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Real Effects of Public Debt on National Development

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(First very rough draft, to be revised and streemlined)

Introduction

South Africa's National Development Plan (NDP) Vision for 2030 clearly articulates that fiscal policy would be expected to play a central role in influencing the pace at which the economy will grow and its capacity to deal with the key challenges that will arise over the next several decades (NPC, 2011). Domestic policy challenges include poor education and health outcomes, rapid urbanisation, environmental hazards, infrastructure capacity weaknesses coupled with inadequate investment levels and household and spatial inequalities. External challenges include immigration and an uncertain global economic environment. Fiscal policy will not only affect macroeconomic stability, but also whether the country can transition to a higher economic growth path, reduce its high poverty rate, and address its substantial income, asset, and regional inequalities.

It is now some five years since the global economic and financial crisis of 2008. The crisis led to prolonged and previously unforeseen fiscal deterioration that has left South Africa with serious challenges. The height of the crisis is now well past, but its aftermath remains pervasive, with South Africa still some way from restoring strong and sustainable economic growth rates per annum, as required by the NDP. These developments have directly affected the level and composition of public debt. The global crises and malaise have brought home that large government debt positions can be far more pernicious than a degree of crowding out. This was most dramatically illustrated by the sovereign debt default situations reached by several countries, most notably Greece, Ireland, Portugal, Spain and Cyprus. These countries have required massive bail-outs by international financial institutions, just to enable the economies to keep functioning. A more insidious effect is demonstrated by the case of Japan, which has the highest government debt-to-gross domestic product (GDP) ratio in the world, and has had great difficulty in achieving even modest economic growth, although a public debt crisis of bail-out proportions has been avoided. In the eurozone, the average public debt level is approximately 100% of GDP and significantly above 100% in countries such as Greece, Ireland, Portugal, Spain, Italy and Cyprus. Japan's ratio at 240% is by far the highest of any country. Countries such as Norway, Sweden and Australia have a public debt ratio of around 50%.Incomparison, South Africa's public debt ratio is around 40%, which does not appear unduly high and is at a similar level to that of South Korea, which is progressing soundly in economic terms.

Nevertheless, in recent years South Africa's debt has increased considerably. Prior to the global economic crisis, policy succeeded: the public debt-to-GDP ratio fell from nearly 50% in 1994 (the result of excessive expenditure by the National Party to finance its homelands projects) to 45% in 1995. From 1996, government took measures that prevented further increases in the debt level and (only in 2000) started to reduce the debt level as a percentage of GDP. By 2008, government surpluses and low deficits had brought the debt level materially down to less than 24%. However, the international crisis in 2008 and the local economic consequences meant that the percentage to GDP inevitably increased, as deficits were incurred. The debt level exceeded 36% of GDP in 2012 and will continue to increase

over the next few years as deficits continue, although the increase is moderate. Some fiscal adjustment is therefore required in order to stabilise the debt dynamics.

The total balance of government debt in relation to the domestic bond market is high, and government bonds are a major determinant of the characteristics of the local bond market. The value of new government bonds being raised in the domestic market has increased significantly and is markedly higher today than during 1990–2000. The proportion of foreign debt (in particular foreign bonds) has been far higher in recent years than during 1995–1998, when it was only around 5% of total government debt. Since then, it has expanded by a multiple of 8.6 times in rand value. These characteristics indicate a need to give careful consideration to the extent and manner of raising new public debt.

The interest payable on government debt is already a significant item in government annual expenditure and is estimated at R100-billion for 2014/2015, or close to 10% of government expenditure. This is in an environment of exceptionally low interest rates, as the South African Reserve Bank (SARB) has adopted a low-rates policy because of the slow economic growth and recovery from the financial crises in major economies. However, if circumstances changed, and the SARB felt compelled to increase interest rates significantly (which could easily occur in two to three years' time), the effect on government's ability to meet other desired expenditure could be compromised. For instance, if the interest rate reached 9%, the long bond rate could then move to 12%. As a result of this interest rate change alone, government's debt servicing costs would increase by 50%, to around R150-billion; in other words, a R50-billion annual constraint on other expenditure. In addition, raising new government debt would place pressure on the domestic bond market and could increase the spread of long bonds relative to short-term financing, thereby placing further strain on long-term debt financing. The situation could easily get worse if the government's actions and policies caused some doubt on its ability to repay its bonds, which would increase the risk portion of bond interest rates and make raising new bonds more difficult. Under such circumstances, meeting the financing requirements to translate the ambitious goals of the NDP into reality would be difficult, if not impossible. The country's recent financial pressures have brought to light the need for an analysis of debt sustainability accompanied by appropriate debt management in the more difficult external and domestic environment.

Debt management decisions have begun to play a predominant role within government's fiscal strategies. As debt grows and its role as a major instrument for financing government needs is enhanced, debt management decisions become very important as part of a fiscal strategy. Considering that public debt management has fundamental effects on public finances, any attempt to determine the country's financing scheme in the medium term should involve adequate public debt management as well as a medium-term debt strategy.[1] A debt

[1]Government has only recently adopted a fiscal stance that is built on three principles of (a) counter-cyclicality, which means spending more relative to GDP during periods of economic weakness and less during periods of strong economic growth; (b) long-term debt sustainability, which means ensuring that spending levels do not continually increase debt and interest costs; and (c) intergenerational equity, which means that future generations should not be overburdened by the costs of current spending and that the upfront cost of capital

policy design that takes into account a broader time horizon is fundamental, since this instrument must simultaneously accomplish different objectives: serving future financing needs, promoting fiscal stabilisation, meeting the restriction of being sustainable and minimising both the debt service costs and the vulnerabilities.

Debt policy contributes to ensuring and managing long-term debt sustainability. Debt sustainability defines the level of public debt that can be financed over a determined period of time without an unrealistically large future correction to the balance of income and expenditures. Debt management determines the composition and structure of the debt portfolio in order for its cost to be low and as less vulnerable as possible to market shocks. The main objective of this chapter is to analyse the appropriate management of South Africa's public debt, taking into account all the relevant financial, macroeconomic, short-term and long-term fiscal considerations, as well as debt paths that are sustainable over time and consistent with ideals of the NDP. Using South African data, models and variation across policy stance and over time, we examine the impact of the movement in debt and alternative policy responses on the economy, and compute thresholds beyond which debt can be considered to be detrimental to the economy. The results have immediate policy relevance. For example, threshold analysis of government debt may reveal higher levels of indebtedness, implying that government should aim to stabilise and reduce its debt to sufficiently low levels that do not retard growth. Prudence dictates that governments should also aim to keep their debt well below the estimated thresholds, so that even extraordinary events are unlikely to push their debt to levels that are damaging to growth. However, it could also imply that government may be unnecessarily overcautious, penalising much sought-after development espoused in the NDP. From a longer-term perspective, reducing debt to lower levels represents a severe test for the economy, and the challenge is compounded by unfavourable economic outlook (unemployment, inequality and poverty) and demographics.

The paper contains the following sections:
Section 2 gives an overview of South Africa's debt market.

Section 3 provides a concise summary of the main economic episodes, principal policy trends and performance of the South African economy over the past two decades, and the economic and fiscal factors that have shaped these. The section compiles relevant data, of the key economic magnitudes, to illustrate the points being made. The section also draws on South Africa's latest forecasts of economic growth, unemployment and government deficits and debts to provide a sketch of the economic background going forward.

Section 4 discusses public debt in South Africa, for each of the main categories of debt and trends over the past 19 years and the factors that have shaped them. It has an overall fiscal policy orientation analysing the current debt portfolio and projects debt costs in the medium and long term. Specific aspects covered are:

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infrastructure assets should be expensed over their useful lives. It is hoped that applying these principles consistently will improve economic conditions as well as strengthen the fiscal position.

- Overview of debt policy, debt/GDP ratios and interest costs
- Denomination, indexation and maturities
- Composition of debt structure
- Liquidity indicators for the government bond market
- General government share of bond debt
- Breakdown of government debt securities between banks, asset managers and other institutions
- Variations over time in yield spreads between securities
- Policy implications for debt management

Section 5 reviews the literature on public debt management. The main themes discussed are:

- Theoretical framework for optimal debt management: tax smoothing
- South African debt studies
- CGE models addressing debt implications on the economy
- An assessment and implications for the project

Section 6 discusses the methodology and data used and provides suggestions for a public debt strategy. **Section 7**explains the policy simulations, while **Section 8** gives the results of the three scenarios. The concluding remarks, recommendations and discussion are contained in **Section 9.**

Debt Market Overview

The debt market has experienced substantial growth since the advent of democracy. This section discusses the legal and regulatory framework, followed by the evolution of debt management, institutions and instruments of public borrowing.

Debt Management, Institutions and Instruments

Government debt management has evolved quite substantially since the 1970s when the need to develop the debt capital market was identified. Before 1990, the state issued debt only three or four times per annum. Bonds were issued at par, as and when needed, and issuance typically coincided with bonds maturity dates. During this period there were no formal auctions, liquid benchmarks, active secondary market or prevailing market rate. Unlike most developing countries, because of sanctions, South Africa's debt was mainly domestic (and this trend continues today). By the end of apartheid, risk premiums were huge and Treasury Bonds traded at a massive discount. In 1993 the country was on the edge of a debt crisis and had very bad credit rating.

From 1994, government started to use macroeconomic frameworks to guide debt management strategies. In 1996 a formal bond exchange[2]was formed to promote the debt capital market and allow for self-regulation. The SARB was then appointed as an issuer of and settlement agent for government bonds. Commencing in 1998, auctions were conducted regularly at predetermined dates. Twelve primary dealers were appointed to ensure market efficiency, liquidity and transparency. Prior to 1999, the main objective of debt management was to develop the domestic market and promote a balanced maturity profile. After 1999, the focus shifted to reducing the cost of debt to within acceptable risk limits, ensuring government's access to domestic and international financial markets, and diversifying funding instruments. These objectives continue to anchor government's debt management strategy today.

Up until the 1990s, rising debt-to-GDP ratios made government more aware of the costs in managing public debt. At the same time, the shift away from financing budget deficits through banks towards nonbank sources increased the risk of rolling over debt at higher interest rates, not least in the context of financial markets that have become increasingly open internationally, especially after South Africa emerged from the apartheid pariah status. The result has been the development of more market-oriented and more sophisticated debt management procedures and techniques (see Table 3). By the late 1990s, longer-term, fixed rate instruments accounted for a large part of government debt, reducing rollover and interest rate risk. Moreover, with the deepening of secondary markets, the impact on market interest rates from government issuance activity in primary markets appears to have been considerably reduced and with it the potential conflict between debt management and the operation of monetary policy. In fact, the link between monetary policy considerations and

[2] The Bond Exchange of South Africa (BESA).

debt management issues is largely through the signalling effects of debt levels and maturity structures on policy makers' credibility. More recently, debt management concerns have abated somewhat, with the advent of low inflation and reduced public deficits. Looking forward, however, debt managers will face different challenges, as debt to-GDP ratios have begun to rise again. Thus an emphasis needs to be on improving the efficiency of debt management techniques, which has the potential to produce budgetary savings.[3]

Table 1: Institutional Aspects of Public Borrowing

Institution authorised to borrow: debt management authority	Debt management agent	Main objective of debt management	Performance assessment	Monetary policy considerations
National Treasury	SARB	Provide government funding, minimise cost, diversify funding instruments, maintain balanced maturity structure.	Yes: National Treasury submits annual report on public debt management (since 2011/12).	Yes: coordination committee with representatives of SARB and National Treasury. Large public entities and metros float their own debt.

As shown in Table 4, South Africa has quite a diversified and liquid debt market with a sophisticated bond market at its apex. Domestic short-term borrowing consists of Treasury bills and cash borrowings from the broader public sector through the Corporation for Public Deposits (CPD). Although Treasury bill issuance is included in the financing of the borrowing requirement, occasionally the need arises for additional short-term financing. For purposes of cash management and financing, government can issue either very short-dated Treasury bills, or repo transactions, cash deposits with the SARB (sterilisation deposits, foreign currency swap transactions and the pool of broader public-sector cash), fixed-rate and inflation-linked bonds, and foreign currency bonds.

Table 2: Instruments and selling techniques of government debt

Standard instruments and maturities	Other instruments, derivatives	Currency	Selling techniques	Primary dealers
Treasury bills, repo	Index-linked bonds;	Domestic and foreign	Auctions; uniform-price	Yes

[3] As the proportion of foreign debt rises, the country will increasingly have to consider the foreign exchange market and risk. The weak trade balance on the current account may place further pressure on debt management.

transactions, cash deposits with the SARB (sterilisation deposits, foreign currency swap transactions and the pool of broader public-sector cash), fixed-rate and inflation-linked bonds, foreign currency bonds	separate trading of registered interest and principal of securities (strips); bond buy back		auctions for long-term and multiple-price auctions for short-term instruments; automated auctions for short-, medium- and long-term instruments; tap system for National Treasury Retail Savings Bonds	

Macroeconomic Perspective and Fiscal Framework

Macroeconomic Policy Frameworks

The period considered here stretches from 1990 through to 2013.During the four years leading to the first democratic elections in 1994, the National Party was in power, and the government supported four nominally independent homeland states and six self-governing areas, all of which had high and growing fiscal requirements. At the same time, severe international sanctions were limiting economic progress, political tensions were high, and violence and worker mass actions were widespread. From 1992, despite some degree of co-governance with the new political leaders, the incumbent National Party maintained responsibility for managing the country's economy.

Having been widely publicised prior to April 1994, the Reconstruction and Development Programme (RDP), became the official macroeconomic policy of the new African National Congress (ANC) government (ANC, 1994). The RDP contained ambitious socio-economic goals and envisaged massive changes to the economy's structure and governance. A minister was assigned to spearhead the programme, which was given a budget to supplement the line budgets of other government departments. Despite laudable goals, the RDP implementation structure was found to be cumbersome. At the same time, concerns were raised about the sustainability of the national budget given the demand on the fiscus and the already high public debt level.

Against this background, in June 1996 the government adopted the Growth, Employment and Redistribution (GEAR) programme, which sought to achieve high employment, and economic growth and redistribution, under fairly strict fiscal constraints. However, the government's alliance partners –the Congress of South African Trade Unions (Cosatu) and South African Communist Party (SACP) – did not support the programme, regarding it as excessively constrained and similar to structural adjustment programmes typically prescribed by the Bretton Woods institutions of the International Monetary Fund (IMF) and World Bank. Nevertheless, the programme had a fiscal effect, and the country's budget deficit reduced steadily over the next several years.

In 2006, the Accelerated and Shared Growth Initiative for South Africa (Asgisa) framework was introduced, as an extension (and possible softening in approach) of the GEAR programme. It was not a departure from the fiscal stringency of the GEAR framework but rather a reorientation, which was aimed at making government expenditure more effective in achieving social goals. Asgisa took note of the binding constraints that stood in the path of accelerated economic growth for South Africa, including the inadequate skills base, ability of the state to lead, and supply and value chain problems. The framework was not as contentious as the GEAR programme, but the opposing parties (such as Cosatu and the SACP) regarded the GEAR programme as still being in effect at macroeconomic policy level.

Following the national elections in 2009 and the change in presidency, the National Planning Commission (NPC) was set up and charged with producing a broad national plan (NPC, 2011) through wide consultation and the use of a non-government panel of leading experts.[4]In November 2011, the NDP was completed and, subsequently, widely discussed until its formal adoption as the economic policy direction at the ANC's conference in December 2012. The NDP has gained widespread acceptance across South African society but is still vociferously criticised by some trade union groupings, in particular the National Union of Metalworkers of South Africa.

The NDP is a broad, wide-ranging document. Economic policy is just one aspect of the plan, which contains ambitious goals to be achieved by 2030.[5]Its economic expansion vision is an average annual economic growth rate of 5.4% and the creation of 11 million new jobs by 2030, with five million by 2020, which implies over 500 000 jobs per annum through to 2020. The intention is to reduce unemployment to around 14% by 2020 and 6% by 2030. The targeted investment-to-GDP ratio is30% by 2030 (from around 20% at present), with the aim of increasing the growth trajectory of the economy. Public sector investment (including government enterprises and public corporations) will contribute significantly to the increased investment level, with the aim of increasing to 10% of GDP (from the present 7%). The expansion of public sector investment, by around 50% in relative terms to GDP, has major implications for fiscal policy and for public debt financing.

Macroeconomic Growth Profile and Growth Prospects

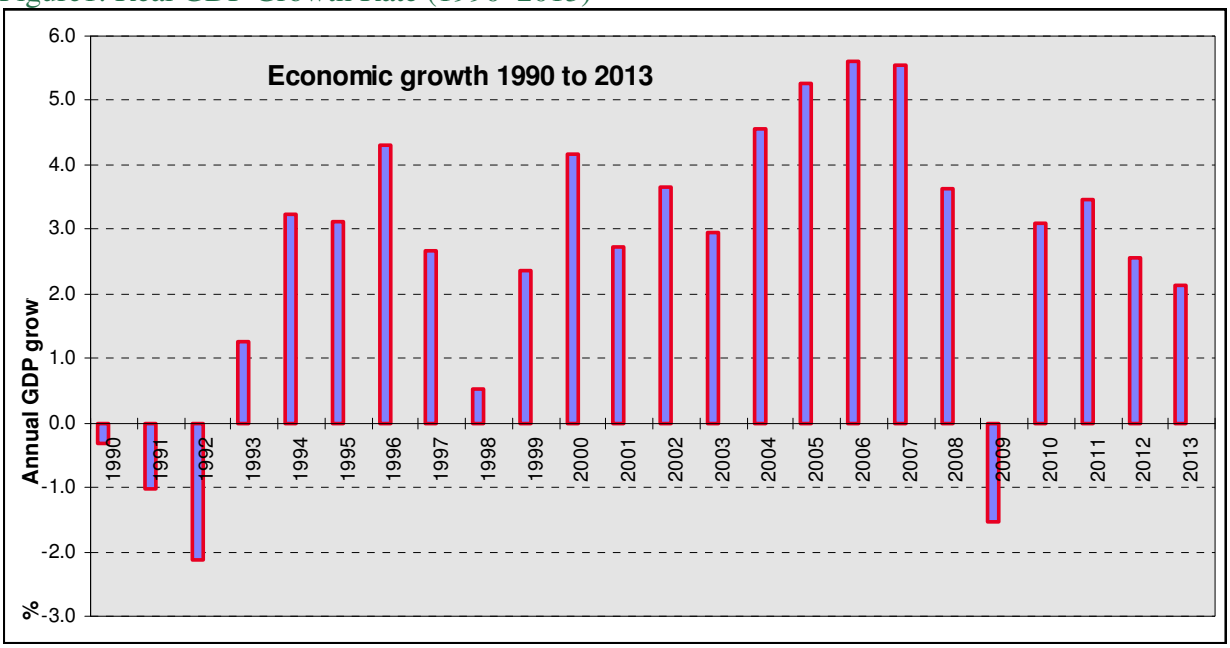
From 1990 to 1992, the South African economy experienced negative growth, the combination of increased domestic protests and industrial action, international sanctions and slow export demand from major trading partners. As the country moved towards the negotiated and internationally accepted democratic election of 1994, the economy began to improve, growing by a modest 1.2% in 1993, followed by four years of 3-4% growth. In 1998, the economy grew by only 0.5% because of the international Asian crisis and high domestic interest rates that were instituted to combat exchange rate speculation. However, thereafter (until the international financial crisis in 2008), the economy achieved robust growth rates: from 2004 to 2007 growth rates were above 4.5%, reaching 5.6% in 2006 and 2007.Growth began falling in 2008, but the full effects of the international crisis on the domestic economy were felt in 2009, when growth was negative (-1.5%).Although South Africa's financial institutions remained stable and robust over the financial crisis period, the economy was severely affected by the fall-off in exports that resulted from the recessionary conditions in major developed economies supplied by South Africa (see Chitiga et al., 2009).In 2010 and 2011, the economy recovered slightly, growing at just above 3%, but

[4]In 2009, a New Growth Path (NGP) was also introduced that focused on the micro-economy and employment creation.

[5]For example it sets out to eliminate poverty and reduce unemployment, improve the quality of school education, deconstruct the spatial patterns of the apartheid system, reduce the level of inequality, as measured by the Gini coefficient from 0.7 in 2007 to 0.6 in 2030, become a less resource intensive economy, adopt sustainable development practices; etc.

export demand from developed countries remained slow. Since then, as poor growth continues in developed economies and somewhat slower growth in large developing economies, the South African economy has struggled to achieve growth rates much above 2%.The economy grew by 2.5% in 2012 but is expected to slow to 2.1% in2013. Figure 1 shows the GDP growth rates since 1990.

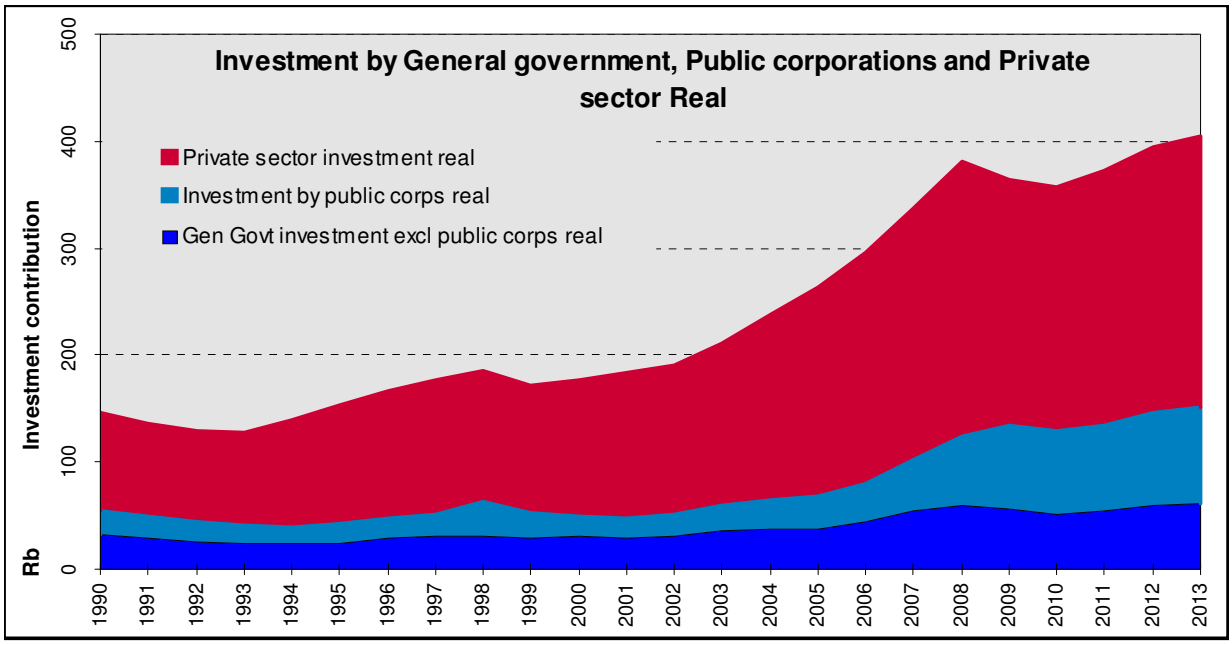
Figure1: Real GDP Growth Rate (1990–2013)



Source:Stats SA

During the period 2000–2012, the amount of gross fixed capital formation (GFCF) per year, which is a measure of investment, more than doubled in real terms (Figure 2). Although private enterprise GFCF has increased the most in terms of levels, the highest growth rates in GFCF have been by government, especially public corporations. This surge in GFCF was driven by investment by state-owned enterprises such as Eskom, for new power generation capacity, and Transnet, to upgrade and expand rail, port facilities and pipeline infrastructure. As a percentage of total investment, general government investment has remained at around 15% to 16%, whereas public corporations investments recovered from a low of 10% in 2001 to reach around 22% today.

Figure 2: Real Investment

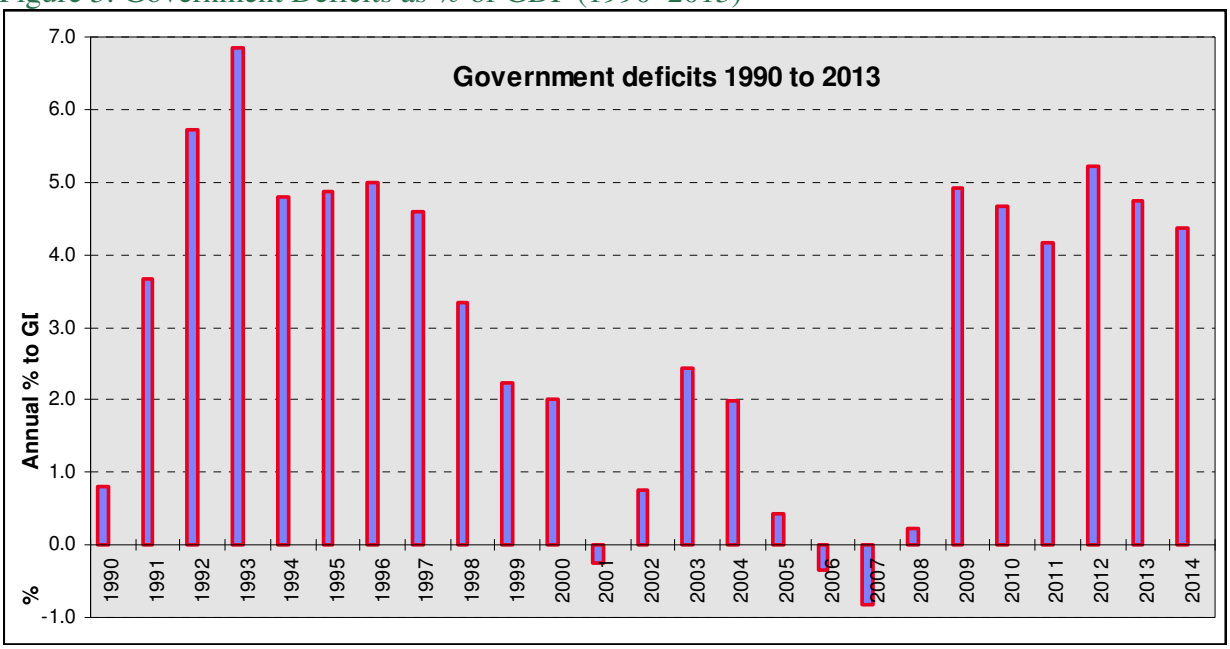


Source:SARB

Government Deficits and Debt Level

Figure 3 shows how government fiscal deficits were reigned in dramatically from 1998. Deficit levels in 1992 and 1993 were increasing and unsustainable, reaching almost 7%of GDP in 1993.After 1995, following the initial spending programmes of the newly elected government, deficit levels were close to 5%. However, from 1997 to 2000, the deficit level reduced steadily under the stringency of the GEAR framework and the fiscally disciplined approach of the finance minister. Up until 2008, deficits continued to be modest, with slight surpluses in 2001, 2006 and 2007, thanks to high economic growth rates and improved tax-collection efficiency. A marginal deficit was shown in 2008, as international growth worsened, and government shifted to significant deficits from 2009 in light of the international economic crisis, which affected growth and employment rates. Deficits have scarcely breached 5%, and for the 2013/14 fiscal year are that a figure of 4.0% is achievable. Government's intention is to reduce this deficit level steadily over the next three years to reach close to 3%.

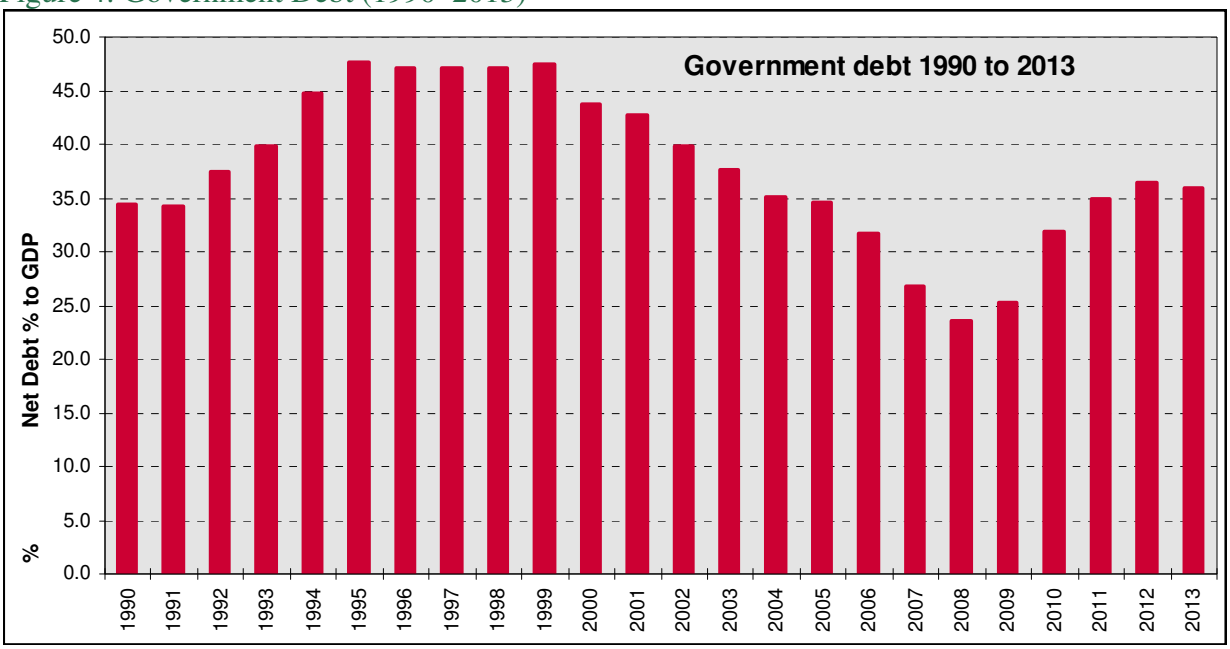
Figure 3: Government Deficits as % of GDP (1990–2013)



Source:SARB

Government debt levels have changed, as the accumulated result of these fiscal deficit percentages changes. Government debt can be viewed at gross or net level, and for central government alone or consolidated to include other tiers of government and public corporations. Here the net figure, i.e., after deducting cash balances, is used, on a consolidated government basis. As Figure 4 shows, after increases prior to 1994, net government debt rose above 45% from 1995. From 1996, government took measures that prevented further increases in the debt level and (in 2000) started to reduce the debt level as a percentage of GDP. Thereafter, government surpluses and low deficits helped bring the debt level down to less than 24% in 2008.With the international crisis of 2008, the percentage to GDP inevitably increased, as deficits were incurred. The debt level exceeded 36% of GDP in 2012 and will continue to increase moderately over the next few years as deficits continue.

Figure 4: Government Debt (1990–2013)



Source:SARB

2.3.4 Government Expenditure Breakdown

When considering borrowing, two key aspects of government expenditure to view are investment spending and expenditures under the economic rubric compared to those of a social support nature. Government investment (fixed capital formation) contributes to the building of physical infrastructure, which directly increases the productive capacity of the economy. It would be logical to argue that debt should always fund investment spending, as this spending has an economic return in terms of future additional production. Indeed, between 1910 and 1976, investment and current spending in South Africa were separated, with the goal of funding current spending from revenue raised and investment spending from borrowing (Siebrits and Calitz, 2004).

Table 3: Consolidated Government Fiscal Framework (2012/13–2016/17)

Table 1.2 Consolidated government fiscal framework, 2012/13 – 2016/17

R billion	2012/13 Outcome	2013/14 Estimate	2014/15 Medium-term estimates	2015/16	2016/17
Revenue	907.9	999.1	1 086.3	1 184.2	1 306.0
Percentage of GDP	*28.3%*	*28.7%*	*28.6%*	*28.5%*	*28.7%*
Expenditure	1 042.9	1 143.7	1 243.8	1 340.4	1 440.2
Percentage of GDP	*32.5%*	*32.8%*	*32.7%*	*32.3%*	*31.7%*
Budget balance	-135.0	-144.6	-157.5	-156.3	-134.2
Percentage of GDP	*-4.2%*	*-4.2%*	*-4.1%*	*-3.8%*	*-3.0%*

Source: National Treasury (2013c)

The breakdown of government expenditure in the current fiscal year and projections to 2016/17 are shown in Table 8.

Table 4: Consolidated Government Expenditure (2013/14–2016/17)

Table 1.4 Consolidated government expenditure, 2013/14 – 2016/17

R billion	2013/14 Revised	2014/15	2015/16 Budget estimate	2016/17	Average annual growth 2013/14 – 2016/17
Defence and state security	44.9	47.5	50.4	53.6	6.1%
Economic services	47.3	48.7	51.1	53.4	4.2%
Education and related functions	233.6	250.2	267.8	286.5	7.0%
Employment and social security	50.6	60.0	66.7	74.6	13.8%
General public services	62.1	65.3	69.4	71.0	4.6%
Health and social protection	266.0	289.2	308.6	328.4	7.3%
Local government, housing and community amenities	128.1	141.2	153.8	163.2	8.4%
Public order and safety	109.6	116.0	122.3	130.7	6.1%
Science and technology	16.8	18.1	19.5	19.5	5.2%
Transport, energy and communication	84.3	94.1	102.7	105.8	7.9%
Total expenditure by function	**1 043.2**	**1 130.4**	**1 212.3**	**1 286.8**	**7.2%**
State debt cost	100.5	110.4	122.2	135.4	10.4%
Contingency reserve	–	3.0	6.0	18.0	
Total expenditure	**1 143.7**	**1 243.8**	**1 340.4**	**1 440.2**	**8.0%**

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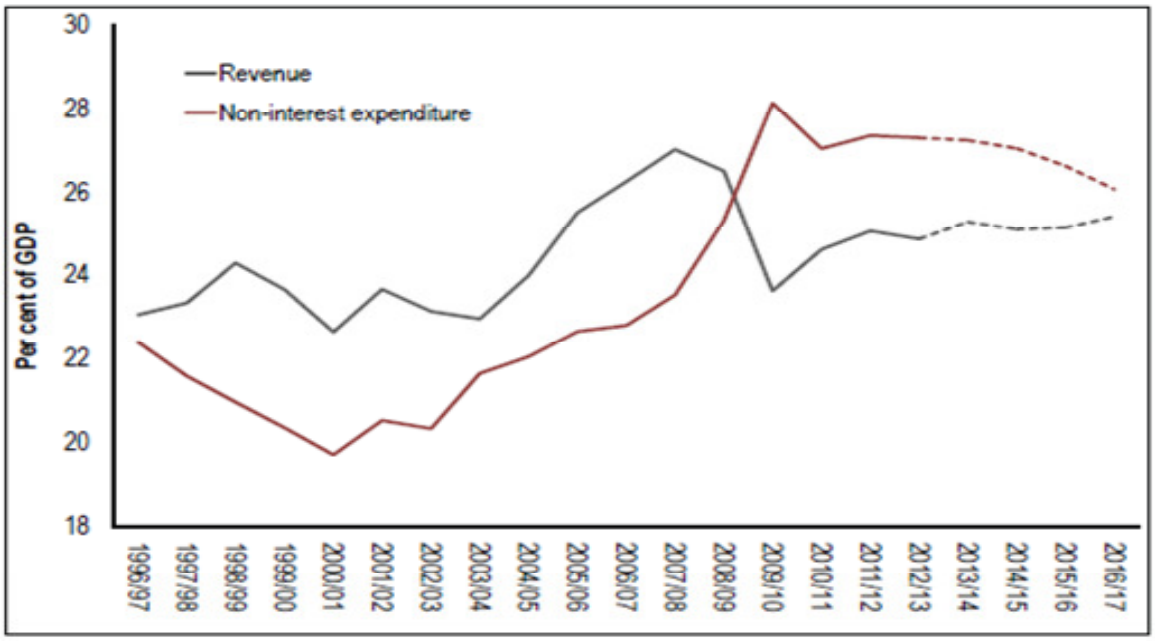
The historical and projected relationship between national revenue and non-interest expenditure is shown in Figure 5.

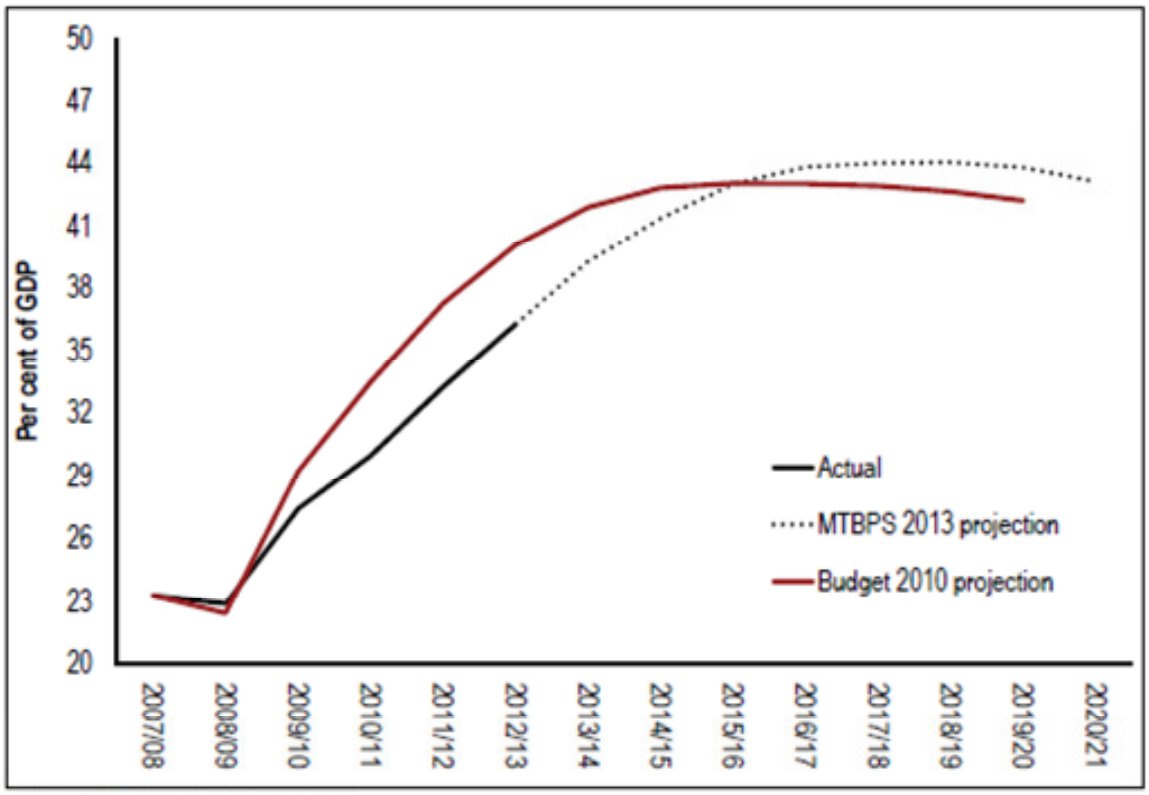
Figure 5: National Revenue and Non-Interest Expenditure (1998/97–2016/17)



Source: National Treasury

Government's long-term projections of net debt to 2020/21 are given in Figure 6.

Figure 6: Long-Term Net Debt Projections (2007/8–2020/21)



Source: National Treasury

Specific values and percentages are shown in Table 9.

Table 5: Total National Government Debt (2010/11–2016/17)

Table 3.6 Total national government debt, 2010/11 – 2016/17

As at 31 March	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17
R billion	Outcome			Estimate	Medium-term estimates		
Total gross loan debt	990.6	1 187.8	1 365.6	1 562.3	1 748.8	1 966.5	2 170.5
Total net loan debt	820.4	989.7	1 181.5	1 370.4	1 573.7	1 788.2	1 994.0
As percentage of GDP:							
Total gross loan debt	*36.2%*	*39.9%*	*42.5%*	*44.8%*	*46.0%*	*47.3%*	*47.7%*
Total net loan debt	*30.0%*	*33.3%*	*36.8%*	*39.3%*	*41.4%*	*43.1%*	*43.9%*
Foreign debt as percentage of:							
Gross loan debt	*9.9%*	*9.8%*	*9.1%*	*8.5%*	*7.5%*	*7.1%*	*6.4%*
Net loan debt	*4.8%*	*5.0%*	*3.7%*	*4.3%*	*3.7%*	*3.8%*	*3.5%*

As Table 9 shows, the net debt percentage to GDP is projected to increase steadily to approximately 44% of GDP in 2016/17.However, between 2011/12 and 2016/17, the proportion of foreign debt is projected to fall from nearly 10% to 6.4% in gross terms, or from 5% to 3.5% in net terms.

Consolidated fiscal figures expressed in the 2013 National Budget are in Table 10 and the latest projections from the MTBPS in Table 11.

Table 6: Consolidated Fiscal Framework (2009/10–2015/16)

R billion / percentage of GDP	2009/10	2010/11 Outcome	2011/12	2012/13 Revised estimate	2013/14 Medium-term estimates	2014/15	2015/16
Revenue	**664.5**	**757.2**	**836.9**	**887.8**	**985.7**	**1 091.1**	**1 199.8**
	27.1%	*27.7%*	*28.1%*	*27.7%*	*28.0%*	*28.1%*	*28.1%*
Expenditure	**824.1**	**877.5**	**954.2**	**1 055.9**	**1 149.4**	**1 244.3**	**1 334.1**
	33.6%	*32.1%*	*32.1%*	*32.9%*	*32.6%*	*32.1%*	*31.2%*
Non-interest expenditure	766.9	811.3	877.7	967.6	1 049.6	1 135.6	1 215.9
	31.3%	*29.7%*	*29.5%*	*30.2%*	*29.8%*	*29.3%*	*28.5%*
Debt-service cost	57.1	66.2	76.5	88.3	99.7	108.7	118.2
	2.3%	*2.4%*	*2.6%*	*2.8%*	*2.8%*	*2.8%*	*2.8%*
Budget balance	**-159.6**	**-120.4**	**-117.3**	**-168.0**	**-163.7**	**-153.2**	**-134.4**
	-6.5%	*-4.4%*	*-3.9%*	*-5.2%*	*-4.6%*	*-3.9%*	*-3.1%*
Primary balance	*-4.2%*	*-2.0%*	*-1.4%*	*-2.5%*	*-1.8%*	*-1.1%*	*-0.4%*

Source: National Budget 2013

Table 7: Consolidated Government Fiscal Framework (2010/11–2016/17)

Table 3.3 Consolidated fiscal framework, 2010/11 – 2016/17

R billion	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17
	Outcome			Estimate	Medium-term estimates		
Operating account							
Revenue	764.7	843.5	907.6	998.9	1 086.1	1 184.0	1 305.8
Current payments	756.3	837.7	919.1	1 008.6	1 086.3	1 165.7	1 247.6
Compensation	309.9	345.5	375.4	409.0	437.2	466.9	498.9
Goods and services	137.2	153.7	165.1	178.6	188.2	198.1	211.8
Interest and rent on land	75.3	81.8	93.2	106.6	116.6	128.8	141.0
Transfers and subsidies	233.9	256.7	285.4	314.3	344.3	371.9	395.8
Current balance	8.4	5.9	-11.5	-9.6	-0.1	18.3	58.3
Percentage of GDP	*0.3%*	*0.2%*	*-0.4%*	*-0.3%*	*0.0%*	*0.4%*	*1.3%*
Capital account							
Capital receipts	0.4	0.2	0.3	0.2	0.2	0.2	0.2
Capital payments	55.7	61.2	68.0	75.7	87.9	95.6	101.7
Capital transfers	45.4	49.7	52.5	55.8	63.3	70.1	72.9
Capital financing requirement[1]	-100.8	-110.6	-120.1	-131.4	-151.1	-165.6	-174.4
Percentage of GDP	*-3.7%*	*-3.7%*	*-3.7%*	*-3.8%*	*-4.0%*	*-4.0%*	*-3.8%*
Financial transactions[2]	22.3	2.8	3.3	3.6	3.3	3.0	0.0
Contingency reserve	–	–	–	–	3.0	6.0	18.0
Budget balance	-114.7	-107.5	-135.0	-144.6	-157.5	-156.3	-134.2
Percentage of GDP	*-4.2%*	*-3.6%*	*-4.2%*	*-4.2%*	*-4.1%*	*-3.8%*	*-3.0%*
Revenue	765.0	843.8	907.9	999.1	1 086.3	1 184.2	1 306.0
Expenditure	879.7	951.3	1 042.9	1 143.7	1 243.8	1 340.4	1 440.2
Non-interest expenditure[3]	*804.4*	*869.5*	*949.6*	*1 037.0*	*1 127.2*	*1 211.7*	*1 299.2*
Interest payments	*75.3*	*81.8*	*93.2*	*106.6*	*116.6*	*128.8*	*141.0*
Primary balance[4]	***-39.4***	***-25.8***	***-41.7***	***-37.9***	***-40.9***	***-27.5***	***6.8***
Percentage of GDP	*-1.4%*	*-0.9%*	*-1.3%*	*-1.1%*	*-1.1%*	*-0.7%*	*0.1%*

1. Includes payments for capital assets, receipts from the sale of capital assets and capital transfers
2. Transactions in financial assets and liabilities
3. All spending except for consolidated interest payments
4. Revenue less non-interest expenditure

Source: National Treasury (2013c)

Sources of New Financing

Since the financial crisis of 2008, government's borrowing requirement has increased significantly, partly as a countercyclical response to support economic growth through infrastructure investment. To meet its requirements, government borrows in both the domestic and international debt markets, with domestic borrowing remaining the primary source, providing 70% of the annual requirement. Treasury bills are issued with maturities below one year and provide a portion of financing, but most financing is obtained through issuing bonds with maturities typically of several years but which extend to 30 years and more at the long end. The South African bond market is one of the most liquid in the world. It also provides financing for state-owned companies, private sector corporates and banks.

Flow of funds statements prepared by the SARB show the extent to which funds have been drawn from overseas sources, compared to funds generated domestically, or moved to foreign users if a surplus occurs domestically. The flow of funds indicates the relative saving and dissaving or investment, borrowing, lending and asset acquisition which occurs in different sectors of the economy, such as households, non-financial businesses, financial intermediaries and government.

The flow of funds account for 2012 indicates that the domestic economy drew in R197-billion of savings from the rest of the world (foreign sector). Much of this was in the form of trade credit and short-term loans (R106-billion) and flows into government bonds (R91-billion). Financial intermediaries in South Africa, primarily banks, showed a net lending outflow of R69-billion in the year, with most of this going to the non-financial business sector (R66-billion). However, banks increased their holdings of equities by R117-billion, drawing down on fund deposits to do so. Net flows into the banking sector were low.

The household sector recorded a net lending position of R11-billion for the year, mainly going toward increased deposits with general government. There were no net flows into the household sector for the year as a whole.

In 2012, the non-financial business sector generated savings of R306-billion, which was virtually all (R302-billion) invested in new fixed capital formation. The parastatal sector invested R134-billion in fixed capital formation, of which only R48-billion was from its own savings.

Public Debt

Composition of Government Debt and Debt Maturities

Table 12 shows the breakdown of government debt. As at March 2013, Treasury bills accounted for 12.6% of government debt and bonds issued in the local bond market (fixed-rate and inflation-linked bonds) for76% of government debt. Foreign debt made up 9.1% of the total, most of which was in the form of foreign currency bonds.

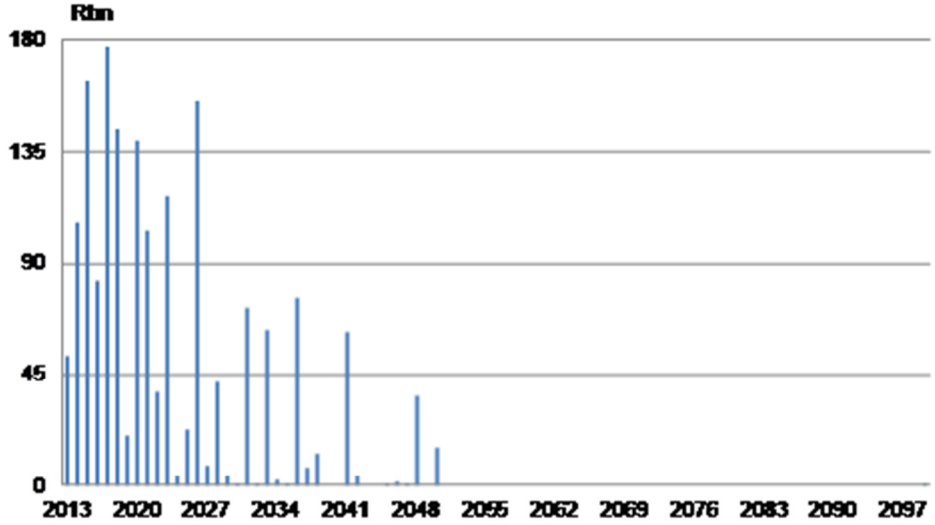
Table 8: Government Debt Breakdown (2012/13)

R million	Mar-12	% of total	Mar-13	% of total
Total domestic debt	**1 070 940**	**90.2**	**1 241 123**	**90.9**
Fixed-rate bonds	668 300	56.3	793 358	58.1
Inflation-linked bonds	220 973	18.6	244 496	17.9
T-bills	155 159	13.1	171 985	12.6
Corporation for Public Deposits	13 256	1.1	18 985	1.4
Retail savings bonds	12 222	1.0	11 269	0.8
Zero-coupon bonds	984	0.1	984	0.1
Other loans	46	–	46	–
Total foreign debt	**116 851**	**9.8**	**124 555**	**9.1**
Foreign currency bonds	98 151	8.3	106 588	7.8
Other foreign loans	18 700	1.6	17 967	1.3
Total government debt	**1 187 791**	**100**	**1 365 678**	**100**

Source: National Treasury

Figure 7 shows the value of all bonds listed on the domestic bond market across the debt maturity spectrum.

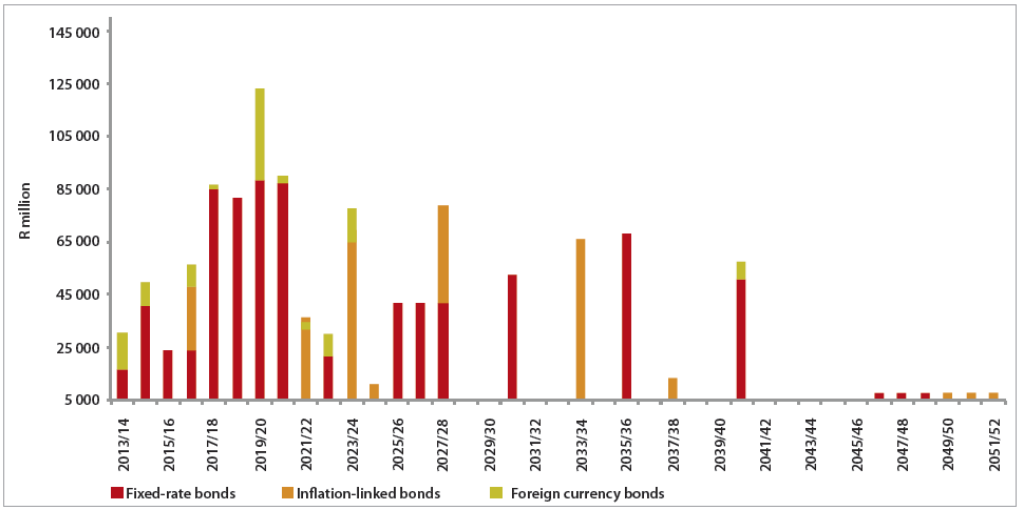
Figure 7: Value of Bonds Listed Domestically Across Debt Maturity Spectrum (2013–2097)



Source: Standard Bank Global Markets Research

Figure 8givesthe maturity profile of government bonds as at 31 March 2013 and shows the concentration of bonds in the five- and ten-year maturity ranges.

Figure 8: Debt Maturity Profile of Government Bonds at 31 March 2013



Source: National Treasury

Total Bond Market, Government Share and Liquidity of Bond Market

As at June 2013, the size of the total bond market in South Africa in terms of balance outstanding wasR1,800-billion (SAR, 2013c), while the total outstanding balance of marketable bonds issued by government was R1,089-billion. Government bonds make up 60.5% of the total outstanding in the South African bond market. With the inclusion of foreign bonds, the total government bonds balance outstanding was R1,428-billion at end-June 2013.

In 2012 (calendar year), the total value of bond trade transactions in the domestic secondary market was R25,274-billion, and the number of transactions397 745, giving an average transaction size of R63.5-million.New issues of public sector bonds were R172.7-billion.In comparison, the total share capital raised on the JSE was R78.1-billion, which was lower than in 2011 when it was R87.60-billion.Nevertheless, new issues of public sector bonds were about double that of new share capital raised. In the first seven months of 2013, new government bond issues came to R96-billion, compared with private sector corporate bond issues of only R18.1-billion. As apparent in the flow of funds figures as well, the extent of public bond issues as a use of funds from the market is very substantial.

At the end of June 2013, national government's foreign debt outstanding was R117.6-billion, of which R99.7-billion was marketable debt. Taking the marketable debt to be by and large bonds, this gives a ratio of foreign to domestic bonds of approximately 9.2%. Table 13 shows national government financing in Q2 2013 and planned for the current fiscal year.

Table 9: National Government Financing (2013/14)

National government financing in fiscal 2013/14

R billions

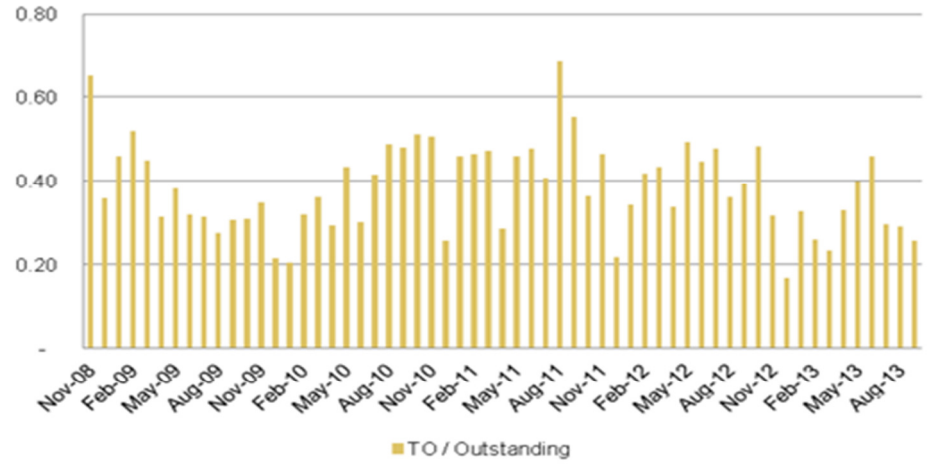
Item or Instrument	Originally budgeted 2013/14[1]	Actual Apr–Jun 2013	Actual Apr–Jun 2012
Deficit	179,2	63,5[2]	23,9[2]
Plus: Extraordinary payments	0,9	0,0	1,4
Cost/profit on revaluation of foreign debt at redemption[3]	3,2	4,7	-2,9
Less: Extraordinary receipts	0,3	3,8	0,1
Net borrowing requirement	183,1	64,4	22,2
Treasury bills	23,0	20,2	11,4
Domestic government bonds	145,4	36,1	34,0
Foreign bonds and loans	-1,1	-11,8	-12,1
Change in available cash balances[4]	15,8	19,9	-11,0
Total net financing[5]	183,1	64,4	22,2

1 *Budget Review 2013*
2 Cash-flow deficit
3 Cost + profit –
4 Increase – decrease +
5 Components may not add up to totals due to rounding

Source: SARB (2013c)

A quantified indicator of bond market liquidity is bond turnover divided by the balance outstanding for bonds in the market. Using this calculation, the liquidity of the domestic bond market for calendar 2012 was 14. Figure 9, constructed using monthly data, shows a noticeable decline in liquidity in the domestic bond market over the course of 2013.

Figure 9: Bond Market Liquidity (Turnover/Outstanding Bonds)

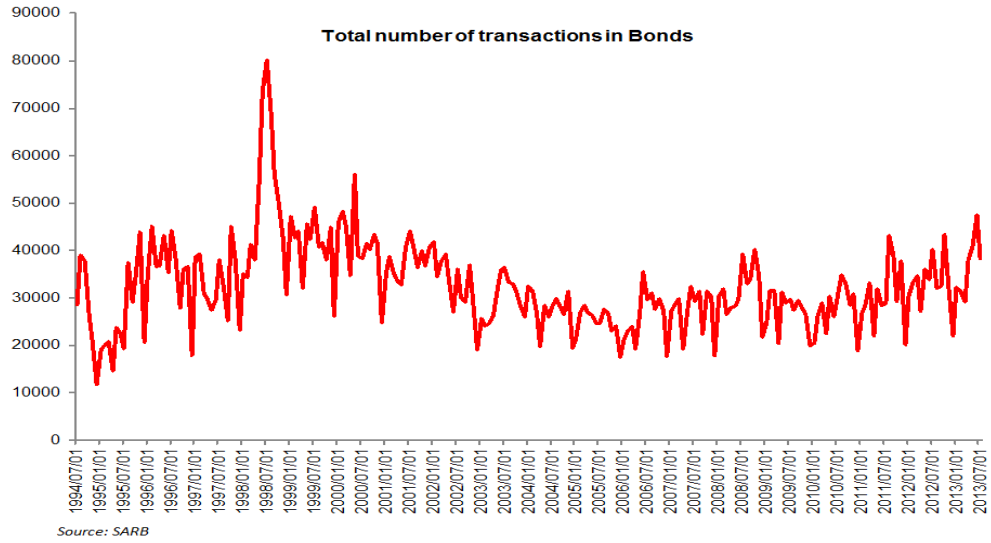


Source: Standard Bank

During the recession of late 2008 and 2009, bond market liquidity declined but increased between early 2010 and late 2011. Since then, the decline in the liquidity of the domestic bond market could reflect two factors at play: an asset market rotation into equities, or an increase in global risk aversion amidst the sovereign debt crises in advanced economies.

A second measure of liquidity of the domestic bond market is the total number of transactions in bonds. This does not take into consideration the value of transactions, or the relativity to bonds outstanding, but does indicate the extent of trading activity. This measure shows a steady uptrend in transaction volumes in the bond market since July 2005 (Figure 10)and highlights the surge in bond trade during the Asian and domestic foreign exchange crisis of 1998. Monthly transactions surged to 80 195 in July 1998 during the most intense period of Rand currency speculation.

Figure 10: Bond Market Liquidity (Total Transactions in Bonds)

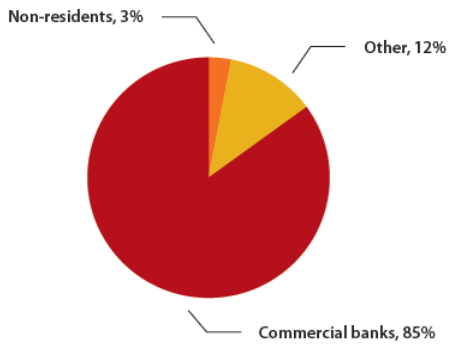


Holders of Government Debt

Holdings of Treasury bills

As at 31 March 2013, the amount outstanding on Treasury bills was R172-billion. Domestic commercial banks held 85% of the Treasury bills, with 3% held by non-residents. The remaining 12% was in the hands of various other financial institutions. Commercial banks are the dominant holders of domestic Treasury bills, which reflect the banks' liquidity and risk management strategies. Figure 11 shows the composition of holdings of Treasury bills.

Figure 11: Composition of Treasury Bills Holdings

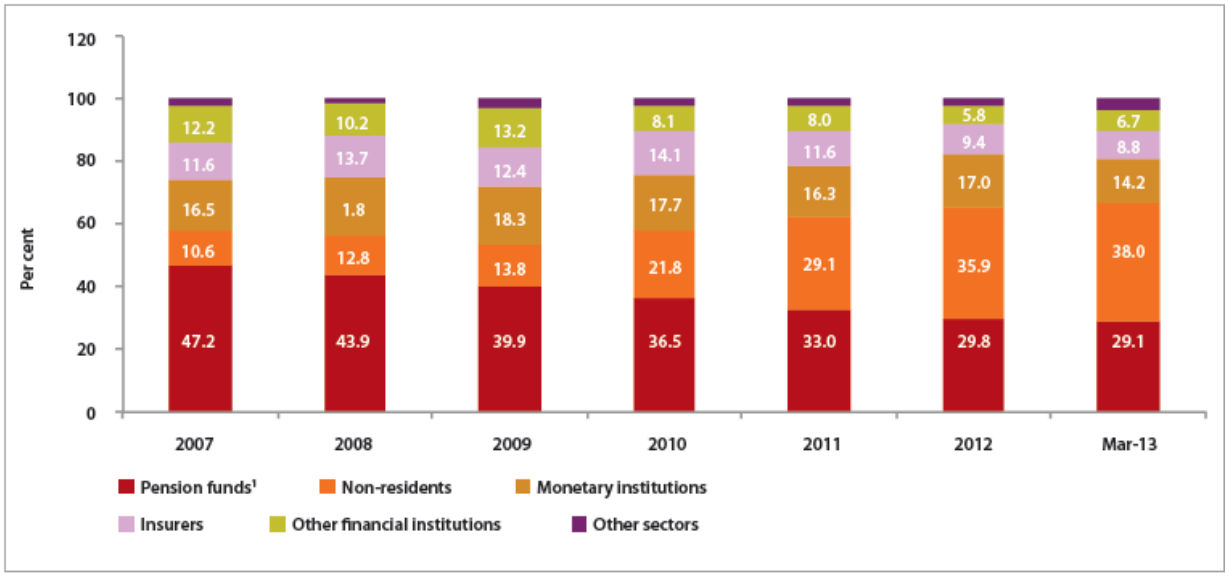


Source: National Treasury

Holdings of domestic government bonds

Figure 12 shows the holders of domestic government bonds over the period 2007 to 2013.

Figure 12: Holders of Domestic Bonds (2007 to March 2013)

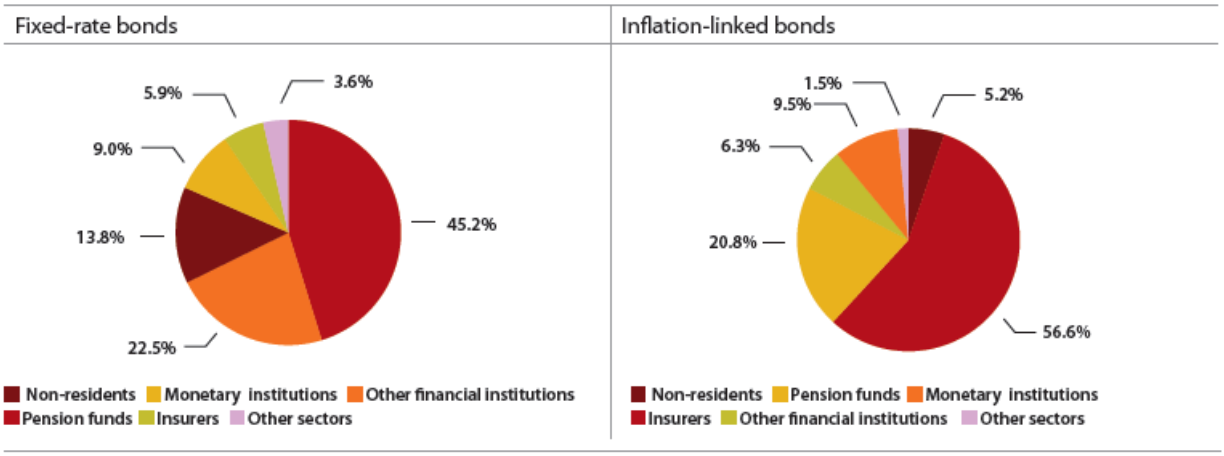


¹ Private self-administered funds and official pension funds

Source: Strate

Since 2007 holdings by pension funds in government bonds have declined, whereas holdings by monetary institutions have been fairly steady, and holdings by non-residents have increased markedly. Figure 13 shows the breakdown of holders for fixed rate bonds and inflation-linked bonds.

Figure 13: Holders of Fixed Rate and Inflation-Linked Bonds 2013



Source: Strate

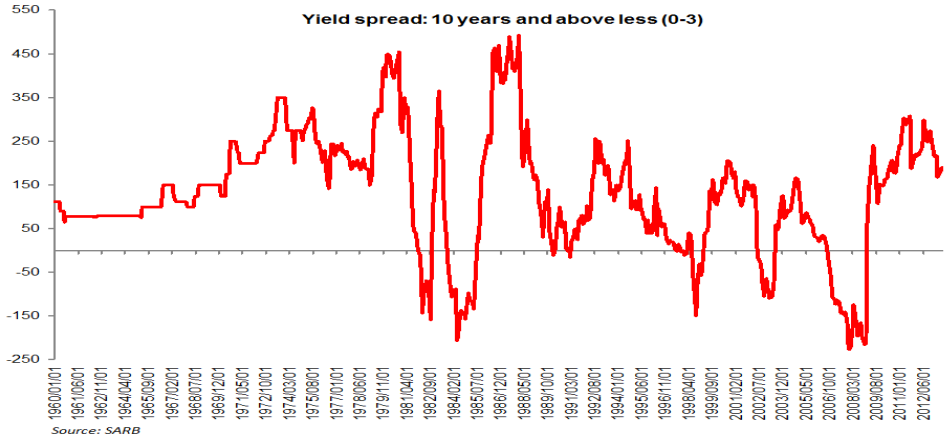
Non-residents have a far higher share in fixed-rate than inflation-linked bonds. Pension funds have very high holdings in fixed-rate bonds, while insurers have a higher relative percentage in inflation-linked bonds.

Bond Yields, Spreads and New Debt Issues

Yields on bonds traded on the stock exchange

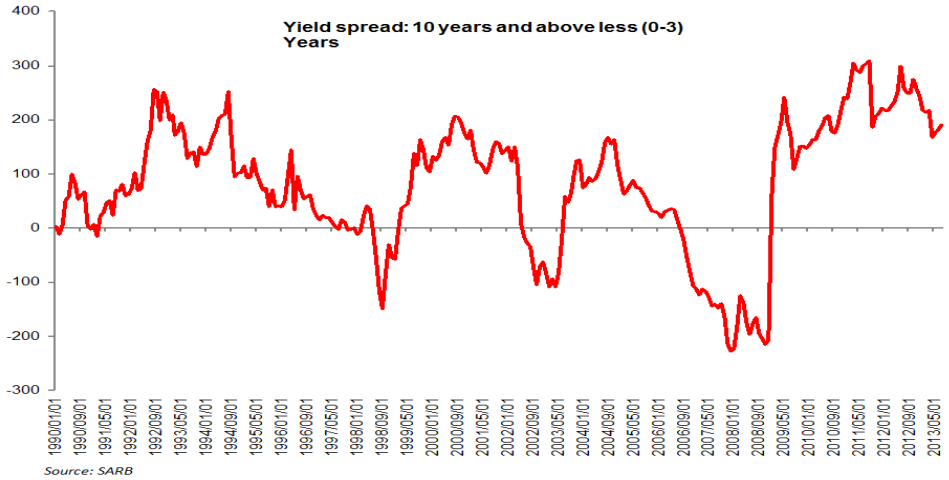
Since the recession of 2008/09, the yield spread between bonds of 0–3 years maturities and those with maturities greater than 10 years have risen sharply. Although spreads have recently declined slightly, they remain high and are similar to those experienced in the late 1980s. This is an indicator of rising credit and liquidity risk in longer dated sovereign debt instruments. Figure 14 and 15 depict the spreads from 1960 and from 1990.

Figure 14: Yield Spread (1960–2012)



Source: SARB

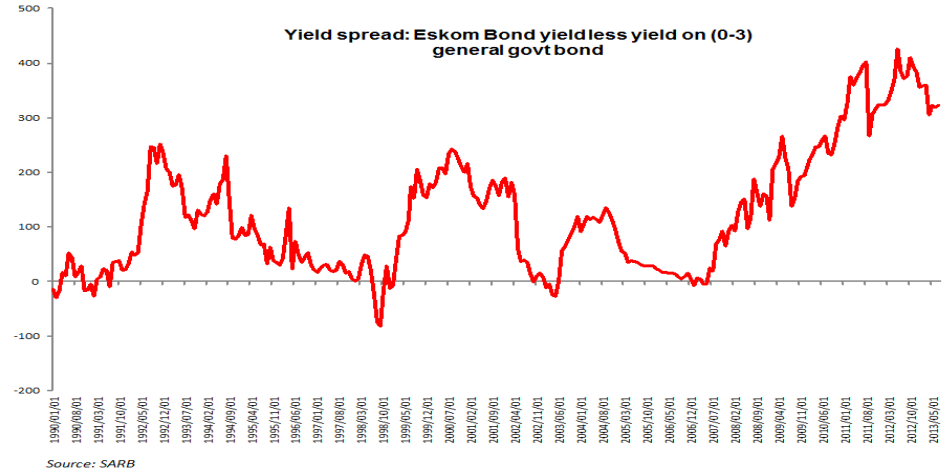
Figure 15: Yield Spread (1990–2013)



Source: SARB

Using Eskom debt securities to view yield spreads on parastatal bonds, there is a distinct increase in credit risk perception related to these debt securities. The spread between Eskom bonds and general government bonds of maturities between 0 and 3 years rose as high as 400 basis points recently. While still elevated, they have declined recently, showing some reduction in risk perception. The upward shift in the yield spread shown in Figure 16indicates how these spreads can be affected by misgivings over the institution's financial commitments.

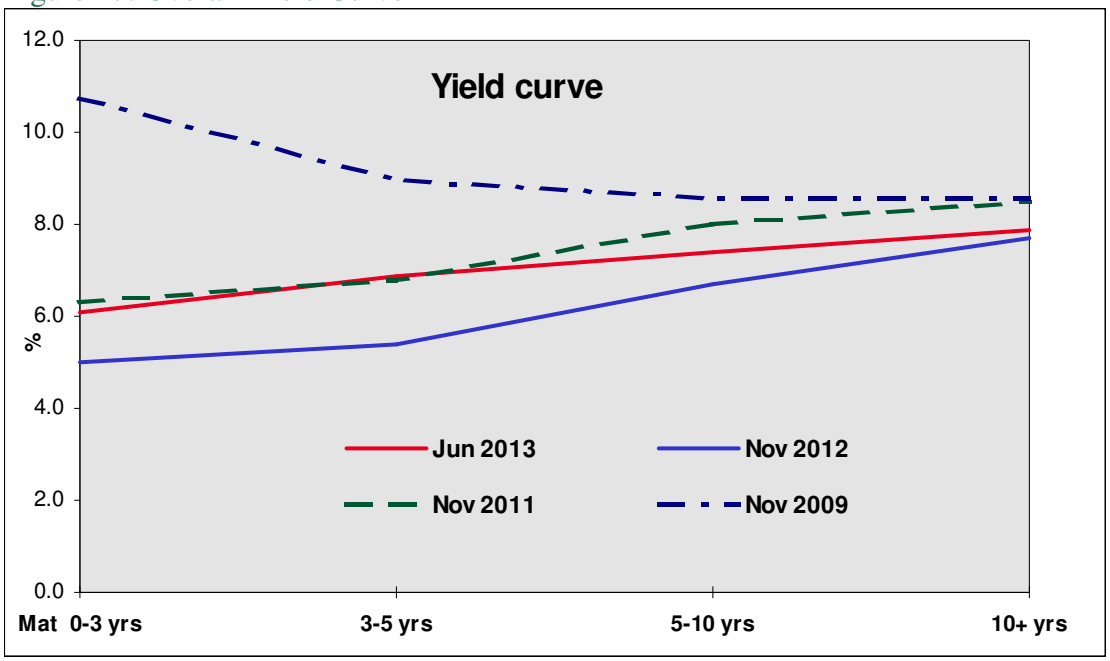
Figure 16: Eskom Bond Yield Spread (1990–2013)



Overall, the yield curve remained strongly positive in Q1 and Q2 2013, although less steep than in late 2012. This is a reflection of the prevailing low interest rate policy and concerns that inflation may increase in the near future because of price pressures and, particularly, a weakening Rand exchange rate. There is growing acceptance in the market that a further reduction in the policy rate is unlikely. In mid-2013, yields on government bonds were 6.1% on short bonds, 6.85% on 3–5 year, 7.4% on 5–10 year and 7.9% on 10+ year bonds. This compares to figures in late 2012 of around 5%, 5.4%, 6.7% and 7.7%, and in December 2011 of 6.3%, 6.8%, 8% and 8.5%. Over the course of 2012, the yield curve shifted downwards by around 0.6% but has shifted moderately upwards over the first half of 2013. The steepening

of the curve towards late 2012 is apparent from the differential between short and long yields, which moved from 2.2% at end 2011 to 2.7% in late 2012. This then narrowed to 1.8% in mid-2013, as the curve flattened, mainly as a result of increasing rates at the shorter end of the spectrum. The positive yield curves are a major change from 2007 and 2008, when the yield curve was inverted, with yields at the long end being over 2.0 percentage points **below** short-term yields. The correction to a positive curve is likely to lead to more balanced allocation of funds both into financial assets and into real investment. The flatter yield curve in mid-2013 may reflect the market view that the consumer price index (CPI) inflation rate is likely to exceed 6% on average in Q3 2013, but is expected to moderate to below 6% thereafter.

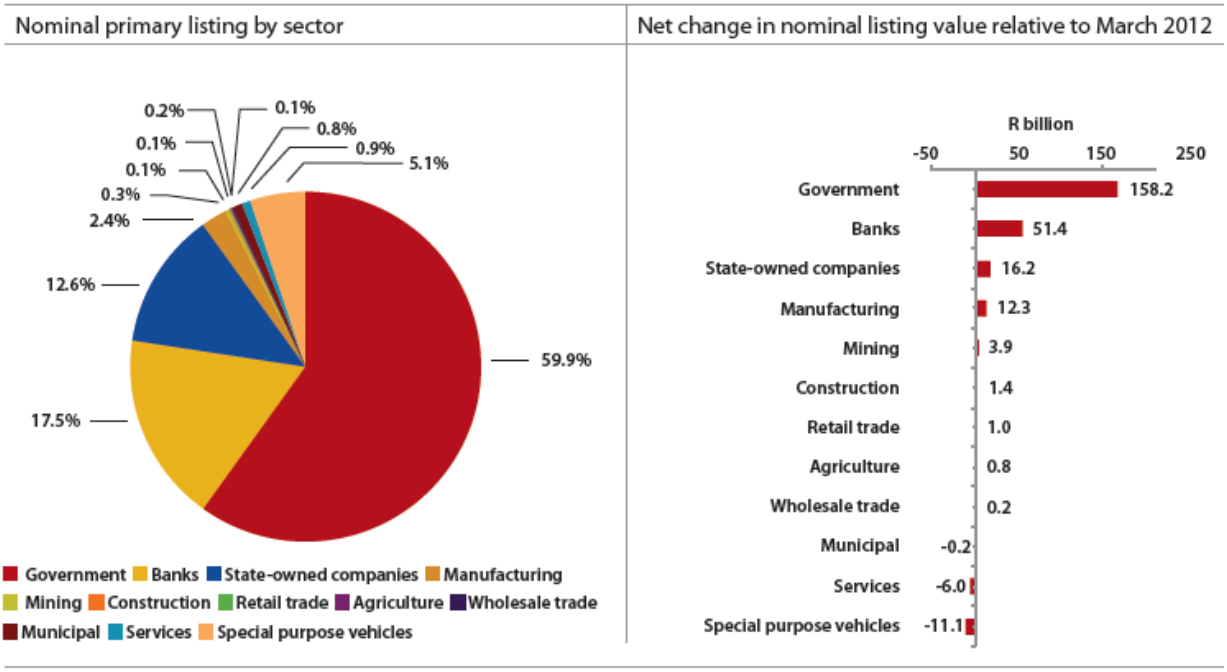
Figure 17: Overall Yield Curve



New Debt Issues

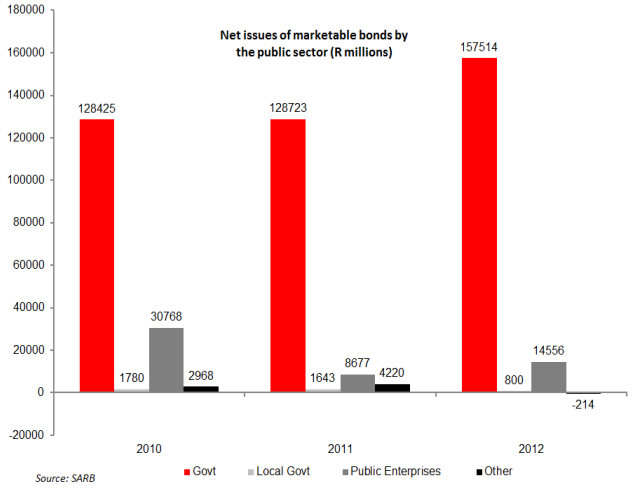
Figure 18 shows new debt issues for the fiscal year to end-March 2013, while Figure 19 compares the amounts raised in recent years to those raised in the 1990–2000 period.

Figure 18: New Debt Issues by Sector



Source: Johannesburg Stock Exchange

Figure 19: Net Issues of Marketable Bonds by Public Sector (R millions)



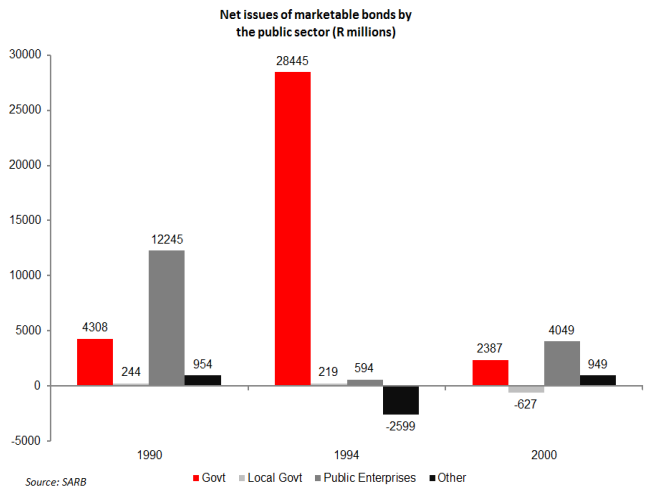
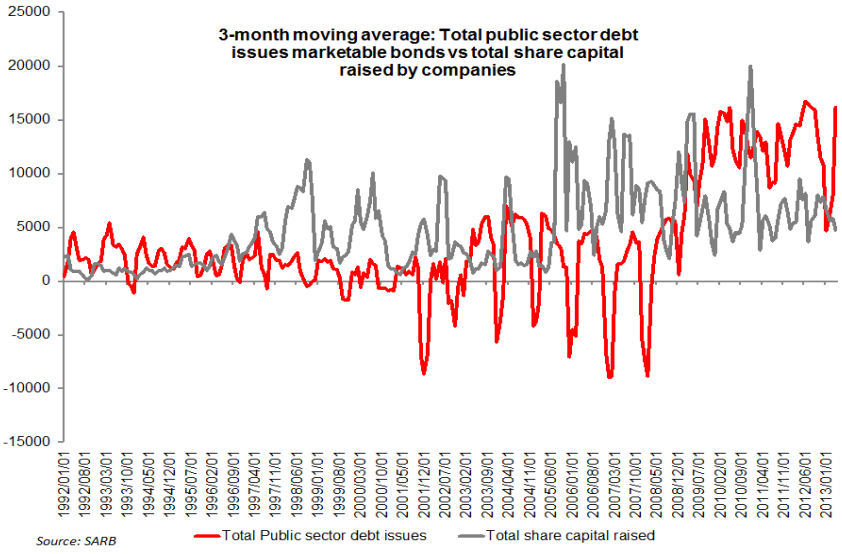


Figure 20 shows the three-month moving average between total public sector debt issues compared to share capital raised by private sector companies. This provides a comparison of the dynamics at play in the respective public and corporate finance markets.

Figure 20: Total Public Sector Debt Issues (Marketable Bonds vs. Total Share Capital Raised by Companies)



Literature Review

Theoretical Framework on Optimal Debt Management: Tax Smoothing

The effects of public debt on the economy of a country can be severe as well as subtle. From a theoretical viewpoint, three principal views can be identified concerning the crowding-out effect of public debt. A neoclassical view holds that increased budget deficits lead to increased consumption expenditure in the economy, with a resultant decrease in savings. Taxes which would be needed to fund the deficit are shifted to future generations, increasing the propensity to spend. Interest rate increases become necessary to subdue inflation

pressures from the increased demand. The increased interest rates have the effect of discouraging private sector investment. Through this channel, government deficits have a crowding-out effect on private sector investment. In contrast, a Keynesian view holds that government deficits are more likely to crowd in private sector investment, since the expansion in aggregate demand results in greater optimism of future potential in the economy, so that a higher level of investment is justified. A third view is that of Ricardo equivalence, in which budget deficits have very little effect on the economy, since actors in the economy are cognisant that reduced current taxation is simply a shift to increased future taxation of similar magnitude. Effects on interest rates and investment spending are thereby muted.

South African Debt Studies

In South Africa, few studies of public debt issues have been carried out, and most of them are mainly descriptive, with few assessing debt management issues. Many of the empirical studies on public debt are linked to the sustainability of fiscal policy in the country. This is not surprising since budget policy is constrained by the need to finance government deficits. Therefore, government's level of borrowing is dictated by the intertemporal (across time) budget constraint. Every country faces an intertemporal budget constraint, which requires that government's future expenditures, including the servicing of its outstanding official debt, be covered by the government's future receipts when measured in present value. No household can continually spend more than it makes. At some point, those who are financing the excess of the household's expenditures over its receipts will soon stop lending money. The same is true of governments. Eventually they need to change their spending or their revenues (or both) to satisfy their intertemporal budgets. The longer the delay in adjusting policy, the bigger and more painful the adjustment will be and the greater the burden on young and future generations who are left behind to pay the bills. The requirement that, along its economic transition path, a country's taxes cover its expenditures when measured in present value (discounted as of today) is a feature of all neoclassical economic growth models. Indeed, every dynamic growth model constructed by economists incorporates this long-term budget constraint, either explicitly or implicitly.

To achieve a sustainable public debt level, prudent government finances need to be achieved first. A sustainable fiscal policy will directly translate into a sustainable debt pattern. In line with the established concept on debt and fiscal sustainability, many empirical studies have been carried out in this area on both developed and developing countries. Evidence from some of these studies suggest some important macroeconomic variables are the responsible factors dictating fiscal and debt sustainability, while other empirical studies suggest some thresholds of debt for countries and group of countries based on their level of income and or quality of policy and institutions (Barro, 1997; Buiter, 1993, 1997; Feder and Just, 1977; Feder et al., 1981;Frank and Cline, 1971;Hamilton and Flavin, 1986; Kraay and Nehru, 2006; Turner, 2002; Wilcox, 1989).In addition, Collignon (2010) assessed fiscal policy rules and the sustainability of public debt in Europe. He interpreted sustainable public debt as the result of the interaction of fiscal policy with the economic environment and not as a statistical

concept as mostly found in the literature. To prevent public debt from exploding over time, policy-makers need to respond to changing conditions in the tax system and to the cost of finance (Collignon, 2010). Therefore, it is critical to establish policy rules so that fiscal policy stances taken by governments are adjusted to changes in the environment and thus ensure long-term debt sustainability.

Lusinyan and Thornton (2009) use an alternative test (unit root and cointegration) to detect fiscal sustainability rather the traditional approach of intertemporal budget constraint. They found that the series are non-stationary (I (1)) and cointegrated. Therefore, the estimated long-run equilibrium supports the presence of a weak deficit sustainability condition (not totally unsustainable). This implies that the pattern of fiscal deficit, especially in the recent past, should be investigated. A similar investigation is reported in Burger et al. (2012) when estimating the South Africa fiscal reaction function in order to detect how the government has reacted to its debt position by adjusting its primary balance. Over the period of investigation, government's fiscal reaction to its debt position varies from period to period depending on the circumstances faced by the economy. Their overall conclusion is that the government has run sustainable fiscal policy over the years by reducing the primary deficit in response to rising debt. Furthermore, when fiscal policy focuses on stabilising output, the potential for higher debt increases but falls when the focus shifts to debt levels themselves. We can thus conclude that public debt has served the purpose of smoothing transitory fluctuations in GDP and public expenses. Naraidoo and Raputsoane (2013) have confirmed that fiscal consolidation in South Africa occurs at a much lower debt-to-GDP ratio, and the country has achieved relatively sound fiscal outcomes in the recent past. To achieve fiscal sustainability through consolidation, it is imperative to detect the component of the fiscals (tax and expenditure) that will ensure a faster outcome. However, as suggested in Akanbi (2013), for a structurally constrained economy such as South Africa, fiscal consolidation through tax changes will be more effective in achieving long-term fiscal and debt sustainability.

CGE Models Addressing Debt Impacts on the Economy

Most empirical literature on debt issues have used time-series and cross-sectional data. There has been a dearth of empirical studies that employed the computable general equilibrium (CGE) technique to address the implications of public debt on the economy. Thissen (1999) describe the few that exist as financial macro CGE models. The reason behind this dearth of empirical studies may be linked to the old dichotomy between real and nominal analysis in economics. For instance, an economy-wide modeller working to construct a theoretical structure for understanding the economy as a whole may see debt as either trivial or intractable. Trivial, because (in a closed economy) it is net zero – the liabilities of all borrowers always exactly match the assets of all lenders. Intractable, because a full understanding of debt means grappling with a world in which the choice between debt and equity matters in some fundamental way. That means confronting, among other things, the intrinsic differences between borrowers and lenders; non-linearities, discontinuities, and constraints in which bankruptcy and limits on borrowing are key; taxes, where interest paid to lenders is treated differently from dividends paid to shareholders; differences between types

of borrowers, so household, corporate and government debt are treated separately; and externalities, since there are times when financial actors do not bear (or are able to avoid) the full costs of their actions.

As modern macroeconomics developed over the last half-century, most people either ignored or finessed the issue of debt. With few exceptions, the focus was on a real economic system in which nominal variables – prices or wages, and sometimes both – were costly to adjust. The result, brought together brilliantly by Woodford (2003), is a logical framework where economic welfare depends on the ability of a central bank to stabilise inflation using its short-term nominal interest rate tool. Money, both in the form of the monetary base controlled by the central bank and as the liabilities of the banking system, is a passive by-product. With no active role for money, integrating credit in the mainstream framework has proven to be difficult. Yet, as the mainstream was building and embracing the New Keynesian orthodoxy, there was a nagging concern that something had been missing from the models. On the fringe were theoretical papers in which debt plays a key role and empirical papers concluding that the quantity of debt makes a difference. The latest crisis has revealed the deficiencies of the mainstream approach and the value of joining those once seen as inhabiting the margin.

In response to the challenge, macroeconomists are now working hard to put financial stability policy on the same theoretical footing as conventional monetary policy. They are working not only to understand the sources of systemic risk, but also on how to measure and mitigate it. That means writing down models in which debt truly matters and working through the implications. Empirical testing of public debt implications in CGE literature became visible from the mid-1980s onwards. Some of the few empirical studies that were done prior to this period are focused on other simulations which could provide important macroeconomic implications. Table 14 outlines the major empirical models related to public debt in CGE models that are available in the literature and summarises the important differences in their methodologies and findings.

Table 10: Summary of Empirical Literature Related to Public Debt in CGE Models

	Title	Authors (Date)	Model and Research Question	Key Findings
1	Financial liberalisation and fiscal repression in Turkey: policy analysis in a CGE model with financial	Yeldan(1997)	CGE model to conduct the effects of government mode of financing its fiscal deficits through debt instruments or	Suggests a significant negative effect on the macro economy

	markets		monetisation.	
2	Macroeconomics of twin-targeting in Turkey: analytics of a financial CGE model.	Telli et al. (2008)	CGE model that provides an overview of the post-1998 Turkish economy in terms of real and financial sectoral adjustments.	Current Turkish monetary strategy is effective in bringing inflation down but at the expense of public sector interest burden.
3	Policy impact under credit rationing: a real and financial CGE of Rwanda	Decaluwe and Nsengiyumva (1994)	CGE model to evaluate the effects of stabilisation policies (monetary instruments) in a financially repressed economy such as Rwanda.	Confirms the importance of linking the real and financial sectors in CGE modelling.
4	Macroeconomic adjustment and income distribution: a macro-micro simulation model	Bourguignon et al. (1989)	CGE model to quantify the effects of stabilisation policies on the distribution of income and wealth.	External borrowing allows the economy to progressively reduce its current account deficit by half over seven-year period while maintaining a constant fiscal deficit.
5	Devaluation, capital flows and crowding-out : a CGE model with portfolio choice for Thailand	Rosensweig and Taylor (1990)	CGE model to evaluate the response of fiscal and monetary policies on the macro economy.	Results confirm that CGE models can be extended successfully to deal with fiscal and monetary questions.
6	Un modèle de l'économie ivoirienne.	Collange (1993), explained in Lemelin and Decaluwe(2007)	Combines the Rosensweig-Taylor portfolio management model and Bourguignon et al. liability management model.	Similar to Bourguignon et al. (1989) and Rosensweig and Taylor (1990).
7	Libéralisation financière, structure du capital et investissement: un MCEG avec actifs financiers appliqué à la Tunisie	Souissi (1994), explained in Lemelin and Decaluwe (2007)	Criticises the asset demand in the Rosensweig-Taylor model.	
8	Macroeconomics, financial variables, and CGE models.	Robinson (1991).	Surveys micro-macro CGE models that incorporate asset markets and product	Provides the first major move to dynamic financial CGE modelling in the

			and factor markets.	literature.
9	Issues in recursive dynamic CGE modelling: investment by destination, savings, and public debt, a survey.	Lemelin and Decaluwe (2007)	Puts forward some ideas on how to represent the evolution of public debt in a recursive dynamic CGE.	Presents the basic requirements on how to represent public debt in the CGE. Surveys literature on issues of public debt in CGE.
10	La dette obligataire dans un MÉGC dynamique séquentiel	Lemelin (2005)	Presents a minimalist version of a model of bond financing and debt, imbedded in a stepwise dynamic CGE model.	Proposes an approach to extend the CGE methodology to simulate the dynamics of debt.
11	Bond indebtedness in a recursive dynamic CGE	Lemelin (2007)	Presents a minimalist version of a model of bond financing and debt, imbedded in a stepwise dynamic CGE model.	Demonstrates the practicability of extending the CGE methodology to simulate the dynamics of debt as proposed in Lemelin (2005).
12	Survey of dynamic CGE models for tax policy evaluation	Pereira and Shoven (1988)	Carried out a survey of 11 CGE models that include some dynamics in their structure.	Treats issues of incorporating dynamics into the models and discusses different computational and implementation approaches. It includes a dynamic CGE model of corporate tax integration that indicates the importance of modelling dynamic choice.
13	Tax policy, asset prices, and growth: a general equilibrium analysis.	Goulder and Summers (1987)	Multisector CGE model that is capable of providing integrated assessments of the economy's short- and long- run responses to tax policy changes	Simulation results reveal that the effects of tax policy differ significantly depending on whether the policy is oriented toward new or old capital.
14	General equilibrium effects of investment incentives in Mexico.	Feltenstein and Shah (1995).	Using CGE model to examine the relative efficacy of tax	The results emphasise the importance of using an open

	instruments.	economy model. Investment tax credit and tax rate reductions increase the demand for all capital rather than new capital alone.

Source: Authors' Compilations

Yeldan (1997) investigated the interaction of the real and financial sectors of the Turkish economy in its different phases of financial liberalisation. The CGE simulations suggest that Turkey's fiscal policy, of financing the public deficits through bond issuing and monetisation, has significant negative effects on the macro-economy, as pressure will be exerted on the interest rate, leading to shrinking of the financial markets and the private sector, which will eventually contract the real economy. A follow-up study (Telli et al., 2008) provided an overview of the post-1998 Turkish economy and focused on "twin targets" (primary surplus and inflation rate). The simulation results suggest that foreign capital inflow along with high interest rates will curb inflation but at the expense of increased cost of interest burden to the public sector, which may strain fiscal credibility. The link between the real and financial sector, especially in developing countries, remains very weak and largely depends on the structure of production and the functioning of the financial system. Therefore, models designed for a structurally constrained economy should take into account this important direct link. If these constraints continue to exist, then the distributive effect of government fiscal actions will remain subdued (Decaluwe and Nsengiyumva, 1994).

As highlighted in Lemelin and Decaluwe (2007), citing Thissen (1999), other important financial CGE models includes Bourguignon et al. (1989), Collange (1993), Robinson (1991),Rosensweig and Taylor (1990) and Souissi (1994).These are macro-simulation models used to quantify the effects of stabilisation policies on income and wealth distribution in developing countries. They have similar characteristics in terms of representative agents in the economy. The household, businesses, commercial and central banks, government and the rest of the world are the representative agents who holds debt or bonds at a particular point in time. In these models, government debt is treated as forms of bonds that are held by households, banks and the rest of the world. Government financial need, as described in the Rosensweig-Taylor model, is the difference between public investment expenditure (including acquisition of new shares issues by public enterprises) and government current savings. Collange's model further extends this to include exogenous transfers received by businesses. These needs are, however, met by central banks advances and foreign capital inflows.

The different approaches to debt issues in the literature mainly arise from the financial markets. Therefore, Lemelin and Decaluwe (2007) put forward some ideas on how to represent the evolution of "purely" public debt in a recursive dynamic CGE model. In this case, public debt is considered essentially to be in the form of bonds, which consist of three related features: interest payments, redemption of matured debt and the debt level itself.

Given these features of public debt, Lemelin and Decaluwe (2007) recommend establishing in the CGE model a relationship between the level of indebtedness and the cost of borrowing. In order to represent the cost of borrowing and the borrowing capacity of government, the interest rate on new issue of bonds is set to depend on the existing stock of debt. In addition, government bonds compete with another asset, so that market valuation of bonds will respond negatively to rising stock of outstanding debt. This is a minimalist framework of bond financing adopted earlier in Lemelin (2005) where he proposed extending the CGE methodology to simulate the dynamics of public debt. The practicability of this modelling principle has been demonstrated in Lemelin (2007) using a small-scale recursive dynamic CGE model.

Other approaches related to CGE simulation on fiscal and debt issues relate to the effects of tax incentives on the macro economy. Most issues and shortcomings on tax policy evaluations have been dealt with in Pereira and Shoven (1988), and Goulder and Summers (1987). These include considering the intertemporal nature of the capital taxation by allowing an optimal evolution of capital stock in the economy and forward-looking optimal investment decisions. This is also coupled with an improved treatment of several tax provisions, such as investment tax credits and depreciation allowances. After incorporating dynamics into the CGE models surveyed, Pereira and Shoven (1988) also integrate corporate tax in order to assess the importance of modelling dynamic choices. The simulation results from Goulder and Summers (1987) reveal that a combined policy, which involves eliminating investment tax credit and reducing corporate taxes, generates windfalls to owners of capital and produces no favourable effect on capital accumulation. Based on this, Feltenstein and Shah (1995) investigated the general equilibrium effects of investment incentives through taxes for the Mexican economy. Their results confirm that reducing corporate tax has the most stimulative impact on investment, as it directly lowers the cost of capital and increases the rate of capital formation in the economy.

Assessment and Implications

Given the above literature review, to the best of our knowledge no studies exist for South Africa on the implication of public debt on the economy using CGE modelling. Such an investigation may augment the existing literature and provide further guidelines for policy-makers in assessing the sustainability of debt in the country. The CGE approach has many advantages over macro-oriented aggregated and partial equilibrium models, as it provides for differential impacts across sectors of production and consumer groups. CGE modelling allows for the analysis of distribution, which is a critical policy question that non CGE studies cannot in general tackle.

Methodology

Model

The model is based on PEP 1-t from Decaluwé et al. (2013), but several assumptions have been changed in order to better represent the South African case and our study.

Introduction of interest and debt in the model

In the model, and according to the social accounting matrix (SAM), the different agents borrow from each other. More precisely, only firms and government borrow from the rest of the world, while each agent borrows domestically (from the firms or the households). Therefore, each agent will receive and pay interest income.

To take into account the interest revenues, for households the share of domestic interest they receive is added:

$$YH_{h,t} = YHL_{h,t} + YHK_{h,t} + YHTR_{h,t} + YHI_{h,t}$$

$$YHI_{h,t} = \lambda_h^I \sum_{ag} INT_{ag,t}^{DOM}$$

Household consumption budget also has to be adjusted. It becomes their disposable income less their savings, less the transfers to non-governmental agents, less the foreign and domestic interest paid:

$$CTH_{h,t} = YDH_{h,t} - SH_{h,t} - \sum_{agng} TR_{agng,h,t} - INT_{h,t}^{DOM} - INT_{h,t}^{ROW}$$

Households' investment is the sum of savings and what they borrow from other agents, less what they lend to the other agents:

$$I\_PRI_{h,t} = SH_{h,t} + \sum_{ag} BOR_{h,ag} - \sum_{ag} BOR_{ag,h}$$

The same reasoning is applied to firms, government and the rest of the world. Note that for the government, this variable represents public investment, IT_PUB.

$$YF_{f,t} = YFK_{f,t} + YFTR_{f,t} + YFI_{f,t}$$

$$YFI_{f,t} = \lambda_f^I \sum_{ag} INT_{ag,t}^{DOM}$$

$$SF_t = YDF_t - \sum_{ag} TR_{ag,'f',t} - INT_{f,t}^{DOM} - INT_{f,t}^{ROW}$$

$$I\_PRI_{f,t} = SF_{f,t} + \sum_{ag} BOR_{f,ag} - \sum_{ag} BOR_{ag,f}$$

$$YG_t = YGK_t + TDHT_t + TDFT_t + TPRODN_t + TPRCTS_t + YGTR_t + YGI_t$$

$$YGI_t = \lambda_{gvt'}^I \sum_{ag} INT_{ag,t}^{DOM}$$

$$SG_t = YG_t - \sum_{agng} TR_{agng,gvt,t} - G_t - INT\_DOM_{'gvt',t} - INT\_ROW_{'gvt',t}$$

$$IT\_PUB_t = SG_t + BOR\_DOM_t + BOR_{gvt','row',t} - \sum_{ag} BOR_{ag,'gvt',t}$$

$$YROW_t = e_t \sum_m PWM_{m,t} IM_{m,t} + \sum_k \lambda^{RK}_{row,k} \left(\sum_j R_{k,j,t} KD_{k,j,t} \right)$$

$$+ \sum_{agd} TR_{row,agd,t} + \sum_{agd} INT\_ROW_{agd,t} + \sum_l \lambda^{WL}_{row,l} \left(\sum_j W_{l,t} LD_{l,j,t} \right)$$

$$I\_PRI_{'row',t} = SROW_t + \sum_{agd} BOR_{row,'agd',t} - \sum_{agd} BOR_{agd,'row',t}$$

Government's borrowing from domestic agents is a share of total domestic borrowing. As a closure rule, it is assumed that government cannot increase its borrowing from the rest of the world:

$$BOR_{'gvt,agd,t} = \lambda^{BOR}_{agd} \; BOR\_DOM_t$$

Domestic and foreign interest are computed as the product of respective interest rate and debt:

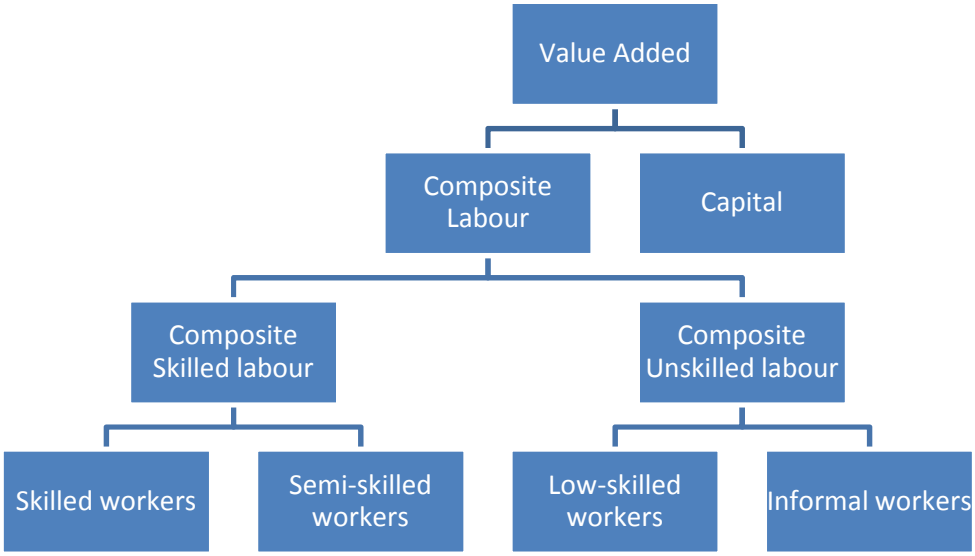
$$INT^{DOM}_{ag,t} = IR^{DOM}_{ag,t} \; DEBT^{DOM}_{ag,t}$$

$$INT^{ROW}_{agd,t} = IR^{ROW}_{agd,t} \; DEBT^{ROW}_{agd,t}$$

The labour market

In line with the SAM, the model has 53 activities and commodities. The production function technology is assumed to be of constant returns to scale and is presented in a four-level production process. At the first level, output is a Leontief input-output of value added and intermediate consumption. At the second level, a constant elasticity of substitution (CES) function is used to represent the substitution between a composite labour and capital. At the third level, composite labour demand is also a CES function between composite skilled and composite unskilled labour. Note that the composite skilled demand is a CES with a low elasticity between skilled and semi-skilled workers, capturing the fact that it is quite difficult for the firms to substitute semi-skilled for skilled workers. On the other hand, a CES is also used to describe the composite unskilled labour demand between informal and unskilled workers. Here, the assumption is that it is relatively easy to substitute producers.

Figure 21: Structure of the Value Added for **E**ach **A**ctivity



South Africa faces high unemployment problems, notably for semi-skilled and unskilled labour. Moreover, unions are very strong in the country. South Africa has the most disciplined and the largest trade union movement in Africa, which has influenced labour market policies and other related industrial policies. Unions negotiate salaries and wages, conditions of service, workforce restructuring and retrenchments on behalf of their members. As a result, wages and salaries are strongly rigid downwards. To take this rigidity into account in our modelling, a minimum wage is assumed. Thus, if the production decreases, producers won't be able to decrease their employees' salary below the minimum wage. On the other hand, this rigidity will have an impact on unemployment: given that producers can't decrease workers wage rate, they will have to retrench some of them.

Data

The core data required to implement this model can be obtained from a SAM, a national accounting matrix and a flow of funds matrix. These data sources are available for South Africa. National accounts were used to update the SAM from 2012with capital accounts. In addition, information on debt stocks for government and other agents was obtained from the SARB. Along with the SAM, some additional data such as elasticities were needed. For the income elasticities, we borrowed the values of Chitiga, Fofana and Mabugu (2011), whereas trade elasticities are taken from Gibson (2003).

Table 11: Structure of the demand

	Private Consumption	Total Intermediate Demand	Public Consumption	Consumption for Investment Purposes	Stock Variation	Margins
Agriculture, forestry and fishing	25.04%	74.55%	0.00%	0.00%	0.41%	0.00%

Coal mining	0.74%	99.19%	0.00%	0.00%	0.07%	0.00%
Gold and uranium ore mining	0.00%	101.78%	0.00%	0.00%	-1.78%	0.00%
Food	77.36%	21.49%	0.00%	0.00%	1.15%	0.00%
Beverages and tobacco	88.51%	10.54%	0.00%	0.00%	0.95%	0.00%
Textiles	41.16%	59.56%	0.00%	0.00%	-0.72%	0.00%
Wearing apparel	85.21%	14.36%	0.00%	0.00%	0.42%	0.00%
Leather and leather products	29.21%	68.16%	0.00%	0.00%	2.63%	0.00%
Footwear	89.18%	10.52%	0.00%	0.00%	0.29%	0.00%
Wood andwood products	0.31%	97.05%	0.00%	2.23%	0.41%	0.00%
Paper andpaper products	8.69%	90.07%	0.00%	0.00%	1.24%	0.00%
Printing, publishing and recorded media	22.46%	76.16%	0.00%	0.00%	1.38%	0.00%
Coke and refined petroleum products	38.23%	58.94%	0.00%	0.00%	2.83%	0.00%
Basic chemicals	3.61%	98.18%	0.00%	0.00%	-1.79%	0.00%
Other chemicals and man-made fibres	37.34%	61.31%	0.00%	0.00%	1.35%	0.00%
Rubber products	37.58%	59.47%	0.00%	2.14%	0.81%	0.00%
Plastic products	1.61%	97.26%	0.00%	0.00%	1.13%	0.00%
Glass andglass products	2.79%	94.22%	0.00%	0.00%	2.99%	0.00%
Non-metallic minerals	1.16%	98.47%	0.00%	0.51%	-0.14%	0.00%
Basic iron and steel	0.02%	104.52%	0.00%	0.00%	-4.54%	0.00%
Basic non-ferrous metals	0.00%	100.35%	0.00%	0.00%	-0.35%	0.00%
Metal products excluding machinery	2.43%	72.06%	0.00%	24.40%	1.11%	0.00%
Machinery and equipment	2.92%	43.48%	0.00%	52.82%	0.77%	0.00%
Electrical machinery	11.90%	62.81%	0.00%	24.44%	0.84%	0.00%
Television, radio and communication equipment	23.86%	44.64%	0.00%	30.39%	1.12%	0.00%
Professional and scientific equipment	34.35%	65.26%	0.00%	0.00%	0.39%	0.00%
Motor vehicles, parts and accessories	30.47%	50.10%	0.00%	19.65%	-0.21%	0.00%
Other transport equipment	2.86%	89.26%	0.00%	6.18%	1.70%	0.00%
Furniture	41.61%	34.63%	0.00%	22.71%	1.05%	0.00%

Other industries	36.54%	44.35%	0.00%	21.19%	-2.08%	0.00%
Water, electricity, gas and steam	49.26%	48.93%	0.00%	0.00%	1.81%	0.00%
Building construction	0.00%	35.69%	0.00%	63.90%	0.40%	0.00%
Wholesale and retail trade	17.57%	18.37%	0.00%	3.12%	1.22%	59.72%
Catering and accommodation services	70.37%	28.79%	0.00%	0.00%	0.85%	0.00%
Transport and storage	33.27%	46.75%	0.00%	0.29%	0.09%	19.60%
Communication	36.36%	63.33%	0.00%	0.00%	0.30%	0.00%
Finance	18.14%	80.09%	0.00%	0.00%	1.78%	0.00%
Insurance	77.08%	21.90%	0.00%	0.00%	1.03%	0.00%
Business services	23.24%	70.18%	0.00%	5.95%	0.21%	0.41%
Non-government: health	84.40%	15.81%	0.00%	0.00%	-0.21%	0.00%
Other non-human health and social work activities	84.50%	15.71%	0.00%	0.00%	-0.20%	0.00%
Community, social and personal services	44.06%	55.63%	0.00%	0.00%	0.30%	0.00%
Non-government: water and sanitation	33.98%	64.59%	0.00%	0.00%	1.44%	0.00%
Non-government: education	93.68%	7.01%	0.00%	0.00%	-0.69%	0.00%
Government: infrastructure	0.00%	16.94%	82.69%	0.00%	0.37%	0.00%
Government: water and sanitation	33.92%	60.18%	4.38%	0.00%	1.52%	0.00%
Government: general administration	0.00%	15.76%	83.88%	0.00%	0.37%	0.00%
Government: defence	0.00%	19.07%	80.56%	0.00%	0.37%	0.00%
Government: law and order	0.00%	16.02%	83.62%	0.00%	0.36%	0.00%
Government: education	0.00%	12.43%	87.20%	0.00%	0.37%	0.00%
Government: health	0.00%	16.46%	83.17%	0.00%	0.37%	0.00%
Government: social	0.00%	21.06%	78.57%	0.00%	0.37%	0.00%
Government: economic	0.00%	17.42%	82.20%	0.00%	0.37%	0.00%

Policy Simulations

Three simulations are run and compared with the Business As Usual (BAU) scenario.

Baseline/Business as Usual Scenarios

The baseline scenario looked at the possible outcome for public-debt to-GDP ratios over the next two decades in the absence of unexpectedly strong fiscal consolidation and/or major adverse economic shocks. The BAU scenario will reflect GDP projections of the National Treasury.

Table 1.1 Macroeconomic projections, 2012 – 2016

Calendar year	2012 Actual	2013 Estimate	2014 Forecast	2015 Forecast	2016 Forecast
Percentage change unless otherwise indicated					
Final household consumption	3.5	2.5	2.9	3.2	3.4
Gross fixed capital formation	5.7	4.1	5.0	5.5	6.3
Real GDP growth	**2.5**	**2.1**	**3.0**	**3.2**	**3.5**
GDP at current prices (R billion)	**3 155.2**	**3 411.7**	**3 720.2**	**4 061.7**	**4 443.7**
CPI inflation	5.7	5.9	5.6	5.4	5.4
Current account balance (% of GDP)	-6.3	-6.5	-6.4	-6.2	-6.1

Across all tables in the MTBPS, the use of "0" refers to a value of small magnitude that is rounded up or down to zero. If a value is exactly zero, it will be denoted by "–". If data is not available it is denoted by "N/A"

Source: National Treasury (2013c)

Public Debt Scenarios

As renewed economic and/or financial turmoil may occur, public debt dynamics were assessed under four shock scenarios. The first three shock scenarios consider adverse single-variable shocks in the real GDP growth rate, the real interest rate, and the primary balance, i.e. the fiscal balance before net debt interest payments:

- *A real GDP growth shock.* This scenario can be understood as a low-growth scenario in which economic activity is strongly restricted by a wide range of factors, including the impact of private-sector deleveraging, sovereign over-borrowing, international trade disputes, high commodity prices, and/or untackled population social issues (mainly poor educational and health outcomes, HIV/AIDS etc.). To build this scenario, we took into account the slowdown in the European economies for some commodities for which Europe is the main market for South Africa.
- *A real interest rate shock.* This shock describes a world where investors become increasingly worried about surging public debt and the inflation outlook, and hence persistently demand higher real interest rates. Rising real interest rates would certainly put pressure on countries with already weak structural fiscal accounts. In particular countries with an already large share of net debt interest payments to GDP (or revenue) would suffer the most from higher real interest rates. Therefore, we simulate an increase in the foreign interest rate.
- *A primary balance shock.* This scenario captures a longer-lasting deterioration in public finances, which could arise from further financial-sector support, slumping tax revenue and/or extraordinary expenses on social security. To build this scenario, we looked at a tiny decrease in households' direct tax rate.

Results

Scenario 1

The European Union (EU) is a major trade partner for South Africa. Table 16, computed from the SAM, shows the share of exports to the EU for the main commodities.

Table 12: Main Exports to Europe (% of Total South African Exports)

Agriculture, forestry and fishing	36
Food	28
Textiles	35
Leather and leather products	45
Glass andglass products	30
Machinery and equipment	34
Furniture	67

Impact on unemployment

The decrease in export demand for selected commodities will affect first the sectors producing these commodities. Given the decrease in their total export, these sectors will have to decrease their production and are likely to retrench workers. Then, the decreased production will mean that these sectors will also reduce their intermediate consumption, which will have a negative impact on the other sectors. Therefore, throughout the period, unemployment rates are increasing for each worker category (Table 17).

Table 13: Impact on Unemployment Rates (in % to the BAU)

	LABHS	LABMS	LABLS
2014	1.22	0.21	0.46
2015	1.23	0.21	0.46
2016	1.25	0.20	0.47
2017	1.27	0.20	0.48
2018	1.30	0.20	0.49
2019	1.33	0.20	0.50
2020	1.36	0.20	0.51

The wage rate for informal workers (who do not face unemployment) decreases during the period, from 0.16% to 0.14%.

Investment in selected activities:

Given the decrease in most of the activities production, the volume of new investment in the sectors also decreases.

Table 14: Impact on Investment (in % to the BAU)

	2014	2015	2016	2017	2018	2019	2020
Agriculture et Forestry	-0.87	-0.81	-0.77	-0.73	-0.70	-0.68	-0.66
Coal	0.01	-0.01	-0.02	-0.04	-0.05	-0.06	-0.08
Gold and mining	0.03	0.01	0.00	-0.02	-0.03	-0.04	-0.06
Food	-0.03	-0.06	-0.07	-0.09	-0.11	-0.12	-0.14
Textile	-0.38	-0.40	-0.41	-0.43	-0.44	-0.46	-0.47
Footwear	-0.07	-0.09	-0.11	-0.12	-0.14	-0.15	-0.16
Chemicals	0.00	-0.02	-0.03	-0.05	-0.06	-0.07	-0.09
Vehicles	-0.14	-0.14	-0.15	-0.16	-0.16	-0.17	-0.17
Insurance	0.01	-0.01	-0.02	-0.04	-0.05	-0.06	-0.08

Impact on households

Table 19 gives some figures on households. As expected, labour income (YHL) and income from transfers (YHTR) decrease over the period. As the two main sources of income are going down, total income (YH) also goes down for the entire period. This will have an impact on household savings (SH) and consumption.

Table 15: Impact on Households (in % to the BAU)

	YHL	YHTR	YH	SH	CTH_REAL
2014	-0,097	-0,053	-0,079	-0,079	-0,047
2015	-0,097	-0,053	-0,079	-0,079	-0,051
2016	-0,097	-0,054	-0,080	-0,080	-0,055
2017	-0,097	-0,055	-0,080	-0,080	-0,060
2018	-0,098	-0,058	-0,082	-0,082	-0,065
2019	-0,098	-0,059	-0,082	-0,082	-0,069
2020	-0,097	-0,061	-0,082	-0,082	-0,072

Impact on government:

Government sources of income are presented in Table 20. Given the reduction in activities, taxes on production (TIPT) decrease. Taxes on commodities – import (TIMT) and VAT taxes –both decrease because of decreased household consumption (as explained above) and decreased intermediate consumption by the different activities. Direct taxes on households (TDHT) and firms (TDFT) drop as well. Transfers received, mainly dividends from the firms, go down. Overall, government income (YG) decreases throughout the period. Government savings decrease (in this case, government deficit is increasing), and the government has to borrow more and, therefore, pay a greater amount of interest.

Table 16: Impact on Government (in % to the BAU)

	TIPT	TIMT	TICT	TDHT	TDFT	YGTR	YG	INT_DOM	SG
2014	-0,08	-0,09	-0,09	-0,08	-0,08	-0,06	-0,08		-1,70

2015	-0,08	-0,09	-0,10	-0,08	-0,08	-0,06	-0,08	0,01	-1,69
2016	-0,09	-0,09	-0,10	-0,08	-0,09	-0,06	-0,08	0,01	-1,69
2017	-0,09	-0,10	-0,10	-0,08	-0,09	-0,06	-0,08	0,02	-1,68
2018	-0,09	-0,10	-0,10	-0,08	-0,09	-0,06	-0,09	0,03	-1,68
2019	-0,09	-0,10	-0,11	-0,08	-0,10	-0,07	-0,09	0,04	-1,68
2020	-0,09	-0,11	-0,11	-0,08	-0,10	-0,07	-0,09	0,05	-1,67

Impact on investment and debt:

The decrease in government savings has an impact on its level of domestic debt, which increases, and on private investment, which reduces.

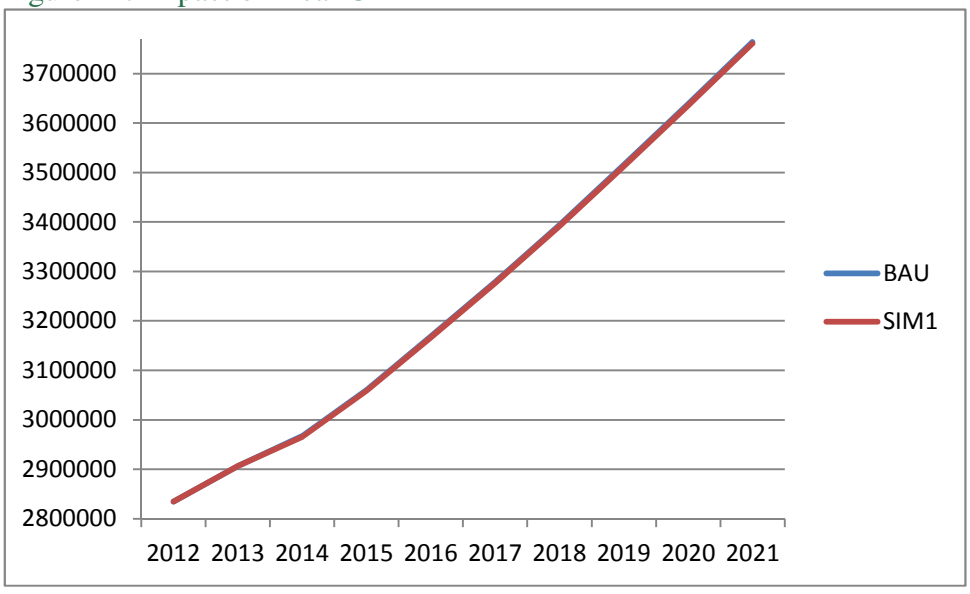
Table 17: Impact on Domestic Debt, Public and Private Investment (in % to the BAU)

	DEBT_DOM	IT_PUB	IT_PRI
2014		-0,04	-0,22
2015	0,01	-0,03	-0,22
2016	0,01	-0,03	-0,22
2017	0,02	-0,03	-0,22
2018	0,03	-0,02	-0,21
2019	0,04	-0,02	-0,21
2020	0,05	-0,02	-0,21

Impact on real GDP

Given the magnitude of the shock, the impact on real GDP is very small. From the beginning of the simulation (2014) until 2021, real GDP is lower than for the BAU.

Figure 22: Impact on Real GDP



Scenario 2

The increase in the foreign interest rate will have different impacts on the economy, as the channels of transmission are different. Indeed, in this simulation, the shock will affect the agents, especially the ones who borrow from the rest of the world (firms and government), and so will have a sharp increase in the interest they have to pay back. We assumed that the interest rate would increase by 2% from 2014 and 2017 and then increase by 5% for the rest of the period.

Impact on agents

As expected, for firms, their income decreases and their savings decrease even more due to the increase of foreign interest they have to pay back. This decrease in firms' savings will have, ceteris paribus, a negative impact on private investment.

Table 18: Impact on Firms (in % to the BAU)

	YF	YFK	YFTR	SF
2014	-0.03	-0.03	-0.02	-0.11
2015	-0.03	-0.04	-0.02	-0.11
2016	-0.03	-0.04	-0.01	-0.11
2017	-0.03	-0.04	-0.01	-0.11
2018	-0.06	-0.08	-0.03	-0.26
2019	-0.06	-0.08	-0.02	-0.26
2020	-0.06	-0.09	-0.01	-0.26

For households, their income also slightly decreases throughout the period, but the decrease is quite small for the entire period.

Table 19: Impact on Households (in % to the BAU)

	YH	YHL	YHTR	SH
2014	-0.03	-0.04	-0.02	-0.03
2015	-0.03	-0.04	-0.02	-0.03
2016	-0.03	-0.03	-0.02	-0.03
2017	-0.03	-0.03	-0.02	-0.03
2018	-0.07	-0.08	-0.05	-0.07
2019	-0.06	-0.07	-0.05	-0.06
2020	-0.06	-0.07	-0.05	-0.06

Government sources of income also decrease because of the decrease in agents' income and in households' consumption.

Table 20: Impact on Government (in % to the BAU)

	TDFT	TDHT	TICT	TIMT	TIPT	YG
2014	-0.03	-0.03	-0.05	-0.05	-0.05	-0.02

2015	-0.04	-0.03	-0.05	-0.05	-0.05	-0.02
2016	-0.04	-0.03	-0.05	-0.05	-0.04	-0.02
2017	-0.04	-0.03	-0.05	-0.05	-0.04	-0.02
2018	-0.08	-0.07	-0.11	-0.10	-0.10	-0.05
2019	-0.08	-0.06	-0.10	-0.11	-0.10	-0.06
2020	-0.09	-0.06	-0.10	-0.11	-0.10	-0.06

Impact on government savings and investment

The decrease in government income, combined with the increase in foreign interest the government has to pay back, has a strong impact on its savings. This has an impact on public investment (IT_PUB), and the domestic debt increases over the period. The impact on private investment is quite harsh: the crowding out effect is combined with the decrease in private agent savings.

Table 21: Impact on Public Savings, Public and Private Investment (in % to the BAU)

	SG	IT_PUB	IT_PRI	DEBT_DOM
2014	-0.425	-0.027	-0.212	
2015	-0.584	-0.022	-0.202	0.004
2016	-0.972	-0.016	-0.192	0.009
2017	-2.886	-0.011	-0.183	0.013
2018	-3.685	-0.036	-0.391	0.018
2019	-1.918	-0.025	-0.378	0.030
2020	-1.445	-0.016	-0.372	0.043

Impact on unemployment

The overall impact on unemployment is quite important. On one hand, the drop in total investment will have an impact on sectors that rely on investment goods (such as the construction sector). On the other hand, the decrease in household consumption will affect sectors that rely heavily on household consumption (for instance agriculture). Altogether, the impact on unemployment is quite harsh. Note that for highly skilled workers, the values are very small, which explains the big change in the percentage terms reflected.

Table 22: Impact on Unemployment Rates (in % to the BAU)

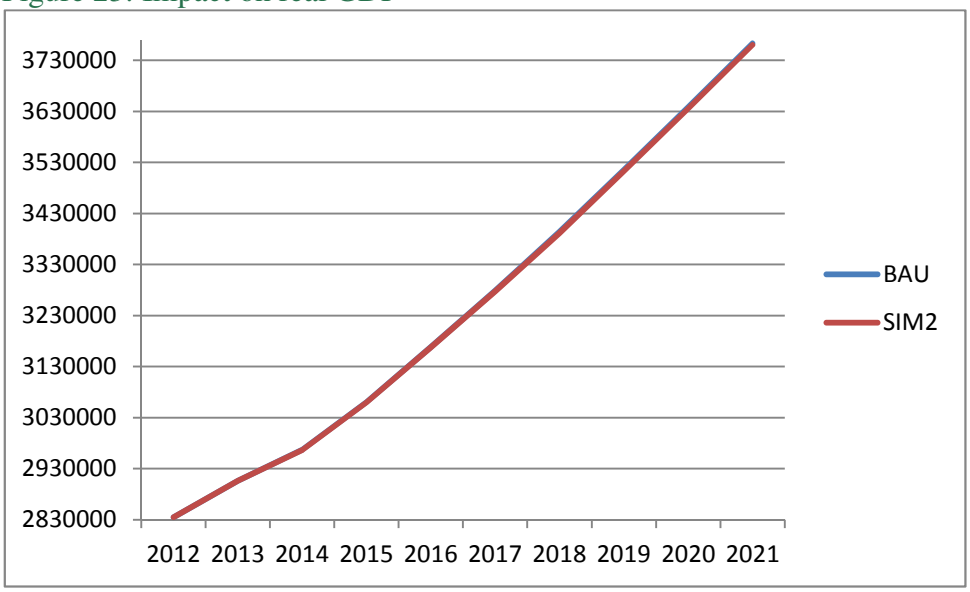
	LABHS	LABMS	LABLS
2014	0.58	0.09	0.18
2015	0.55	0.09	0.18
2016	0.53	0.08	0.18
2017	0.51	0.07	0.17
2018	1.43	0.20	0.46
2019	1.38	0.19	0.46
2020	1.34	0.17	0.46

Informal workers see their wage rate decreasing by 0.10% throughout the period.

Impact on GDP_BP_real

Finally, the impact on real GDP is slightly worse than in the BAU scenario.

Figure 23: Impact on real GDP



Scenario 3

The third scenario is designed to mimic a primary balance shock. We chose to decrease the direct tax rate on households by 1% over the period. By decreasing this tax, we are interested in seeing whether the loss the government makes on the one side can be covered by an increase in the indirect taxes because of the increase in the volume of consumption (switching).

Impact on households

Table 27 gives the percentage change in households' budget consumption (CTH), savings (SH), income (YH) and sources of income. Not surprisingly, households' budget consumption increases by 0.18% across the period.

Table 23: Impact on Households (in % to the BAU)

	CTH	SH	YH	YHL	YHTR
2014	0.18	0.17	0.03	0.04	0.03
2015	0.18	0.17	0.04	0.04	0.03
2016	0.18	0.17	0.04	0.04	0.03
2017	0.18	0.17	0.04	0.04	0.02
2018	0.18	0.17	0.04	0.04	0.02
2019	0.18	0.17	0.04	0.04	0.01
2020	0.18	0.17	0.04	0.04	0.01

From the SAM, we know that households spend 14% of their expenses on food products, 13% on business activities and a bit more than 6% on beverages and tobacco. An increase in household budget consumption will therefore have a positive impact on these commodities. Moreover, the increase in spending by households will have a very positive impact on activities producing food or beverage and tobacco, as private consumption represents 77% and 88% respectively of total demand for these particular commodities.

The impacts on unemployment are quite encouraging, as unemployment decreases for each category of workers.

Table 24: Impact on Unemployment (in % to the BAU)

	LABHS	LABMS	LABLS
2014	-0.60	-0.12	-0.04
2015	-0.64	-0.12	-0.05
2016	-0.68	-0.13	-0.06
2017	-0.72	-0.13	-0.07
2018	-0.77	-0.14	-0.07
2019	-0.81	-0.14	-0.08
2020	-0.85	-0.15	-0.08

Impact on government:

As expected, total households direct taxes are decreasing. The other components of government income go up, but in total, government spending goes down by around 0.24% across the period.

Table 25: Impact on Government (in % to the BAU)

	YGTR	TPRCTS	TPRDN	TDFT	TDHT	YG
2014	0.03	0.06	0.05	0.04	-0.97	-0.23
2015	0.03	0.05	0.05	0.03	-0.96	-0.23
2016	0.02	0.05	0.05	0.02	-0.96	-0.23
2017	0.02	0.04	0.04	0.01	-0.97	-0.24
2018	0.01	0.03	0.04	0.00	-0.97	-0.24
2019	0.01	0.03	0.03	-0.02	-0.97	-0.25
2020	0.00	0.02	0.02	-0.03	-0.97	-0.25

Government savings decrease and government borrowing increases throughout the period, which hampers private investment (crowding-out effect). The domestic debt increases by 0.13% compared to the BAU at the end of the period.

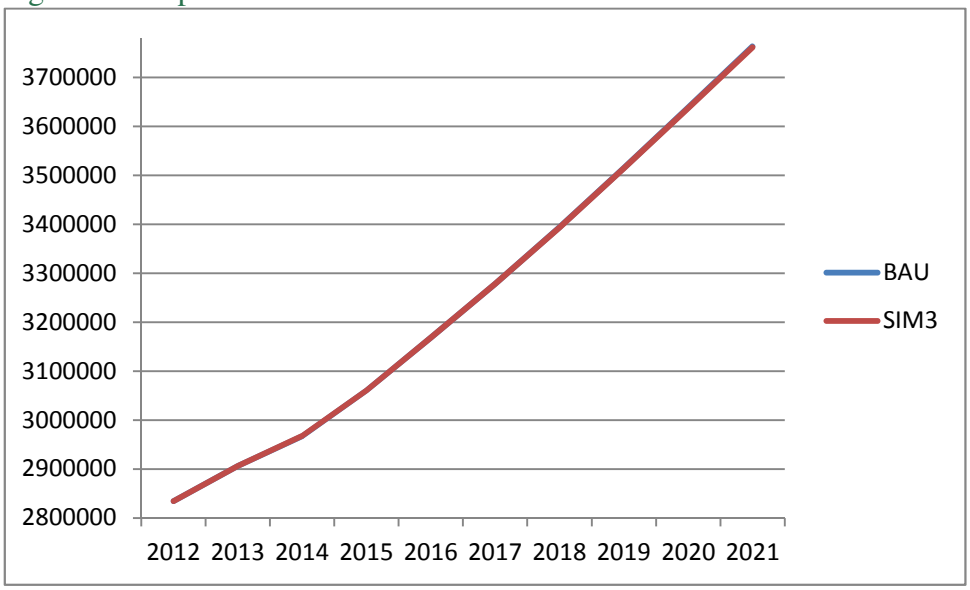
Table 26: Impact on Government (in % to the BAU)

	SG	BOR_DOM	IT_PUB	IT_PRI	DEBT_DOM
2014	-1.21	1.07	-0.01	-0.35	
2015	-1.30	1.15	0.00	-0.36	0.02

2016	-1.40	1.24	0.00	-0.37	0.04
2017	-1.52	1.35	0.01	-0.38	0.06
2018	-1.66	1.48	0.02	-0.38	0.09
2019	-1.82	1.62	0.02	-0.39	0.11
2020	-2.01	1.79	0.03	-0.40	0.13

Finally, the impact on real GDP is hardly perceptible in this simulation.

Figure 24: Impact on Real GDP



Scenario 4

This last scenario presents the impacts of an increase of firms' tax rate by 1%. Overall, we expect this increase to have direct impacts on firms (reduce firms savings as well as the transfers they make to other agents) but as well impact on government's income and savings, and in the long run, on public debt.

The following table shows the different sources of income for the government. Not surprisingly, direct taxes from firms increase and drive the increase in government' total income. For the other components, the increase or decrease is extremely small across the period.

Table 27: Impact on Government (in % to the BAU)

	TIPT	TIMT	TICT	TDHT	TDFT	YG
2014	-0.01	0.00	-0.01	-0.04	0.99	0.15

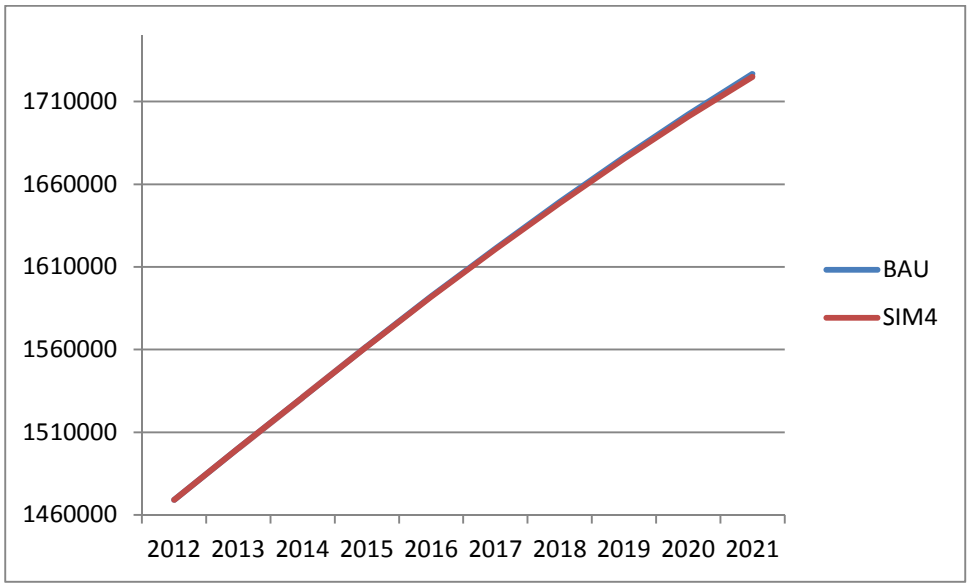
2015	-0.01	0.00	-0.01	-0.04	0.99	0.15
2016	-0.01	0.00	-0.01	-0.04	1.00	0.15
2017	-0.01	0.00	-0.01	-0.04	1.00	0.15
2018	-0.01	0.00	-0.01	-0.04	1.00	0.15
2019	-0.01	0.00	-0.01	-0.04	1.00	0.15
2020	-0.01	0.00	-0.01	-0.04	1.00	0.16
2021	-0.01	0.01	-0.01	-0.04	1.00	0.16

The increase in government's income has a strong and positive impact on government savings, as government spending is kept constant. The government reduces its current deficit throughout the period, and this has a positive impact on the reduction of the public debt as shown in the table and graph below.

Table 28: Impact on public savings, domestic debt and private investment (in % to the BAU)

	SG	DEBT_DOM	IT_PRI
2014	0.77		0.08
2015	0.81	-0.01	0.08
2016	0.87	-0.03	0.09
2017	0.94	-0.04	0.09
2018	1.02	-0.05	0.09
2019	1.11	-0.07	0.10
2020	1.22	-0.08	0.10
2021	1.34	-0.10	0.10

Figure 25: Impact on public debt



The improvement in government's savings leads to an increase in private investment by 0.10% across the period.
This increase in the total private investment budget leads to an increase of investments in the different sectors of the economy the following year.

Table 29: Impact on investment (in % to the BAU)

	2014	2015	2016	2017	2018	2019	2020
Agriculture et Forestry	0.06	0.07	0.07	0.07	0.08	0.08	0.08
Coal	0.09	0.09	0.10	0.10	0.11	0.11	0.12
Gold and mining	0.10	0.11	0.12	0.13	0.13	0.14	0.15
Food	0.07	0.07	0.08	0.08	0.09	0.09	0.10
Textile	0.08	0.08	0.09	0.10	0.11	0.11	0.12
Footwear	0.07	0.08	0.08	0.09	0.10	0.10	0.11
Chemicals	0.09	0.10	0.10	0.11	0.12	0.12	0.13
Vehicles	0.10	0.11	0.11	0.12	0.13	0.13	0.14
Insurance	0.05	0.05	0.05	0.06	0.06	0.07	0.07

The increase of private investment will benefit to some investment commodities, and therefore will have an impact on the demand of these particular commodities (ex: construction, machinery…).
For most of these sectors, the production is increasing due to the increase of this component of the demand.
The impact on households is very small (-0.04% over the period). On one hand, dividends they receive from firms are decreasing (*YHTR*), the impact on labour income is nearly imperceptible, leading to a slight decrease in households income.

Table 30: Impact on households (in % to the BAU)

	YHTR	YHL	YH
2012	-0.11	-0.01	-0.04
2013	-0.11	-0.01	-0.04
2014	-0.11	-0.01	-0.04
2015	-0.11	-0.01	-0.04
2016	-0.11	-0.01	-0.04
2017	-0.11	-0.01	-0.04
2018	-0.11	-0.01	-0.04
2019	-0.11	-0.01	-0.04

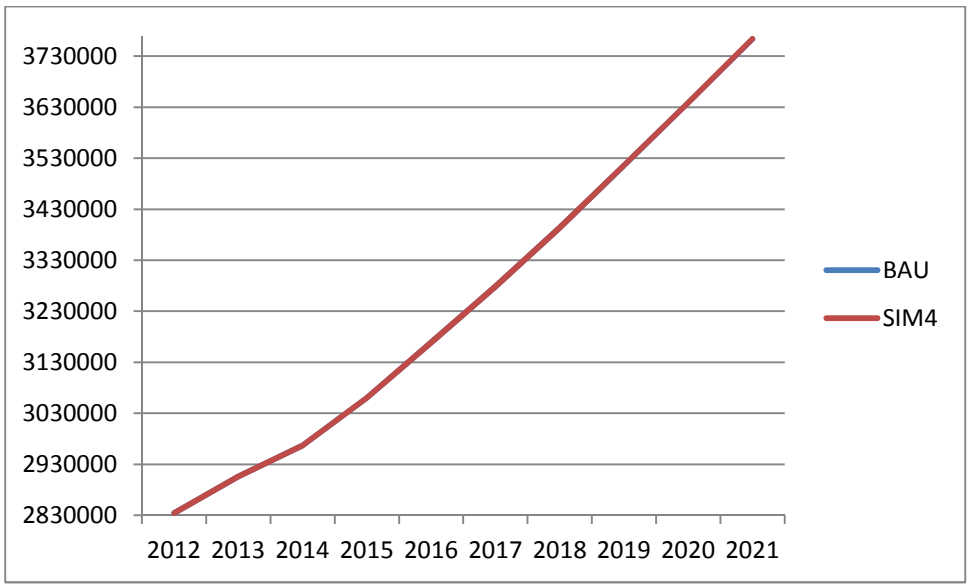
This decrease in households income will have a slight negative impact on their budget of consumption, and therefore, will have a negative impact on some commodities (here, we have the reverse case of simulation 3).
Therefore, on one hand, some activities which rely on households' consumption will fire workers due to the decrease in households' final demand, and on the other hand, other activities will benefit from the increase in private investment, and hire workers.
The overall impact on unemployment is slightly negative, especially for highly skilled workers (though we have to keep in mind that the percentage is computed on a very small basis).

Table 31: Impact on unemployment (in % to the BAU)

	LABHS	LABMS	LABLS
2014	0.14	0.03	0.01
2015	0.15	0.03	0.01
2016	0.16	0.03	0.01
2017	0.17	0.03	0.02
2018	0.19	0.03	0.02
2019	0.20	0.03	0.02
2020	0.21	0.04	0.02
2021	0.22	0.04	0.02

The impact on real GDP is slightly higher than the real GDP computed in the reference scenario.

Figure 26: Impact on Real GDP



Concluding Remarks, Recommendations and Issues for Discussion

The main objective of this chapter was to study the evolution of public debt and its impact on the economy in order to make recommendations on how to mitigate the risks of public debt. In this chapter, the sustainability of public debt was interpreted as the result of the interaction

of fiscal policy with the economic environment, and not as a statistical concept (as in most of the recent literature). If debt must not explode over time, policy-makers have to respond to the changing conditions in their tax base (economic growth) and to the cost of finance (interest rates). Policy rules can help to ensure that at given moments the specific fiscal policy stances taken by governments are adjusted to changes in the environment, so that debt will not explode. This chapter has defined the conditions that will ensure compliance with the intertemporal budget constraint, while the empirical part of the paper has shown that public debt is sustainable in this respect. However, while compliance with the intertemporal budget constraint is a necessary condition for debt sustainability, it may not be sufficient. A government can be solvent, in the sense that it can raise sufficient revenue in the future to pay for the debt service, but may become illiquid if it cannot access financial markets at reasonable terms when old debt comes to maturity. A liquidity crisis can then turn into a solvency crisis, if high risk premiums push interest rates up. This is also the issue with credit rating agencies.

The following recommendations are made:

1. To ensure continued high levels of public debt do not create risks for economic and fiscal objectives, crowd out spending on public services, limit the ability to absorb the impact of future economic shocks and thereby destabilise underlying national, provincial and local fiscal frameworks, Government should consider improving existing debt management through a greater focus on:
    a. Level of optimal public debt desired should be made explicit. Our analysis emphasises that not only the trend but also the level of the debt-to-GDP ratio should be a key indicator in this framework. The Commission does not find a sound basis for integrating specific debt limits. However, our analysis suggests that a reference point for public debt of 60% of GDP be used flexibly to trigger the reference point for debt limit analysis.
    b. Sub-national governments should be required to define long-term debt targets, functioning as an anchor for sub-national fiscal policy. Self-imposed, long-term debt targets best reflect a government's commitment to fiscal consolidation and sustainable public finances.
2. The Government should design and encourage the use of a more precise definition of productive public investment in municipal and provincial debt laws to minimise subjectivity in borrowing to finance productive infrastructure by tying new borrowing to secured productive activities.
3. The Government should make coverage of fiscal balance and public debt as broad as possible, with particular attention to entities that present significant fiscal risks, including state-owned companies and enterprises, public-private partnerships, and pension and health care programmes.

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