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The sustainability of South African fiscal policy

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Abstract: The public-debt-to-GDP ratio in South Africa increased from 26 per cent in the 2008/09 fiscal year to 73.9 per cent in 2023/24, raising fears that fiscal policy is not sustainable. This raises the question: did the government take steps to arrest the increase in the debt-to-GDP ratio and regain fiscal sustainability, and if so, why did they fail? Establishing fiscal sustainability can be done directly or indirectly. Doing it directly entails the government increasing the primary balance in reaction to higher debt levels. Hence, this paper presents a fiscal reaction function. The analysis shows that during the period in which the public-debt-to-GDP ratio rose, the primary balance did indeed react to an increased debt burden, but its level remained too low to arrest the increase in the public-debt-to-GDP ratio. The analysis also assesses whether fiscal fatigue set in, wherein the responsiveness of the primary balance to the debt burden is positive but eventually weakens. Some evidence for the presence of fiscal fatigue is present. One indirect approach to establishing fiscal sustainability is through the impact of expenditure and revenue on economic growth. Leaving revenue for further study later, this paper presents an adapted growth equation to investigate the impact on growth of general government investment and consumption expenditure, and of public (and private) corporation investment. While the effect of private sector investment is positive, neither general government nor public corporation investment has a statistically significant impact on growth. Furthermore, government consumption has a negative impact on growth.

Key words: public debt, deficit, fiscal sustainability, investment, government consumption

JEL classification: E62, H54, H62, H63

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1 Introduction

The public-debt-to-GDP ratio in South Africa increased from 26 per cent in the 2008/09 fiscal year to 73.9 per cent in 2023/24 (National Treasury various years a). In nominal rand (R) terms this is an increase from R626,975 of debt in 2008/09 to R5,207,344 in 2023/24, and a further expected increase to R6,293,173 by 2026/27 (or 74.7 per cent of GDP). This raises the question: did the government take steps to arrest the increase in the debt-to-GDP ratio and regain fiscal sustainability, and if so, why did they fail?

Public-debt-to-GDP dynamics are typically driven by three direct factors, with the determinants of these factors playing an indirect role. The three direct factors are the primary balance (which is the difference between non-interest expenditure and revenue); the effective interest rate on public debt, r; and the economic growth rate, g (which together with the effective interest rate constitute the so-called $(r-g)$ gap). On the face of it, managing the public debt burden therefore seems deceivingly simple; if the dynamics coming from the $(r-g)$ gap put upward pressure on the debt-to-GDP ratio, the government simply needs to run a sufficiently large primary surplus to prevent the debt-to-GDP ratio from increasing. However, it is not that simple, as there is interaction between the variables and this interaction determines whether or not the debt-to-GDP ratio increases. Budget decisions, for instance, impact economic growth, which in turn impacts the movement in the public-debt-to-GDP ratio. The latter is of importance in South Africa, as the period since 2008 saw a significant slowdown in economic growth compared with the decade preceding 2008.

Establishing fiscal sustainability can be done directly or indirectly. Doing it directly entails the government increasing the primary balance in reaction to higher debt levels. Hence, this paper presents a fiscal reaction function. The analysis shows that during the period in which the public-debt-to-GDP ratio rose, the primary balance did indeed react to an increased debt burden, but its level remained too low to arrest the increase in the public-debt-to-GDP ratio. The analysis also assesses whether fiscal fatigue set in, wherein the responsiveness of the primary balance to the debt burden is positive but eventually weakens. Some evidence for the presence of fiscal fatigue is present. One indirect approach to establishing fiscal sustainability is through the impact of expenditure and revenue on economic growth. Leaving revenue for further study later, this paper thus presents an adapted growth equation to investigate the impact on growth of general government investment and consumption expenditure, and of public (and private) corporation investment.

Public discourse also often includes proposals arguing that instead of shrinking the deficit, the government should rather increase it and then depend on the expenditure multiplier to increase economic growth. The analysis tests for this and shows that while the deficit has had a short-term stimulatory effect, the effect has been muted.

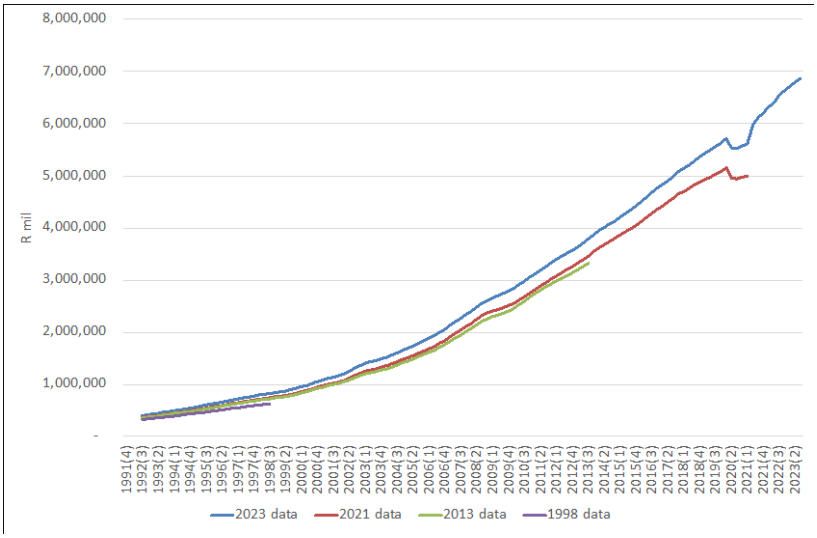
Before presenting the analysis on the above objectives, the next two sections present an overview of the debt and deficit movements over time to answer the questions: how large is the debt burden and its annual change really? And therefore, how large is the fiscal *un*sustainability problem? These questions do not have straightforward answers. Two aspects deserve attention. First, the debt burden is calculated as the ratio of debt to GDP. It is therefore influenced as much by the nominal amount of debt as it is by the level and change in nominal GDP. The same goes for the calculation of the primary-balance-to-GDP ratio. GDP numbers over the years have undergone revisions. Second, simple textbook analysis would define the change in debt as equal to the conventional deficit. However, there are several below-the-line budgetary items that usually render the change

in debt larger than the official deficit. Thus, considering the size of the deficit to understand debt movements is not sufficient.

2 How large is the debt burden really?

South Africa has undergone two large-scale revisions of its national accounts, and thus GDP, data since the 1990s—one in 1998 and the other in 2021. There was also a smaller revision in 2013 (see Figure 1).

Figure 1: Nominal GDP using different SNA vintages

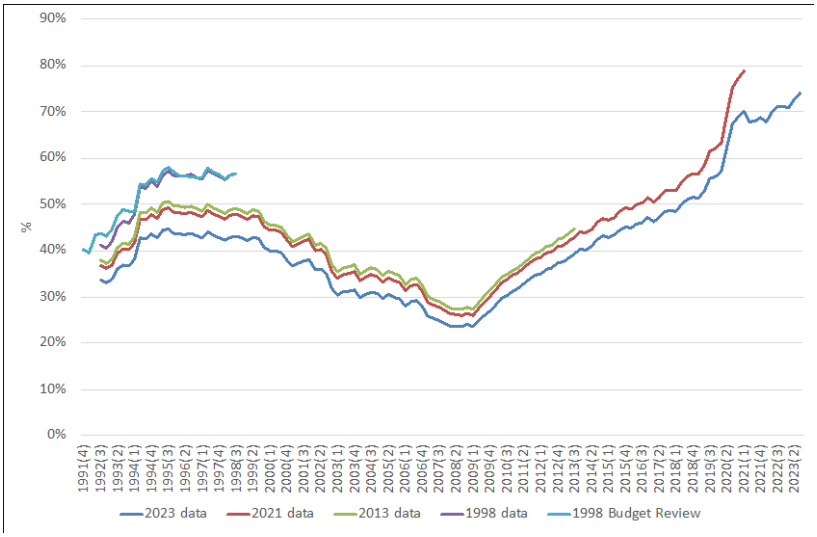


Note: dates in legend refer to last year vintage was published.

Source: author's illustration based on SARB (various years) and own calculations.

The impact has been significant, particularly when considering the debt-to-GDP ratio. In the late 1990s, the data indicated that the debt-to-GDP ratio (gross government debt) stabilized between 55 per cent and 60 per cent (see Figure 2). After the new GDP data were released in 1998, the data indicated that the debt-to-GDP ratio in the late 1990s was seven to eight percentage points lower, at roughly 50 per cent (with the nominal debt amount remaining unchanged). With the release of the 2021 GDP data, the ratio of the late 1990s fell even further, to below 45 per cent.

Figure 2: Debt-to-GDP ratio using different SNA vintages

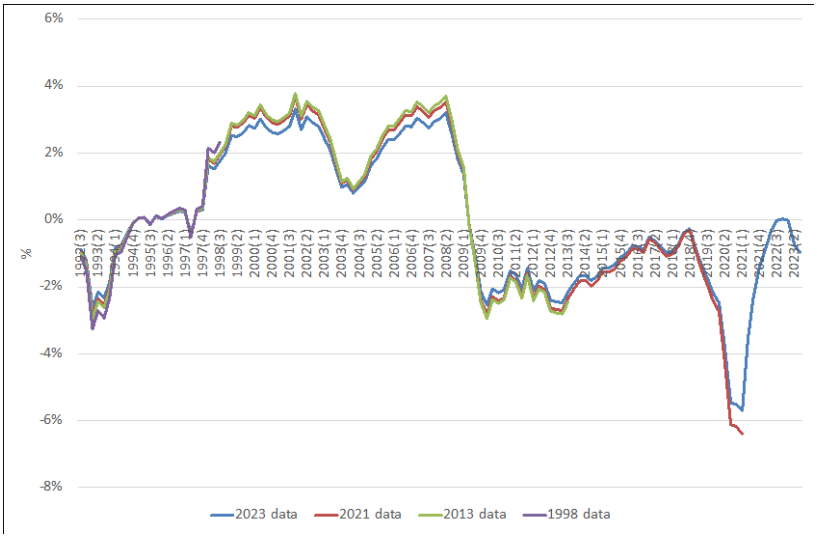


Note: dates in legend refer to last year vintage was published.

Source: author's illustration based on SARB (various years) and own calculations.

The 2021 GDP data have also impacted the debt-to-GDP ratio in recent years. In 2020, the debt-to-GDP ratio was estimated at 80.3 per cent. After the data revision of 2021 (with the nominal debt amount remaining unchanged), the ratio fell to 70.7 per cent. Similar changes, though smaller as a percentage of GDP, happened to the primary-balance-to-GDP ratio (see Figure 3).

Figure 3: Primary-balance-to-GDP ratio using different SNA vintages



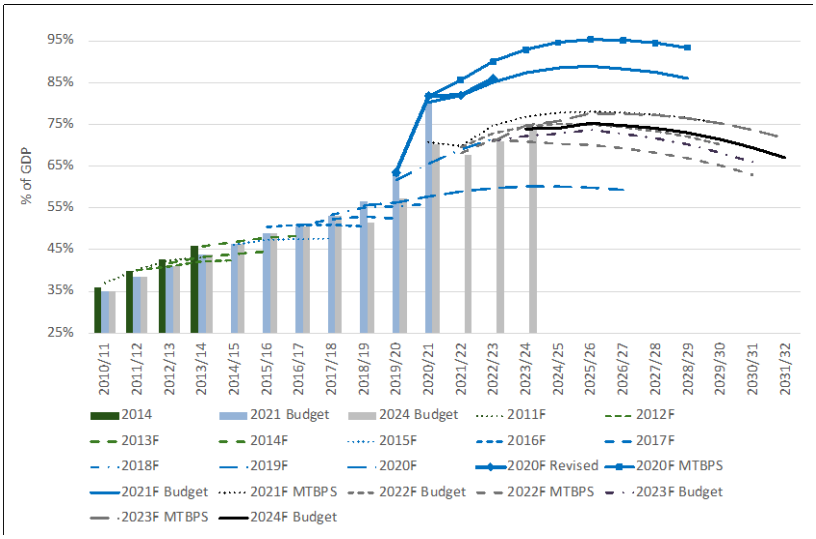
Note: dates in legend refer to last year vintage was published.

Source: author's illustration based on SARB (various years) and own calculations.

These revisions mean that, strictly speaking, one should ideally not just plug the debt- and primary-balance-to-GDP ratios calculated with the latest, current vintage data into a fiscal reaction function to estimate the extent to which the primary balance reacts to a change in the debt-to-GDP ratio. For instance, in 1996 the South African government announced its 'Growth, Employment and Redistribution (GEAR)' policy, a central tenet of which was to stabilize fiscal policy (National Treasury 1996). Already in the early 1990s, what was considered a strong upward surge in the debt-to-GDP ratio elicited fears that the country might be approaching a debt trap (Roux 1993). Given

that the ratio approached 60 per cent, comparisons with the European Union's Maastricht criteria. which set an upper limit of 60 per cent on EU country debt-to-GDP ratios, led to a heightened sense of urgency. In terms of the GEAR policy, the government therefore implemented the same 3 per cent target for the deficit-to-GDP ratio set by the Maastricht criteria (National Treasury 1996: 4). It is doubtful that same sense of urgency would have existed if the debt-to-GDP ratio was measured as less than 45 per cent, as the latest data vintage measured the debt-to-GDP ratio in the late 1990s. The same goes for the recent revision. An 80 per cent debt-to-GDP ratio forecast to rise to 95 per cent or even 100 per cent (as measured with the previous vintage of GDP data) raises much more concern than a 70 per cent ratio forecast to peak at 75 per cent (as measured with the current vintage of GDP data)(see Figure 4).[1] Hence, for the purposes of analysis, the analysis below uses the debt- and primary-balance-to-GDP ratios to which the government reacted and thus those constructed with the vintage of GDP data in place at the time.

Figure 4: Gross debt-to-GDP ratio



Note: 'F' following a date indicates forecasts as contained in either the Budget Review or the MTBPS; bars report the debt-to-GDP data in the 2014, 2021, and 2024 Budget Reviews respectively.

Source: author's illustration based on the Budget Review and MTBPS (National Treasury various years a, b) using various vintages of National Accounts (GDP) data.

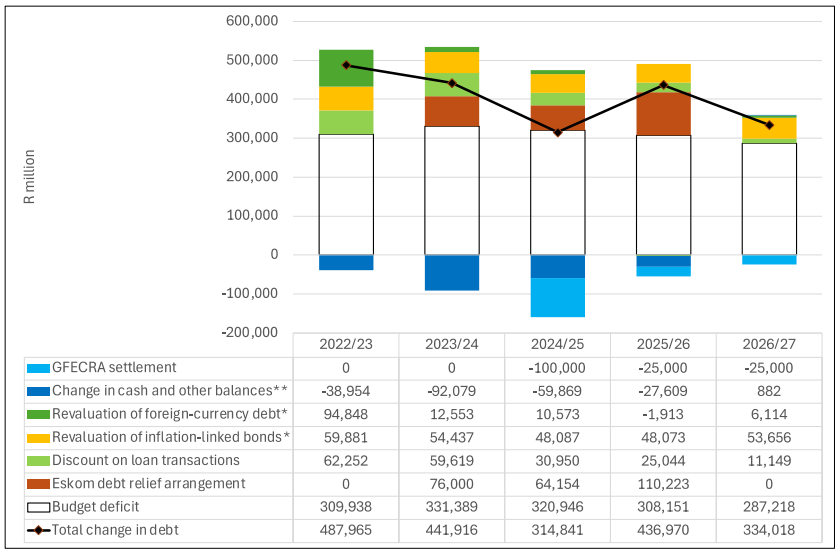
3 How large is the (actual) deficit really?

Conceptually, the change in debt equals the conventional deficit. However, there are several below-the-line budgetary items that usually cause the increase in debt to exceed the deficit. Thus, the increase in debt is not merely the primary balance plus interest payments. In South Africa, below-the-line budgetary items include Eskom debt relief arrangements; the discount on loan transactions; the revaluation of inflation-linked bonds (which constitute 19 per cent of all government bonds, calculated from data in SARB 2024a); the revaluation of foreign-currency-denominated debt (a depreciation increases the rand value of the outstanding debt); changes in the government's cash reserves and other balances; and, in the 2024/25 budget, withdrawals from the

[1] What is notable from Figure 4 is that the debt-to-GDP ratio is always, year after year, projected to stabilize in an outer year of the medium-term forecast. The failure to do so has usually also coincided with economic growth rates (and therefore the rate of revenue) falling short of the Treasury's forecast for growth.

Gold and Foreign Exchange Contingency Reserve Account (GFECRA).[2] Figure 5 presents data for these below-the-line items.

Figure 5: Analysis of annual increase in gross loan debt



	2022/23	2023/24	2024/25	2025/26	2026/27
GFECRA settlement	0	0	-100,000	-25,000	-25,000
Change in cash and other balances**	-38,954	-92,079	-59,869	-27,609	882
Revaluation of foreign-currency debt*	94,848	12,553	10,573	-1,913	6,114
Revaluation of inflation-linked bonds*	59,881	54,437	48,087	48,073	53,656
Discount on loan transactions	62,252	59,619	30,950	25,044	11,149
Eskom debt relief arrangement	0	76,000	64,154	110,223	0
Budget deficit	309,938	331,389	320,946	308,151	287,218
Total change in debt	487,965	441,916	314,841	436,970	334,018

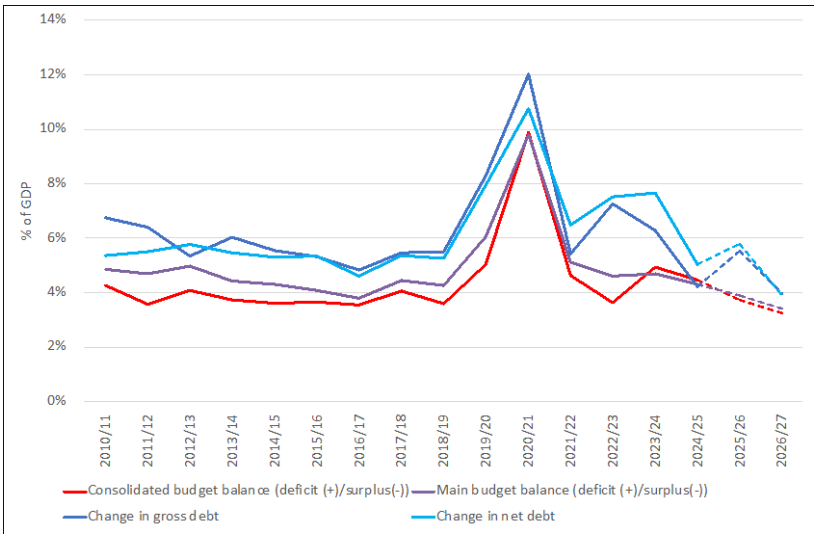
Note: * revaluation based on National Treasury projections of inflation and exchange rates; ** a negative value indicates that cash is used to finance part of the borrowing requirement; 2023/24 is an estimate; 2024/25, 2025/26, and 2026/27 are medium-term estimates.

Source: author's illustration based on National Treasury (2024: 79).

Figure 6 compares the consolidated and main budget balances with the change in net and gross debt. On average, the difference between the main budget balance and the change in gross debt since 2010/11 has been between 1 per cent and 1.5 per cent of GDP, but on three occasions it has been higher than 2.25 per cent (2019/20, 2020/21, and 2022/23). In 2023/24, the increase in debt did not exceed 2.25 per cent because of the R92 billion reduction in government cash holdings, while in 2024/25 the increase in debt is set to come down because of the R100 billion taken from the GFECRA. The GFECRA and government's cash holdings are non-renewable resources, meaning that the government cannot count on them to keep down the increase in its borrowing requirement.

[2] The GFECRA reports the gains and losses on foreign exchange holdings that result from exchange rate movements. It is a liability of the South African Reserve Bank (SARB) and an asset of the National Treasury.

Figure 6: The budget balance vs change in debt (as % of GDP)



Source: author's illustration based on National Treasury (various years a, b).

The importance of knowing the size of the 'actual' deficit is to know what size primary balance would stabilize the public-debt-to-GDP ratio. Equation 1 is the standard debt-to-GDP dynamics equation, where the change in the debt-to-GDP ratio is dependent directly on four variables, namely the effective interest rate on government debt, r; the economic growth rate, g; the primary balance calculated with above-the-line items, PB; and the below-the-line-item balance-to-GDP ratio, BtL:

$$\Delta(D/Y)_t = \left(\frac{r_t - g_t}{1+g_t}\right)\left(\frac{D}{Y}\right)_{t-1} + \left(\frac{PB}{Y}\right)_t + \left(\frac{BtL}{Y}\right)_t \quad (1)$$

where:

r_t = real (nominal) effective interest rate on government debt;

g_t= real (nominal) GDP growth rate;

$\left(\frac{D}{Y}\right)$ = public-debt-to-GDP ratio;

$\left(\frac{PB}{Y}\right)$ = primary-balance-to-GDP ratio calculated with above-the-line items (surplus (−)/deficit (+)); and

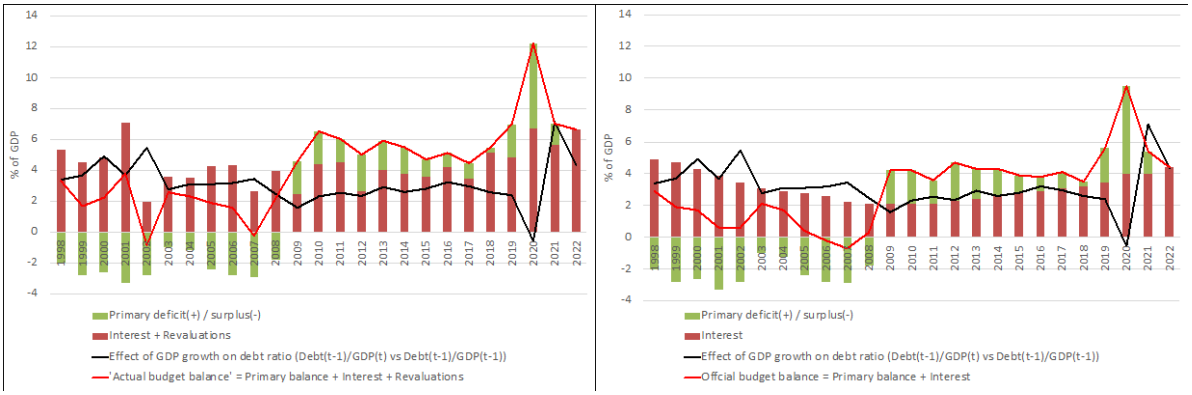
$\left(\frac{BtL}{Y}\right)$ = below-the-line-item balance-to-GDP ratio (surplus (−)/deficit (+)).

Interpreting Equation 1 is straightforward. If $r_t > g_t$, then $\left(\frac{r_t - g_t}{1+g_t}\right)\left(\frac{D}{Y}\right)_{t-1} > 0$. Thus, if $r_t > g_t$, then $\Delta(D/Y)_t > 0$ unless $\left(\frac{PB}{Y}\right)_t \geq -\left(\frac{r_t - g_t}{1+g_t}\right)\left(\frac{D}{Y}\right)_{t-1} - \left(\frac{BtL}{Y}\right)_t$.

Thus, the larger the BtL/Y ratio, the larger PB/Y should be if the debt-to-GDP ratio is not to increase. Equation 1 also means that given the effective interest rate, r, the higher the economic growth rate, g, is, the lower $(r — g)$ is and thus the lower the primary-balance-to-GDP ratio needed to stabilize the debt-to-GDP ratio (see the appendix on the classification of below-the-line

items to interest cost). To demonstrate the impact the below-the-line revaluations have, contrast the left- and right-hand graphs in Figure 7.

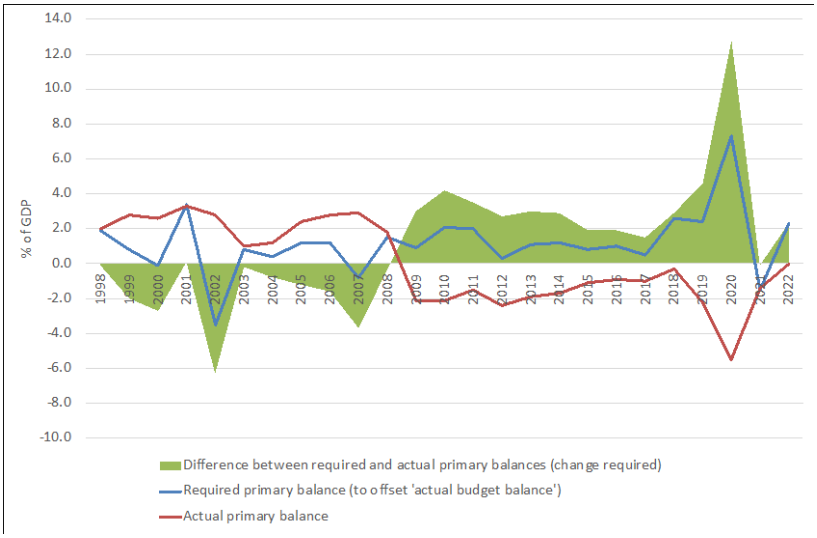
Figure 7: Debt dynamics (left: interest expenditure; right: interest expenditure and revaluations)



Source: author's illustration based on SARB (2024b) and own calculations.

On the left-hand graph of Figure 7 the red-brown bar represents only the interest cost as reported in the Budget Review, while on the right-hand graph it represents the interest cost reported in the Budget Review plus the revaluations and other below-the-line items reported in Figure 5. The green bar represents the official primary balance. Thus, while the sum of the red-brown and green bars (= the red line) represents the official budget balance on the left-hand graph, on the right-hand graph it represents the 'actual' budget balance, i.e. the change in gross-debt-to-GDP ratio. In period t, the difference between the interest cost plus revaluations (red-brown bar) and the effect of economic growth on the debt-to-GDP ratio (defined as $D_{t-1}/Y_{t-1} — D_{t-1}/Y_t$)(the black line in Figure 7) is the primary balance required to stabilize the debt-to-GDP ratio at its value in period $t-1$ (the blue line in Figure 8). Hence, the green area in Figure 8, calculated as the difference between the required primary balance (blue line) and the official primary balance calculated with above-the-line items (the red line), is the adjustment in the primary balance required to stabilize the debt-to-GDP ratio at its value in the preceding year. It has been in positive territory since 2009, which explains why the public-debt-to-GDP ratio has been increasing since 2009.

Figure 8: Required and actual primary-balance-to-GDP ratio



Source: author's illustration based on SARB (2024b) and own calculations.

4 Did the primary balance react to the increase in the debt-to-GDP ratio?

Since 2012 the government has implemented expenditure ceilings to arrest the increase in the debt-to-GDP ratio and to establish fiscal sustainability (SA News 2017). However, the debt burden has continued to increase and expenditure ceilings have been breached. The question is whether these efforts at arresting the increase in the debt-to-GDP ratio are reflected in the behaviour of the official primary balance, a variable that the government reports when it discusses measures to improve its fiscal position (see National Treasury 2024: 23, 30; PBO 2023: 4, 10–16). If no fiscal reaction is picked up, this would indicate the complete failure of these measures. It is also possible to pick up a fiscal reaction, but since the debt-to-GDP ratio has continued to increase, the conclusion would be that such a reaction had only a partial impact on stabilizing the debt-to-GDP ratio.

To explore this question, this section presents the estimation of a fiscal reaction function in the tradition of Henning Bohn (1995, 1998, 2007, 2010; see also Afonso and Jalles 2018). A fiscal reaction function regresses the primary-balance-to-GDP ratio on a lagged value of the public-debt-to-GDP ratio (as well as a number of control variables) to establish whether the primary balance improved in reaction to an increase in the public-debt-to-GDP ratio.

Because of the various vintages of National Accounts data, the primary balance in 2022/23 (or 1999/2000) did not react to the public-debt-to-GDP ratio announced in the 2021/22 (1998/99) budget. Thus, the analysis uses the public-debt-to-GDP and primary-balance-to-GDP series adjusted to reflect the ratios to which the government would have reacted.

The analysis includes real GDP growth as a control variable, as is standard. It also includes a dummy for the COVID-19 period (2020: Q2 to 2021: Q1 = 1). The four-quarter lag of debt is used because the government's budget is the fundamental data-generating process (DGP) of the primary balance, which occurs at an annual frequency. The relationship estimated is captured as Equation 2, and the results are presented in Table 1. The relationship is estimated as a Markov-switching model allowing for two regimes (distinguishing between primary surplus and primary deficit regimes). The four-quarter lag of debt, the constant, and the variance were regime-dependent. Diagnostics (serial correlation, normality, and ARCH or autoregressive conditional heteroscedasticity effects) were all sound. The null hypothesis of linearity was also rejected, justifying the regime-dependent model.

$$\left(\frac{PB}{Y}\right)_t = \alpha_{R0} + \alpha_{R1}\left(\frac{D}{Y}\right)_{t-4} + \beta_1 g_{t-1} + \beta_2 g_{t-3} + \beta_3\left(\frac{PB}{Y}\right)_{t-1} + \beta_4\left(\frac{PB}{Y}\right)_{t-3} + \beta_5 DumCovid_t + \varepsilon_{tR} \quad (2)$$

Table 1: Fiscal reaction function (1993: Q3 – 2023: Q3)

	Coefficient	t-prob.	Long-run coefficient
Constant (R0)	0.003	0.275	0.013
Constant (R1)	−0.009	0.000	−0.034
Debt-to-GDPY (t−4) (R0)	0.007	0.304	0.025
Debt-to-GDPY (t−4) (R1)	0.011	0.012	0.040
Real GDP growth (t−1)	0.066	0.000	0.250
Real GDP growth (t−3)	0.037	0.043	0.141
Primary-balance-to-GDP (t−1)	0.939	0.000	
Primary-balance-to-GDP (t−3)	−0.204	0.000	
DumCovid	−0.014	0.000	−0.052

	Coefficient	Std error
sigma(R0)	0.0035	0.0004
sigma(R1)	0.0036	0.0003
p_{0|0}	0.978	0.022
p_{1|1}	0.986	0.014

Transition probabilities p_{i|j} = P(Regime i at t+1 | Regime j at t)

	Regime 0,t	Regime 1,t
Regime 0,t+1	0.978	0.014
Regime 1,t+1	0.022	0.986

Linearity LR-test Chi^2(5) = 28.124 [0.0000]** approximate upper bound: [0.0000]**

Descriptive statistics for scaled residuals

Normality test	Chi^2(2)	0.798	[0.6710]
ARCH 1-1 test	F(1,106)	2.212	[0.1399]
Portmanteau(12)	Chi^2(10)	8.154	[0.6138]

Regime classification based on smoothed probabilities

Regime 0	Quarters	Avg. prob.
1997: Q3 – 2009: Q1	47	0.997

Total: 47 quarters (38.84 per cent) with average duration of 47.00 quarters

Regime 1	Quarters	Avg. prob.
1993: Q3 – 1997: Q2	16	0.999
2009: Q2 – 2023: Q3	58	1

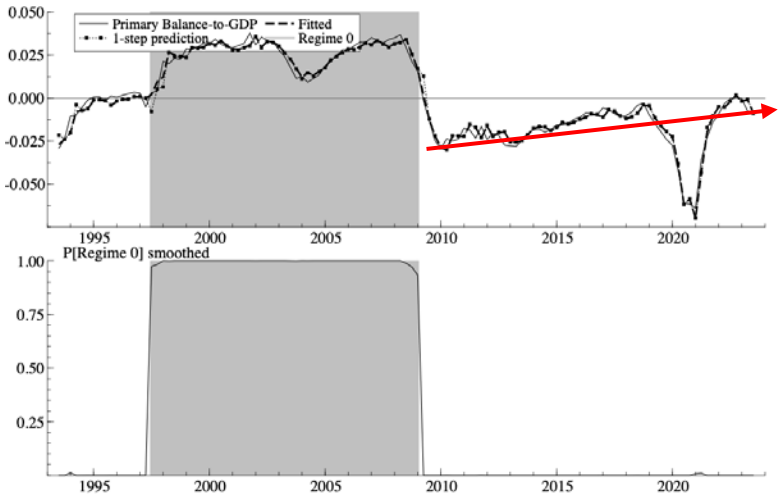
Total: 74 quarters (61.16 per cent) with average duration of 37.00 quarters

Note: long-term coefficient equals short-term coefficient divided by $(1-\beta_3-\beta_4)$.

Source: author's construction based on own calculations.

Figure 9 shows the regime classification, with the grey-shaded area representing Regime 0 and the non-shaded area covering Regime 1. Regime 0 can be characterized as a primary surplus regime, while Regime 1 is a primary deficit regime.

Figure 9: Regime classification of primary-balance-to-GDP ratio



Source: author's illustration based on own calculations.

The results indicate the following:

Regime 0:

- Covered the period 1997: Q3 – 2009: Q1.
- This is the period during which the debt-to-GDP ratio fell.
- The parameter on the lagged debt-to-GDP ratio for this period shows that the primary-balance-to-GDP ratio did not react to a change in the debt-to-GDP ratio.
- But the level of the primary balance, as captured by a constant that is statistically not significantly different from zero, was *sufficient* to prevent the debt-to-GDP ratio from increasing (in fact, it fell).

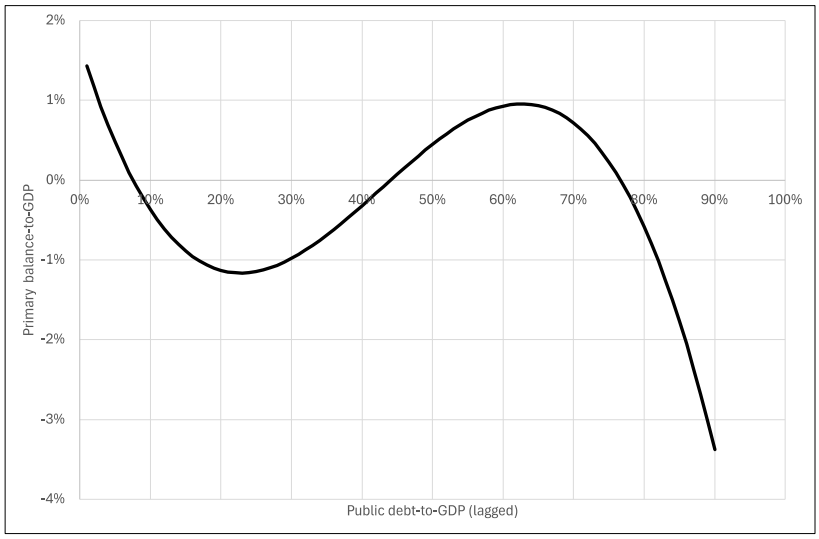
Regime 1:

- Covered the periods 1993: Q3 – 1997: Q2 and 2009: Q2 – 2023: Q3.
- Both periods were characterized by a high and/or rising debt-to-GDP ratio.
- Nonetheless, the primary-balance-to-GDP ratio reacted to a change in the debt-to-GDP ratio. Except for the COVID period, the effect of this effort was an improving primary-balance-to-GDP ratio, as demonstrated by the red line in Figure 9.
- However, the reaction of the primary-balance-to-GDP ratio was insufficient to prevent the debt-to-GDP ratio from increasing. Specifically, the level of the primary balance (as captured by a statistically significant negative constant for the period, together with a much lower economic growth rate) was *insufficient* to prevent the debt-to-GDP ratio from increasing.

5 Did fiscal fatigue set in in the fiscal reaction function?

Running primary surpluses often exposes governments to critique that they are implementing austerity that is detrimental to the economy and society. South Africa is no exception (PBO 2023). Political pressure might result in weakened resolve to run primary surpluses. Ghosh et al. (2013: F14) argue that fiscal fatigue can be seen when, '[a]s debt increases, the primary balance rises but the responsiveness eventually begins to weaken and then actually decreases at very high levels of debt'. To test for the presence of fiscal fatigue, Ghosh et al. (2013) include the squared and cubed values of the public-debt-to-GDP ratio in the estimation of a fiscal reaction function, which when estimated with statistically significant parameters for all squared and cubed values of the public-debt-to-GDP ratio yields an s-shaped relationship, as depicted in Figure 10.

Figure 10: Example of fiscal fatigue—primary-balance-to-GDP and debt-to-GDP ratios



Note: not actual data—example only.

Source: author's illustration based on own calculations.

Figure 10 presents a stylized example of the presence of fiscal fatigue, depicting it as a relationship between the primary-balance-to-GDP ratio and the lagged values of the debt-to-GDP ratio. At low levels of the debt burden, there is little concern over debt levels and the relationship might even be negative, meaning that the government does not mind the debt burden increasing. The relationship at these lower debt-to-GDP-ratio levels might also be statistically insignificant. This is followed by a range of debt-to-GDP levels at which there is concern about higher debt levels, resulting in a primary-balance-to-GDP ratio that reacts to these higher debt levels. This is also the positive reaction that the simple linear relationship seeks to find, as presented in the previous section. The reaction becomes weaker at higher levels of debt-to-GDP ratio and fiscal fatigue sets in, as political pressure not to cut expenditure or raise tax rates increases. Ultimately the relationship turns negative at higher levels of debt-to-GDP ratio, as the primary-balance-to-GDP ratio does not react to a higher debt burden, or even increases.[3] Equation 3 presents the regression estimated to test for fiscal fatigue while Table 2 presents the results.

[3] The concept of fiscal fatigue can be considered the first step of entering a debt trap. A second step is a position where the government finds it impossible to reduce expenditure or to raise more revenue through raising tax rates, and finds no willing buyers for its government bonds unless it offers increasingly higher bond rates. In the third and

$$\left(\frac{B}{Y}\right)_t = \alpha_{R1}\left(\frac{D}{Y}\right)_{t-4} + \alpha_{R2}\left(\frac{D}{Y}\right)^2_{t-4} + \alpha_{R3}\left(\frac{D}{Y}\right)^3_{t-4} + \beta_1 g_{t-1} + \beta_2 g_{t-3} + \beta_3\left(\frac{B}{Y}\right)_{t-1} + \beta_4\left(\frac{B}{Y}\right)_{t-3} + \beta_5 DumCovid_t + \varepsilon_{tR} \quad (3)$$

Table 2: Fiscal reaction function with fiscal fatigue (1993: Q3 – 2023: Q3)

	Coefficient	t-prob.	Long-run coefficient
Primary-balance-to-GDP (t−1)	0.928	0.000	
Primary-balance-to-GDP (t−3)	−0.234	0.000	
Real GDP growth (t−1)	0.063	0.000	0.204
Real GDP growth (t−3)	0.033	0.058	0.109
Debt-to-GDPY (t−4) (R0)	−0.009	0.783	−0.029
Debt-to-GDPY (t−4) (R1)	−0.080	0.000	−0.260
Square of debt-to-GDPY (t−4) (R0)	0.158	0.286	0.515
Square of debt-to-GDPY (t−4) (R1)	0.239	0.000	0.779
Cube of debt-to-GDPY (t−4) (R0)	−0.216	0.190	−0.705
Cube of debt-to-GDPY (t−4) (R1)	−0.186	0.000	−0.607
DumCovid	−0.016	0.000	−0.051

	Coefficient	Std error
sigma(R0)	0.0035	0.0004
sigma(R1)	0.0035	0.0003
p_{0|0}	0.978	0.022
p_{1|1}	0.985	0.015

Transition probabilities p_{i|j} = P(Regime i at t+1 | Regime j at t)

	Regime 0,t	Regime 1,t
Regime 0,t+1	0.978	0.015
Regime 1,t+1	0.022	0.985

Linearity LR-test Chi^2(5) = 28.124 [0.0000]** approximate upper bound: [0.0000]**

Descriptive statistics for scaled residuals

Normality test	Chi^2(2)	1.090	[0.5797]
ARCH 1-1 test	F(1,106)	2.002	[0.1601]
Portmanteau(12)	Chi^2(10)	11.731	[0.3035]

Regime classification based on smoothed probabilities

Regime 0	Quarters	Avg. prob.
1997: Q3 – 2009: Q1	47	0.999
Total: 47 quarters (38.84 per cent) with average duration of 47.00 quarters		
Regime 1	Quarters	Avg. prob.
1993: Q3 – 1997: Q2	16	0.999
2009: Q2 – 2023: Q3	58	0.994
Total: 74 quarters (61.16 per cent) with average duration of 37.00 quarters		

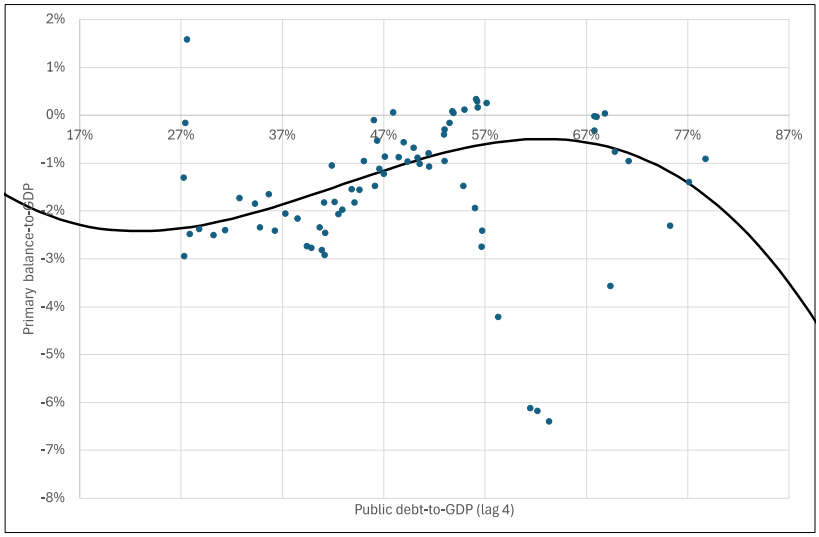
Note: long-term coefficient equals the short-term coefficient divided by (1−β_3−β_4).

Source: author's construction based on own calculations.

extreme step of entering a debt trap, investors become unwilling to buy bonds irrespective of the interest rate offered, and the government is left with only two options: either it defaults, or it monetizes its debt.

Regimes 0 and 1 have the same period classification as in the model that did not test for fiscal fatigue, presented in the previous section. Furthermore, for Regime 0, the primary surplus regime, the findings are the same as in the model that did not test for fiscal fatigue, with none of the debt-to-GDP-ratio variables significant. For Regime 1, the results are also similar to those in the model that did not test for fiscal fatigue, but there are signs of debt fatigue at higher levels of debt, as seen in a slightly weaker reaction of the primary balance to changes in debt-to-GDP at higher rates of debt-to-GDP. This weakening response of the primary-balance-to-GDP ratio to the debt burden at higher debt-to-GDP levels is also visible in Figure 11, which presents the estimated reaction function.

Figure 11: Fiscal fatigue—primary-balance-to-GDP and debt-to-GDP ratios



Source: author's illustration based on SARB (various years) and own calculations.

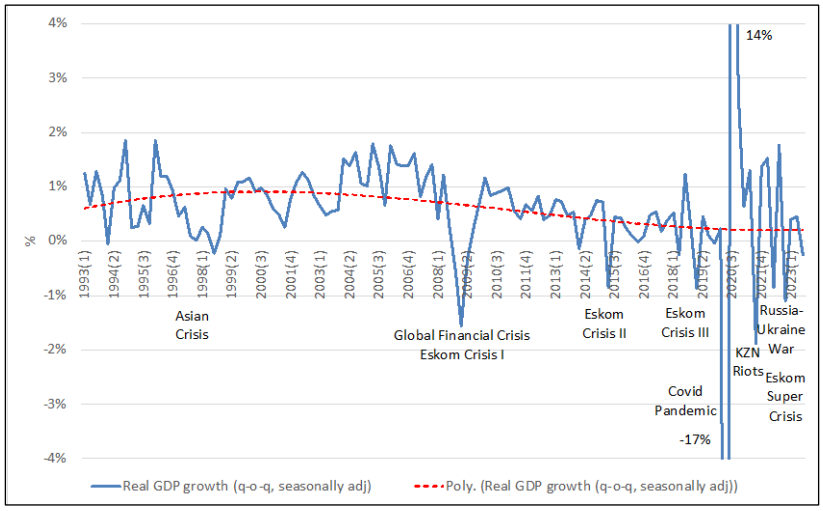
6 Does government expenditure have a positive impact on economic growth?

The above describes the direct approach to achieve fiscal sustainability, measuring whether the government adjusts its primary balance (i.e., its revenues and non-interest expenditure) to stabilize the debt-to-GDP ratio. However, from Equation 1 above it is also clear that a contributing factor to a rising public-debt-to-GDP ratio is a lower economic growth rate. Additionally, as stated in the introduction, the indirect approach to establishing fiscal sustainability is for the government to support higher economic growth, because higher growth, through the dynamics of Equation 1, will, *ceteris paribus*, reduce the $(r-g)$ gap, thereby reducing the size of the primary surplus needed to stabilize the debt-to-GDP ratio.

Figure 12, which depicts quarter-on-quarter real economic growth, shows that in the period since 2009, real GDP growth has fallen significantly. This average lower growth has also coincided in recent years with more volatility, as the economy has suffered the impact of various crises, e.g., the COVID-19 crisis, the electricity crises caused by the electricity-producing public corporation Eskom, and local and global political instability. Thus, one question that arises is whether this fall in economic growth can be reversed, possibly through a change in the level and composition of government expenditure, in pursuit of the benefits of higher growth, which includes an easier path to a sustainable fiscal policy.

To answer this question, the analysis presented below distinguishes among general government investment, public corporation investment, and government consumption expenditure. Including the first two entails the estimation of a type of growth equation. Ideally, growth equations are estimated for per capita growth. However, the growth rate appearing in Equation 1, which describes the dynamics of fiscal sustainability, is not the per capita real GDP growth rate but the GDP growth rate unadjusted for population growth.[4] Hence, the GDP growth rate unadjusted for population growth is the policy variable of interest when discussing the sustainability of fiscal policy. Therefore, the analysis below uses quarter-on-quarter GDP growth.[5]

Figure 12: Real GDP growth (quarter on quarter)



Note: q-o-q = quarter-on-quarter.

Source: author's illustration based on SARB (2024b) and own calculations.

With regard to investment, according to neoclassical growth theory, higher levels of investment can permanently increase the level of output per capita but not the rate at which output grows (Solow 1956, 1957). However, in later new growth theory, higher investment relative to output can lead to a permanently higher economic growth rate (Afonso and St Aubyn 2017; Bruns and Ioannidis 2020; Hamilton and Monteagudo 1998; Mankiw et al. 1992; Mourougane et al. 2016; Vedia-Jerez and Chasco 2016). According to Hamilton and Monteagudo (1998: 508), investment embodies new technology, and new technology boosts economic growth. Afonso and St Aubyn (2017) and Mourougane et al. (2016) also distinguish between the effects of public and private sector investment on economic growth. Afonso and St Aubyn (2017) find that private sector investment has a positive effect on economic growth and that in most cases, public sector investment also has such a positive effect.

Some growth equations also consider the impact of government expenditure on economic growth. Some authors postulate a negative impact of government expenditure on growth (Afonso and Furceri 2010; Agénor 2010; Hajamini and Falahi 2018; Romero-Ávila and Strauch 2008), while

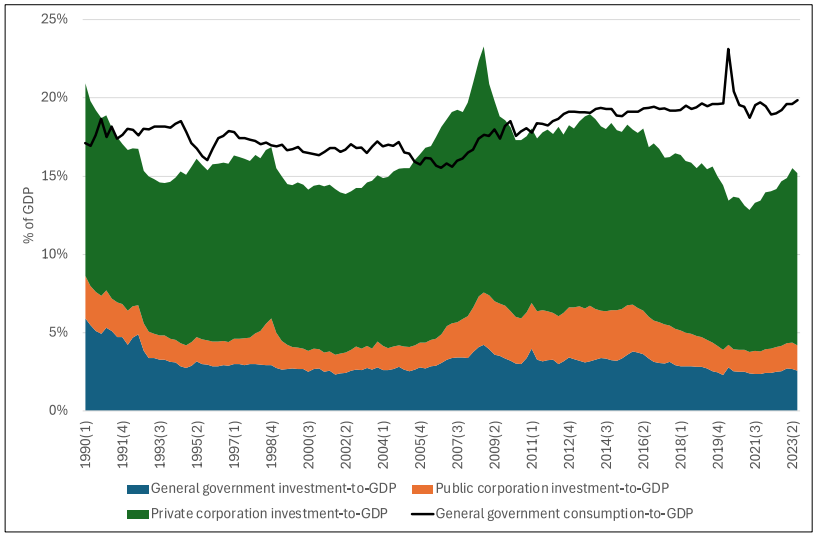
[4] In addition, quarterly population data are not available. One could employ interpolation, but that is not ideal.

[5] Given that the model has a quarterly frequency, it does not use year-on-year GDP growth, as doing so means there is an overlap of three quarters between any two successive quarterly values (e.g., the GDP growth values for the third and fourth quarter). This tends to introduce serial correlation into the regression.

others postulate a non-linear, parabolic relationship, positive at lower levels of expenditure and negative at higher levels (Forte and Maggazino 2016).

Figure 13 presents investment by private corporations, public corporations, and general government as a percentage of GDP. It also presents general government consumption expenditure as a percentage of GDP. It shows how the latter has increased since the mid-2000s, while investment as a percentage of GDP by all sectors has fallen in the same period.

Figure 13: Government consumption and private and public investment as % of GDP



Source: author's illustration based on SARB (2024b) and own calculations.

Equation 4 is the regression estimated:[6]

$$g_t = \beta_1 \left(\frac{Pr\ Inv}{Y}\right)_{t-1} + \beta_2 \left(\frac{GG\ Inv}{Y}\right)_{t-1} + \beta_3 \left(\frac{Publ\ Corp\ Inv}{Y}\right)_{t-1} + \beta_4 \left(d\frac{Pr\ Inv}{Y}\right)_t + \beta_5 \left(d\frac{GG\ Inv}{Y}\right)_t + \beta_6 \left(d\frac{Publ\ Cor\ Inv}{Y}\right)_t + \beta_7 \left(d\frac{Gov\ Cons}{Y}\right)_t + \beta_8 \left(\frac{Gov\ Cons}{Y}\right)_{t-1} + \beta_9 \left(\frac{Gov\ Cons}{Y}\right)^2_{t-1} + \beta_{10} Openness_{t-2} + \beta_{11} \left(\frac{dDebt}{Y}\right)_{t-1} + \beta_{12} DumCovidSpike_t + \alpha_R g_{t-1} + \varepsilon_{tR} \quad (4)$$

- g is quarterly GDP growth rates (quarter-on-quarter), seasonally adjusted;
- GDP (Y), government consumption ($Gov\ Cons$) and investment (private ($Pr\ Inv$), general government ($GG\ Inv$), and public corporations ($Publ\ Cor\ Inv$)) are all quarterly, nominal, and seasonally adjusted, using the 2021-revised National Accounts data;
- $dDebt$ is the change in the ratio of gross public debt to GDP (using the latest GDP vintage to calculate the ratio, as the intention is to estimate not a reaction function but the impact of the change in gross-public-debt-to-GDP on economic growth);
- $Openness = (exports + imports)/GDP$; and
- $DumCovidSpike$ is a COVID spike dummy (2020: Q2 = 1; 2020: Q3 = −1).

[6] A regression that also included the change in the GDP deflator (as an inflation indicator) and the share of net operating surplus in net value added (as a profitability indicator) was also run, but neither were statistically significant.

Table 3 presents the results while Figure 14 presents Regimes 0 and 1, with Regime 1 being the low-growth regime.

Table 3: Government expenditure and economic growth (1994: Q2 – 2023: Q3)

	Coefficient	t-prob.	Long-run coefficient R0	Long-run coefficient R1
Private Investment-to-GDP (t−1)	0.114	0.046	0.138	0.086
Gen Gov Investment-to-GDP (t−1)	−0.266	0.111	−0.321	−0.199
Public Corp Investment-to-GDP (t−1)	0.054	0.524	0.066	0.041
d(Private Investment-to-GDP) (t)	0.263	0.016	0.317	0.197
d(Gen Gov Investment-to-GDP) (t)	−0.015	0.939	−0.018	−0.011
d(Public Corp Investment-to-GDP) (t)	0.244	0.366	0.295	0.183
d(GovCons-to-GDP) (t)	−0.106	0.369	−0.128	−0.079
Gov Consumption-to-GDP (t−1)	0.293	0.000	0.354	0.220
Square of Gov Consumption-to-GDP (t−1)	−1.214	0.000	−1.466	−0.910
Openness (t−2)	−0.026	0.000	−0.032	−0.020
Change in debt-to-GDP (t−3)	0.115	0.012	0.139	0.086
DumCovidSpike	−0.168	0.000	−0.203	−0.126
Real GDP growth (t−1) (R0)	0.172	0.000		
Real GDP growth (t−1)(R1)	−0.334	0.052		

	Coefficient	Std error
sigma(R0)	0.0025	0.0003
sigma(R1)	0.0085	0.0011
p_{0|0}	0.911	0.039
p_{1|1}	0.818	0.078

Transition probabilities p_{i|j} = P(Regime i at t+1 | Regime j at t)

	Regime 0,t	Regime 1,t
Regime 0,t+1	0.911	0.182
Regime 1,t+1	0.089	0.818

Linearity LR-test Chi^2(4) = 52.783 [0.0000]** approximate upper bound: [0.0000]**

Descriptive statistics for scaled residuals

Normality test	Chi^2(2)	1.153	[0.5618]
ARCH 1-1 test	F(1,106)	0.213	[0.6452]
Portmanteau(12)	Chi^2(10)	10.223	[0.5964]

Regime classification based on smoothed probabilities

Regime 0	Quarters	Avg. prob.
1994: Q2 – 1994: Q3	2	0.732
1996: Q2 – 1996: Q4	3	0.778
1999: Q1 – 2007: Q3	35	0.933
2009: Q2 – 2015: Q1	24	0.93
2015: Q3 – 2018: Q1	11	0.896
2019: Q3 – 2020: Q4	6	0.909
2023: Q2 – 2023: Q3	2	0.769

Total: 83 quarters (70.34 per cent) with average duration of 11.86 quarters.

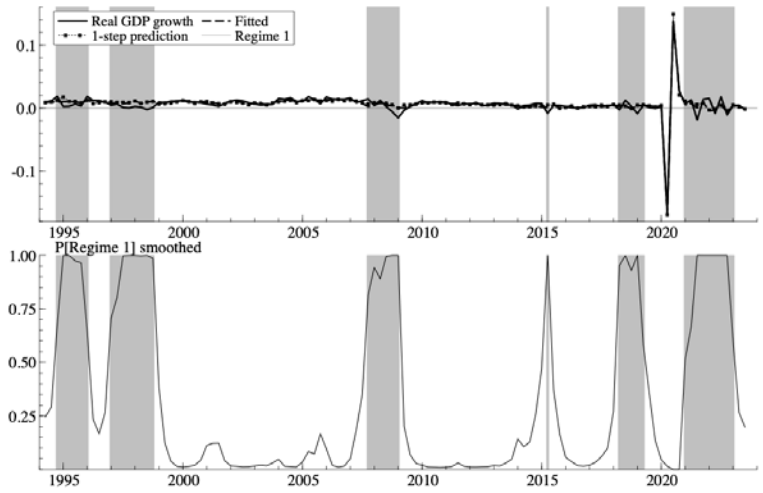
Regime 1	Quarters	Avg. prob.
1994: Q4 – 1996: Q1	6	0.877
1997: Q1 – 1998: Q4	8	0.936
2007: Q4 – 2009: Q1	6	0.941

2015: Q2 – 2015: Q2	1	1.000
2018: Q2 – 2019: Q2	5	0.893
2021: Q1 – 2023: Q1	9	0.865

Note: long-term coefficient equals the short-term coefficient divided by (1−α_R).

Source: author's construction based on own calculations.

Figure 14: Regime classification of real GDP growth



Source: author's illustration based on own calculations.

The regression could simply have regressed GDP growth on the investment-to-GDP ratios and their lags. However, to capture and separate the short- and longer-term impacts of the ratios of private and public corporation and general government investment to GDP, $\beta_1\left(\frac{Pr\ Inv}{Y}\right)_{t-1}$, $\beta_2\left(\frac{GG\ Inv}{Y}\right)_{t-1}$, and $\beta_1\left(\frac{Publ\ Corp\ Inv}{Y}\right)_{t-1}$ were added and subtracted on the right-hand side. Since investment is part of GDP, a short-run, contemporaneous effect (bias) is expected with a change in the investment-to-GDP ratio (Jones 1995: 510). Adding and subtracting $\beta_1\left(\frac{Pr\ Inv}{Y}\right)_{t-1}$, $\beta_2\left(\frac{GG\ Inv}{Y}\right)_{t-1}$, and $\beta_1\left(\frac{Publ\ Corp\ Inv}{Y}\right)_{t-1}$ on the right-hand side isolates this contemporaneous effect (see Jones 1995: 510–11, who performed a similar transformation). The longer-run effects, capturing the impact of investment on growth, are then captured by $\beta_1\left(\frac{Pr\ Inv}{Y}\right)_{t-1}$, $\beta_2\left(\frac{GG\ Inv}{Y}\right)_{t-1}$, and $\beta_1\left(\frac{Publ\ Corp\ Inv}{Y}\right)_{t-1}$.

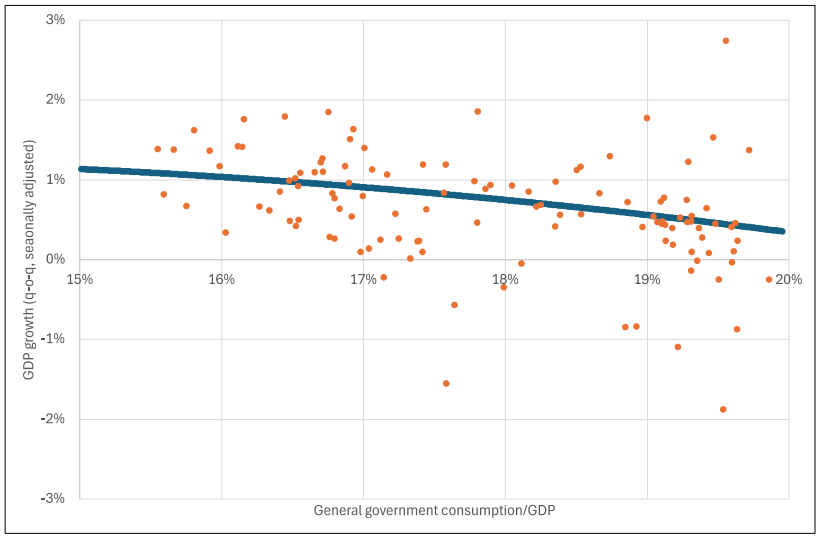
Economic theory postulates a non-linear relationship between the government-consumption-to-GDP ratio and economic growth. At lower levels of the government-consumption-to-GDP ratio the relationship is positive, while at higher levels it is negative. This is modelled using a parabolic relationship, $\beta_1\left(\frac{GovCons}{Y}\right)_{t-1} + \beta_2\left(\frac{GovCons}{Y}\right)^2_{t-1}$, in which $\beta_1 > 0$ and $\beta_2 < 0$ (Forte and Maggazino 2016).

The relationship was again estimated as a Markov-switching model allowing for two regimes (a high-growth and a low-growth regime). The lag of growth and the variance were regime-dependent. Diagnostics (serial correlation, normality and ARCH effects) were all sound. The null

hypothesis of linearity was also rejected, justifying the regime-dependent model. The results are as follows.

- A one-percentage-point increase in the private-investment-to-GDP ratio leads to a 0.138 per cent *increase* in quarterly real economic growth, or 0.675 per cent annual real economic growth.
- The ratios of general government investment and public corporation investment to GDP ratios are statistically *insignificant*.
- The relationship between the ratio of general government consumption to GDP and economic growth is negative when the ratio ranges between 15 per cent and 20 per cent. All else being equal to their average values over the sample period, a government-consumption-to-GDP ratio of 15 per cent is associated with quarterly growth of 1.14 per cent, while a ratio of 20 per cent is associated with a quarterly growth rate of 0.35 per cent (see Figure 15).

Figure 15: Real GDP growth and government consumption/GDP



Source: author's illustration based on SARB (2024b) and own calculations.

A one-percentage-point increase in the quarterly change in the debt-to-GDP ratio (a proxy for the quarterly budget deficit) leads to a 0.139 per cent *increase* in quarterly real economic growth, or 0.682 per cent annual real economic growth. Note that the effect of a change in the quarterly change in the debt-to-GDP ratio (i.e. a change in the change variable) has been muted, as it is a stationary series (reverting back to the mean following an increase). Since 2009, the quarterly change in the debt-to-GDP ratio has been 0.8 per cent, with a 2 per cent standard deviation. Excluding the COVID period (2020: Q2 to 2021: Q2) reduces the standard deviation to 0.83 per cent while leaving the average at 0.8 per cent, i.e. a one-standard-deviation band running between −0.3 per cent and 1.63 per cent. In brief, this means that higher deficits are typically offset by smaller ones later, thus also offsetting the stimulatory effects of larger deficits (though the average change in debt-to-GDP ratio was still positive, meaning that the debt-to-GDP ratio kept increasing).

7 Conclusion: policy implications of the results

The negative effect on growth of a higher government-consumption-to-GDP ratio suggests that a *reduction* in this ratio will impact positively on economic growth—that is, unless the efficiency of government expenditure can be improved significantly. An example is education (see Burger 2021), with South Africa lagging in international comparisons (e.g. Trends in International Mathematics and Science Study/TIMSS and Progress in International Reading Literacy Study/PIRLS), even though, as a percentage of GDP, its education spending is relatively high compared globally. Thus, the country needs to improve the efficiency and value for money of the education system. In essence, the government needs to spend less to obtain the same results, or to improve outputs and outcomes for a given amount of spending.

The positive (stimulatory) effect of an increase in the quarterly change in the debt-to-GDP ratio (i.e. a larger deficit) are small and reversible, as the series is stationary. Increases in the change are offset by decreases, while the average change is still positive in the period post 2009, meaning that the debt-to-GDP ratio kept increasing irrespective of the stimulatory or contractionary effect of the rise and fall of the change in the debt-to-GDP ratio.

With the ratios of both general government investment to GDP and public corporation investment to GDP being statistically *insignificant*, the *efficiency* of government investment requires significant attention. This involves the *selection* of the right projects, the *allocation* of resource to these projects, and the *management* of the allocated resources.

This also creates an opportunity for the private sector to play role in the *financing*, *building*, *operation*, and *maintenance* of what has typically been considered public infrastructure. The inefficiency associated with investment by public corporations together with the positive impact of the private-investment-to-GDP ratio suggests that shifting investment from the public to the private sector will be beneficial for economic growth. In addition, given the strong relationship between the private-investment-to-GDP ratio and real economic growth, significantly higher private investment should be pursued in the interest of higher economic growth.

Hence, the following 2024/25 announcements made in the Minister of Finance's budget speech are steps in the right direction:

- the creation of an infrastructure finance and implementation support agency to coordinate planning and preparation of large projects;
- engagement with private financial institutions; and
- a larger role for public–private partnerships (PPPs).

Also, steps announced to facilitate unsolicited bids for PPPs are a move in the right direction.

However, much more will be required, including a much bigger role for the private sector in existing infrastructure management, operations, and maintenance.

To conclude, this paper has demonstrated that in the period since 2008/09, the South African government has reacted directly to arrest the increase in the debt-to-GDP ratio. This indicates that measures such as expenditure ceilings were successful to some extent. However, while the primary-balance-to-GDP ratio improved, its level was too low to arrest the increase in the debt-to-GDP ratio. There are also some signs of fiscal fatigue, meaning that the government finds it increasingly difficult to adjust its primary balance (by cutting expenditure and raising more revenue) to stabilize the public-debt-to-GDP ratio. As a result, it will have to augment its direct approach to regain

fiscal sustainability (i.e., improving the primary balance) by strengthening its indirect approach, which entails strengthening economic growth.

Strengthening economic growth will require a combination of reducing government consumption and improving the efficiency of government consumption to ensure that it does not impact negatively on economic growth. It also entails improving the efficiency of public sector investment and a greater reliance on partnerships with the private sector to achieve this. And lastly, it needs the implementation of policy that strengthens and attracts private sector investment, as such investment improves economic growth.

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Appendix

Strictly speaking, the discount on loan transactions, the revaluation of inflation-linked bonds, and the revaluation of foreign-currency debt should be included in 'actual' effective interest cost and thus, the calculation of r in Equation 1, while the other items in Table 1 should be included in the BtL term in Equation 1. The effective interest rate is most often calculated by merely dividing interest cost (as reported by government in the Budget Review) by government debt. However, that leaves out below-the-line items that are, in essence, interest cost items. For instance, a bond issued at, say, a 5 per cent coupon rate but also at a discount needs to include that discount in interest cost.

Furthermore, the revaluation of an inflation-linked bond should be included with interest cost. For instance, with 5 per cent inflation, the inflation rate is included either in the interest rate on the non-inflation-linked bond or in the face-value revaluation of the inflation-linked bond. On a R100 bond, that is either R5 included in the interest cost in the case of a non-inflation-linked bond, or a R5 revaluation of the bond's face value in the case of an inflation-linked bond, taking the bond's value to R105.

The principle behind including an exchange rate revaluation is the same. Purchasing power parity states that in the long run, the change in the exchange rate equals the difference between the inflation rates of two countries. For instance, a rand-denominated non-inflation-linked bond would have paid, say, a 7 per cent nominal interest rate if the real rate equalled 2 per cent and the South African inflation rate equalled 5 per cent. At a 2 per cent real rate and 3 per cent US inflation rate, the nominal rate on a dollar-denominated South African government bond would be 5 per cent. However, if South African inflation is 5 per cent, we can expect the rand to depreciate by 2 per cent (5 per cent minus 3 per cent). At an initial exchange rate of, say, \$1 = R18, a 2 per cent depreciation will weaken the rand to \$1 = R18.36. The rand value of a \$100 bond will then increase from R1800 to R1836. That R36 equals the inflation differential and rand depreciation and should, strictly speaking, be included in the interest cost if the interest cost already includes the inflation component of rand-denominated non-inflation-linked bonds.