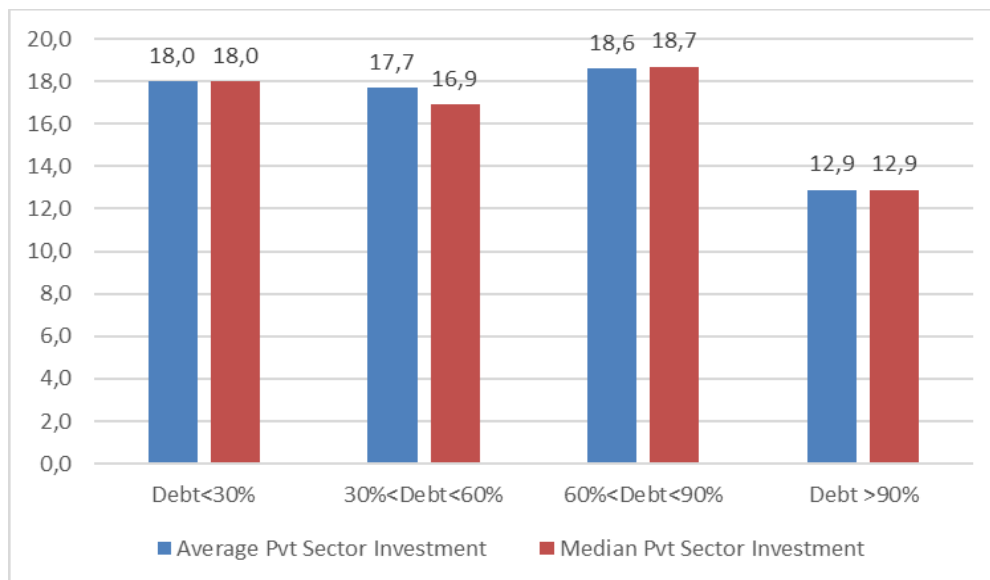
	Period	Debt Levels Below 30%	Debt Levels Below 30%	Debt Levels 30% - 60%	Debt Levels 30% - 60%	Debt Levels 60% - 90%	Debt Levels 60% - 90%	Debt Levels 90% and above	
Country		Average	Median	Average	Median	Average	Median	Average	Median
Brazil	1995 - 2017	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
China	1995 - 2017	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
India	1996 - 2016	n.a.	n.a.	22,1	22,5	22,1	22,2	n.a.	n.a.
Mexico	1995 - 2016	18,0	19,0	16,8	16,9	n.a.	n.a.	n.a.	n.a.
Russia	1998 - 2016	18	18	16,8	16,8	15,1	15,1	12,9	12,9
South Africa	1995 - 2017	18	18	15	14,9	n.a.	n.a.	n.a.	n.a.
Turkey	1995 - 2017	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Average		18,0		17,7		18,6		12,9	
Median			18,0		16,9		18,7		12,9
Number of Observations = 164		40		102		18		4,0	

Source: World Bank, OECD and Trading Economics Data and Own Analysis

At debt levels below 30%, the Mexican, Russian and South African private sector investment stood at an average of 18%, slightly below their respective country public sector investment levels. All three emerging market economies recorded their highest private sector investment at debt levels below 30%. At debt levels between 30% and 60%, the Indian economy recorded levels of private sector investment above the emerging market average of 17.7%. Mexico, Russia and South Africa recorded marginally lower private sector investment levels of 16.8%, 16.8% and 15%, respectively. The data does indicate that India used the increased debt levels to accumulate public sector investment, which also crowded in private sector investment. At debt levels between 60% and 90%, India maintained its private sector investment levels of 22.1%, while Russia recorded a slowdown in private sector investment.

The Keynesian approach as advocated by Szabo (2013) seeks to support the accumulation of capital stock to investments in infrastructure development to crowd in private sector investment. It can be noted from Figure 5.9 that government debt levels below 90% to GDP would not crowd out private sector investment. This can be explained by the fact that when the increased debt is used to support public sector investment, it will lead to a crowding in of private sector investment. As stated by Holtfrerich (2014), government debt should be regarded as harmless when used to increase the productivity capacity of the economy and allow the economic growth to be used to finance the debt. In addition, the increase in economic growth will lead to a crowding in of private sector investment.

Figure 5.9: Emerging Market Debt Ratio and Private Sector Investment Average and Median Levels



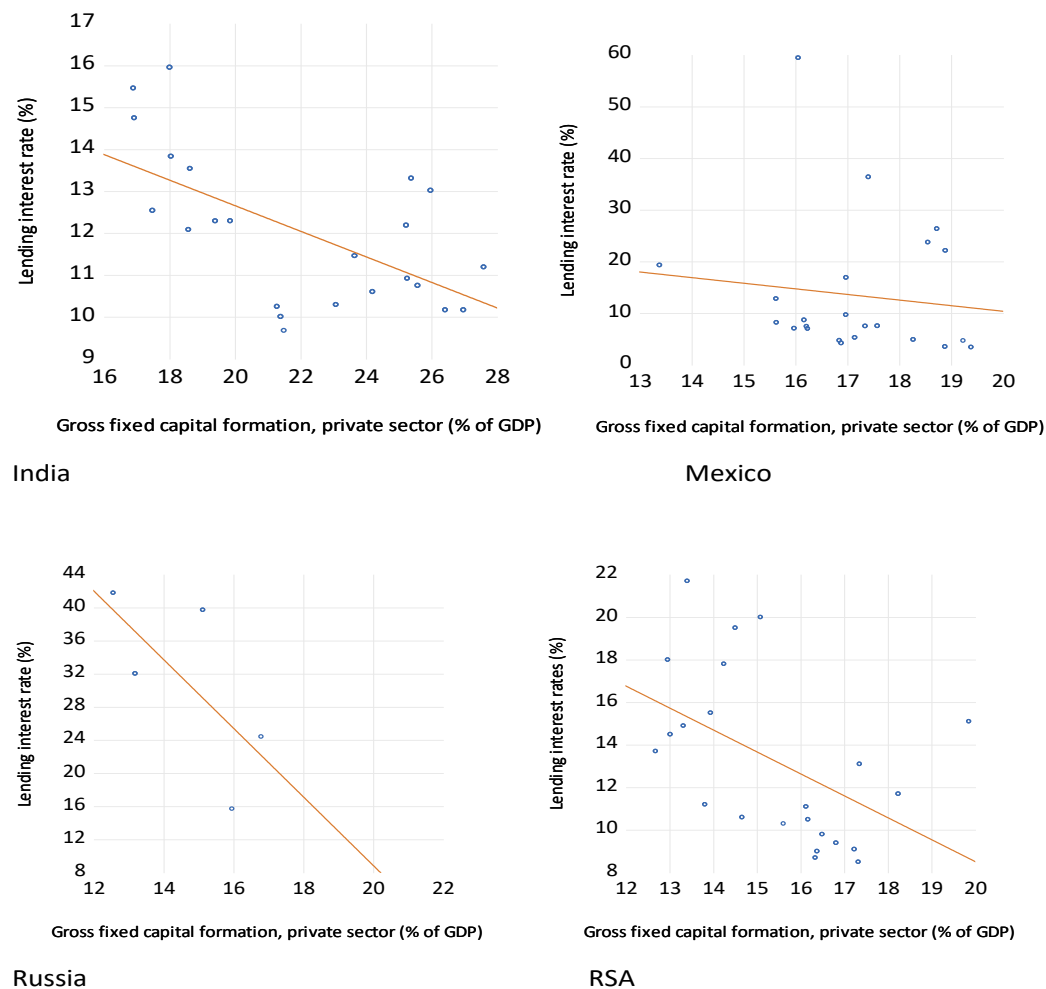
Source: World Bank, OECD and Trading Economics Data and Own Analysis

5.4.1 Emerging Market Country Covariance Analysis

5.4.1.1 Interest Rates and Private Sector Investment

From Figure 5.10, it is evident that there is an inverse relationship between interest rates and private sector investment across all the emerging market economies. The inverse correlation would indicate that decreases in interest rates would lead to an increase in private sector investment, confirming that increased interest rates will lead to the crowding out of private sector investment. It can be depicted that at lower interest rates, private sector investment is incentivised to invest more in the economy.

Figure 5.10: Interest Rates and Private Sector Investment Scatter Diagram



Source: World Bank, OECD and Trading Economics Data

The results from Table 5.28 can be interpreted as follows: there is an inverse relationship between interest rates and private sector investment given the negative covariance across all the emerging market economies. The data from India and South Africa are significant and can confirm that low interest rates in the capital market will increase private sector investment in the economy, thus leading to the crowding in effect.

Table 5.28: Interest Rates and Private Sector Investment Covariance Analysis¹¹

Country	Co-variance	Correlation	Correlation strength	P-value
India	-3.77	-0.60	Strong	0.002
Mexico	-2.15	-0.11	Weak	0.591
Russia	-10.78	-0.68	Weak	0.197
RSA	-3.57	-0.49	Moderate	0.017

Source: World Bank, OECD, Trading Economics Data, and Own Analysis

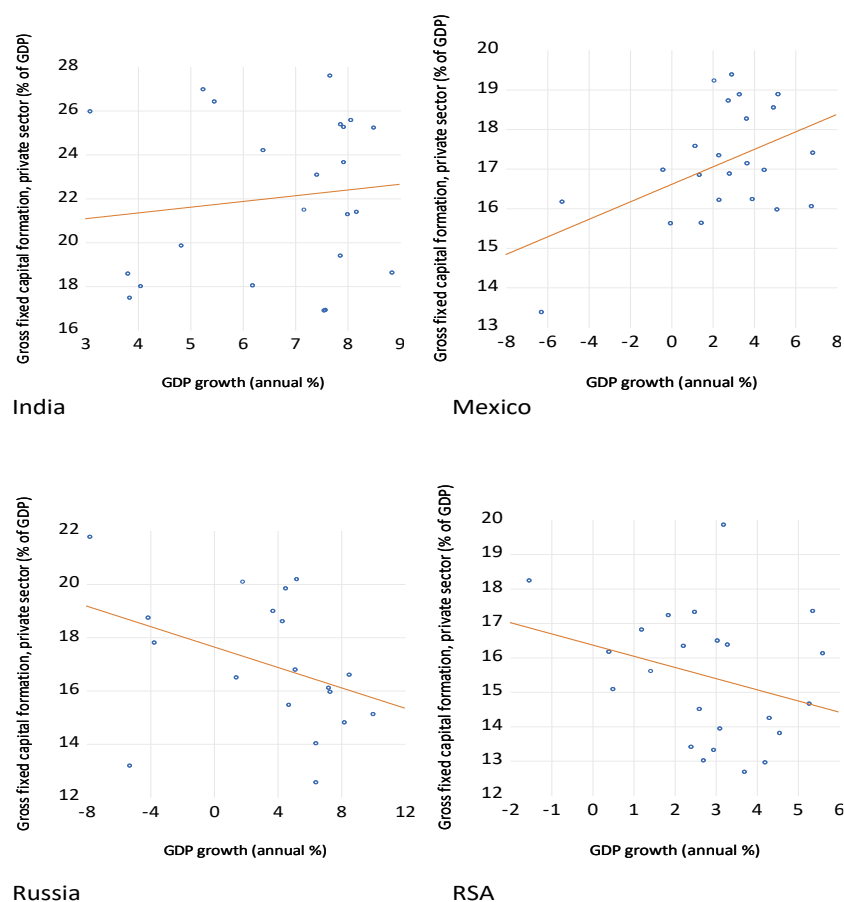
5.4.1.2 Private Sector Investment and Economic Growth

Figure 5.11 depicts an inverse relationship between private sector investment and economic growth for Russia and South Africa. The inverse correlation would indicate that a decrease in private sector investment would lead to an increase in economic growth. This would suggest that public sector investment plays a more significant role in driving economic growth.

India and Mexico depict a positive relationship, which would suggest that increases in private sector investment would lead to an increase in economic growth. However, it can also be depicted for India that low levels of private sector investment still yielded positive economic growth rates, which could indicate the greater role played by public sector investment in supporting growth. The case for Mexico indicates that low levels of private sector investment contributed to the country's negative economic growth.

¹¹ Refer to Annexure 1 for detailed presentation of country results

Figure 5.11: Private Sector Investment and Economic Growth Scatter Diagram



Source: World Bank, OECD and Trading Economics Data

Table 5.29 shows that the strength of the relationship is weak across all the emerging market economies, and the data is not significant. However, it should be noted that the crowding in of private sector investment should be encouraged to support the productive capacity of the economy, which is key to supporting positive economic growth rates.

Table 5.29: Private Sector Investment and Economic Growth Covariance Analysis¹²

Country	Co-variance	Correlation	Correlation strength	P-value
India	0.75	0.12	Weak	0.565
Mexico	-2.15	-0.11	Weak	0.591
Russia	-4.69	-0.38	Weak	0.106
RSA	-0.91	-0.29	Weak	0.174

Source: World Bank, OECD, Trading Economics Data, and Own Analysis

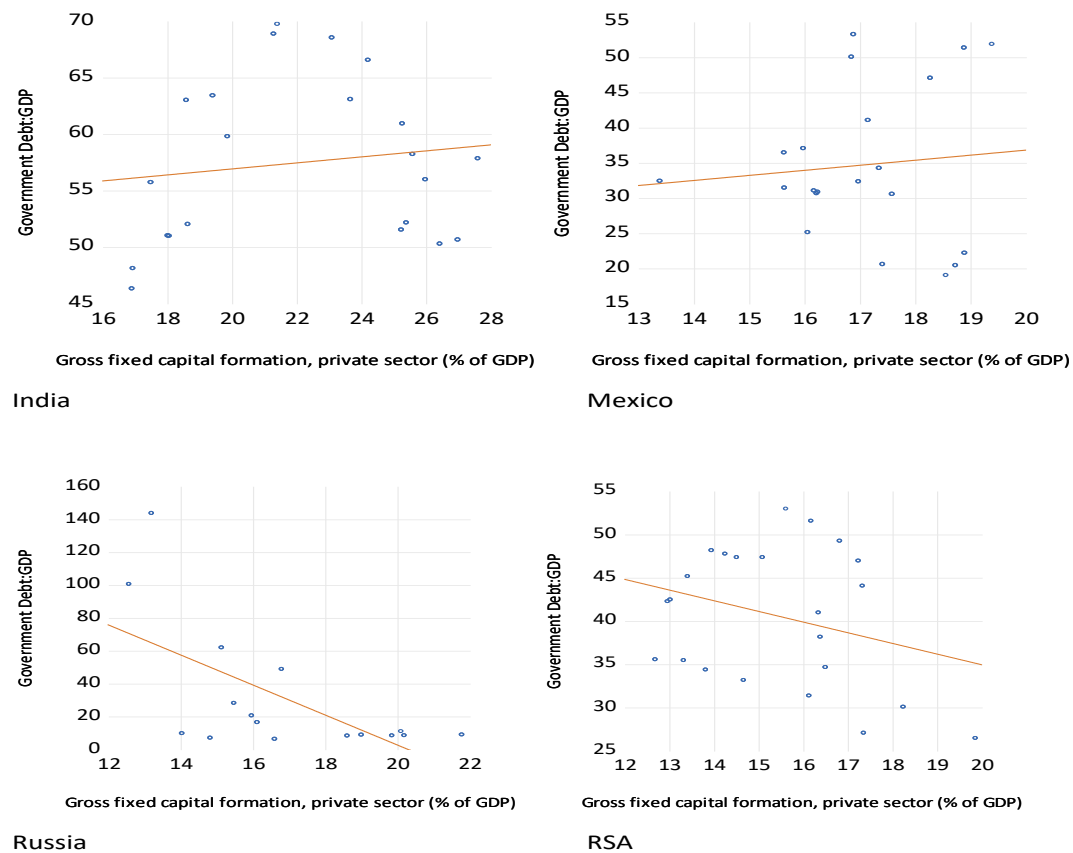
5.4.1.3 Debt Ratio and Private Sector Investment

Figure 5.12 illustrates a positive relationship between govern debt and private sector investment for India and Mexico. The positive correlation would indicate that increases in government debt would crowd in the private sector investment. This would lead to an increase in economic growth. In the case for India, Mohanty and Mishra (2016) in their study confirm this, indicating that the government's expansionary debt policy supported private sector investment through the provision of institutional credit to the private sector that in turn increased economic growth.

Russia and South Africa depict an inverse relationship, which would suggest that increases in government debt would lead to the crowding out of private sector investment. In the case for South Africa, it can also be deduced that higher government debt levels also crowded in private investment. The crowding in of private sector investment could be as a result of government using the debt to invest in the productive side of the economy.

¹² Refer to Annexure 1 for detailed presentation of country results

Figure 5.12: Debt Ratio and Private Sector Investment Scatter Diagram



Source: World Bank, OECD and Trading Economics Data

Table 5.30 shows that Russia is the only country that indicated a strong correlation relationship with the data being significant. It can be concluded that in Russia, high public debt levels crowded out private sector investment. In the case of India, Mexico and South Africa, the data suggest that increased public debt would lead to the crowding in of private sector investment via government investment programmes.

Table 5.30: Debt Ratio and Private Sector Investment Covariance Analysis¹³

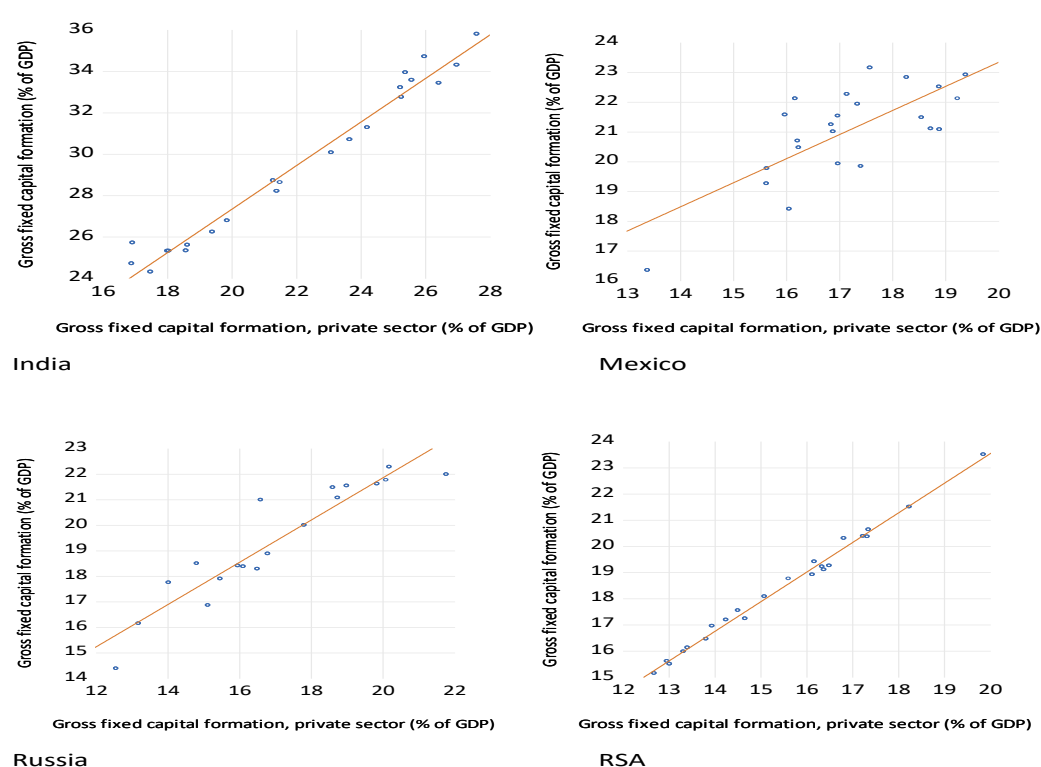
Country	Co-variance	Correlation	Correlation strength	P-value
India	3.44	0.13	Weak	0.547
Mexico	1.0	0.09	Weak	0.680
Russia	-64.41	-0.63	Strong	0.008
RSA	-4.27	-0.29	Weak	0.172

Source: World Bank, OECD, Trading Economics Data, and Own Analysis

5.4.1.4 Public Sector Investment and Private Sector Investment

Figure 5.12 depicts a positive relationship between public sector investment and private sector investment across all emerging economies. The positive correlation would indicate that increases in government investment accumulation would lead to the crowding in of private sector investment.

Figure 5.12: Public Sector Investment and Private Sector Investment Scatter Diagram



Source: World Bank, OECD and Trading Economics Data

¹³ Refer to Annexure 1 for detailed presentation of country results

Table 5.31 shows there is a positive relationship between public sector investment and private sector investment across all the emerging market economies. The strength of the correlation relationship is strong, and the data is significant. It can be confirmed from the strong relationship depicted in Table 5.14 that increases in public sector investment can crowd in private sector investment. This confirms the important role of public sector investment in crowding in private sector investment.

Table 5.31: Public Sector Investment and Private Sector Investment Covariance Analysis¹⁴

Country	Co-variance	Correlation	Correlation strength	P-value
India	13.03	0.98	Strong	0.000
Mexico	1.60	0.73	Strong	0.000
Russia	5.09	0.93	Strong	0.000
RSA	3.92	0.99	Strong	0.000

Source: World Bank, OECD, Trading Economics Data, and Own Analysis

5.4.3 Summary Analysis

The findings from the emerging market economies data indicate that debt levels above 90% will have a significant impact on private sector investment, which is needed to support and drive economic growth, as summarised in Table 5.15. The slowdown in private sector investment can be correlated with the low economic growth rates that averaged 0.5% for debt levels above 90%. As public and private sector fixed capital formation slow down and/or decline to lower levels, it will lead to a slowdown in economic activity and growth as depicted from the tables and analysis of the data. Mexico, Russia and South Africa recorded marginally lower private sector investment levels of 16.8%, 16.8% and 15%, respectively. India is the only country that experienced a crowding in of private sector investment as government debt levels increased. The data does indicate that in India, the increased debt levels were used to accumulate public sector investment, which crowded in private sector investment. It can be concluded from the data analysis that government's accumulation of capital stock was financed by increased government debt with reference to the 'golden rule' theory. When the increased debt is used to support public sector investment, it will lead to a crowding in effect of private sector investment.

¹⁴ Refer to Annexure for detailed presentation of country results

Table 5.32: Summary of Results for Emerging Market Economies

Debt and private sector investment	Private sector investment and economic growth	Interest rates and private sector investment
Private investment averaged 18.1% at debt levels < 90%; Increased public debt would lead to the crowding in of private sector investment via government investment programmes	Critical to encourage private sector investment to support economic growth	Inverse relationship; Low interest rates will crowd in private sector investment

Source: Own Analysis

The key findings of the emerging market country analysis indicate that debt should be used to finance the public sector investment given its ability to attract private sector investment, which is critical in supporting economic growth. It can be concluded that increases in government debt did lead to an increase in investment in the emerging market economies. As stated by Holtfrerich (2014), debt financing of government expenditure is harmless and will be sustainable if it leads to an increase in productive capacity. The findings from the emerging market economies do indicate this, with reference to the positive and strong relationship between public sector investment and private sector investment.

The functional finance of the Keynesian approach argues that government spending should be used to stimulate investment in the economy and lead to an increase in the productive capacity of the economy, which is key to supporting positive economic growth rates (Jayadev & Mason, 2018). They base their assumptions on the notion that lower interest rates and higher budget deficits will lead to an increase in aggregate demand and economic activity, while higher interest rates and smaller budget deficits will lead to a fall in aggregate demand and economic activity (Jayadev & Mason, 2018).

The findings from the emerging market economies are that lower interest rates will also lead to a crowding in effect of private sector investment. It can be concluded that an increase in government debt as advocated by the Keynesian approach to support public

sector investment will lead to the crowding in of private sector investment. The crowding in of both public and private sector investment will yield to positive economic growth.

To achieve low interest rates that encourage the crowding in of private sector investments, Tcherneva (2008) states that central banks will need to purchase government debt to influence market interest rates. The central banks' purchase of government debt should also be viewed by central bankers as providing new money to the private sector to increase their investment in the economy (Joyce et al, 2012).

The use of government debt is further supported by Svaljek (1999), who states that increased government debt needs to be used to crowd in private sector investment. Government debt is regarded as a safe investment instrument and when this investment is used to accumulate public sector investment, it will support economic growth. As argued in the literature review, government will use the positive economic growth to finance its debt and to reduce its debt ratio.

5.5 Debt Determinants and Fiscal Sustainability

This section identifies fiscal sustainability risks that will affect the fiscal space for the emerging market economies. Key variables to be analysed are real interest rates, government debt ratios, budget deficits, and the interest rate growth differential. The basic assumption is that interest rates will increase as government debt increases or reaches its debt limit (Ghosh et al, 2011). Interest rates provide a signal to the market of sustainability risk and can be used to determine the cost of government borrowing and the risk premium government needs to pay when issuing debt. High interest rates will price government out of the bond market and thus reduce the fiscal space available. Calitz et al (2013) also states that economic growth should be greater than real interest rates to ensure fiscal sustainability.

5.5.1 Measuring Fiscal Sustainability

As indicated by Ganiko et al (2016), fiscal sustainability will be reached when interest rates are less than economic growth, which will give governments the opportunity to increase debt levels and the ability to increase budget deficits.

Table 5.16 depicts that only China and India have achieved fiscal sustainability and would be able to raise government debt and run budget deficits at low interest rates. The Chinese and Indian position would indicate that the economies would have greater fiscal space as compared to the rest of the emerging market economies. For the rest of the emerging market economies, economic growth is less than real interest rates, which would signal risk to fiscal sustainability which would affect their fiscal space. The fiscal sustainability risk would lead to an increase in interest rates in the bond market and increase the cost of government borrowing. It can be depicted from the data in Table 5.33 that Brazil's significantly high real interest rates will increase the country's fiscal sustainability risk and make it expensive for government to finance its debt and reduce government's ability to issue more debt. The gap between real interest rates and economic growth is significantly high for Brazil, which will send a signal to the market of increased fiscal sustainability risk, which will lead to an increase in interest rates in Brazil. In addition, Brazil's high debt ratio of 73.8%: GDP in 2017 will pose a risk to fiscal sustainability.

The increase in interest rates will price government out of the bond market and make it costly for government to raise debt to support economic growth and therefore reduce the fiscal space available to government. Any increases in debt levels at this point will result in increases in interest rates. For the countries that have no fiscal space, the alternative approach should be to decrease interest rates or issue debt via sovereign money creation.

Table 5.33: Emerging Market Country Fiscal Sustainability Assessment

	Average real interest rate for the period 1994 – 2017	Average GDP growth for the period 1994 – 2017	Interest growth difference for the period 1994 – 2017	Fiscal sustainability & space
Brazil	41,85	2,53	$i > g$	No
China	2,19	9,41	$i < g$	Yes
India	5,78	6,99	$i < g$	Yes
Mexico	3,47	2,49	$i > g$	No
RSA	5,7	2,8	$i > g$	No
Russia	3,17	2,14	$i > g$	No
Turkey	n.a.	n.a.		

Source: World Bank, OECD, Trading Economics Data, and Own Analysis

As argued by Dyson et al (2016), the use of sovereign money will give central banks control in creating new money in the economy and direct the funds to support the productive side

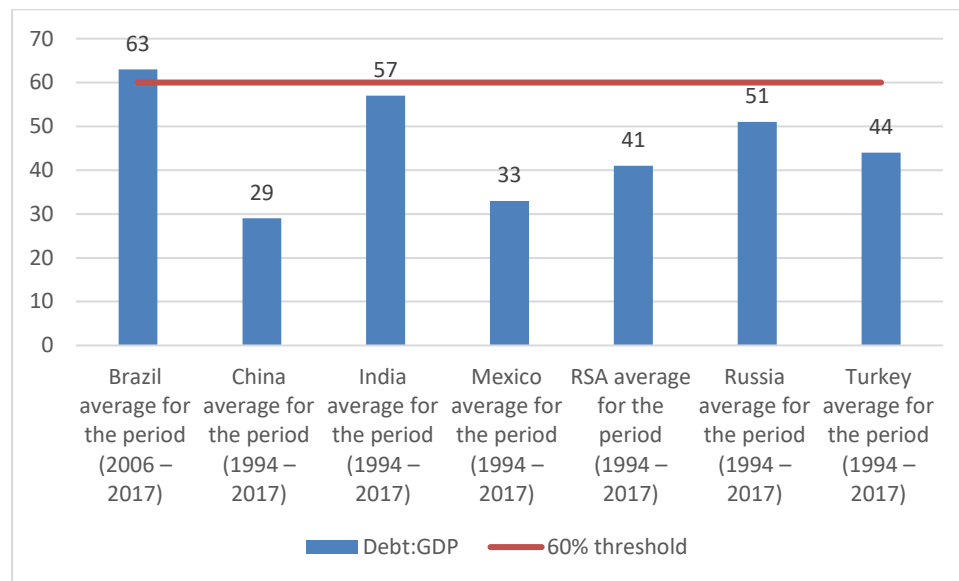
of the economy and directly support aggregate demand. In addition, Dyson et al (2016) state that this approach will ensure that the creation of money does not lead to accumulation of debt in the economy via the conventional open market operations approach, but to directly transmit the new money into the economy through government spending. The sovereign money can be used to close the output gap and be directed towards the sectors that are contracting. This approach can be used to support governments to deal with the slowdown in economic activity without affecting the fiscal space.

The above approach is supported by the modern monetary theory, which argues that the increases in local currency dominated debt should not be a problem, given that a country cannot go insolvent if it issues local currency denominated debt. This calls for central banks to print money to finance government debt, however, the inflationary implications will have to be taken into account. All the emerging market economies have the ability to issue local currency debt. As indicated by Ullrich (2018), for China, Brazil and South Africa 90% of these countries' sovereign debt is in their local currency, with Mexico at 80%, Russia at 70%, and Turkey at 63%.

5.5.2 Measuring Default Risk

According to Ghosh et al (2013), government will default if debt levels are above the debt limit. In this case, if 60% is used as the threshold or debt limit, Figure 5.13 depicts that Brazil is the only country with average debt levels above the 60% threshold for the study period, signalling to the market increases in debt sustainability risk and increases in default risk. In addition, Brazil's high real interest rates will increase the default risk and make it expensive for government to finance its debt. However, it should be noted that Brazil has not defaulted post the emerging market crisis and has not yet been shut out of the debt market. For the remaining five countries, the risk of default is low using Ghosh et al's (2013) determination, indicating increased room for these governments to increase their debt levels.

Figure 5.13: Emerging Market Country Average Debt Ratio



Source: World Bank, OECD, Trading Economics Data, and Own Analysis

In applying the debt limit calculated by Ganiko et al (2016) of between 68% and 97% to GDP for emerging economies, this gives all the emerging market economies significant room to increase their debt levels, including Brazil. This will be critical to economies experiencing low economic growth that will be in need of fiscal stimulus to drive growth. The debt limit of 97% to GDP will increase the fiscal space available to the emerging market economies: Brazil could hypothetically have increased their debt levels by an additional 34%, China by 68%, India by 40%, Mexico by 64%, South Africa by 56%, Russia by 46% and Turkey by 53%.

Given the available fiscal space as per Table 5.13 and Ganiko et al's (2016) calculations, the findings of this thesis would agree with Ostry et al (2015), who stated that economies should not aim to pay off their debt but should rather allow the debt ratio to decline through economic growth. This can be achieved, as argued, by applying the Keynesian approach of using government spending to accumulate public sector investment to support the productive capacity of the economy. As indicated by Ostry et al (2015), reducing government debt by increasing taxes or reducing government spending will lead to a slowdown in economic growth.

The literature review highlighted the importance of governance in ensuring that the increased government expenditure, debt levels and fiscal space will be utilised effectively

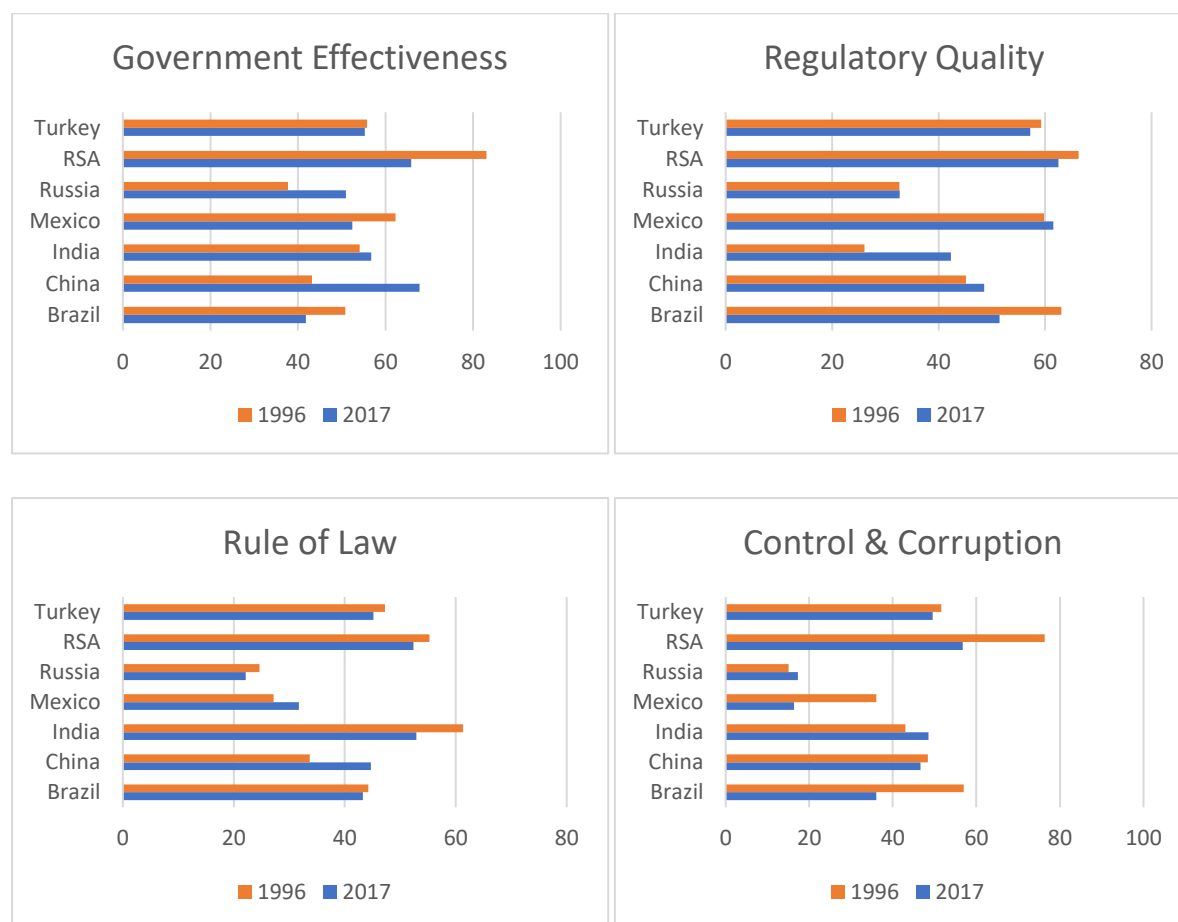
to support economic growth. This will ensure that governments have the capacity to plan, allocate and manage the resources to ensure they are directed towards the productive side of the economy.

The literature review also indicated that for countries which are pushing for increased fiscal space, their country governance indicators with reference to “government effectiveness, regulatory quality, rule of law, and control and corruption” will need to be high and show some level of improvements over the study period of 1994 to 2017. These indicators seek to measure governments’ capacity to draft and implement policies, and the credibility of institutions that govern economic and social systems (Kaufmann, Kraay & Mastruzzi, 2010). Kaufmann et al (2010) provide some guidelines on interpreting the results, indicating that the data ranges in percentile rank from ‘0’ being the lowest to ‘100’ being the highest across the surveyed global countries. In interpreting the results, they indicate that the governance indicators are somewhat correlated and make the following assumptions, namely that, ‘an effective government can lead to an improved regulatory environment; increased accountability and the respect for the rule of law can lead to less corruption’ (Kaufmann et al, 2010:5).

With reference to government effectiveness, Figure 5.14 shows that China and South Africa scored relatively higher (67 and 65, respectively), with only Brazil scoring below 50. South Africa experienced a significant decline in government effectiveness between 1996 and 2017. Moreover, it can be noted that the emerging market economies that experienced declines in government effectiveness (Turkey, South Africa, Mexico and Brazil) also experienced a decline in their regulatory environment, respect for the rule of law, and an increase in corruption. Russia, India and China all realised improvements in government effectiveness, however, only Russia and India improved their scores in controlling corruption. The implications for the argument for increased ‘fiscal space’ is that it will need to be supported by improved governance and effective government, which will ensure that the increased debt is more likely to be effective in driving economic growth due to increased government capacity to plan, implement, manage expenditure and allocate resources better. Declines in government effectiveness can be used as an indicator for inefficient use of available resources, which will have negative implications for ‘fiscal space’ as the increase in government debt will be unproductive and distort

capital investment, as argued in the literature review. Kaur and Kaur (2015) caution against fiscal sustainability risks if government debt is not used for productive purposes.

Figure 5.14: World Bank Worldwide Governance Indicators



Source: Kaufmann et al (2010), The Worldwide Governance Indicators

5.5.3 Debt Sustainability

Chalk and Hemming (2000) unpack the risks associated with rising debt ratios in a high interest rate environment, which will cause government debt levels to grow faster than economic growth. This should be considered as a risk to fiscal sustainability. The conditions highlighted by Chalk and Hemming (2000) are as follows:

1. percentage change in debt levels should be < real interest rates; and
2. percentage change in debt levels should be < GDP growth.

Chalk and Hemming (2000) explain the first condition as follows: that debt should not increase faster than interest rates, and that if interest rates are high for a long period, debt levels can increase and grow faster than economic growth, which may lead to unsustainable levels of debt. Chalk and Hemming (2000) further explain that unsustainable debt levels will pose a risk when the growth in debt levels is greater than interest rates and economic growth is less than the percentage change in debt ratio. Therefore, it is necessary for interest rates and economic growth to be greater than the growth in debt levels to avoid unsustainable debt risk.

When reviewing the emerging market economies data, the following assessment can be made (see Table 5.34) looking at the average figures for the study period: Mexico is the only country that failed to meet both conditions, thus making its debt position unsustainable according to Chalk and Hemming's (2000) assessment. However, what is interesting to note is that Mexico also has the second lowest debt ratio and real interest rates across the emerging market economies, thus limiting the debt sustainability risks. In addition, during the study period, Mexico did not default or experience high levels of debt. This would explain the low interest rates in Mexico.

The Indian, South African and Russian economies all met both conditions, indicating that their debt levels are sustainable. Brazil failed to meet condition 2 and experienced the highest debt levels and highest real interest rates. These two indicators would contribute to the increased risk of Brazil's debt position.

China and Mexico experienced the highest growth in debt levels; however, for China, economic growth was far higher than the growth in debt levels, thus limiting the risk. In Mexico, economic growth was lower than the growth in debt levels, thus posing a risk. What is interesting for China is that it recorded the lowest debt levels amongst the emerging market economies and lowest real interest rates, but the highest growth in debt levels, indicating that the growth in debt levels could have been supported by the conducive monetary policy position of low interest rates. However, this can only be determined through further research.

Table 5.34: Emerging Market Country Debt Sustainability Assessment

	Real interest rate (%)	GDP growth (annual %)	Debt : GDP	% change in debt levels	Condition 1	Condition 2
Brazil average (2006 – 2017) figures	32	2	63	2	% change in debt < i	% change in debt = g
China average (1994 – 2017) figures	2	10	29	4	% change in debt > i	% change in debt < g
India average (1994 – 2017) figures	6	7	57	2	% change in debt < i	% change in debt < g
Mexico average (1994 – 2017) figures	3	2	33	4	% change in debt > i	% change in debt > g
RSA average (1994 – 2017) figures	6	3	41	1	% change in debt < i	% change in debt < g
Russia average (1994 – 2017) figures	3	2	51	-2	% change in debt < i	% change in debt < g

Source: World Bank, OECD, Trading Economics Data, and Own Analysis

Calitz et al (2013) also state that economic growth should be greater than real interest rates to ensure fiscal sustainability. According to Calitz et al's (2013) measure, only China and India achieved fiscal sustainability. In addition, it can be depicted that Brazil's high interest rates do pose a risk to its fiscal space and government's ability to borrow more. A decrease in interest rates will support the identified economies to achieve fiscal sustainability if economic growth remains at current levels.

Botev et al (2016) argue that low interest rates should give governments the opportunity to raise more debt without losing market access and affecting fiscal sustainability. Low interest rates should create the space for governments to pursue expansionary fiscal policy needed to support economic growth, which is a policy option governments should not fear as it will be financed by the increase in economic growth.

It should be noted that increases in debt levels will increase interest rates, thus reducing the fiscal space available to government. The increase in interest rates calls for a more effective utilisation of monetary policy instead of fiscal policy via the reduction of interest rates and purchasing of zero interest rate government bonds. The argument as advocated

by Jayadev and Mason (2018) calls for the increased role of monetary policy to use interest rates to achieve debt sustainability and price stability.

5.5.3.1 Country Debt Sustainability Assessment

1. Brazil: Debt Sustainability Assessment

Based on the two conditions or tests applied (percentage change in debt levels < real interest rates; and percentage change in debt levels < GDP growth), the following analysis is provided for Brazil: the country started to experience a growth in debt levels from 2014 reaching a high of 16 percent in 2015, during the same period, economic growth had been declining from 2013 to reach a low of -4 percent in 2013. This triggered government to increase debt levels to try and support economic growth and to finance its debt, however this was followed by a significant increase in real interest rates in the economy, which could have been influenced by the increase in debt levels and poor economic growth. It can be concluded given the study period that Brazil is the only emerging market economy with the average debt level above the 60 percent threshold but should be noted that this might not be a true reflection given the limitation of data. The key risks to debt sustainability for Brazil are the low economic growth and high real interest rates for Brazil. The poor economic growth will push government to increase its debt levels, posing increased risks to debt sustainability. Brazil experienced a long period of high interest rates. Debt financing will pose further risk to government if it needs to increase debt to support economic growth. Given the current data context, Brazil has a high risk to debt sustainability.

Table 5.35: Brazil Debt Sustainability Assessment

	Real interest rate (%)	GDP growth (annual %)	Debt:GDP	% change in debt levels	Condition 1	Condition 2
2006	35	6	63,95			
2007	35	5	62,45	-2	% change in debt < i	% change in debt < g
2008	35	0	60,66	-3	% change in debt < i	% change in debt < g
2009	29	8	63,81	5	% change in debt < i	% change in debt < g
2010	33	4	61,32	-4	% change in debt < i	% change in debt < g
2011	27	2	59,34	-3	% change in debt < i	% change in debt < g
2012	19	3	59,85	1	% change in debt < i	% change in debt < g
2013	22	1	57,23	-4	% change in debt < i	% change in debt < g
2014	34	-4	58,46	2	% change in debt < i	% change in debt < g
2015	41	-3	67,54	16	% change in debt < i	% change in debt > g
2016	42	1	73,54	9	% change in debt < i	% change in debt > g
Average	32	2	63	2	% change in debt < i	% change in debt < g

Source: World Bank, OECD and Trading Economics Data and Own Analysis

2. China: Debt Sustainability Assessment

Based on the two conditions or tests applied (percentage change in debt levels < real interest rates; and percentage change in debt levels < GDP growth), the following can be depicted for China: the country started to experience a growth debt levels from 2007 and 2009 reaching a high 14 and 27 percent respectively, during the same period, economic growth was at all time high of 14 percent in 2007 and started to show signs of cooling off from 2008, which triggered the increase in debt levels. The significant growth in debt levels also influenced the increase in interest rates. It can be concluded given the study period that the average debt levels for China are far below the 60 percent threshold, thus limiting the risk to debt sustainability, and the higher economic growth should support debt sustainability and government's ability to finance its debt. Given the study period, government debt is sustainable and there is room to increase debt, which will be supported by the high economic growth.

Table 5.36: China Debt Sustainability Assessment

	Real interest rates	GDP growth (annual %)	Debt:GDP	% change in debt levels	Condition 1	Condition 2
1994	-8	13				
1995	-1	11	21			
1996	3	10	21	0	% change in debt < i	% change in debt < g
1997	7	9	20	-4	% change in debt < i	% change in debt < g
1998	7	8	21	0	% change in debt < i	% change in debt < g
1999	7	8	22	6	% change in debt < i	% change in debt < g
2000	4	8	23	5	% change in debt > i	% change in debt < g

2001	4	8	24	7	% change in debt > i	% change in debt < g
2002	5	9	26	5	% change in debt = i	% change in debt < g
2003	3	10	27	4	% change in debt > i	% change in debt < g
2004	-1	10	26	-2	% change in debt < i	% change in debt < g
2005	2	11	26	0	% change in debt < i	% change in debt < g
2006	2	13	25	-3	% change in debt < i	% change in debt < g
2007	0	14	29	14	% change in debt > i	% change in debt = g
2008	-2	10	27	-7	% change in debt < i	% change in debt < g
2009	5	9	34	27	% change in debt > i	% change in debt > g
2010	-1	11	34	-2	% change in debt < i	% change in debt < g
2011	-1	10	34	0	% change in debt > i	% change in debt < g
2012	4	8	34	2	% change in debt < i	% change in debt < g
2013	4	8	37	8	% change in debt > i	% change in debt = g
2014	5	7	40	8	% change in debt > i	% change in debt > g
2015	4	7	41	3	% change in debt < i	% change in debt < g

2016	3	7	44	8	% change in debt > i	% change in debt > g
Average	2	10	29	4	% change in debt > i	% change in debt < g

Source: World Bank, OECD and Trading Economics Data and Own Analysis

3. India: Debt Sustainability Assessment

India started to experience a growth in debt levels from 1997, 2000 and again in 2014 to reach a high of 32 percent. During the same period, economic growth was averaging 4 percent in the initial period and reached a high of 7 percent in 2014, which was sustained till 2017. This triggered government to increase debt levels to support economic growth, however this was followed by a significant increase in real interest rates in the economy, which could have been influenced by the increase in debt levels and slowdown in economic growth. The significant growth in debt levels also influenced the increase in interest rates but the data shows that increase was followed by a decline in interest rates the following year. It can be concluded given the study period that the average debt levels for India are far below the 60 percent threshold, thus limiting the risk to debt sustainability, however, the debt levels have been increasing above the 60 percent threshold since 2014 but the higher economic growth should support debt sustainability and government's ability to finance its debt. Given the study period, government debt is sustainable and there is room to increase debt, which is supported by the high economic growth.

Table 5.37: India Debt Sustainability Assessment

	Real interest rate (%)	GDP growth (annual %)	Central government debt, total (% of GDP)	% change in debt levels	Condition 1	Condition 2
1994	4	7	50			
1995	6	8	48	-4	% change in debt < i	% change in debt < g
1996	8	8	46	-4	% change in debt < i	% change in debt < g
1997	7	4	51	10	% change in debt > i	% change in debt > g
1998	5	6	51	0	% change in debt < i	% change in debt < g
1999	9	9	52	2	% change in debt < i	% change in debt < g
2000	8	4	56	7	% change in debt < i	% change in debt > g
2001	9	5	60	7	% change in debt < i	% change in debt > g
2002	7	4	63	5	% change in debt < i	% change in debt > g
2003	7	8	63	1	% change in debt < i	% change in debt < g
2004	5	8	63	1	% change in debt < i	% change in debt < g
2005	6	9	63	-1	% change in debt < i	% change in debt < g
2006	4	9	61	-3	% change in debt < i	% change in debt < g

2007	7	10	58	-4	% change in debt < i	% change in debt < g
2008	4	4	58	-1	% change in debt < i	% change in debt < g
2009	6	8	56	-3	% change in debt < i	% change in debt < g
2010	1	10	52	-7	% change in debt < i	% change in debt < g
2011	1	7	52	-1	% change in debt < i	% change in debt < g
2012	2	5	51	-2	% change in debt < i	% change in debt < g
2013	4	6	50	-1	% change in debt < i	% change in debt < g
2014	7	7	67	32	% change in debt > i	% change in debt > g
2015	8	8	69	3	% change in debt < i	% change in debt < g
2016	6	7	69	0	% change in debt < i	% change in debt < g
2017	6	7	70	1	% change in debt < i	% change in debt < g
Average	6	7	57	2	% change in debt < i	% change in debt < g

Source: World Bank, OECD and Trading Economics Data and Own Analysis

4. Mexico: Debt Sustainability Assessment

The following analysis is provided for Mexico: the country started to experience a growth in debt levels from 1995 and 2002, and a spike in 2003 to reach a high of 69 percent. This was followed by declines in debt growth levels until 2011 where it grew by 9 percent. During the same period, the economy experienced a negative growth rate of -6 percent in 1995, and only grew by 1 percent in 2003. It can be deduced that the poor economic growth rates triggered government to increase debt levels to try and support economic growth i.e. high growth debt levels are associated with low economic growth rates. The increase in debt levels was associated with low real interest rates in the economy, with high or double-digit real interest rates experienced in 1995. It can be concluded given the study period that the average debt levels for Mexico are far below the 60 percent threshold, thus limiting the risk to debt sustainability, however, the poor economic growth will push government to increase its debt levels, posing increased risks to debt sustainability. Given the study period, government debt is sustainable and there is room to increase debt to support economic growth.

Table 5.38: India Debt Sustainability Assessment

	Real interest rate (%)	GDP growth (annual %)	Debt:GDP	% change in debt levels	Condition 1	Condition 2
1994	10	5	28			
1995	15	-6	32	15	% change in debt = i	% change in debt > g
1996	8	7	25	-22	% change in debt < i	% change in debt < g
1997	3	7	21	-18	% change in debt < i	% change in debt < g
1998	9	5	22	8	% change in debt < i	% change in debt > g

1999	7	3	20	-8	% change in debt < i	% change in debt < g
2000	5	5	19	-7	% change in debt < i	% change in debt < g
2001	6	0	20	2	% change in debt < i	% change in debt > g
2002	3	0	22	11	% change in debt > i	% change in debt > g
2003	3	1	37	69	% change in debt > i	% change in debt > g
2004	0	4	32	-14	% change in debt < i	% change in debt < g
2005	4	2	31	-2	% change in debt < i	% change in debt < g
2006	1	4	31	-1	% change in debt < i	% change in debt < g
2007	2	2	32	6	% change in debt > i	% change in debt > g
2008	2	1	34	6	% change in debt > i	% change in debt > g
2009	3	-5	31	-11	% change in debt < i	% change in debt < g
2010	1	5	31	2	% change in debt > i	% change in debt < g
2011	-1	4	37	19	% change in debt > i	% change in debt > g
2012	1	4	41	11	% change in debt > i	% change in debt > g
2013	3	1	47	15	% change in debt > i	% change in debt > g

2014	-1	3	50	6	% change in debt > i	% change in debt > g
2015	1	3	53	6	% change in debt > i	% change in debt > g
2016	-1	3	51	-4	% change in debt < i	% change in debt < g
2017	1	2	52	1	% change in debt = i	% change in debt < g
Average	3	2	33	4	% change in debt > i	% change in debt > g

Source: World Bank, OECD and Trading Economics Data and Own Analysis

5. RSA: Debt Sustainability Assessment

The analysis for South Africa is as follows: the country started to experience double-digit growth in debt levels from 2009 to 2011 to reach a high of 15 percent in 2010. During the period 1995 to 2009, the South African government pursued fiscal consolidation or discipline policies that saw the country experiencing negative growth in debt levels. The slowdown in economic growth triggered government to increase debt levels to try and support economic growth in addition to driving infrastructure development leading to the 2010 World Cup. It is important to note that real interest rates had been declining since 1998 and averaged a low of 3 percent in 2010 despite the growth in debt levels.

It can be concluded given the study period that the average debt levels for South Africa are far below the 60 percent threshold, thus limiting the risk to debt sustainability; however, the continued poor economic growth and government's bail out of SOEs will push government to increase its debt levels, posing increased risks to debt sustainability. Given the study period, government debt is sustainable and there is room to increase debt to support economic growth.

Table 5.39: RSA Debt Sustainability Assessment

	Real interest rate (%)	GDP y-o-y growth rate	Debt:GDP	% change in debt levels	Condition 1	Condition 2
1994	5	3	48			
1995	7	3	48	1	% change in debt < i	% change in debt < g
1996	11	3	48	-1	% change in debt < i	% change in debt < g
1997	11	3	47	-1	% change in debt < i	% change in debt < g
1998	13	1	47	0	% change in debt < i	% change in debt < g
1999	10	3	45	-5	% change in debt < i	% change in debt < g
2000	5	5	42	-6	% change in debt < i	% change in debt < g
2001	6	3	43	0	% change in debt < i	% change in debt < g
2002	9	3	36	-16	% change in debt < i	% change in debt < g
2003	4	3	36	0	% change in debt < i	% change in debt < g
2004	5	5	34	-3	% change in debt < i	% change in debt < g
2005	5	5	33	-3	% change in debt < i	% change in debt < g

2006	4	6	31	-5	% change in debt < i	% change in debt < g
2007	6	6	27	-14	% change in debt < i	% change in debt < g
2008	4	3	27	-2	% change in debt < i	% change in debt < g
2009	3	-3	30	14	% change in debt > i	% change in debt > g
2010	2	2	35	15	% change in debt > i	% change in debt > g
2011	3	3	38	10	% change in debt > i	% change in debt > g
2012	2	3	41	7	% change in debt > i	% change in debt > g
2013	3	3	44	8	% change in debt > i	% change in debt > g
2014	4	2	47	7	% change in debt > i	% change in debt > g
2015	3	1	49	5	% change in debt > i	% change in debt > g
2016	5	1	52	5	% change in debt = i	% change in debt > g
2017		1	53	3	% change in debt < i	% change in debt > g
Average	6	3	41	1	% change in debt < i	% change in debt < g

Source: World Bank, OECD and Trading Economics Data and Own Analysis

6. Russia: Debt Sustainability Assessment

The findings for Russia are as follows: the country had the highest debt levels in the EME countries in 1998 of 144 percent to GDP, however, following the debt crisis, the country started to experience declines in debt levels ever since, reaching a low of 6 percent to GDP in 2008. Russia had the highest and lowest debt levels in the EME countries. Russia experienced a decline in debt from 144 percent to GDP in 1998 to 49 percent in 2001, the decrease in debt levels was followed by an increase in economic growth from a -5 percent in 1998 to 5 percent in the said period. Real interest rates were at negative figures and the growth in debt levels also experienced negative growth rates until 2008. The growth in debt levels started again in 2009 to grow by 34 percent, 24 percent in 2014, and 21 percent in 2015. The increase in debt levels can be associated with the poor economic growth rates indicating that government used debt to try and stimulate economic growth. It can be concluded that the low debt levels in Russia will not pose a risk to debt sustainability for the country. Given the study period, government debt is sustainable and there is room to increase debt to support economic growth. It should be noted that any significant increases in debt levels, the market will increase interest rates as indicated above, making it more costly for government to raise resources via bond market.

Table 5.40: Russia Debt Sustainability Assessment

	Real interest rate (%)	GDP growth (annual %)	Central government debt, total (% of GDP)	% change in debt levels	Condition 1	Condition 2	
1994		-13	..				
1995		-4	..				
1996		-4	..				
1997	15	1	..				
1998	20	-5	144				
1999	-19	6	101	-30	% change in debt < i	% change in debt < g	

2000	-10	10	62	-38	% change in debt < i	% change in debt < g	
2001		5	49	-21			
2002	0	5					
2003		7	28			% change in debt < g	
2004		7	21	-27		% change in debt < g	
2005		6	17	-20		% change in debt < g	
2006		8	10	-41		% change in debt < g	
2007		9	7	-28		% change in debt < g	
2008		5	6	-9		% change in debt < g	
2009		-8	9	34		% change in debt > g	
2010		5	9	5		% change in debt > g	
2011		5	9	-5		% change in debt < g	
2012		4	9	-1		% change in debt < g	
2013	4	2	9	6	% change in debt > i	% change in debt > g	
2014	3	1	11	24	% change in debt > i	% change in debt > g	
2015	7	-3	13	21	% change in debt > i	% change in debt > g	

2016	9	0	14	5	% change in debt < i	% change in debt > g
2017		2				
Average	3	2	51	-2	% change in debt < i	% change in debt < g

Source: World Bank, OECD and Trading Economics Data and Own Analysis

5.6 Conclusion

The data analysis indicates that economic growth was positive even at high levels of government debt. It can also be concluded that increases in government debt levels did not hinder economic growth across the emerging market economies. In agreement with Kaur and Kaur (2015), this research has argued for the increased use of government debt, and if the increase is accompanied by increased economic growth, governments should not worry as they will be able to finance the debt and bring down their debt levels. It can be concluded from the data analysis that government's accumulation of capital stock was financed by increased government debt with reference to the 'golden rule' theory. When the increased debt is used to support public sector investment, it leads to a crowding in of private sector investment in the emerging market economies.

It can also be concluded that increases in government debt did lead to an increase in investment in the emerging market economies and to an increase in economic growth. The study further concludes that government debt can be used to finance the public sector investment given its ability to attract private sector investment. As stated by Holtfrerich (2014), debt financing of government expenditure is harmless and will be sustainable if it leads to an increase in productive capacity of the economy. The findings in the emerging market economies do indicate this with reference to the positive and strong relationship between public sector investment and private sector investment. The functional finance of the Keynesian approach argues that government spending should be used to stimulate investment in the economy and lead to an increase in the productive capacity of the economy, which is key to supporting positive economic growth rates (Jayadev & Mason, 2018).

The findings are in line with the Keynesian approach, which regards government debt to have a positive impact on economic growth when governments use this access of additional funds to invest in the economy and support the productive side of the economy by spending on infrastructure development, human capital, industrial development, R&D, and spending on administrative and judicial reforms. The analysis has confirmed across the emerging market economies that governments are using debt to finance public sector investment. To sustain this approach, governments will need a market environment of low interest rates, which will crowd in private sector investment. When debt is used to finance public sector investment, the research findings confirm that it has the ability to crowd in private sector investment, which is critical to supporting economic growth.

The key findings with regard to measuring debt sustainability using the debt limit calculated by Ganiko et al (2016) of between 68% and 97% to GDP for emerging market economies give all the emerging market economies significant room to increase their debt levels. However, it was noted that Brazil's high debt ratio and high interest rates might pose a risk to the country's debt sustainability. In addition, the default risk is limited across the emerging market economies when applying Ganiko et al's (2016) debt limit levels. However, the analysis identifies Brazil's high interest rates as a risk to its fiscal space and government's ability to borrow more. As argued by Botev et al (2016), this research study concludes that the low interest rates environment will give governments the opportunity to raise more debt without losing market access and affecting fiscal sustainability. Low interest rates should allow for governments to pursue expansionary fiscal policy needed to support economic growth and they should not fear this policy approach as it will be financed by the increase in economic growth. The data analysis confirms that governments used debt to finance public sector investment and this investment also crowded in private sector investment. To support both public and private sector investment, which is critical to driving economic growth, it will need to be supported by having low interest rates in the capital market.

The findings of this research have shown the positive economic returns of accumulating public sector investment and using debt to finance this accumulation. Governments should no longer fear the use of debt, especially during difficult economic growth. Prolonged economic growth constraints will force governments to increase taxes to fund

expenditure, which will further slow down economic growth – South Africa and Brazil are the two emerging market economies identified to be a concern given their low average economic growth as debt levels increased. As argued by Jayadev and Mason (2018), pushing for smaller budget deficits during difficult economic growth will lead to a fall in aggregate demand and economic activity. Forcing governments to pay off their debt is counter-productive; instead, governments should be encouraged to increase their debt levels to drive investment and economic growth. As argued by Ostry et al (2015), governments with fiscal space should allow the debt level ratios to decline through increased economic growth. It has been shown in the analysis that the emerging market economies do have the fiscal space to increase government debt to support economic growth and development.

High interest rates will price government out of the bond market, making it costly for government to raise money to fund the productive side of the economy. In addition, high interest rates will reduce the fiscal space of government and, given the output gaps seen in emerging market economies, the research study proposes for an alternative approach of creating sovereign money and/or government issuing zero interest rate bonds to be financed by central banks. The new money created through the sovereign money approach should be channelled to support the productive side of the economy and to close the output gap. The approach seeks to propose to central banks to purchase government debt and to make money available to the private sector through the decrease in interest rates. As stated by Fawley and Neely (2013), the reduction in real interest rates in the market will lead to improvements in economic activity, as it will stimulate aggregate demand in the economy.

The argument presented seeks to challenge the current conventional approach of fearing the growth of government debt and limiting governments access to funds needed to support the productive side of the economy via the capital market. The promotion of local capital markets and strengthening of institutions will assist emerging market economies to raise debt in local currency with the aim to reduce their dependence and risks associated with foreign denominated debt.

The analysis has shown that increases in interest rates will reduce the fiscal space available to government. Economies that are faced with developmental challenges, low levels of public sector investment, human capital investment and R&D spending, as well as lack of industrial development and support, will need increased government spending to increase these levels in order to allow for the economy to grow. Economies that need to invest more in infrastructure development and human capital, for example, can only do this through the creation of sovereign money or through central banks buying government debt and creating a low interest rate environment that will crowd in private sector investment. The research study has argued for an increased role of monetary policy that seeks to use interest rates to support economic growth and promote fiscal sustainability, while maintaining price stability.

Chapter 6: Conclusions and Recommendations

6.1 Introduction

As indicated in the problem statement, the South African economy is characterised by low economic growth, high unemployment, increasing poverty and high levels of inequality. For the government to effectively address these issues, it will need to increase its fiscal spending to upgrade industrial and infrastructure development, and invest in social programmes. This should provide the necessary stimulus to drive economic growth and industrial development that will lead to job creation and more equitable income generation.

In the literature review it was argued that countries should not reduce budget deficits and government debt at the expense of investing in their economies, especially in an environment of low economic growth and increasing unemployment. As argued in the literature review that fiscal consolidation measures that promote the reduction of government debt can be detrimental to economic growth, as it will put a constraint on the required investment spending needed in the economy, particularly investment in human capital and infrastructure that will drive economic growth.

The purpose of this thesis was to apply the ‘theory of fiscal space’ and the use of government debt to support economic growth and development in the context of South Africa to answer the primary research question: ‘Should governments increase the required fiscal space to support economic growth and development?’ Emerging markets countries were identified and used to answer the following two questions: a) Should governments increase fiscal spending or government debt to finance investment in the productive capacity of the economy in order to support and drive economic growth? and b) Will an increase in government debt reduce investment and economic growth?

In addressing the two research questions, the study refers to Botev et al’s (2016) definition of fiscal space as the resources available to government to support fiscal policy and provide it with the necessary room to manoeuvre and increase government spending to support the productive capacity of the economy. The thesis applied this definition to argue

its position on increasing government debt and spending to support economic growth and development.

The literature review argued for the increased use of debt and that debt should be regarded as an instrument available to governments to support and sustain economic growth and development. As argued by Ostry et al (2015), using debt to increase public sector investment will lead to positive economic growth which will be used to reduce the debt levels in the medium to long run, as opposed to using distortionary policy measures to reduce debt levels. This research has shown that the level of government debt should not be the policy goal, but rather a country's ability to finance its debt, thus shifting the focus to the ability to generate revenue to cover interest payments. As stated in the World Bank Report (2019), government debt will not be a threat if it is used to finance the output gap.

In addition, the literature review has discussed that increases in debt levels and budget deficits can be used to stimulate economic activity and that monetary policy should be used to support fiscal policy via a zero interest rate approach to finance government's fiscal stimulus. However, governments will need to ensure that the machinery of the state is capable of efficient and effective delivery to limit the mismanagement or under-utilisation of funds made available by central banks. The alternative approaches support the use of government debt, calling on governments to fund their expenditure by issuing debt in their own currencies. This will assist to address the debt default and debt crisis experienced in a number of emerging market economies relating to foreign denominated debt. The alternative approach or argument is supported by economic principles embedded in the post-Keynesian approach, stating that if governments decide to increase spending via the issuing of debt, the central bank can act as the remaining buyer of the debt and thus control interest rates in the market (Tcherneva, 2008).

6.2 Research Findings

6.2.1 Should Governments Increase Fiscal Spending or Government Debt to Finance the Investment in the Productive Capacity of the Economy in order to Support and Drive Economic Growth?

The key findings from the emerging market economies analysis confirm the positive relationship between government debt and economic growth across all the identified countries. The findings are also in line with the Keynesian approach, which regards government debt as a positive accumulation of private capital or savings in the economy. This is supported by Holtfrerich (2014) in the literature review, stating that government debt will have a positive impact on economic growth, given that debt will give government the opportunity to access capital to drive economic development by investing in infrastructure, human capital, State-Owned Enterprises, and spending on administrative and judicial reforms. The Keynesian approach as articulated by Szabo (2013) supports this position, stating that an increase in government debt may lead to investments in infrastructure development, which is critical to crowding in private sector investment.

These development approaches as discussed in the literature review are supported by the ‘new growth theory of fiscal stimulus’ advocated by Szabo (2013), which seeks to argue for the utilisation of government debt to support the productive capacity of the economy and increases in economic growth.

It can be concluded that the findings from the research on the identified emerging market economies indicate that economic growth is high and stable when debt levels are below the 90% ratio. The findings are also supported by Egert’s (2014) study on emerging economies, which concludes that economic growth remains stable below the 90% debt level. The results are also confirmed by Fincke and Greiner (2014) in their study that showed that government debt had a positive effect on investment and economic growth in emerging market economies. They concluded that the emerging market economies have not reached the peak where government debt will lead to negative economic growth rates when compared to developed economies that have long breached their 60% threshold (Fincke & Greiner, 2014).

In comparison with the findings in the literature review regarding emerging countries, Reinhart and Rogoff's (2010) study concluded that the average economic growth range was 4.2% for debt levels below 90% of GDP, and that growth declines to an average growth of 1.0% when debt levels are above 90%. The findings from the thesis are similar to the emerging market economies, which experienced an average economic growth rate of 5.0% for debt levels below 90% of GDP.

Using GDP per capita as a measure of economic development, this study has shown that average growth was at 3.9% when debt levels were below the 90% ratio. The findings are in support of Ostry et al's (2015) view that governments should rather use debt than increase taxes in order to drive the development finance needed to invest in economic infrastructure, productivity capacity, and human capital.

The core of the research study has argued for South Africa to adopt a more accommodating macroeconomic framework by moving away from the orthodox fiscal policy approach, and to instead adopt an alternative approach of using government debt and increased budget deficits and/or increasing government spending to support and accelerate economic growth. The literature review has discussed that governments need to be concerned about the poor economic growth, which will lead to fiscal deterioration and to further declines in economic activity (Kobayashi, 2015). Kobayashi (2015) states that fiscal management should not be the core focus of government, but rather how government can support economic growth and development.

6.2.2 Will an Increase in Government Debt Reduce Investment and Economic Growth?

This study has argued for the use of government expenditure to drive economic growth, with the expenditure to be directed towards the productive side of the economy, i.e., education, health, infrastructure development, industrial development, and research and development (R&D). The findings confirm that the accumulation of capital stock did lead to positive economic growth across the sample of emerging market economies analysed in this research. It is within this economic approach that the research study has argued for 'the use of government debt to support economic growth'.

The above argument is based on the Keynesian approach as advocated by Szabo (2013), which supports the use of government debt to finance government expenditure. Government expenditure should be used to support the accumulation of public sector investment, and such accumulation needs to be funded by increased government debt levels. As stated by Holtfrerich (2014), government debt should be regarded as harmless when used to increase the productivity capacity of the economy, as economic growth will be used to finance the debt. In addition to the economic approach, the Harrod-Domar growth model articulates the importance of government's ability to accumulate capital stock to drive economic growth, an approach that will require borrowing to accumulate the capital stock needed to grow the economy (Todaro, 1994).

The study's findings indicate that the emerging market economies showed a median and average public sector investment to GDP ratio of between 20.6% and 23.6%, respectively, for debt levels below 90% of GDP. For debt above 90% of GDP, public sector investment to GDP was slightly lower, averaging 15.3%.

The findings from the emerging market economies do support the themes in the literature review that government debt can influence economic growth through the total factor productivity channel. This will entail increased government investment in infrastructure development, industrial development, education, health and nutrition. Tasos (2012) states that such expenditure will have an influence on the well-being of the citizens and lead to higher economic growth levels. This is also supported by the findings in Fincke and Greiner (2014), where the use of government debt to finance public sector investment will have a positive effect on economic growth.

With regard to governments using debt to crowd in private sector investment, the study's findings confirm that a low interest rate environment and increased accumulation of public sector investment will lead to the 'crowding in' effect. The functional finance of the Keynesian approach argues that government spending should be used to stimulate investment in the economy, leading to an increase in the productive capacity of the economy, which is key to supporting positive economic growth rates (Jayadev & Mason, 2018). The increase in government debt to fund the accumulation of public sector investment should be used to crowd in private sector investment. This investment as

experienced in India and China supported economic growth. This is further supported by Svaljek (1999), who states that increased government debt needs to be used to crowd in private sector investment.

6.3 Debt Sustainability

As argued by Botev et al (2016), a low interest rate environment will give governments the opportunity to raise more debt without losing market access and affecting fiscal sustainability. Low interest rates create the opportunity to increase the fiscal space for governments to pursue the expansionary fiscal policy needed to support economic growth.

Chalk and Hemming (2000) unpack the risks associated with rising debt ratios in a high interest rate environment, which will cause government debt levels to grow faster than economic growth. Brazil failed to meet condition 2 (percentage change in debt levels < real interest rates) and experienced the highest debt levels and real interest rates. These two indicators would contribute to the increased risk of Brazil's debt position. Brazil was the only country with the average debt levels above the 60% threshold for the study period.

However, it should be noted that in applying the debt limit calculated by Ganiko et al (2016) of between 68% and 97% to GDP for emerging economies, this study can conclude that all the emerging market economies have significant room to increase their debt levels, including Brazil.

The study has also concluded that there is limited default risk across the emerging market economies and they will be able to increase government borrowing, with reference to the Ghosh et al (2013) conditions (government will default if debt levels are above the debt limit threshold of 60%).

In conclusion, it should be noted that increases in debt levels will increase interest rates, thus reducing the fiscal space available to government. The increase in interest rates calls for a more effective utilisation of monetary policy instead of fiscal policy via the reduction of interest rates and purchasing of zero interest rate government bonds. This talks to the argument raised in support of sovereign money and/or government debt. To achieve this,

this study calls for the increased role of monetary policy to use interest rates to achieve debt sustainability and to support economic growth and price stability as advocated by Jayadev and Mason (2018).

6.4 Policy Recommendations

To achieve low interest rates that encourage the ‘crowding in’ of both public and private sector investments, central banks will need to purchase government debt to insure that interest rates remain low in the capital market (Tcherneva, 2008). The central banks’ purchase of government debt should be viewed by central bankers as providing money to government and the private sector to increase their investment in the economy (Joyce et al, 2012).

A high interest rate environment will price government out of the bond market and make it costly for government to raise debt to support economic growth and therefore reduce the fiscal space available to government. This study has argued that in countries with limited or no fiscal space, the alternative approach should be to issue debt via sovereign money creation. As argued by Dyson et al (2016), the use of sovereign money will give central banks control of creating new money in the economy and directing the resources needed to support the productive side of the economy in order to drive economic growth. In addition, Dyson et al (2016) state that this approach will ensure the creation of money does not lead to accumulation of debt in the economy via the conventional open market operations approach, but will directly transmit the new money into the economy through government spending. The sovereign money can be used to close the output gap and be directed towards the sectors that are contracting.

The sovereign money approach as argued by Dyson et al (2016), will give the South African Reserve Bank the direct policy tool to issue new money into the economy via government spending rather than the current banking system. This approach can be used to support government to deal with the slowdown in economic activity and address the economic and developmental challenges without affecting its fiscal space. Dyson et al (2016) further argue that the creation of sovereign money by the central bank will not be linked to interest rates, which will mean that the stock of money will be debt free. This approach further talks to the principles of ‘quantitative easing’, where central banks can use their

balance sheet to purchase interest-free government bonds (Dyson et al, 2016). This means that there will be no need for increased borrowing by households and businesses in order to create money in the economy. This will lead to less borrowing in the economy, including government borrowing.

The above approach is supported by modern monetary theory, which argues that the increases in local currency dominated debt should not be a problem, given that a country cannot go insolvent if it issues local currency denominated debt. This calls for central banks to print money to finance government debt, however, they will need to take into account the inflationary implications. As argued by Monnet (2021) and Malikane (2020), central banks should be allowed to monetise government debt to support economic growth and development.

Based on the economic models and theories discussed in the literature review, an opportunity arises for the South African government to drive economic growth by accumulating capital stock financed by increased government debt. The policy options deliberated by Lerner's functional finance states that if governments cannot raise enough revenue through increases in taxes, monetary policy should be applied by lowering interest rates. As discussed in the literature review, government bonds should be viewed as injecting money into the financial sector. South Africa issues debt in its own currency in an open capital market and has a good functional central bank with significant reserves to the value of R276 billion to hold government debt. This gives government the opportunity to create money to fund infrastructure development and the productive side of the economy via the issuance of government bonds.

The proposed policy approach as discussed in the literature review and argued by Kobayashi (2015) is that government debt can be used to support economic activity when fiscal spending is driven by the issuance of government bonds via the explained liquidity channel. South Africa is in a position to consider this policy approach, given that the position of government to consolidate its fiscal position during the current stagnant economic growth will further constrain economic activity and aggregate demand, and in addition, affect the country's tax revenue that is needed to fund government spending and borrowing costs. Kobayashi (2015) states that fiscal deterioration will lead to lower

economic activity, and governments need to guard against this. In periods of poor economic growth, Kobayashi (2015) states that fiscal consolidation should not be the primary focus of government, but rather how government can get the economy to full employment.

As argued using the Keynesian approach, increasing government borrowing to finance government spending should be regarded as a positive fiscal response which is harmless and will be sustainable, as the spending leads to an increase in productive capacity and economic growth and enables government to cover the financing of the debt (Holtfrerich, 2014). The South African government should increase its debt levels to fund the needed structural reforms, infrastructure development, human capital development and state machinery, to address the developmental challenges, and to drive industrial development, all with the purpose of supporting economic growth and development. India and China provide lessons on how economies used debt to finance the planned investments to drive economic growth. India's debt financing programme of its investment accumulation was planned for 31 years from 1981 to 2012 (Barik, 2012). This should not be a once-off exercise but a long-term intervention to fund the structural reforms needed to get the South African economy towards higher and sustainable economic growth. The South African government will need to develop long-term plans to be implemented over the next 20 to 30 years and to direct the debt funding towards the implementation of these plans. However, it should be noted that this will require a well-oiled capacitated state machinery with a clear long-term vision and capacity to develop and implement the plans.

The South African government will struggle to access capital markets due to the increase in interest rates and the downgrading of the country's investment grade. These limitations should be used to enhance the role of the SARB in supporting economic growth. As argued by Monnet (2021) and Malikane (2020), central banks should be allowed to monetise government debt to support economic growth and development. As discussed, this will give the South African government the opportunity to create money to fund the necessary structural reforms, infrastructure and human capital development, to address the developmental challenges and drive industrial development, and to support struggling industries in the primary and secondary sectors as well as small, medium and micro enterprises development, and invest more in R&D. The South African government will

need to develop a 20–30-year-horizon economic development plan that will guide the spending and investment programme of government, and which will allow the SARB to increase money supply via government spending with the intention to grow the economy above the 1994–2017 average real interest rate of 5.7%.

In conclusion, the key policy recommendation is to increase the coordination between fiscal and monetary policy that will allow the SARB to finance government's investment in the economy via low interest rates policy intervention or purchasing of government's zero interest rate bonds. The experience of India and China shows how the mandate of the central banks in these countries focused on the support of economic development by providing financial support to drive the productive side of the economy. This was undertaken through the development of financial institutions that enabled the financial sector to increase access to financial instruments to finance economic development projects such as infrastructure, technology development, and human capital investment. In this way, central banks can finance government investment in physical infrastructure and human capital investment via low interest rates or government issue of zero interest rate bonds.

Low interest rates should be used to incentivise both public and private sector investment to finance their accumulation of fixed capital formation. Governments should use the availability of cheap credit via the monetary policy intervention to finance the necessary investments, infrastructure and developments to support and drive economic growth. The low interest rate environment will give policy makers the tool to use fiscal stimulus to support economic growth and development.

The argument for sovereign money and the increase of money supply via government spending will require increased policy coordination between monetary and fiscal policy, with enhanced institutional arrangements that will ensure that the creation of money is directed towards economic growth (Dyson et al, 2016). The SARB in this case will be responsible for determining the amount of money to be created and National Treasury will determine how the new money will be allocated and distributed in the economy (Dyson et al, 2016).

6.5 Contribution to Knowledge

The study's contribution to knowledge is to enhance the debates and argument for the use of government debt to support economic growth and highlight the fiscal space available to governments in order to get their economies to full employment. Given the contradicting views relating to the use of government debt and the negative impact it will have on the economy, the thesis has argued for and provided evidence in support of the use of debt to support economic growth. The thesis has argued that governments should not fear using debt and must use the debt towards the accumulation of capital investment which will lead to positive economic growth. The thesis further argues that government's core focus should be about getting their economies to full employment and not fiscal sustainability. The focus on fiscal sustainability when the economy is not growing can lead to further economic deterioration, which should be regarded as economic mismanagement on the part of government. Therefore, the use of government debt, increased spending, and the role of central banks in reducing interest rates and monetising government debt to deal with debt sustainability problems should be considered as alternative policy measures with the view to supporting economic growth. The thesis has provided alternative policy direction for both fiscal and monetary policy on how to increase the fiscal space available to government to raise additional resources to support economic growth and development by decreasing interest rates, monetising government debt and creating sovereign money.

Developing and emerging market economies should be encouraged to increase borrowing to invest in their economies and they should not fear debt if the funds are going to be directed towards the productive side of the economy. The proposal for raising sovereign money is aimed at assisting countries that cannot raise the needed resources via the conventional market route due to market conditions and risks associated with government debt or countries having no/limited bond markets. The proposal to use sovereign money is intended to assist governments that have reached their debt limits, have limited fiscal space, are highly indebted, and are unable to mobilise resources to invest in their economies. Central banks should review their policy stance to support sovereign money to provide governments with the fiscal space needed to invest in and support economic growth. Developing and emerging market economies should not delay

their capital investment in the economy and/or rely on markets to issue foreign denominated debt in order to invest in their economies. Central banks should be encouraged to support public sector capital investment accumulation needed to grow the economy. Sovereign money should become an alternative source of government funding, which will help to prevent governments from becoming highly indebted and relying on markets to raise capital and to reduce the risks associated with foreign denominated debt. Given the impact of the “original sin” to developing economies and how currency devaluations have triggered the default of foreign denominated debt and debt crisis, the promotion of sovereign debt markets and raising debt local currency should be regarded as a solution to dealing with the “original sin” problem.

The contribution to knowledge was to argue for an alternative economic model and thinking that calls for increased use of government debt to fund public sector investment, which will in turn support economic growth and development. The contribution to knowledge is to change the paradigm and narrative that debt is bad for economic growth, and instead to promote the policy direction of using debt and increased spending to get economies to full employment. The paradigm shift also talks to changing the conventional monetary policy, which seeks to allow central banks to support government debt sustainability by decreasing interest rates, monetisation of government debt, and creation of sovereign money. The paradigm shift seeks to change the conventional policy direction of central banks of increasing money supply indirectly using the banking sector, to directly increase money supply through fiscal policy in order to support economic growth.

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Annexure

1. Government Debt and Economic Growth Covariance Analysis

Brazil: Government Debt and Economic Growth Covariance Analysis

Covariance Analysis: Ordinary

Date: 01/21/21 Time: 14:04

Sample: 2006 2017

Included observations: 12

Balanced sample (listwise missing value deletion)

Covariance

Correlation

t-Statistic

Probability	CENTRAL_GOVERNMENT_DEBT_TOTAL_OF_GDP	GDP_GROWTH_ANNUAL
CENTRAL_GOVERNMENT_DEBT_TOTAL_OF_GDP	28.19957 1.000000 ----- -----	
GDP_GROWTH_ANNUAL	-9.989820 -0.563513 -2.157086 0.0564	11.14461 1.000000 ----- -----

Source: World Bank, OECD and Trading Economics Data

China: Government Debt and Economic Growth Covariance Analysis

Covariance Analysis: Ordinary

Date: 01/21/21 Time: 14:10

Sample: 1995 2017

Included observations: 23

Balanced sample (listwise missing value deletion)

Covariance

Correlation

t-Statistic

Probability	DEBT_GDP	GDP_GROWTH_ANNUAL
DEBT_GDP	60.47157 1.000000 ----- -----	
GDP_GROWTH_ANNUAL	-6.518228 -0.450013	3.469430 1.000000

	-2.309257	-----
	0.0312	-----

Source: World Bank, OECD and Trading Economics Data

India: Government Debt and Economic Growth Covariance Analysis

Covariance Analysis: Ordinary

Date: 01/21/21 Time: 14:12

Sample: 1994 2017

Included observations: 24

Covariance

Correlation

t-Statistic

Probability	CENTRAL_GOVERNMENT_DEBT_TOTAL_OF_GDP	GDP_GROWTH_ANNUAL
CENTRAL_GOVERNMENT_DEBT_TOTAL_OF_GDP	48.82490 1.000000 ----- -----	
GDP_GROWTH_ANNUAL	1.338078 0.101581 0.478935 0.6367	3.553829 1.000000 ----- -----

Source: World Bank, OECD and Trading Economics Data

Mexico: Government Debt and Economic Growth Covariance Analysis

Covariance Analysis: Ordinary

Date: 01/21/21 Time: 14:14

Sample: 1994 2017

Included observations: 24

Covariance

Correlation

t-Statistic

Probability	DEBT_GDP	GDP_GROWTH_ANNUAL
DEBT_GDP	113.7977 1.000000 ----- -----	

GDP_GROWTH__ANNUAL__	-2.980889	9.582632
	-0.090269	1.000000
	-0.425133	-----
	0.6749	-----

Source: World Bank, OECD and Trading Economics Data

RSA: Government Debt and Economic Growth Covariance Analysis

Covariance Analysis: Ordinary

Date: 01/21/21 Time: 14:15

Sample: 1994 2017

Included observations: 24

Covariance

Correlation

t-Statistic

Probability	DEBT_GDP	GDP_Y_O_Y_GROWTH_RATE
DEBT_GDP	60.17276	
	1.000000	

GDP_Y_O_Y_GROWTH_RATE	-4.351312	3.477663
	-0.300799	1.000000
	-1.479387	-----
	0.1532	-----

Source: World Bank, OECD and Trading Economics Data

Russia: Government Debt and Economic Growth Covariance Analysis

Covariance Analysis: Ordinary

Date: 01/21/21 Time: 14:17

Sample: 1998 2017

Included observations: 19

Balanced sample (listwise missing value deletion)

Covariance

Correlation

t-Statistic

Probability	CENTRAL_GOVERNMENT_DEBT_TOTAL_H__ANNUAL__OF GDP	GDP_GROWTH__ANNUAL__
-------------	---	----------------------

CENTRAL_GOVERNMENT_DEBT_TOTAL_OF_GDP_	1285.570	
	1.000000	

GDP_GROWTH_ANNUAL_	-22.60792	21.97554
	-0.134506	1.000000
	-0.559670	-----
	0.5830	-----

Source: World Bank, OECD and Trading Economics Data

Turkey: Government Debt and Economic Growth Covariance Analysis

Covariance Analysis: Ordinary

Date: 01/21/21 Time: 14:18

Sample: 1994 2017

Included observations: 24

Covariance			
Correlation			
t-Statistic			
	CENTRAL_GOVERNMENT_DEBT_TOTAL_OF_GDP_	GDP_GROWTH_ANNUAL_	
Probability			
CENTRAL_GOVERNMENT_DEBT_TOTAL_OF_GDP_	160.5125		
	1.000000		

GDP_GROWTH_ANNUAL_	-15.53041	22.48348	
	-0.258522	1.000000	
	-1.255245	-----	
	0.2226	-----	

Source: World Bank, OECD and Trading Economics Data

2. Public Sector Investment and Economic Growth Covariance Analysis

Brazil: Public Sector Investment and Economic Growth Covariance Analysis

Covariance Analysis: Ordinary
Date: 01/27/21 Time: 12:27
Sample: 1995 2017
Included observations: 23
Balanced sample (listwise missing value deletion)

Covariance			
Correlation			
t-Statistic			
	GROSS_FIXED _CAPITAL_FO RMATION____ OF_GDP_	GDP_GROWT H__ANNUAL__	
Probability			
GROSS_FIXED_CAP ITAL_FORMATION____ __OF_GDP_	2.567528 1.000000 ----- -----		
GDP_GROWTH__AN NUAL____	1.641458 0.383424 1.902471 0.0709	7.138154 1.000000 ----- -----	

Source: World Bank, OECD and Trading Economics Data

China: Public Sector Investment and Economic Growth Covariance Analysis

Covariance Analysis: Ordinary
Date: 01/27/21 Time: 12:34
Sample: 1995 2017
Included observations: 23
Balanced sample (listwise missing value deletion)

Covariance			
Correlation			
t-Statistic			
	GROSS_FIXED _CAPITAL_FO RMATION____ OF_GDP_	GDP_GROWT H__ANNUAL__	
Probability			
GROSS_FIXED_CAP ITAL_FORMATION____ __OF_GDP_	23.32987 1.000000 ----- -----		

GDP_GROWTH__AN NUAL__	-1.395123	3.488622
	-0.154643	1.000000
	-0.717291	----
	0.4811	----

Source: World Bank, OECD and Trading Economics Data

India: Public Sector Investment and Economic Growth Covariance Analysis

Covariance Analysis: Ordinary

Date: 01/27/21 Time: 12:43

Sample: 1995 2017

Included observations: 23

Balanced sample (listwise missing value deletion)

Covariance

Correlation

t-Statistic

	GROSS_FIXED _CAPITAL_FO GDP_GROWT RMATION__ H__ANNUAL__ OF GDP	
Probability		
GROSS_FIXED_CAP ITAL_FORMATION__ __OF_GDP__	14.07870	
	1.000000	

GDP_GROWTH__AN NUAL__	0.888597	2.892363
	0.139251	1.000000
	0.644405	----
	0.5263	----

Source: World Bank, OECD and Trading Economics Data

Mexico: Public Sector Investment and Economic Growth Covariance Analysis

Covariance Analysis: Ordinary

Date: 01/27/21 Time: 12:48

Sample: 1995 2017

Included observations: 23

Balanced sample (listwise missing value deletion)

Covariance

Correlation

t-Statistic

	GROSS_FIXED _CAPITAL_FO GDP_GROWT RMATION__ H__ANNUAL__ OF GDP	
Probability		

GROSS_FIXED_CAPITAL_FORMATION__OF_GDP_	2.420093	
	1.000000	

GDP_GROWTH__ANNUAL__	1.302283	9.726704
	0.268415	1.000000
	1.276888	----
	0.2156	----

Source: World Bank, OECD and Trading Economics Data

Russia: Public Sector Investment and Economic Growth Covariance Analysis

Covariance Analysis: Ordinary
Date: 01/27/21 Time: 12:51
Sample: 1995 2017
Included observations: 23
Balanced sample (listwise missing value deletion)

Covariance		
Correlation		
t-Statistic		
	GROSS_FIXED _CAPITAL_FO RMATION__ OF_GDP_	GDP_GROWT H__ANNUAL__
Probability		
GROSS_FIXED_CAPITAL_FORMATION__OF_GDP_	4.813387	
	1.000000	

GDP_GROWTH__ANNUAL__	-3.240477	22.16120
	-0.313752	1.000000
	-1.514256	----
	0.1449	----

Source: World Bank, OECD and Trading Economics Data

RSA: Government Public Sector Investment and Economic Growth Covariance Analysis

Covariance Analysis: Ordinary
Date: 01/27/21 Time: 12:55
Sample: 1995 2017
Included observations: 23

Balanced sample (listwise missing value deletion)

Covariance
Correlation
t-Statistic

Probability	GROSS_FIXED _CAPITAL_FO RMATION____ OF_GDP_	GDP_GROWT H__ANNUAL__
GROSS_FIXED_CAP ITAL_FORMATION__ __OF_GDP_	4.471645 1.000000 ----- -----	
GDP_GROWTH__AN NUAL__	-1.145706 -0.321949 -1.558327 0.1341	2.832075 1.000000 ----- -----

Source: World Bank, OECD and Trading Economics Data

Turkey: Government Public Sector Investment and Economic Growth Covariance Analysis

Covariance Analysis: Ordinary
Date: 01/27/21 Time: 13:01
Sample: 1995 2017
Included observations: 23
Balanced sample (listwise missing value deletion)

Covariance
Correlation
t-Statistic

Probability	GROSS_FIXED _CAPITAL_FO RMATION____ OF_GDP_	GDP_GROWT H__ANNUAL__
GROSS_FIXED_CAP ITAL_FORMATION__ __OF_GDP_	11.91426 1.000000 ----- -----	
GDP_GROWTH__AN NUAL__	7.942900 0.520697 2.794910 0.0109	19.53088 1.000000 ----- -----

Source: World Bank, OECD and Trading Economics Data

3. Debt Ratio and Public Sector Investment Covariance Analysis

Brazil: Debt Ratio and Public Sector Investment Covariance Analysis

Covariance Analysis: Ordinary

Date: 01/27/21 Time: 12:24

Sample: 2006 2017

Included observations: 12

Balanced sample (listwise missing value deletion)

Covariance

Correlation

t-Statistic

	GROSS_FIXED _CAPITAL_FO RMATION_	
Probability	DEBT_GDP	OF_GDP
DEBT_GDP	28.19957 1.000000 ----- -----	
GROSS_FIXED_CAP ITAL_FORMATION_ __OF_GDP__	-9.623224 -0.932531 -8.166744 0.0000	3.776347 1.000000 ----- -----

Source: World Bank, OECD and Trading Economics Data

China: Debt Ratio and Public Sector Investment Covariance Analysis

Covariance Analysis: Ordinary

Date: 01/27/21 Time: 12:33

Sample: 1995 2016

Included observations: 22

Balanced sample (listwise missing value deletion)

Covariance

Correlation

t-Statistic

	GROSS_FIXED _CAPITAL_FO RMATION_	
Probability	DEBT_GDP	OF_GDP
GOVERNMENT_DEB T_GDP	62.45498 1.000000 ----- -----	

GROSS_FIXED_CAPITAL_FORMATION__OF_GDP_	33.05330	23.94136
	0.854785	1.000000
	7.365790	-----
	0.0000	-----

Source: World Bank, OECD and Trading Economics Data

India: Debt Ratio and Public Sector Investment Covariance Analysis

Covariance Analysis: Ordinary
Date: 01/27/21 Time: 12:40
Sample: 1995 2016
Included observations: 22
Balanced sample (listwise missing value deletion)

Covariance		
Correlation		
t-Statistic		
Probability		
GOVERNMENT_DEBT_GDP	GROSS_FIXED_CAPITAL_FORMATION__OF_GDP_	
	49.73097	
	1.000000	

GROSS_FIXED_CAPITAL_FORMATION__OF_GDP_	1.427106	14.68246
	0.052813	1.000000
	0.236518	-----
	0.8154	-----

Source: World Bank, OECD and Trading Economics Data

Mexico: Debt Ratio and Public Sector Investment Covariance Analysis

Covariance Analysis: Ordinary
Date: 01/27/21 Time: 12:46
Sample: 1995 2016
Included observations: 21
Balanced sample (listwise missing value deletion)

Covariance		
Correlation		
t-Statistic		
Probability		
	GOVERNMENT_DEBT_GDP	GROSS_FIXED_CAPITAL_FORMATION__OF_GDP_

	FORMATION OF GDP	
GOVERNMENT_DEB T_GDP	111.0604 1.000000 ----- -----	
GROSS_FIXED_CAP ITAL_FORMATION_ __OF_GDP__	5.967970 0.355580 1.658317 0.1137	2.536405 1.000000 ----- -----

Source: World Bank, OECD and Trading Economics Data

Russia: Debt Ratio and Public Sector Investment Covariance Analysis

Covariance Analysis: Ordinary

Date: 01/27/21 Time: 12:52

Sample: 1998 2016

Included observations: 19

Balanced sample (listwise missing value deletion)

Covariance

Correlation

t-Statistic

	GROSS_FIXED _CAPITAL_FO FORMATION_ OF GDP	
GOVERNMENT_DEB T_GDP	1285.570 1.000000 ----- -----	
GROSS_FIXED_CAP ITAL_FORMATION_ __OF_GDP__	-61.25066 -0.744850 -4.602739 0.0003	5.260030 1.000000 ----- -----

Source: World Bank, OECD and Trading Economics Data

RSA: Debt Ratio and Government Fixed Capital Formation Covariance Analysis

Covariance Analysis: Ordinary

Date: 01/27/21 Time: 12:56

Sample: 1995 2017

Included observations: 23

Balanced sample (listwise missing value deletion)

Covariance

Correlation

t-Statistic

	GROSS_FIXED _CAPITAL_FO RMATION_	
Probability	DEBT_GDP	OF_GDP
GOVERNMENT_DEB T_GDP	60.62113 1.000000 ----- -----	
GROSS_FIXED_CAP ITAL_FORMATION_ _OF_GDP_	-4.059336 -0.246552 -1.165835 0.2568	4.471645 1.000000 ----- -----

Source: World Bank, OECD and Trading Economics Data

Turkey: Debt Ratio and Government Fixed Capital Formation Covariance Analysis

Covariance Analysis: Ordinary

Date: 01/27/21 Time: 13:04

Sample: 1995 2015

Included observations: 20

Balanced sample (listwise missing value deletion)

Covariance

Correlation

t-Statistic

	GROSS_FIXED _CAPITAL_FO RMATION_	
Probability	DEBT_GDP	OF_GDP
DEBT_GDP	142.2947 1.000000 ----- -----	
GROSS_FIXED_CAP ITAL_FORMATION_ _OF_GDP_	-30.33263 -0.790445 -5.474929 0.0000	10.34875 1.000000 ----- -----

Source: World Bank, OECD and Trading Economics Data

4. Changes government spending and changes in government debt

Brazil: Changes government spending and changes in government debt

Covariance Analysis: Ordinary
Date: 01/27/21 Time: 12:28
Sample: 2006 2017
Included observations: 12
Balanced sample (listwise missing value deletion)

Covariance		
Correlation		
t-Statistic		
Probability	DEBT_GDP	GOVERNMENT _SPENDING
DEBT_GDP	28.19957 1.000000 ----- -----	
GOVERNMENT_SPE NDING	10.84952 0.626561 2.542253 0.0292	10.63289 1.000000 ----- -----

Source: World Bank, OECD and Trading Economics Data

China: Changes government spending and changes in government debt

Covariance Analysis: Ordinary
Date: 01/27/21 Time: 12:35
Sample: 1995 2016
Included observations: 22
Balanced sample (listwise missing value deletion)

Covariance		
Correlation		
t-Statistic		
Probability	GOVERNMENT _DEBT_GDP	GOVERNMENT _SPENDING_G DP
GOVERNMENT_DEB T_GDP	62.45498 1.000000 ----- -----	
GOVERNMENT_SPE NDING_GDP	-3.047481 -0.357448	1.163830 1.000000

	-1.711638	-----
	0.1024	-----

Source: World Bank, OECD and Trading Economics Data

India: Changes government spending and changes in government debt

Covariance Analysis: Ordinary
Date: 01/27/21 Time: 12:44
Sample: 1995 2016
Included observations: 22
Balanced sample (listwise missing value deletion)

Covariance			
Correlation			
t-Statistic			
Probability	GOVERNMENT DEBT	GOVERNMENT GDP	GOVERNMENT SPEND GDP
GOVERNMENT_DEB			
T_GDP	49.73097		
	1.000000		

GOVERNMENT_SPE			
ND_GDP	-2.305441	1.001060	
	-0.326746	1.000000	
	-1.546117	-----	
	0.1378	-----	

Source: World Bank, OECD and Trading Economics Data

Mexico: Changes government spending and changes in government debt

Covariance Analysis: Ordinary
Date: 01/27/21 Time: 12:49
Sample: 1995 2016
Included observations: 15
Balanced sample (listwise missing value deletion)

Covariance			
Correlation			
t-Statistic			
Probability	GOVERNMENT DEBT	GOVERNMENT GDP	GOVERNMENT SPEND GDP
GOVERNMENT_DEB			
T_GDP	151.4163		
	1.000000		

GOVERNMENT_SPE		
ND_GDP	46.67071	22.67348
	0.796524	1.000000
	4.750045	-----
	0.0004	-----

Source: World Bank, OECD and Trading Economics Data

Russia: Changes government spending and changes in government debt

Covariance Analysis: Ordinary
Date: 01/27/21 Time: 12:53
Sample: 1998 2016
Included observations: 19
Balanced sample (listwise missing value deletion)

Covariance		
Correlation		
t-Statistic		
Probability	GOVERNMENT DEBT_GDP	GOVERNMENT SPEND_GDP
GOVERNMENT_DEB		
T_GDP	1285.570	
	1.000000	

GOVERNMENT_SPE		
ND_GDP	-22.93566	13.26347
	-0.175645	1.000000
	-0.735638	-----
	0.4720	-----

Source: World Bank, OECD and Trading Economics Data

RSA: Changes government spending and changes in government debt

Covariance Analysis: Ordinary
Date: 01/27/21 Time: 12:58
Sample: 1995 2017
Included observations: 23
Balanced sample (listwise missing value deletion)

Covariance		
Correlation		
t-Statistic		
Probability	GOVERNMENT DEBT_GDP	GOVERNMENT SPEND_GDP

GOVERNMENT_DEB		
T_GDP	60.62113	
	1.000000	

GOVERNMENT_SPE		
ND_GDP	8.728979	4.476484
	0.529887	1.000000
	2.863265	----
	0.0093	----

Source: World Bank, OECD and Trading Economics Data

Turkey: Changes government spending and changes in government debt

Covariance Analysis: Ordinary
Date: 01/27/21 Time: 13:02
Sample: 1995 2015
Included observations: 12
Balanced sample (listwise missing value deletion)

Covariance		
Correlation		
t-Statistic		
Probability	DEBT_GDP	GOVERNMENT SPEND_GDP
DEBT_GDP	45.83996	
	1.000000	

GOVERNMENT_SPE		
ND_GDP	11.72867	17.42285
	0.415018	1.000000
	1.442496	----
	0.1797	----

Source: World Bank, OECD and Trading Economics Data

5. Government Spending and Economic Growth Covariance Analysis

Brazil: Government Spending and Economic Growth Covariance Analysis

Covariance Analysis: Ordinary

Date: 01/27/21 Time: 12:36

Sample: 1995 2017

Included observations: 23

Balanced sample (listwise missing value deletion)

Covariance

Correlation

t-Statistic

	GOVERNMENT _SPENDING_G DP	GDP_GROWTH _ANNUAL__
Probability		
GOVERNMENT_SPE NDING_GDP	1.119736 1.000000 ----- -----	
GDP_GROWTH__AN NUAL__	-0.653037 -0.330410 -1.604226 0.1236	3.488622 1.000000 ----- -----

Source: World Bank, OECD and Trading Economics Data

6. Interest Rates and Private Sector Investment Covariance Analysis

India: Interest Rates and Private Sector Investment Covariance Analysis

Covariance Analysis: Ordinary

Date: 01/27/21 Time: 13:20

Sample: 1995 2017

Included observations: 23

Balanced sample (listwise missing value deletion)

Covariance

Correlation

t-Statistic

	GROSS_FIXED _CAPITAL_FO RMATION__PR LENDING_INT IVATE_SECTO EREST_RATE_ R___OF_GDP	
Probability		
LENDING_INTERES T_RATE____	3.126064	
	1.000000	

GROSS_FIXED_CAP ITAL_FORMATION__ PRIVATE_SECTOR_ ___OF_GDP_	-3.776859	12.38439
	-0.607008	1.000000
	-3.500286	-----
	0.0021	-----

Source: World Bank, OECD and Trading Economics Data

Mexico: Interest Rates and Private Sector Investment Covariance Analysis

Covariance Analysis: Ordinary

Date: 01/27/21 Time: 13:30

Sample: 1995 2017

Included observations: 23

Balanced sample (listwise missing value deletion)

Covariance

Correlation

t-Statistic

	GROSS_FIXED _CAPITAL_FO RMATION__PR LENDING_INT IVATE_SECTO EREST_RATE_ R___OF_GDP	
Probability		

LENDING_INTEREST _RATE____	167.9146 1.000000 ----- -----	
GROSS_FIXED_CAP ITAL_FORMATION_ PRIVATE_SECTOR_ ____OF_GDP_	-2.156230 -0.118085 -0.544946 0.5915	1.985695 1.000000 ----- -----

Source: World Bank, OECD and Trading Economics Data

Russia: Interest Rates and Private Sector Investment Covariance Analysis

Covariance Analysis: Ordinary
Date: 01/27/21 Time: 13:35
Sample: 1998 2003
Included observations: 5
Balanced sample (listwise missing value deletion)

Covariance		
Correlation		
t-Statistic		
	GROSS_FIXED _CAPITAL_FO RMATION_PR LENDING_INT IVATE_SECTO EREST_RATE_ R____OF_GDP	
Probability		
LENDING_INTEREST _RATE____	94.07796 1.000000 ----- -----	
GROSS_FIXED_CAP ITAL_FORMATION_ PRIVATE_SECTOR_ ____OF_GDP_	-10.78912 -0.689400 -1.648409 0.1978	2.603405 1.000000 ----- -----

Source: World Bank, OECD and Trading Economics Data

RSA: Interest Rates and Private Sector Investment Covariance Analysis

Covariance Analysis: Ordinary
Date: 01/27/21 Time: 13:38
Sample: 1995 2017

Included observations: 23
Balanced sample (listwise missing value deletion)

Covariance			
Correlation			
t-Statistic			
		GROSS_FIXED _CAPITAL_FO RMATION__PR IVATE_SECTO RENT_RATE R____OF_GDP	
Probability			
LENDING_INTEREST _RATES____		15.30563 1.000000 ----- -----	
GROSS_FIXED_CAP ITAL_FORMATION__ PRIVATE_SECTOR_ ____OF_GDP_		-3.573023 -0.490561 -2.579776 0.0175	3.466043 1.000000 ----- -----

Source: World Bank, OECD and Trading Economics Data

7. Private Sector Investment and Economic Growth Covariance Analysis

India: Private Sector Investment and Economic Growth Covariance Analysis

Covariance Analysis: Ordinary
Date: 01/27/21 Time: 13:20
Sample: 1995 2017
Included observations: 23
Balanced sample (listwise missing value deletion)

Covariance			
Correlation			
t-Statistic			
		GROSS_FIXED _CAPITAL_FO RMATION__PR IVATE_SECTO GDP_GROWT R____OF_GDP H__ANNUAL__	
Probability			
GROSS_FIXED_CAP ITAL_FORMATION__ PRIVATE_SECTOR_ ____OF_GDP_		12.38439 1.000000 ----- -----	
GDP_GROWTH__AN NUAL____		0.755907 0.126300 0.583454	2.892363 1.000000 -----

0.5658 -----

Source: World Bank, OECD and Trading Economics Data

Mexico: Private Sector Investment and Economic Growth Covariance Analysis

Covariance Analysis: Ordinary

Date: 01/27/21 Time: 13:31

Sample: 1995 2017

Included observations: 23

Balanced sample (listwise missing value deletion)

Covariance

Correlation

t-Statistic

	GROSS_FIXED _CAPITAL_FO RMATION__PR IVATE_SECTO R___OF_GDP	GDP_GROWT H__ANNUAL__
Probability		
GROSS_FIXED_CAP ITAL_FORMATION__ PRIVATE_SECTOR_ ___OF_GDP_	1.985695 1.000000 ----- -----	
GDP_GROWTH__AN NUAL__	2.149797 0.489168 2.570143 0.0178	9.726704 1.000000 ----- -----

Source: World Bank, OECD and Trading Economics Data

Russia: Private Sector Investment and Economic Growth Covariance Analysis

Covariance Analysis: Ordinary

Date: 01/27/21 Time: 13:35

Sample: 1995 2013

Included observations: 19

Balanced sample (listwise missing value deletion)

Covariance

Correlation

t-Statistic

	GROSS_FIXED _CAPITAL_FO RMATION__PR IVATE_SECTO	GDP_GROWT H__ANNUAL__
Probability		

	R____OF_GDP	
GROSS_FIXED_CAPITAL_FORMATION_PRIVATE_SECTOR____OF_GDP_	6.158283	
	1.000000	

GDP_GROWTH__ANNUAL__	-4.699226	24.52299
	-0.382393	1.000000
	-1.706327	-----
	0.1061	-----

Source: World Bank, OECD and Trading Economics Data

RSA: Private Sector Investment and Economic Growth Covariance Analysis

Covariance Analysis: Ordinary

Date: 01/27/21 Time: 13:39

Sample: 1995 2017

Included observations: 23

Balanced sample (listwise missing value deletion)

Covariance

Correlation

t-Statistic

	GROSS_FIXED _CAPITAL_FO RMATION__PR IVATE_SECTO GDP_GROWT R____OF_GDP H__ANNUAL__	
Probability		
GROSS_FIXED_CAPITAL_FORMATION_PRIVATE_SECTOR____OF_GDP_	3.466043	
	1.000000	

GDP_GROWTH__ANNUAL__	-0.919214	2.832075
	-0.293391	1.000000
	-1.406378	-----
	0.1742	-----

Source: World Bank, OECD and Trading Economics Data

8. Debt Ratio and Private Sector Investment Covariance Analysis

India: Debt Ratio and Private Sector Investment Covariance Analysis

Covariance Analysis: Ordinary

Date: 01/27/21 Time: 13:21

Sample: 1995 2016

Included observations: 22

Balanced sample (listwise missing value deletion)

Covariance

Correlation

t-Statistic

	GROSS_FIXED _CAPITAL_FO RMATION__PR IVATE_SECTO GOVERNMENT R____OF_GDP	
Probability	DEBT_GDP	
GOVERNMENT_DEB T_GDP	49.73097	
	1.000000	

GROSS_FIXED_CAP ITAL_FORMATION__ PRIVATE_SECTOR_ ____OF_GDP_	3.441055	12.93202
	0.135689	1.000000
	0.612485	-----
	0.5471	-----

Source: World Bank, OECD and Trading Economics Data

Mexico: Debt Ratio and Private sector Investment Covariance Analysis

Covariance Analysis: Ordinary

Date: 01/27/21 Time: 13:32

Sample: 1995 2016

Included observations: 21

Balanced sample (listwise missing value deletion)

Covariance

Correlation

t-Statistic

	GROSS_FIXED _CAPITAL_FO RMATION__PR IVATE_SECTO GOVERNMENT R____OF_GDP	
Probability	DEBT_GDP	

GOVERNMENT_DEBT_GDP	111.0604	
	1.000000	

GROSS_FIXED_CAPITAL_FORMATION_PRIVATE_SECTOR_OF_GDP	1.406421	1.957701
	0.095381	1.000000
	0.417661	-----
	0.6809	-----

Source: World Bank, OECD and Trading Economics Data

Russia: Debt Ratio and Private Sector Investment Covariance Analysis

Covariance Analysis: Ordinary
Date: 01/27/21 Time: 13:36
Sample: 1998 2013
Included observations: 16
Balanced sample (listwise missing value deletion)

Covariance		
Correlation		
t-Statistic		
	GROSS_FIXED_CAPITAL_FORMATION_PRIVATE_SECTOR_OF_GDP	
Probability	GOVERNMENT DEBT_GDP	
GOVERNMENT_DEBT_GDP	1481.452	
	1.000000	

GROSS_FIXED_CAPITAL_FORMATION_PRIVATE_SECTOR_OF_GDP	-64.41775	7.052846
	-0.630202	1.000000
	-3.036969	-----
	0.0089	-----

Source: World Bank, OECD and Trading Economics Data

RSA: Debt Ratio and Private Sector Investment Covariance Analysis

Covariance Analysis: Ordinary
Date: 01/27/21 Time: 13:40
Sample: 1995 2017

Included observations: 23
Balanced sample (listwise missing value deletion)

Covariance			
Correlation			
t-Statistic			
		GROSS_FIXED _CAPITAL_FO RMATION__PR IVATE_SECTO GOVERNMENT R____OF_GDP	
Probability		DEBT_GDP	
GOVERNMENT_DEB T_GDP		60.62113 1.000000 ----- -----	
GROSS_FIXED_CAP ITAL_FORMATION__ PRIVATE_SECTOR_ ____OF_GDP_		-4.273343 -0.294808 -1.413813 0.1721	3.466043 1.000000 ----- -----

Source: World Bank, OECD and Trading Economics Data

9. Public Sector Investment and Private Sector Investment Covariance Analysis

India: Public Sector Investment and Private Sector Investment Covariance Analysis

Covariance Analysis: Ordinary
Date: 01/27/21 Time: 13:23
Sample: 1995 2017
Included observations: 23
Balanced sample (listwise missing value deletion)

Covariance			
Correlation			
t-Statistic			
		GROSS_FIXED _CAPITAL_FO GROSS_FIXED RMATION__PR _CAPITAL_FO IVATE_SECTO RMATION____ R____OF_GDP	
Probability		OF_GDP	
GROSS_FIXED_CAP ITAL_FORMATION__ ____OF_GDP_		14.07870 1.000000 ----- -----	
GROSS_FIXED_CAP ITAL_FORMATION__ PRIVATE_SECTOR_ ____OF_GDP_		13.03694 0.987318	12.38439 1.000000

	28.50011	-----
	0.0000	-----

Source: World Bank, OECD and Trading Economics Data

Mexico: Public Sector Investment and Private Sector Investment Covariance Analysis

Covariance Analysis: Ordinary
Date: 01/27/21 Time: 13:33
Sample: 1995 2017
Included observations: 23
Balanced sample (listwise missing value deletion)

Covariance		
Correlation		
t-Statistic		
Probability		
GROSS_FIXED_CAPITAL_FORMATION__OF_GDP_	GROSS_FIXED_CAPITAL_FORMATION__PRIVATE_SECTOR__OF_GDP_	
	2.420093	
	1.000000	

GROSS_FIXED_CAPITAL_FORMATION__PRIVATE_SECTOR__OF_GDP_	1.607406	1.985695
	0.733252	1.000000
	4.941754	-----
	0.0001	-----

Source: World Bank, OECD and Trading Economics Data

Russia: Public Sector Investment and Private Sector Investment Covariance Analysis

Covariance Analysis: Ordinary
Date: 01/27/21 Time: 13:37
Sample: 1995 2013
Included observations: 19
Balanced sample (listwise missing value deletion)

Covariance		
Correlation		
t-Statistic		
Probability		
	GROSS_FIXED_CAPITAL_FO	GROSS_FIXED_CAPITAL_FO

	FORMATION__ OF_GDP_	FORMATION__PR IVATE_SECTO R__OF_GDP
GROSS_FIXED_CAP ITAL_FORMATION__ __OF_GDP_	4.828324 1.000000 ----- -----	
GROSS_FIXED_CAP ITAL_FORMATION__ PRIVATE_SECTOR_ __OF_GDP_	5.097741 0.934867 10.85794 0.0000	6.158283 1.000000 ----- -----

Source: World Bank, OECD and Trading Economics Data

RSA: Public Sector Investment and Private Sector Investment Covariance Analysis

Covariance Analysis: Ordinary

Date: 01/27/21 Time: 13:41

Sample: 1995 2017

Included observations: 23

Balanced sample (listwise missing value deletion)

Covariance

Correlation

t-Statistic

	GROSS_FIXED _CAPITAL_FO GROSS_FIXED RMATION__PR _CAPITAL_FO IVATE_SECTO RMATION__ R__OF_GDP OF_GDP	
Probability		
GROSS_FIXED_CAP ITAL_FORMATION__ __OF_GDP_	4.471645 1.000000 ----- -----	
GROSS_FIXED_CAP ITAL_FORMATION__ PRIVATE_SECTOR_ __OF_GDP_	3.920953 0.995958 50.81219 0.0000	3.466043 1.000000 ----- -----

Source: World Bank, OECD and Trading Economics Data

1. Stationarity Tests

If there is no serial correlation in the residuals, the autocorrelations and partial autocorrelations at all lags should be nearly zero, and all Q -statistics should be insignificant with large p -values.

11.1 Debt Determinants Variables

Brazil

Pairwise Granger Causality Tests

Date: 03/25/23 Time: 12:38

Sample: 1994 2017

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
CENTRAL_GOVERNMENT_DEBT__TOTAL____OF_GDP_ does not Granger Cause GDP_GROWTH__ANNUAL____	10	0.84613	0.4825
GDP_GROWTH__ANNUAL____ does not Granger Cause CENTRAL_GOVERNMENT_DEBT__TOTAL____OF_GDP_		0.14549	0.8681

Debt:GDP and GDP growth

Date: 06/10/20 Time: 13:15

Sample (adjusted): 2006 2017

Included observations: 12 after adjustments

Included observations: 12 after adjustments		AC	PAC	Q-Stat	Prob	
Autocorrelation	Partial Correlation					
		1	0.609	0.609	5.6696	0.017
		2	0.068	-0.483	5.7462	0.057
		3	-0.245	-0.024	6.8651	0.076
		4	-0.286	-0.044	8.5770	0.073
		5	-0.209	-0.097	9.6266	0.087
		6	-0.134	-0.078	10.129	0.119
		7	-0.086	-0.058	10.378	0.168
		8	-0.095	-0.141	10.756	0.216
		9	-0.116	-0.084	11.505	0.243
		10	-0.020	0.109	11.540	0.317
		11	0.014	-0.231	11.570	0.397

The pattern indicates that the time series data is stationary and from lag 2 the series is statistically significant. The correlogram only has a spike at lag 1 and the Q-stat are significant at all lags, which indicates significant serial correlation in the residuals.

Pairwise Granger Causality Tests

Date: 06/10/20 Time: 13:20

Sample: 1994 2017

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
CENTRAL_GOVERNMENT_DEBT__TOTAL___OF_GDP_ does not Granger Cause REAL_INTEREST_RATE___	10	0.62312	0.5733
REAL_INTEREST_RATE___ does not Granger Cause CENTRAL_GOVERNMENT_DEBT__TOTAL___OF_GDP_		4.80796	0.0684
BUDGET_DEFICIT_GDP does not Granger Cause REAL_INTEREST_RATE___	12	3.08056	0.1097
REAL_INTEREST_RATE___ does not Granger Cause BUDGET_DEFICIT_GDP		0.95016	0.4314
BUDGET_DEFICIT_GDP does not Granger Cause CENTRAL_GOVERNMENT_DEBT__TOTAL___OF_GDP_	9	10.2631	0.0266
CENTRAL_GOVERNMENT_DEBT__TOTAL___OF_GDP_ does not Granger Cause BUDGET_DEFICIT_GDP		9.51606	0.0302

Real interest rates, debt:GDP, budget deficit:GDP

Date: 06/10/20 Time: 13:21

Sample (adjusted): 1997 2017

Included observations: 21 after adjustments

Autocorrelation		Partial Correlation		AC	PAC	Q-Stat	Prob
		1	0.810	0.810	15.860	0.000	
		2	0.497	-0.465	22.143	0.000	
		3	0.322	0.403	24.922	0.000	
		4	0.255	-0.201	26.766	0.000	
		5	0.184	0.015	27.791	0.000	
		6	0.110	0.034	28.183	0.000	
		7	0.026	-0.222	28.206	0.000	
		8	-0.080	-0.028	28.446	0.000	
		9	-0.173	-0.059	29.653	0.001	
		10	-0.226	-0.098	31.889	0.000	
		11	-0.262	-0.058	35.197	0.000	
		12	-0.285	-0.007	39.561	0.000	

The pattern indicates that the time series data is stationary and from lag 3 the series is

statistically significant. The correlogram only has a spike at lag 1 and 2, and the Q-stat are significant at all lags, which indicates significant serial correlation in the residuals.

Pairwise Granger Causality Tests

Date: 06/10/20 Time: 13:23

Sample: 1994 2017

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
GDP_GROWTH__ANNUAL__ does not Granger Cause REAL_INTEREST_RATE__	19	1.92893	0.1820
REAL_INTEREST_RATE__ does not Granger Cause GDP_GROWTH__ANNUAL__		1.80007	0.2015

GDP growth and real interest rates

Date: 06/10/20 Time: 13:24

Sample (adjusted): 1997 2017

Included observations: 21 after adjustments

Included observations: 12 after adjustments		AC	PAC	Q-Stat	Prob	
Autocorrelation	Partial Correlation					
		1	0.810	0.810	15.860	0.000
		2	0.497	-0.465	22.143	0.000
		3	0.322	0.403	24.922	0.000
		4	0.255	-0.201	26.766	0.000
		5	0.184	0.015	27.791	0.000
		6	0.110	0.034	28.183	0.000
		7	0.026	-0.222	28.206	0.000
		8	-0.080	-0.028	28.446	0.000
		9	-0.173	-0.059	29.653	0.001
		10	-0.226	-0.098	31.889	0.000
		11	-0.262	-0.058	35.197	0.000
		12	-0.285	-0.007	39.561	0.000

The pattern indicates that the time series data is stationary and from lag 3 the series is statistically significant. The correlogram only has a spike at lag 1 and 2, and the Q-stat are significant at all lags, which indicates significant serial correlation in the residuals.

China

Pairwise Granger Causality Tests

Date: 03/25/23 Time: 12:42

Sample: 1994 2017

Lags: 2

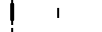
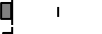
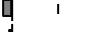
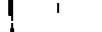
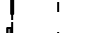
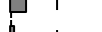
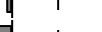
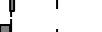
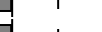
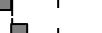
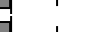
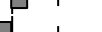
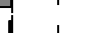
Null Hypothesis:	Obs	F-Statistic	Prob.
DEBT_GDP does not Granger Cause GDP_GROWTH__ANNUAL__	21	0.61553	0.5527
GDP_GROWTH__ANNUAL__ does not Granger Cause DEBT_GDP		4.36992	0.0306

Debt:GDP and GDP growth

Date: 06/10/20 Time: 12:12

Sample (adjusted): 1995 2017

Included observations: 23 after adjustments

Included observations: 12 after adjustments		AC	PAC	Q-Stat	Prob	
Autocorrelation	Partial Correlation					
		1	0.829	0.829	17.974	0.000
		2	0.688	0.001	30.940	0.000
		3	0.545	-0.083	39.485	0.000
		4	0.409	-0.071	44.550	0.000
		5	0.296	-0.018	47.354	0.000
		6	0.212	0.012	48.867	0.000
		7	0.132	-0.047	49.492	0.000
		8	0.033	-0.138	49.533	0.000
		9	-0.088	-0.175	49.854	0.000
		10	-0.129	0.144	50.592	0.000
		11	-0.205	-0.148	52.609	0.000
		12	-0.245	-0.009	55.755	0.000

The pattern indicates that the time series data is stationary and from lag 5 of the autocorrelation and lag 2 of the partial correlation, the series is statistically significant. The correlogram only has a spike at lag 1 to 4 and the Q-stat are significant at all lags, which indicates significant serial correlation in the residuals.

Pairwise Granger Causality Tests

Date: 06/10/20 Time: 12:19

Sample: 1994 2017

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
DEBT_GDP does not Granger Cause REAL_INTEREST_RATES	21	5.93874	0.0118

REAL_INTEREST_RATES does not Granger Cause DEBT_GDP		0.26433	0.7710
BUDGET_DEFICIT_GDP does not Granger Cause REAL_INTEREST_RATES	21	2.24848	0.1379
REAL_INTEREST_RATES does not Granger Cause BUDGET_DEFICIT_GDP		0.76201	0.4829
BUDGET_DEFICIT_GDP does not Granger Cause DEBT_GDP	20	2.95174	0.0830
DEBT_GDP does not Granger Cause BUDGET_DEFICIT_GDP		0.19502	0.8249

Real interest rates, debt:GDP, budget deficit:GDP

Date: 06/10/20 Time: 12:22

Sample: 1994 2017

Included observations: 24

Autocorrelation	Partial Correlation	AC	PAC	Q-Stat	Prob
		1 0.365	0.365	3.6134	0.057
		2 0.013	-0.138	3.6184	0.164
		3 -0.047	-0.003	3.6846	0.298
		4 -0.166	-0.169	4.5467	0.337
		5 -0.308	-0.225	7.6695	0.175
		6 -0.142	0.044	8.3693	0.212
		7 -0.143	-0.183	9.1239	0.244
		8 -0.269	-0.253	11.950	0.153
		9 -0.128	-0.051	12.632	0.180
		10 0.022	-0.075	12.655	0.244
		11 -0.081	-0.229	12.967	0.296
		12 -0.020	-0.110	12.988	0.370

The pattern indicates that the time series data is stationary and from lag 1 the series is statistically significant. The Q-stat are significant at all lags, which indicates significant serial correlation in the residuals.

Pairwise Granger Causality Tests

Date: 06/10/20 Time: 12:27

Sample: 1994 2017

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
GDP_GROWTH__ANNUAL__ does not Granger Cause REAL_INTEREST_RATES	22	8.05255	0.0035
REAL_INTEREST_RATES does not Granger Cause GDP_GROWTH__ANNUAL__		0.45612	0.6413

GDP and Real interest rates

Date: 06/10/20 Time: 12:29

Sample: 1994 2017

Included observations: 24

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	0.365	0.365	3.6134	0.057
		2	0.013	-0.138	3.6184	0.164
		3	-0.047	-0.003	3.6846	0.298
		4	-0.166	-0.169	4.5467	0.337
		5	-0.308	-0.225	7.6695	0.175
		6	-0.142	0.044	8.3693	0.212
		7	-0.143	-0.183	9.1239	0.244
		8	-0.269	-0.253	11.950	0.153
		9	-0.128	-0.051	12.632	0.180
		10	0.022	-0.075	12.655	0.244
		11	-0.081	-0.229	12.967	0.296
		12	-0.020	-0.110	12.988	0.370

The pattern indicates that the time series data is stationary and from lag 1 the series is statistically significant. The Q-stat are significant at all lags, which indicates significant serial correlation in the residuals.

India

Pairwise Granger Causality Tests

Date: 03/25/23 Time: 12:44

Sample: 1994 2017

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
CENTRAL_GOVERNMENT_DEBT__TOTAL____OF_GDP_ does not Granger Cause GDP_GROWTH__ANNUAL____	22	1.26718	0.3069
GDP_GROWTH__ANNUAL____ does not Granger Cause CENTRAL_GOVERNMENT_DEBT__TOTAL____OF_GDP_		0.31002	0.7375

Debt:GDP and GDP growth

Date: 06/10/20 Time: 13:27

Sample: 1994 2017

Included observations: 24

Autocorrelation		Partial Correlation		AC	PAC	Q-Stat	Prob
		1	0.755	0.755	15.466	0.000	
		2	0.444	-0.292	21.066	0.000	
		3	0.112	-0.256	21.441	0.000	
		4	-0.203	-0.251	22.727	0.000	
		5	-0.305	0.212	25.788	0.000	
		6	-0.359	-0.197	30.254	0.000	
		7	-0.363	-0.150	35.084	0.000	
		8	-0.286	-0.012	38.265	0.000	
		9	-0.174	0.136	39.522	0.000	
		10	-0.039	-0.037	39.591	0.000	
		11	0.116	0.061	40.241	0.000	
		12	0.238	0.081	43.197	0.000	

The pattern indicates that the time series data is stationary and from lag 3 the series is statistically significant. The correlogram only has a spike at lag 1 and 2 and the Q-stat are significant at all lags, which indicates significant serial correlation in the residuals.

Pairwise Granger Causality Tests

Date: 06/10/20 Time: 13:28

Sample: 1994 2017

Lags: 2

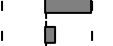
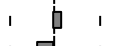
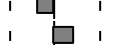
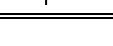
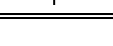
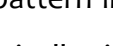
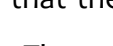
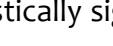
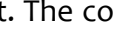
Null Hypothesis:	Obs	F-Statistic	Prob.
CENTRAL_GOVERNMENT_DEBT__TOTAL____OF_GDP_ does not Granger Cause REAL_INTEREST_RATE____	22	1.47511	0.2566
REAL_INTEREST_RATE____ does not Granger Cause CENTRAL_GOVERNMENT_DEBT__TOTAL____OF_GDP_		0.25232	0.7799
BUDGET_DEFICIT_GDP does not Granger Cause REAL_INTEREST_RATE____	21	0.12217	0.8858
REAL_INTEREST_RATE____ does not Granger Cause BUDGET_DEFICIT_GDP		0.49450	0.6189
BUDGET_DEFICIT_GDP does not Granger Cause CENTRAL_GOVERNMENT_DEBT__TOTAL____OF_GDP_	21	1.20190	0.3264
CENTRAL_GOVERNMENT_DEBT__TOTAL____OF_GDP_ does not Granger Cause BUDGET_DEFICIT_GDP		12.8395	0.0005

Real interest rates, debt:GDP, budget deficit:GDP

Date: 06/10/20 Time: 13:29

Sample: 1994 2017

Included observations: 24

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	0.545	0.545	8.0569	0.005
		2	0.419	0.174	13.035	0.001
		3	0.087	-0.288	13.259	0.004
		4	0.059	0.072	13.366	0.010
		5	-0.137	-0.154	13.985	0.016
		6	0.004	0.177	13.986	0.030
		7	-0.145	-0.183	14.755	0.039
		8	-0.118	-0.115	15.302	0.054
		9	-0.322	-0.208	19.624	0.020
		10	-0.288	-0.081	23.317	0.010
		11	-0.384	-0.074	30.387	0.001
		12	-0.212	0.015	32.728	0.001

The pattern indicates that the time series data is stationary and from lag 3 the series is statistically significant. The correlogram only has a spike at lag 1 and 2 and the Q-stat are significant at all lags, which indicates significant serial correlation in the residuals.

Pairwise Granger Causality Tests

Date: 06/10/20 Time: 13:31

Sample: 1994 2017

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
GDP_GROWTH__ANNUAL__ does not Granger Cause REAL_INTEREST_RATE__	22	0.83313	0.4517
REAL_INTEREST_RATE__ does not Granger Cause GDP_GROWTH__ANNUAL__		2.75339	0.0921

GDP growth and real interest rates

Date: 06/10/20 Time: 13:32

Sample: 1994 2017

Included observations: 24

Autocorrelation	Partial Correlation	AC	PAC	Q-Stat	Prob
		1 0.545	0.545	8.0569	0.005
		2 0.419	0.174	13.035	0.001
		3 0.087	-0.288	13.259	0.004
		4 0.059	0.072	13.366	0.010
		5 -0.137	-0.154	13.985	0.016
		6 0.004	0.177	13.986	0.030
		7 -0.145	-0.183	14.755	0.039
		8 -0.118	-0.115	15.302	0.054
		9 -0.322	-0.208	19.624	0.020
		10 -0.288	-0.081	23.317	0.010
		11 -0.384	-0.074	30.387	0.001
		12 -0.212	0.015	32.728	0.001

The pattern indicates that the time series data is stationary and from lag 3 the series is statistically significant. The correlogram only has a spike at lag 1 and 2 and the Q-stat are significant at all lags, which indicates significant serial correlation in the residuals.

Mexico

Pairwise Granger Causality Tests

Date: 03/25/23 Time: 12:47

Sample: 1994 2017

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
DEBT_GDP does not Granger Cause GDP_GROWTH__ANNUAL__	22	0.14314	0.8677
GDP_GROWTH__ANNUAL__ does not Granger Cause DEBT_GDP		0.22085	0.8041

Debt:GDP and GDP growth

Date: 06/10/20 Time: 13:37

Sample: 1994 2017

Included observations: 24

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	0.843	0.843	19.297	0.000
		2	0.691	-0.070	32.840	0.000
		3	0.514	-0.176	40.683	0.000
		4	0.347	-0.083	44.437	0.000
		5	0.198	-0.051	45.727	0.000
		6	0.064	-0.074	45.870	0.000
		7	0.005	0.139	45.871	0.000
		8	0.023	0.206	45.892	0.000
		9	-0.011	-0.254	45.897	0.000
		10	-0.052	-0.151	46.019	0.000
		11	-0.121	-0.122	46.720	0.000
		12	-0.181	-0.041	48.431	0.000

The pattern indicates that the time series data is stationary and from lag 4 the series is statistically significant. The correlogram only has a spike at lag 1 to 3 and the Q-stat are significant at all lags, which indicates significant serial correlation in the residuals.

Pairwise Granger Causality Tests

Date: 06/10/20 Time: 13:39

Sample: 1994 2017

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
DEBT_GDP does not Granger Cause REAL_INTEREST_RATE____	22	2.23974	0.1370
REAL_INTEREST_RATE____ does not Granger Cause DEBT_GDP		5.03471	0.0192
BUDGET_DEFICIT_GDP does not Granger Cause REAL_INTEREST_RATE____	22	0.97289	0.3981
REAL_INTEREST_RATE____ does not Granger Cause BUDGET_DEFICIT_GDP		0.43633	0.6534
BUDGET_DEFICIT_GDP does not Granger Cause DEBT_GDP	22	5.62534	0.0133
DEBT_GDP does not Granger Cause BUDGET_DEFICIT_GDP		0.45311	0.6431

Real interest rates, debt:GDP, budget deficit:GDP

Date: 06/10/20 Time: 13:40

Sample: 1994 2017

Included observations: 24

Autocorrelation		Partial Correlation		AC	PAC	Q-Stat	Prob
		1	0.597	0.597	9.6596	0.002	
		2	0.361	0.007	13.347	0.001	
		3	0.396	0.276	17.998	0.000	
		4	0.355	0.021	21.922	0.000	
		5	0.233	-0.037	23.699	0.000	
		6	0.154	-0.046	24.517	0.000	
		7	0.094	-0.070	24.842	0.001	
		8	-0.044	-0.184	24.919	0.002	
		9	-0.127	-0.082	25.594	0.002	
		10	-0.066	0.082	25.789	0.004	
		11	-0.117	-0.083	26.441	0.006	
		12	-0.156	0.050	27.699	0.006	

The pattern indicates that the time series data is stationary and from lag 2 the series is statistically significant. The correlogram only has a spike at lag 1 and the Q-stat are significant at all lags, which indicates significant serial correlation in the residuals.

Pairwise Granger Causality Tests

Date: 06/10/20 Time: 13:41

Sample: 1994 2017

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
GDP_GROWTH__ANNUAL__ does not Granger Cause REAL_INTEREST_RATE__	22	11.0773	0.0008
REAL_INTEREST_RATE__ does not Granger Cause GDP_GROWTH__ANNUAL__		1.54226	0.2424

GDP growth and real interest rates

Date: 06/10/20 Time: 13:43

Sample: 1994 2017

Included observations: 24

Autocorrelation		Partial Correlation		AC	PAC	Q-Stat	Prob
		1	0.597	0.597	9.6596	0.002	
		2	0.361	0.007	13.347	0.001	
		3	0.396	0.276	17.998	0.000	
		4	0.355	0.021	21.922	0.000	
		5	0.233	-0.037	23.699	0.000	
		6	0.154	-0.046	24.517	0.000	
		7	0.094	-0.070	24.842	0.001	
		8	-0.044	-0.184	24.919	0.002	
		9	-0.127	-0.082	25.594	0.002	
		10	-0.066	0.082	25.789	0.004	
		11	-0.117	-0.083	26.441	0.006	
		12	-0.156	0.050	27.699	0.006	

The pattern indicates that the time series data is stationary and from lag 2 the series is statistically significant. The correlogram only has a spike at lag 1 and the Q-stat are significant at all lags, which indicates significant serial correlation in the residuals.

RSA

Pairwise Granger Causality Tests

Date: 03/25/23 Time: 12:48

Sample: 1994 2017

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
DEBT_GDP does not Granger Cause GDP_Y_O_Y_GROWTH_RATE	22	0.24065	0.7887
GDP_Y_O_Y_GROWTH_RATE does not Granger Cause DEBT_GDP		1.23056	0.3169

Debt:GDP and GDP growth

Date: 06/10/20 Time: 13:45

Sample: 1994 2017

Included observations: 24

Autocorrelation	Partial Correlation	AC	PAC	Q-Stat	Prob
		1 0.873	0.873	20.700	0.000
		2 0.693	-0.295	34.321	0.000
		3 0.479	-0.219	41.130	0.000
		4 0.248	-0.189	43.042	0.000
		5 0.019	-0.153	43.054	0.000
		6 -0.200	-0.188	44.442	0.000
		7 -0.388	-0.129	49.962	0.000
		8 -0.531	-0.114	60.958	0.000
		9 -0.577	0.149	74.788	0.000
		10 -0.554	0.012	88.486	0.000
		11 -0.494	-0.089	100.21	0.000
		12 -0.431	-0.226	109.89	0.000

The pattern indicates that the time series data is stationary and from lag 4 to 6 on the autocorrelation the series is statistically significant and lag 2 on the partial correlation the series is statistically significant. The correlogram spikes at lag 1 to 3 and again from lag 7 to 12 on the autocorrelation, and only spikes on lag 1 on the partial correlation. The Q-stat are significant at all lags, which indicates significant serial correlation in the residuals.

Pairwise Granger Causality Tests

Date: 06/10/20 Time: 13:47

Sample: 1994 2017

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
DEBT_GDP does not Granger Cause REAL_INTEREST_RATE____	21	2.02182	0.1649
REAL_INTEREST_RATE____ does not Granger Cause DEBT_GDP		0.20525	0.8166
BUDGET_DEFICIT__GDP does not Granger Cause REAL_INTEREST_RATE____	21	0.98891	0.3936
REAL_INTEREST_RATE____ does not Granger Cause BUDGET_DEFICIT__GDP		1.03497	0.3778
BUDGET_DEFICIT__GDP does not Granger Cause DEBT_GDP	22	7.15648	0.0056
DEBT_GDP does not Granger Cause BUDGET_DEFICIT__GDP		0.10844	0.8978

Real interest rates, debt:GDP, budget deficit:GDP

Date: 06/10/20 Time: 13:48

Sample (adjusted): 1994 2016

Included observations: 23 after adjustments

Autocorrelation	Partial Correlation	AC	PAC	Q-Stat	Prob	
		1	0.728	0.728	13.857	0.000
		2	0.518	-0.026	21.198	0.000
		3	0.418	0.106	26.211	0.000
		4	0.224	-0.240	27.734	0.000
		5	0.153	0.137	28.478	0.000
		6	0.112	-0.047	28.905	0.000
		7	-0.046	-0.207	28.980	0.000
		8	-0.108	0.010	29.423	0.000
		9	-0.058	0.148	29.560	0.001
		10	-0.159	-0.245	30.679	0.001
		11	-0.226	-0.086	33.121	0.001
		12	-0.280	-0.170	37.214	0.000

The pattern indicates that the time series data is stationary and from lag 3 the series is statistically significant. The correlogram only has a spike at lag 1 to 2 and the Q-stat are significant at all lags, which indicates significant serial correlation in the residuals.

Pairwise Granger Causality Tests

Date: 06/10/20 Time: 13:49

Sample: 1994 2017

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
GDP_Y_O_Y_GROWTH_RATE does not Granger Cause REAL_INTEREST_RATE____	21	0.10230	0.9033
REAL_INTEREST_RATE____ does not Granger Cause GDP_Y_O_Y_GROWTH_RATE		0.10882	0.8976

GDP growth and real interest rates

Date: 06/10/20 Time: 13:50

Sample (adjusted): 1994 2016

Included observations: 23 after adjustments

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	0.728	0.728	13.857	0.000
		2	0.518	-0.026	21.198	0.000
		3	0.418	0.106	26.211	0.000
		4	0.224	-0.240	27.734	0.000
		5	0.153	0.137	28.478	0.000
		6	0.112	-0.047	28.905	0.000
		7	-0.046	-0.207	28.980	0.000
		8	-0.108	0.010	29.423	0.000
		9	-0.058	0.148	29.560	0.001
		10	-0.159	-0.245	30.679	0.001
		11	-0.226	-0.086	33.121	0.001
		12	-0.280	-0.170	37.214	0.000

The pattern indicates that the time series data is stationary and from lag 3 the series is statistically significant. The correlogram only has a spike at lag 1 and 2 and the Q-stat are significant at all lags, which indicates significant serial correlation in the residuals.

Russia

Pairwise Granger Causality Tests

Date: 03/25/23 Time: 12:52

Sample: 1994 2017

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
CENTRAL_GOVERNMENT_DEBT__TOTAL____OF_GDP_ does not Granger Cause GDP_GROWTH__ANNUAL____	15	0.58414	0.5755
GDP_GROWTH__ANNUAL____ does not Granger Cause CENTRAL_GOVERNMENT_DEBT__TOTAL____OF_GDP_		2.02958	0.1821

Debt:GDP and GDP growth

Date: 06/10/20 Time: 13:52

Sample (adjusted): 1998 2017

Included observations: 19 after adjustments

Included observations: 12 after adjustments		AC	PAC	Q-Stat	Prob	
Autocorrelation	Partial Correlation					
		1	0.640	0.640	9.0911	0.003
		2	0.380	-0.051	12.483	0.002
		3	0.237	0.024	13.887	0.003
		4	0.111	-0.066	14.213	0.007
		5	0.059	0.030	14.312	0.014
		6	-0.017	-0.088	14.321	0.026
		7	-0.077	-0.043	14.517	0.043
		8	-0.132	-0.080	15.150	0.056
		9	-0.159	-0.030	16.159	0.064
		10	-0.171	-0.051	17.454	0.065
		11	-0.174	-0.034	18.958	0.062
		12	-0.184	-0.067	20.883	0.052

The pattern indicates that the time series data is stationary and from lag 2 the series is statistically significant. The correlogram only has a spike at lag 1 and the Q-stat are significant at all lags, which indicates significant serial correlation in the residuals.

Pairwise Granger Causality Tests

Date: 06/10/20 Time: 13:53

Sample: 1994 2017

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
CENTRAL_GOVERNMENT_DEBT__TOTAL__OF_GDP_ does not Granger Cause REAL_INTEREST_RATE__	3	NA	NA
REAL_INTEREST_RATE__ does not Granger Cause CENTRAL_GOVERNMENT_DEBT__TOTAL__OF_GDP_		NA	NA
BUDGET_DEFICIT_GDP does not Granger Cause REAL_INTEREST_RATE__	3	NA	NA
REAL_INTEREST_RATE__ does not Granger Cause BUDGET_DEFICIT_GDP		NA	NA
BUDGET_DEFICIT_GDP does not Granger Cause CENTRAL_GOVERNMENT_DEBT__TOTAL__OF_GDP_	15	2.94744	0.0986
CENTRAL_GOVERNMENT_DEBT__TOTAL__OF_GDP_ does not Granger Cause BUDGET_DEFICIT_GDP		0.15286	0.8602

Real interest rates, debt:GDP, budget deficit:GDP

Date: 06/10/20 Time: 13:55

Sample (adjusted): 1997 2016

Included observations: 9 after adjustments

Autocorrelation	Partial Correlation	AC	PAC	Q-Stat	Prob
		1 0.118	0.118	0.1719	0.678
		2 -0.379	-0.399	2.2072	0.332
		3 -0.066	0.052	2.2796	0.516
		4 -0.047	-0.237	2.3239	0.676
		5 -0.033	0.009	2.3515	0.799
		6 0.000	-0.131	2.3515	0.885
		7 0.000	-0.005	2.3515	0.938
		8 0.000	-0.074	2.3515	0.968

The pattern indicates that the time series data is stationary and from lag 1 the series is statistically significant. The Q-stat are significant from lag 2, which indicates significant serial correlation in the residuals.

Pairwise Granger Causality Tests

Date: 06/10/20 Time: 13:59

Sample: 1994 2017

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
GDP_GROWTH__ANNUAL___ does not Granger Cause REAL_INTEREST_RATES	22	8.05255	0.0035
REAL_INTEREST_RATES does not Granger Cause GDP_GROWTH__ANNUAL___		0.45612	0.6413

GDP growth and real interest rates

Date: 06/10/20 Time: 13:58

Sample: 1994 2017

Included observations: 24

Autocorrelation	Partial Correlation	AC	PAC	Q-Stat	Prob	
		1	0.392	0.392	4.1784	0.041
		2	0.200	0.055	5.3171	0.070
		3	0.131	0.042	5.8259	0.120
		4	0.177	0.125	6.8079	0.146
		5	-0.111	-0.276	7.2162	0.205
		6	-0.107	-0.008	7.6115	0.268
		7	-0.047	0.035	7.6912	0.361
		8	-0.185	-0.229	9.0219	0.340
		9	-0.376	-0.222	14.907	0.094
		10	-0.297	-0.078	18.843	0.042
		11	-0.097	0.090	19.296	0.056
		12	-0.236	-0.180	22.190	0.035

The pattern indicates that the time series data is stationary and from lag 1 the series is statistically significant. The the Q-stat are significant at all lags, which indicates significant serial correlation in the residuals.

Turkey

Pairwise Granger Causality Tests

Date: 03/25/23 Time: 12:53

Sample: 1994 2017

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
CENTRAL_GOVERNMENT_DEBT__TOTAL___OF_GDP_ does not Granger Cause GDP_GROWTH__ANNUAL___	22	0.82530	0.4549
GDP_GROWTH__ANNUAL___ does not Granger Cause CENTRAL_GOVERNMENT_DEBT__TOTAL___OF_GDP_		2.56271	0.1065

Debt:GDP and GDP growth

Date: 06/10/20 Time: 14:08

Sample: 1994 2017

Included observations: 24

Autocorrelation	Partial Correlation	AC	PAC	Q-Stat	Prob	
		1	0.741	0.741	14.893	0.000
		2	0.408	-0.313	19.609	0.000
		3	0.163	-0.004	20.400	0.000
		4	-0.086	-0.284	20.630	0.000
		5	-0.217	0.081	22.178	0.000
		6	-0.199	0.051	23.547	0.001
		7	-0.097	0.116	23.890	0.001
		8	0.022	0.009	23.909	0.002
		9	0.080	-0.084	24.175	0.004
		10	-0.006	-0.270	24.177	0.007
		11	-0.157	-0.122	25.363	0.008
		12	-0.266	-0.014	29.032	0.004

The pattern indicates that the time series data is stationary and from lag 2 the series is statistically significant. The correlogram only has a spike at lag 1 and 2 and the Q-stat are significant at all lags, which indicates significant serial correlation in the residuals.

Pairwise Granger Causality Tests

Date: 06/10/20 Time: 14:10

Sample: 1994 2017

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
CENTRAL_GOVERNMENT_DEBT__TOTAL____OF_GDP_ does not Granger Cause BUDGET_DEFICIT__GDP	15	3.67918	0.0635
BUDGET_DEFICIT__GDP does not Granger Cause CENTRAL_GOVERNMENT_DEBT__TOTAL____OF_GDP_		0.03191	0.9687

Debt:GDP and budget deficit:GDP

Date: 06/10/20 Time: 14:11

Sample (adjusted): 2001 2017

Included observations: 17 after adjustments

Autocorrelation		Partial Correlation		AC	PAC	Q-Stat	Prob
		1	0.384	0.384	2.9757	0.085	
		2	0.246	0.116	4.2794	0.118	
		3	0.017	-0.131	4.2864	0.232	
		4	-0.085	-0.096	4.4640	0.347	
		5	-0.092	-0.006	4.6894	0.455	
		6	-0.045	0.035	4.7485	0.576	
		7	-0.034	-0.021	4.7858	0.686	
		8	0.031	0.038	4.8200	0.777	
		9	-0.031	-0.069	4.8578	0.847	
		10	-0.103	-0.114	5.3440	0.867	
		11	-0.106	-0.023	5.9489	0.877	
		12	-0.146	-0.066	7.3287	0.835	

The pattern indicates that the time series data is stationary and from lag 1 the series is statistically significant. The Q-stat are significant at all lags, which indicates significant serial correlation in the residuals.

11.2 Govt debt, pvt sector investment and lending rates

Russia: Govt debt, pvt sector investment and lending rates

Pairwise Granger Causality Tests

Date: 06/10/20 Time: 14:23

Sample: 1995 2017

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
GROSS_FIXED_CAPITAL_FORMATION__PRIVATE_SECTOR____OF_GDP_ does not Granger Cause GOVERNMENT_DEBT_GDP	14	4.42629	0.0459
GOVERNMENT_DEBT_GDP does not Granger Cause GROSS_FIXED_CAPITAL_FORMATION__PRIVATE_SECTOR____OF_GDP_		0.17535	0.8420

Debt:GDP and private sector investment

Date: 06/10/20 Time: 14:30

Sample (adjusted): 1998 2016

Included observations: 19 after adjustments

Included observations: 12 after adjustments		AC	PAC	Q-Stat	Prob	
Autocorrelation	Partial Correlation					
		1	0.640	0.640	9.0840	0.003
		2	0.373	-0.062	12.358	0.002
		3	0.223	0.014	13.593	0.004
		4	0.076	-0.099	13.746	0.008
		5	-0.000	-0.003	13.746	0.017
		6	-0.060	-0.060	13.858	0.031
		7	-0.116	-0.060	14.306	0.046
		8	-0.144	-0.042	15.054	0.058
		9	-0.156	-0.039	16.019	0.066
		10	-0.160	-0.042	17.154	0.071
		11	-0.173	-0.068	18.644	0.068
		12	-0.184	-0.061	20.570	0.057

The pattern indicates that the time series data is stationary and from lag 2 the series is statistically significant. The correlogram only has a spike at lag 1 and the Q-stat are significant at all lags, which indicates significant serial correlation in the residuals.

Pairwise Granger Causality Tests

Date: 06/10/20 Time: 14:31

Sample: 1995 2017

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
GROSS_FIXED_CAPITAL_FORMATION__PRIVATE_SECTOR____OF_GDP_ does not Granger Cause LENDING_INTEREST_RATE____	2	NA	NA
LENDING_INTEREST_RATE____ does not Granger Cause GROSS_FIXED_CAPITAL_FORMATION__PRIVATE_SECTOR____OF_GDP_		NA	NA

RSA: Govt debt, pvt sector investment and lending rates

Pairwise Granger Causality Tests

Date: 06/10/20 Time: 17:20

Sample: 1995 2017

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
GROSS_FIXED_CAPITAL_FORMATION__PRIVATE_SECTOR____OF_GDP_ does not Granger Cause GOVERNMENT_DEBT_GDP	21	4.60713	0.0263
GOVERNMENT_DEBT_GDP does not Granger Cause GROSS_FIXED_CAPITAL_FORMATION__PRIVATE_SECTOR____OF_GDP_		1.08081	0.3628

Debt:GDP and private sector investment

Date: 06/10/20 Time: 17:21

Sample: 1995 2017

Included observations: 23

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	0.863	0.863	19.453	0.000
		2	0.674	-0.275	31.888	0.000
		3	0.451	-0.225	37.726	0.000
		4	0.208	-0.207	39.041	0.000
		5	-0.019	-0.115	39.052	0.000
		6	-0.232	-0.181	40.873	0.000
		7	-0.427	-0.217	47.433	0.000
		8	-0.539	0.049	58.567	0.000
		9	-0.582	-0.019	72.490	0.000
		10	-0.549	0.041	85.839	0.000
		11	-0.477	-0.094	96.724	0.000
		12	-0.398	-0.171	105.02	0.000

The pattern indicates that the time series data is stationary and from lag 4 to 6 on the autocorrelation the series is statistically significant and lag 2 on the partial correlation the series is statistically significant. The correlogram only fall within the 95% confidence level at lag 3 – 5 on the autocorrelation and spikes only at lag 1 on the partial correlation, the Q-stat are significant at all lags, which indicates significant serial correlation in the residuals.

Pairwise Granger Causality Tests

Date: 06/10/20 Time: 17:23

Sample: 1995 2017

Lags: 2

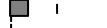
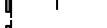
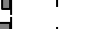
Null Hypothesis:	F- Obs	Statistic	Prob.
GROSS_FIXED_CAPITAL_FORMATION__PRIVATE_SECTOR____OF_GDP_ does not Granger Cause LENDING_INTEREST_RATES____	21	0.55795	0.5831
LENDING_INTEREST_RATES____ does not Granger Cause GROSS_FIXED_CAPITAL_FORMATION__PRIVATE_SECTOR____OF_GDP_		3.53277	0.0536

Private sector investment and lending interest rates

Date: 06/10/20 Time: 17:25

Sample: 1995 2017

Included observations: 23

Autocorrelation		Partial Correlation		AC	PAC	Q-Stat	Prob
		1	0.868	0.868	19.689	0.000	
		2	0.671	-0.335	32.005	0.000	
		3	0.486	-0.001	38.803	0.000	
		4	0.328	-0.050	42.052	0.000	
		5	0.166	-0.174	42.931	0.000	
		6	0.044	0.076	42.996	0.000	
		7	-0.019	0.061	43.008	0.000	
		8	-0.026	0.073	43.033	0.000	
		9	-0.037	-0.117	43.088	0.000	
		10	-0.068	-0.103	43.295	0.000	
		11	-0.134	-0.181	44.150	0.000	
		12	-0.236	-0.222	47.059	0.000	

The pattern indicates that the time series data is stationary and from lag 3 the series is statistically significant. The correlogram only has a spike at lag 1 to 3 and the Q-stat are significant at all lags, which indicates significant serial correlation in the residuals.

Pairwise Granger Causality Tests

Date: 06/10/20 Time: 17:26

Sample: 1995 2017

Lags: 2

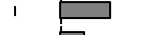
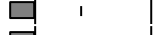
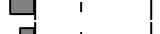
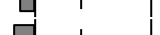
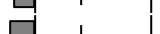
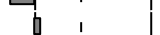
Null Hypothesis:	Obs	F-Statistic	Prob.
LENDING_INTEREST_RATES_____ does not Granger Cause GOVERNMENT_DEBT_GDP	21	0.61506	0.5529
GOVERNMENT_DEBT_GDP does not Granger Cause LENDING_INTEREST_RATES_____		1.93492	0.1768

Debt:GDP and lending interest rates

Date: 06/10/20 Time: 17:27

Sample: 1995 2017

Included observations: 23

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	0.863	0.863	19.453	0.000
		2	0.674	-0.275	31.888	0.000
		3	0.451	-0.225	37.726	0.000
		4	0.208	-0.207	39.041	0.000
		5	-0.019	-0.115	39.052	0.000
		6	-0.232	-0.181	40.873	0.000
		7	-0.427	-0.217	47.433	0.000
		8	-0.539	0.049	58.567	0.000
		9	-0.582	-0.019	72.490	0.000
		10	-0.549	0.041	85.839	0.000
		11	-0.477	-0.094	96.724	0.000
		12	-0.398	-0.171	105.02	0.000

The pattern indicates that the time series data is stationary and from lag 4 to 6 on the autocorrelation the series is statistically significant and lag 2 on the partial correlation the series is statistically significant. The correlogram only fall within the 95% confidence level at lag 4 – 6 on the autocorrelation and spikes only at lag 1 on the partial correlation, the Q-stat are significant at all lags, which indicates significant serial correlation in the residuals.

India: Govt debt, pvt sector investment and lending rates

Pairwise Granger Causality Tests

Date: 06/10/20 Time: 17:29

Sample: 1994 2017

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
GROSS_FIXED_CAPITAL_FORMATION__PRIVATE_SECTOR____OF_GDP_ does not Granger Cause GOVERNMENT_DEBT_GDP	20	0.37144	0.6959
GOVERNMENT_DEBT_GDP does not Granger Cause GROSS_FIXED_CAPITAL_FORMATION__PRIVATE_SECTOR____OF_GDP_		1.02354	0.3831

Debt:GDP and private sector investment

Date: 06/10/20 Time: 17:30

Sample (adjusted): 1995 2016

Included observations: 22 after adjustments

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	0.723	0.723	13.133	0.000
		2	0.375	-0.307	16.855	0.000
		3	0.049	-0.194	16.921	0.001
		4	-0.284	-0.338	19.292	0.001
		5	-0.373	0.199	23.603	0.000
		6	-0.390	-0.212	28.621	0.000
		7	-0.351	-0.049	32.969	0.000
		8	-0.224	-0.082	34.868	0.000
		9	-0.067	0.171	35.049	0.000
		10	0.105	0.008	35.535	0.000
		11	0.259	0.108	38.752	0.000
		12	0.324	-0.042	44.307	0.000

The pattern indicates that the time series data is stationary and from lag 2 the series is statistically significant. The correlogram only has a spike at lag 1 and the Q-stat are significant at all lags, which indicates significant serial correlation in the residuals.

Pairwise Granger Causality Tests

Date: 06/10/20 Time: 17:31

Sample: 1994 2017

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
LENDING_INTEREST_RATE___ does not Granger Cause			
GROSS_FIXED_CAPITAL_FORMATION_PRIVATE_SECTOR___OF_GDP_	21	0.12631	0.8822
GROSS_FIXED_CAPITAL_FORMATION_PRIVATE_SECTOR___OF_GDP_ does not Granger Cause			
LENDING_INTEREST_RATE___		0.10831	0.8980

Private sector investment and lending interest rates

Date: 06/10/20 Time: 17:31

Sample (adjusted): 1995 2017

Included observations: 23 after adjustments

Autocorrelation		Partial Correlation		AC	PAC	Q-Stat	Prob
		1	0.863	0.863	19.456	0.000	
		2	0.703	-0.161	33.001	0.000	
		3	0.550	-0.063	41.696	0.000	
		4	0.375	-0.191	45.945	0.000	
		5	0.220	-0.030	47.487	0.000	
		6	0.058	-0.176	47.600	0.000	
		7	-0.091	-0.075	47.895	0.000	
		8	-0.286	-0.396	51.027	0.000	
		9	-0.448	-0.060	59.259	0.000	
		10	-0.480	0.289	69.455	0.000	
		11	-0.472	0.067	80.130	0.000	
		12	-0.424	0.032	89.530	0.000	

The pattern indicates that the time series data is stationary and from lag 4 to 8 on the autocorrelation the series is statistically significant and lag 2 on the partial correlation the series is statistically significant. The correlogram only fall within the 95% confidence level at lag 4 – 8 on the autocorrelation and spikes only at lag 1 on the partial correlation, the Q-stat are significant at all lags, which indicates significant serial correlation in the residuals.

Pairwise Granger Causality Tests

Date: 06/10/20 Time: 17:33

Sample: 1994 2017

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
GOVERNMENT_DEBT_GDP does not Granger Cause LENDING_INTEREST_RATE_____	20	0.60994	0.5563
LENDING_INTEREST_RATE_____ does not Granger Cause GOVERNMENT_DEBT_GDP		1.68099	0.2194

Debt:GDP and lending interest rates

Date: 06/10/20 Time: 17:34

Sample (adjusted): 1995 2017

Included observations: 23 after adjustments

Autocorrelation		Partial Correlation		AC	PAC	Q-Stat	Prob
		1	0.792	0.792	16.392	0.000	
		2	0.512	-0.308	23.581	0.000	
		3	0.263	-0.070	25.574	0.000	
		4	0.172	0.242	26.473	0.000	
		5	0.121	-0.126	26.941	0.000	
		6	0.061	-0.104	27.066	0.000	
		7	-0.049	-0.092	27.151	0.000	
		8	-0.104	0.096	27.567	0.001	
		9	-0.082	0.077	27.844	0.001	
		10	-0.004	0.013	27.845	0.002	
		11	0.061	0.035	28.024	0.003	
		12	0.077	-0.017	28.331	0.005	

The pattern indicates that the time series data is stationary and from lag 3 the series is statistically significant. The correlogram only has a spike at lag 1 and 2 and the Q-stat are significant at all lags, which indicates significant serial correlation in the residuals.

Mexico: Govt debt, pvt sector investment and lending rates

Pairwise Granger Causality Tests

Date: 06/10/20 Time: 17:43

Sample: 1995 2017

Lags: 2

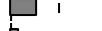
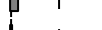
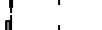
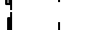
Null Hypothesis:	Obs	F-Statistic	Prob.
GROSS_FIXED_CAPITAL_FORMATION__PRIVATE_SECTOR____OF_GDP_ does not Granger Cause GOVERNMENT_DEBT_GDP	17	0.76676	0.4860
GOVERNMENT_DEBT_GDP does not Granger Cause GROSS_FIXED_CAPITAL_FORMATION__PRIVATE_SECTOR____OF_GDP_		0.17222	0.8438

Debt:GDP and private sector investment

Date: 06/10/20 Time: 17:44

Sample (adjusted): 1995 2016

Included observations: 21 after adjustments

Autocorrelation		Partial Correlation		AC	PAC	Q-Stat	Prob
		1	0.831	0.831	16.693	0.000	
		2	0.620	-0.229	26.480	0.000	
		3	0.425	-0.064	31.320	0.000	
		4	0.232	-0.140	32.852	0.000	
		5	0.079	-0.018	33.040	0.000	
		6	0.004	0.096	33.040	0.000	
		7	-0.039	-0.035	33.094	0.000	
		8	-0.020	0.133	33.108	0.000	
		9	-0.003	-0.095	33.108	0.000	
		10	-0.044	-0.186	33.192	0.000	
		11	-0.080	0.023	33.500	0.000	
		12	-0.132	-0.111	34.441	0.001	

The pattern indicates that the time series data is stationary and from lag 3 the series is statistically significant. The correlogram only has a spike at lag 1 and 2 and the Q-stat are significant at all lags, which indicates significant serial correlation in the residuals.

Pairwise Granger Causality Tests

Date: 06/10/20 Time: 17:44

Sample: 1995 2017

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
GROSS_FIXED_CAPITAL_FORMATION__PRIVATE_SECTOR____OF_GDP_ does not Granger Cause LENDING_INTEREST_RATE____	21	1.65542	0.2221
LENDING_INTEREST_RATE____ does not Granger Cause GROSS_FIXED_CAPITAL_FORMATION__PRIVATE_SECTOR____OF_GDP_		0.29795	0.7464

Private sector investment and lending interest rates

Date: 06/10/20 Time: 17:45

Sample: 1995 2017

Included observations: 23

Autocorrelation		Partial Correlation		AC	PAC	Q-Stat	Prob
		1	0.665	0.665	11.566	0.001	
		2	0.423	-0.035	16.460	0.000	
		3	0.376	0.195	20.534	0.000	
		4	0.268	-0.096	22.715	0.000	
		5	0.131	-0.071	23.260	0.000	
		6	0.031	-0.082	23.293	0.001	
		7	-0.047	-0.069	23.373	0.001	
		8	-0.078	0.012	23.603	0.003	
		9	-0.074	0.024	23.830	0.005	
		10	-0.075	0.009	24.079	0.007	
		11	-0.118	-0.088	24.749	0.010	
		12	-0.134	-0.031	25.692	0.012	

The pattern indicates that the time series data is stationary and from lag 2 the series is statistically significant. The correlogram only has a spike at lag 1 and the Q-stat are significant at all lags, which indicates significant serial correlation in the residuals.

Pairwise Granger Causality Tests

Date: 06/10/20 Time: 17:46

Sample: 1995 2017

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
LENDING_INTEREST_RATE_____ does not Granger Cause GOVERNMENT_DEBT_GDP	17	0.54608	0.5930
GOVERNMENT_DEBT_GDP does not Granger Cause LENDING_INTEREST_RATE_____		2.45002	0.1282

Debt:GDP and lending interest rates

Date: 06/10/20 Time: 17:47

Sample (adjusted): 1995 2016

Included observations: 21 after adjustments

Autocorrelation		Partial Correlation		AC	PAC	Q-Stat	Prob
		1	0.831	0.831	16.693	0.000	
		2	0.620	-0.229	26.480	0.000	
		3	0.425	-0.064	31.320	0.000	
		4	0.232	-0.140	32.852	0.000	
		5	0.079	-0.018	33.040	0.000	
		6	0.004	0.096	33.040	0.000	
		7	-0.039	-0.035	33.094	0.000	
		8	-0.020	0.133	33.108	0.000	
		9	-0.003	-0.095	33.108	0.000	
		10	-0.044	-0.186	33.192	0.000	
		11	-0.080	0.023	33.500	0.000	
		12	-0.132	-0.111	34.441	0.001	

The pattern indicates that the time series data is stationary and from lag 3 the series is statistically significant. The correlogram only has a spike at lag 1 and 2 and the Q-stat are significant at all lags, which indicates significant serial correlation in the residuals.

11.3 Fixed capital formation covariance

Brazil: government gross capital formations and changes in public debt

Pairwise Granger Causality Tests

Date: 06/11/20 Time: 13:02

Sample: 1994 2017

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
DEBT_GDP does not Granger Cause GROSS_FIXED_CAPITAL_FORMATION____OF_GDP_	10	0.19322	0.8302
GROSS_FIXED_CAPITAL_FORMATION____OF_GDP_ does not Granger Cause DEBT_GDP		1.22441	0.3692

Debt:GDP and fixed capital formation:GDP

Date: 06/11/20 Time: 13:04

Sample (adjusted): 1995 2017

Included observations: 23 after adjustments

Included observations: 23 after adjustments		AC	PAC	Q-Stat	Prob	
Autocorrelation	Partial Correlation					
		1	0.655	0.655	11.196	0.001
		2	0.294	-0.235	13.561	0.001
		3	-0.007	-0.168	13.563	0.004
		4	-0.232	-0.165	15.185	0.004
		5	-0.338	-0.092	18.837	0.002
		6	-0.389	-0.163	23.950	0.001
		7	-0.400	-0.173	29.710	0.000
		8	-0.369	-0.163	34.931	0.000
		9	-0.271	-0.094	37.953	0.000
		10	-0.096	-0.002	38.360	0.000
		11	0.001	-0.195	38.360	0.000
		12	0.085	-0.081	38.737	0.000

The pattern indicates that the time series data is stationary and from lag 2 the series is statistically significant. The correlogram only has a spike at lag 1 and the Q-stat are significant at all lags, which indicates significant serial correlation in the residuals.

Brazil: changes government spending and changes in government debt

Pairwise Granger Causality Tests

Date: 06/11/20 Time: 13:05

Sample: 1994 2017

Lags: 2

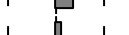
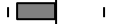
Null Hypothesis:	Obs	F-Statistic	Prob.
DEBT_GDP does not Granger Cause GOVERNMENT_SPENDING	10	1.24574	0.3639
GOVERNMENT_SPENDING does not Granger Cause DEBT_GDP		0.59405	0.5869

Debt:GDP and Govt spending:GDP

Date: 06/11/20 Time: 13:05

Sample (adjusted): 1997 2017

Included observations: 21 after adjustments

Included observations: 11 after adjustments		AC	PAC	Q-Stat	Prob	
Autocorrelation	Partial Correlation					
		1	0.833	0.833	16.770	0.000
		2	0.666	-0.094	28.038	0.000
		3	0.495	-0.110	34.623	0.000
		4	0.406	0.158	39.316	0.000
		5	0.321	-0.065	42.425	0.000
		6	0.159	-0.345	43.244	0.000
		7	0.054	0.147	43.343	0.000
		8	-0.078	-0.192	43.571	0.000
		9	-0.114	0.085	44.093	0.000
		10	-0.177	-0.096	45.465	0.000
		11	-0.264	-0.211	48.835	0.000
		12	-0.337	-0.008	54.928	0.000

The pattern indicates that the time series data is stationary and from lag 4 on the autocorrelation the series is statistically significant and from lag 2 on the partial correlation the series is statistically significant. The correlogram only has a spike at lag 1 to 3 and the Q-stat are significant at all lags, which indicates significant serial correlation in the residuals.

China: government gross capital formations and changes in public debt

Pairwise Granger Causality Tests

Date: 06/11/20 Time: 13:15

Sample: 1994 2017

Lags: 2

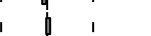
Null Hypothesis:	Obs	F-Statistic	Prob.
GOVERNMENT_DEBT_GDP does not Granger Cause GROSS_FIXED_CAPITAL_FORMATION___OF_GDP_	20	2.83799	0.0901
GROSS_FIXED_CAPITAL_FORMATION___OF_GDP_ does not Granger Cause GOVERNMENT_DEBT_GDP		1.63472	0.2279

Debt:GDP and fixed capital formation:GDP

Date: 06/11/20 Time: 13:16

Sample (adjusted): 1995 2017

Included observations: 23 after adjustments

Autocorrelation		Partial Correlation		AC	PAC	Q-Stat	Prob
		1	0.907	0.907	21.504	0.000	
		2	0.770	-0.298	37.740	0.000	
		3	0.624	-0.078	48.927	0.000	
		4	0.499	0.054	56.469	0.000	
		5	0.368	-0.183	60.803	0.000	
		6	0.221	-0.183	62.455	0.000	
		7	0.069	-0.085	62.627	0.000	
		8	-0.064	-0.029	62.782	0.000	
		9	-0.159	0.033	63.824	0.000	
		10	-0.215	0.063	65.864	0.000	
		11	-0.272	-0.176	69.397	0.000	
		12	-0.355	-0.258	75.993	0.000	

The pattern indicates that the time series data is stationary and from lag 5 on the autocorrelation the series is statistically significant and lag 2 the series is significant. The correlogram only has a spike at lag 1 to 4 and the Q-stat are significant at all lags, which indicates significant serial correlation in the residuals.

China: changes government spending and changes in government debt

Pairwise Granger Causality Tests

Date: 06/11/20 Time: 13:17

Sample: 1994 2017

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
GOVERNMENT_DEBT_GDP does not Granger Cause GOVERNMENT_SPENDING_GDP	20	1.53206	0.2481
GOVERNMENT_SPENDING_GDP does not Granger Cause GOVERNMENT_DEBT_GDP		0.75609	0.4866

Debt:GDP and Govt spending:GDP

Date: 06/11/20 Time: 13:17

Sample (adjusted): 1995 2017

Included observations: 23 after adjustments

Autocorrelation	Partial Correlation	AC	PAC	Q-Stat	Prob
		1 0.844	0.844	18.610	0.000
		2 0.524	-0.653	26.128	0.000
		3 0.189	0.055	27.155	0.000
		4 -0.065	0.005	27.282	0.000
		5 -0.208	-0.041	28.659	0.000
		6 -0.252	-0.028	30.813	0.000
		7 -0.289	-0.371	33.811	0.000
		8 -0.323	0.107	37.820	0.000
		9 -0.340	-0.078	42.573	0.000
		10 -0.324	-0.067	47.211	0.000
		11 -0.270	-0.022	50.716	0.000
		12 -0.189	-0.129	52.585	0.000

The pattern indicates that the time series data is stationary and from lag 3 the series is statistically significant. The correlogram only has a spike at lag 1 and 2 and the Q-stat are significant at all lags, which indicates significant serial correlation in the residuals.

India: government gross capital formations and changes in public debt

Pairwise Granger Causality Tests

Date: 06/11/20 Time: 13:20

Sample: 1994 2017

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.

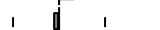
GOVERNMENT_DEBT_GDP does not Granger Cause GROSS_FIXED_CAPITAL_FORMATION____OF_GDP_	20	1.04465	0.3761
GROSS_FIXED_CAPITAL_FORMATION____OF_GDP_ does not Granger Cause GOVERNMENT_DEBT_GDP		0.54371	0.5916

Debt:GDP and fixed capital formation:GDP

Date: 06/11/20 Time: 13:21

Sample (adjusted): 1995 2017

Included observations: 23 after adjustments

Autocorrelation		Partial Correlation		AC	PAC	Q-Stat	Prob
		1	0.892	0.892	20.817	0.000	
		2	0.737	-0.294	35.677	0.000	
		3	0.564	-0.133	44.813	0.000	
		4	0.354	-0.289	48.607	0.000	
		5	0.151	-0.061	49.334	0.000	
		6	-0.032	-0.084	49.370	0.000	
		7	-0.199	-0.099	50.788	0.000	
		8	-0.376	-0.330	56.193	0.000	
		9	-0.499	0.054	66.439	0.000	
		10	-0.508	0.390	77.850	0.000	
		11	-0.476	-0.009	88.699	0.000	
		12	-0.405	-0.059	97.266	0.000	

The pattern indicates that the time series data is stationary and from lag 4 to 8 the series is statistically significant on the autocorrelation, and from lag 2 the series is significant on the partial correlation. The correlogram only fall within the 95% level from lag 4 to 8 on the autocorrelation and only has a spike at lag 1 on the partial correlation. The Q-stat are significant at all lags, which indicates significant serial correlation in the residuals.

India: changes government spending and changes in government debt

Pairwise Granger Causality Tests

Date: 06/11/20 Time: 13:22

Sample: 1994 2017

Lags: 2

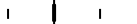
Null Hypothesis:	Obs	F-Statistic	Prob.
GOVERNMENT_DEBT_GDP does not Granger Cause GOVERNMENT_SPEND_GDP	20	1.19479	0.3300
GOVERNMENT_SPEND_GDP does not Granger Cause GOVERNMENT_DEBT_GDP		1.03969	0.3777

Debt:GDP and Govt spending:GDP

Date: 06/11/20 Time: 13:22

Sample (adjusted): 1995 2017

Included observations: 23 after adjustments

Autocorrelation	Partial Correlation	AC	PAC	Q-Stat	Prob
		1 0.709	0.709	13.135	0.000
		2 0.279	-0.449	15.273	0.000
		3 -0.032	-0.003	15.303	0.002
		4 -0.106	0.135	15.643	0.004
		5 -0.034	0.015	15.680	0.008
		6 -0.024	-0.201	15.700	0.015
		7 -0.043	0.092	15.766	0.027
		8 -0.021	0.107	15.783	0.046
		9 0.049	0.008	15.880	0.069
		10 0.113	-0.009	16.445	0.088
		11 0.012	-0.245	16.452	0.125
		12 -0.182	-0.098	18.178	0.110

The pattern indicates that the time series data is stationary and from lag 2 the series is statistically significant. The correlogram only has a spike at lag 1 and the Q-stat are significant at all lags, which indicates significant serial correlation in the residuals.

India: change in gross private sector capital formation and changes in public debt

Pairwise Granger Causality Tests

Date: 06/11/20 Time: 13:23

Sample: 1994 2017

Lags: 2

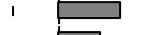
Null Hypothesis:	Obs	F-Statistic	Prob.
GOVERNMENT_DEBT_GDP does not Granger Cause GROSS_FIXED_CAPITAL_FORMATION__PRIVATE_SECTOR____OF_GDP_	20	1.02354	0.3831
GROSS_FIXED_CAPITAL_FORMATION__PRIVATE_SECTOR____OF_GDP_ does not Granger Cause GOVERNMENT_DEBT_GDP		0.37144	0.6959

Debt:GDP and fixed capital formation:GDP

Date: 06/11/20 Time: 13:24

Sample (adjusted): 1995 2017

Included observations: 23 after adjustments

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	0.863	0.863	19.456	0.000
		2	0.703	-0.161	33.001	0.000
		3	0.550	-0.063	41.696	0.000
		4	0.375	-0.191	45.945	0.000
		5	0.220	-0.030	47.487	0.000
		6	0.058	-0.176	47.600	0.000
		7	-0.091	-0.075	47.895	0.000
		8	-0.286	-0.396	51.027	0.000
		9	-0.448	-0.060	59.259	0.000
		10	-0.480	0.289	69.455	0.000
		11	-0.472	0.067	80.130	0.000
		12	-0.424	0.032	89.530	0.000

The pattern indicates that the time series data is stationary and from lag 4 to 8 the series is statistically significant on the autocorrelation, and from lag 2 the series is significant on the partial correlation. The correlogram only fall within the 95% level from lag 4 to 8 on the autocorrelation and only has a spike at lag 1 on the partial correlation. The Q-stat are significant at all lags, which indicates significant serial correlation in the residuals.

Mexico: government gross capital formations and changes in public debt

Pairwise Granger Causality Tests

Date: 06/11/20 Time: 13:28

Sample: 1994 2017

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
GOVERNMENT_DEBT_GDP does not Granger Cause GROSS_FIXED_CAPITAL_FORMATION____OF_GDP_	17	0.48343	0.6282
GROSS_FIXED_CAPITAL_FORMATION____OF_GDP_ does not Granger Cause GOVERNMENT_DEBT_GDP			
		1.35399	0.2950

Debt:GDP and fixed capital formation:GDP

Date: 06/11/20 Time: 13:28

Sample (adjusted): 1995 2017

Included observations: 23 after adjustments

Included observations: 12 after adjustments		AC	PAC	Q-Stat	Prob	
Autocorrelation	Partial Correlation					
		1	0.597	0.597	9.3024	0.002
		2	0.258	-0.151	11.131	0.004
		3	0.115	0.044	11.511	0.009
		4	0.126	0.107	11.994	0.017
		5	0.086	-0.061	12.232	0.032
		6	0.174	0.222	13.256	0.039
		7	0.221	0.036	15.019	0.036
		8	0.190	-0.002	16.398	0.037
		9	0.058	-0.081	16.535	0.057
		10	-0.068	-0.126	16.737	0.080
		11	-0.177	-0.127	18.245	0.076
		12	-0.245	-0.150	21.395	0.045

The pattern indicates that the time series data is stationary and from lag 2 the series is statistically significant. The correlogram only has a spike at lag 1 and the Q-stat are significant at all lags, which indicates significant serial correlation in the residuals.

Mexico: changes government spending and changes in government debt

Pairwise Granger Causality Tests

Date: 06/11/20 Time: 13:29

Sample: 1994 2017

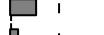
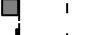
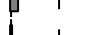
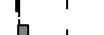
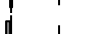
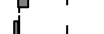
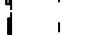
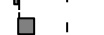
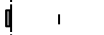
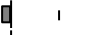
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
GOVERNMENT_SPEND_GDP does not Granger Cause GOVERNMENT_DEBT_GDP	11	7.30845	0.0246
GOVERNMENT_DEBT_GDP does not Granger Cause GOVERNMENT_SPEND_GDP		0.85010	0.4731

Date: 06/11/20 Time: 13:30

Sample (adjusted): 1995 2016

Included observations: 21 after adjustments

Autocorrelation		Partial Correlation		AC	PAC	Q-Stat	Prob	
1		1		1	0.831	0.831	16.693	0.000
2		2		2	0.620	-0.229	26.480	0.000
3		3		3	0.425	-0.064	31.320	0.000
4		4		4	0.232	-0.140	32.852	0.000
5		5		5	0.079	-0.018	33.040	0.000
6		6		6	0.004	0.096	33.040	0.000
7		7		7	-0.039	-0.035	33.094	0.000
8		8		8	-0.020	0.133	33.108	0.000
9		9		9	-0.003	-0.095	33.108	0.000
10		10		10	-0.044	-0.186	33.192	0.000
11		11		11	-0.080	0.023	33.500	0.000
12		12		12	-0.132	-0.111	34.441	0.001

The pattern indicates that the time series data is stationary and from lag 3 the series is statistically significant. The correlogram only has a spike at lag 1 and 2 and the Q-stat are significant at all lags, which indicates significant serial correlation in the residuals.

Mexico: change in gross private sector capital formation and changes in public debt

Pairwise Granger Causality Tests

Date: 06/11/20 Time: 13:30

Sample: 1994 2017

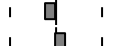
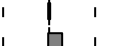
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
GOVERNMENT_DEBT_GDP does not Granger Cause GROSS_FIXED_CAPITAL_FORMATION_PRIVATE_SECTOR__OF_GDP_	17	0.17222	0.8438
GROSS_FIXED_CAPITAL_FORMATION_PRIVATE_SECTOR__OF_GDP_ does not Granger Cause GOVERNMENT_DEBT_GDP		0.76676	0.4860

Date: 06/11/20 Time: 13:31

Sample (adjusted): 1995 2017

Included observations: 23 after adjustments

Included observations: 12 after adjustments		AC	PAC	Q-Stat	Prob	
Autocorrelation	Partial Correlation					
		1	0.494	0.494	6.3847	0.012
		2	0.016	-0.302	6.3915	0.041
		3	-0.253	-0.166	8.2349	0.041
		4	-0.219	0.024	9.6918	0.046
		5	-0.201	-0.190	10.981	0.052
		6	-0.093	0.024	11.273	0.080
		7	0.082	0.115	11.517	0.118
		8	0.166	-0.021	12.571	0.128
		9	0.090	-0.040	12.903	0.167
		10	-0.029	-0.022	12.939	0.227
		11	-0.140	-0.113	13.872	0.240
		12	-0.177	-0.057	15.511	0.215

The pattern indicates that the time series data is stationary and from lag 2 the series is statistically significant. The correlogram only has a spike at lag 1 and the Q-stat are significant at all lags, which indicates significant serial correlation in the residuals.

RSA: government gross capital formations and changes in public debt

Pairwise Granger Causality Tests

Date: 06/11/20 Time: 13:34

Sample: 1994 2017

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
GOVERNMENT_DEBT_GDP does not Granger Cause GROSS_FIXED_CAPITAL_FORMATION____OF_GDP_	21	0.69516	0.5135
GROSS_FIXED_CAPITAL_FORMATION____OF_GDP_ does not Granger Cause GOVERNMENT_DEBT_GDP		4.35163	0.0310

Date: 06/11/20 Time: 13:35

Sample (adjusted): 1995 2017

Included observations: 23 after adjustments

Autocorrelation		Partial Correlation		AC	PAC	Q-Stat	Prob
		1	0.834	0.834	18.197	0.000	
		2	0.574	-0.402	27.223	0.000	
		3	0.347	0.040	30.676	0.000	
		4	0.202	0.059	31.908	0.000	
		5	0.113	-0.047	32.314	0.000	
		6	0.008	-0.195	32.316	0.000	
		7	-0.082	0.045	32.558	0.000	
		8	-0.180	-0.183	33.794	0.000	
		9	-0.244	0.020	36.230	0.000	
		10	-0.255	0.019	39.098	0.000	
		11	-0.302	-0.315	43.460	0.000	
		12	-0.344	0.044	49.657	0.000	

The pattern indicates that the time series data is stationary and from lag 3 the series is statistically significant. The correlogram only has a spike at lag 1 and 2 and the Q-stat are significant at all lags, which indicates significant serial correlation in the residuals.

RSA: changes government spending and changes in government debt

Pairwise Granger Causality Tests

Date: 06/11/20 Time: 13:35

Sample: 1994 2017

Lags: 2

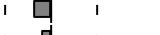
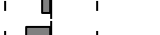
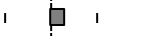
Null Hypothesis:	Obs	F-Statistic	Prob.
GOVERNMENT_DEBT_GDP does not Granger Cause GOVERNMENT_SPEND_GDP	21	6.68324	0.0078

GOVERNMENT_SPEND_GDP does not Granger Cause GOVERNMENT_DEBT_GDP 7.31651 0.0055

Date: 06/11/20 Time: 13:37

Sample (adjusted): 1995 2017

Included observations: 23 after adjustments

Autocorrelation		Partial Correlation		AC	PAC	Q-Stat	Prob
		1	0.888	0.888	20.601	0.000	
		2	0.747	-0.194	35.886	0.000	
		3	0.584	-0.174	45.700	0.000	
		4	0.410	-0.143	50.782	0.000	
		5	0.242	-0.075	52.655	0.000	
		6	0.060	-0.213	52.777	0.000	
		7	-0.096	-0.027	53.107	0.000	
		8	-0.257	-0.220	55.643	0.000	
		9	-0.398	-0.109	62.158	0.000	
		10	-0.450	0.246	71.133	0.000	
		11	-0.444	0.129	80.590	0.000	
		12	-0.433	-0.215	90.399	0.000	

The pattern indicates that the time series data is stationary and from lag 4 to 9 the series is statistically significant on the autocorrelation, and from lag 2 the series is significant on the partial correlation. The correlogram only fall within the 95% level from lag 4 to 9 on the autocorrelation and only has a spike at lag 1 on the partial correlation. The Q-stat are significant at all lags, which indicates significant serial correlation in the residuals.

RSA: change in gross private sector capital formation and changes in public debt

Pairwise Granger Causality Tests

Date: 06/11/20 Time: 13:38

Sample: 1994 2017

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
GOVERNMENT_DEBT_GDP does not Granger Cause GROSS_FIXED_CAPITAL_FORMATION__PRIVATE_SECTOR____OF_GDP_	21	1.08081	0.3628
GROSS_FIXED_CAPITAL_FORMATION__PRIVATE_SECTOR____OF_GDP_ does not Granger Cause GOVERNMENT_DEBT_GDP		4.60713	0.0263

Date: 06/11/20 Time: 13:39

Sample (adjusted): 1995 2017

Included observations: 23 after adjustments

Autocorrelation		Partial Correlation		AC	PAC	Q-Stat	Prob
		1	0.844	0.844	18.630	0.000	
		2	0.617	-0.335	29.040	0.000	
		3	0.404	-0.030	33.743	0.000	
		4	0.252	0.044	35.664	0.000	
		5	0.144	-0.037	36.326	0.000	
		6	0.013	-0.237	36.332	0.000	
		7	-0.096	0.039	36.664	0.000	
		8	-0.206	-0.171	38.294	0.000	
		9	-0.281	-0.015	41.542	0.000	
		10	-0.292	0.075	45.312	0.000	
		11	-0.336	-0.313	50.724	0.000	
		12	-0.364	0.039	57.643	0.000	

The pattern indicates that the time series data is stationary and from lag 3 the series is statistically significant. The correlogram only has a spike at lag 1 and 2 and the Q-stat are significant at all lags, which indicates significant serial correlation in the residuals.

Russia: government gross capital formations and changes in public debt

Pairwise Granger Causality Tests

Date: 06/11/20 Time: 13:43

Sample: 1994 2017

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
GOVERNMENT_DEBT_GDP does not Granger Cause GROSS_FIXED_CAPITAL_FORMATION____OF_GDP_	17	0.60773	0.5605
GROSS_FIXED_CAPITAL_FORMATION____OF_GDP_ does not Granger Cause GOVERNMENT_DEBT_GDP			
		4.52559	0.0343

Date: 06/11/20 Time: 13:44
Sample (adjusted): 1995 2017
Included observations: 23 after adjustments

Autocorrelation		Partial Correlation		AC	PAC	Q-Stat	Prob
		1	0.808	0.808	17.050	0.000	
		2	0.533	-0.344	24.826	0.000	
		3	0.374	0.238	28.843	0.000	
		4	0.265	-0.147	30.972	0.000	
		5	0.227	0.237	32.625	0.000	
		6	0.189	-0.220	33.839	0.000	
		7	0.065	-0.125	33.990	0.000	
		8	-0.113	-0.242	34.476	0.000	
		9	-0.279	-0.113	37.668	0.000	
		10	-0.390	-0.124	44.399	0.000	
		11	-0.408	0.044	52.376	0.000	
		12	-0.336	0.098	58.289	0.000	

The pattern indicates that the time series data is stationary and from lag 3 the series is statistically significant. The correlogram only has a spike at lag 1 and 2 and the Q-stat are significant at all lags, which indicates significant serial correlation in the residuals.

Russia: changes government spending and changes in government debt

Pairwise Granger Causality Tests
Date: 06/11/20 Time: 13:45
Sample: 1994 2017
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
GOVERNMENT_DEBT_GDP does not Granger Cause GOVERNMENT_SPEND_GDP	17	0.79732	0.4730
GOVERNMENT_SPEND_GDP does not Granger Cause GOVERNMENT_DEBT_GDP		1.23675	0.3248

Date: 06/11/20 Time: 13:46
Sample (adjusted): 1995 2017
Included observations: 21 after adjustments

Included observations: 11 after adjustments		AC	PAC	Q-Stat	Prob	
Autocorrelation	Partial Correlation					
		1	0.368	0.368	3.2737	0.070
		2	0.188	0.060	4.1677	0.124
		3	0.009	-0.091	4.1697	0.244
		4	0.084	0.114	4.3705	0.358
		5	0.156	0.127	5.1043	0.403
		6	0.215	0.114	6.5944	0.360
		7	0.176	0.051	7.6571	0.364
		8	0.044	-0.067	7.7289	0.460
		9	-0.118	-0.158	8.2846	0.506
		10	-0.139	-0.081	9.1323	0.520
		11	-0.052	0.008	9.2637	0.598
		12	-0.081	-0.125	9.6123	0.650

The pattern indicates that the time series data is stationary and from lag 1 the series is statistically significant. The Q-stat are significant at all lags, which indicates significant serial correlation in the residuals.

Russia: change in gross private sector capital formation and changes in public debt

Pairwise Granger Causality Tests

Date: 06/11/20 Time: 13:47

Sample: 1994 2017

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
GOVERNMENT_DEBT_GDP does not Granger Cause GROSS_FIXED_CAPITAL_FORMATION_PRIVATE_SECTOR___OF_GDP_	14	0.17535	0.8420
GROSS_FIXED_CAPITAL_FORMATION_PRIVATE_SECTOR___OF_GDP_ does not Granger Cause GOVERNMENT_DEBT_GDP		4.42629	0.0459

Date: 06/11/20 Time: 13:47

Sample (adjusted): 1995 2013

Included observations: 19 after adjustments

Included observations: 12 after adjustments		AC	PAC	Q-Stat	Prob	
Autocorrelation	Partial Correlation					
		1	0.709	0.709	11.150	0.001
		2	0.304	-0.399	13.326	0.001
		3	0.086	0.161	13.511	0.004
		4	0.040	0.012	13.554	0.009
		5	0.013	-0.087	13.558	0.019
		6	-0.025	0.010	13.578	0.035
		7	-0.053	-0.026	13.673	0.057
		8	-0.127	-0.182	14.256	0.075
		9	-0.276	-0.214	17.301	0.044
		10	-0.445	-0.230	26.086	0.004
		11	-0.383	0.242	33.404	0.000
		12	-0.196	-0.096	35.604	0.000

The pattern indicates that the time series data is stationary and from lag 2 the series is statistically significant. The correlogram only has a spike at lag 1 and the Q-stat are significant at all lags, which indicates significant serial correlation in the residuals.

Turkey: government gross capital formations and changes in public debt

Pairwise Granger Causality Tests

Date: 06/11/20 Time: 13:50

Sample: 1994 2017

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
DEBT_GDP does not Granger Cause GROSS_FIXED_CAPITAL_FORMATION____OF_GDP_ GROSS_FIXED_CAPITAL_FORMATION____OF_GDP_ does not Granger Cause DEBT_GDP	16	6.44112	0.0141
		0.19244	0.8277

Date: 06/11/20 Time: 13:51

Sample (adjusted): 1995 2017

Included observations: 23 after adjustments

Autocorrelation	Partial Correlation	AC	PAC	Q-Stat	Prob
1	0.737	0.737	14.194	0.000	
2	0.501	-0.092	21.073	0.000	
3	0.264	-0.159	23.070	0.000	
4	0.089	-0.045	23.311	0.000	
5	-0.058	-0.097	23.419	0.000	
6	-0.009	0.279	23.422	0.001	
7	0.019	-0.048	23.435	0.001	
8	0.053	-0.024	23.543	0.003	
9	0.053	-0.035	23.660	0.005	
10	0.004	-0.135	23.660	0.009	
11	-0.117	-0.096	24.311	0.011	
12	-0.307	-0.323	29.249	0.004	

The pattern indicates that the time series data is stationary and from lag 3 the series is statistically significant. The correlogram only has a spike at lag 1 and 2 and the Q-stat are significant at all lags, which indicates significant serial correlation in the residuals.

Turkey: changes government spending and changes in government debt

Pairwise Granger Causality Tests

Date: 06/11/20 Time: 13:52

Sample: 1994 2017

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
DEBT_GDP does not Granger Cause GOVERNMENT_SPEND_GDP	8	3.34202	0.1724
GOVERNMENT_SPEND_GDP does not Granger Cause DEBT_GDP		1.93801	0.2882

Date: 06/11/20 Time: 13:52
Sample (adjusted): 1995 2017
Included observations: 14 after adjustments

Autocorrelation		Partial Correlation		AC	PAC	Q-Stat	Prob
		1	0.460	0.460	3.6448	0.056	
		2	0.300	0.112	5.3196	0.070	
		3	0.351	0.227	7.8226	0.050	
		4	0.064	-0.244	7.9150	0.095	
		5	0.053	0.048	7.9854	0.157	
		6	0.056	-0.033	8.0748	0.233	
		7	0.107	0.216	8.4411	0.295	
		8	0.090	-0.059	8.7467	0.364	
		9	0.009	-0.060	8.7506	0.461	
		10	-0.024	-0.143	8.7839	0.553	
		11	-0.229	-0.244	12.714	0.312	
		12	-0.207	0.036	17.506	0.132	

The pattern indicates that the time series data is stationary and from lag 1 the series is statistically significant. The Q-stat are significant at all lags, which indicates significant serial correlation in the residuals.

Turkey: change in gross private sector capital formation and changes in public debt

Pairwise Granger Causality Tests
Date: 06/11/20 Time: 13:53
Sample: 1994 2017
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
DEBT_GDP does not Granger Cause			
GROSS_FIXED_CAPITAL_FORMATION_PRIVATE_SECTOR_OF_GDP_	1	NA	NA
GROSS_FIXED_CAPITAL_FORMATION_PRIVATE_SECTOR_OF_GDP_ does not			
Granger Cause DEBT_GDP		NA	NA

Date: 06/11/20 Time: 13:54
Sample (adjusted): 1995 1997
Included observations: 3 after adjustments

Autocorrelation		Partial Correlation		AC	PAC	Q-Stat	Prob
		1	-0.015	-0.015	0.0017	0.967	
		2	-0.485	-0.485	3.5301	0.171	

Limited data to determine pattern and test time series.

