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The impact of fiscal risk on the South African yield curve and risk premium

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The impact of fiscal risk on the South African yield curve and risk premium

Luchelle Soobyah*

Abstract

Since the global financial crisis, government debt sustainability has become a major concern worldwide. South Africa serves as a notable example, as rising government debt since 2009 has increased the perceived risk associated with its government bonds. This fiscal risk premium has led to higher borrowing costs for the country, caused a steeper sovereign yield curve and elevated long-term interest rates – even when short-term rates remain low. This paper examines the impact of fiscal risks on South Africa's macroeconomy, focusing on the sovereign yield curve. Using a large Bayesian vector autoregressive model to investigate the dynamic relationship between fiscal risk and the yield curve, the paper finds that a percentage point increase in the debt ratio increases the term premium and bond yields by roughly 12 basis points. Both the level and curvature of the yield curve increase, with the slope becoming steeper.

JEL classification

E50, E60, E62, H63

Keywords

Fiscal policy, monetary policy, risk premium, large Bayesian vector autoregression

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1. Introduction[1]

Public debt to gross domestic product (GDP) has increased significantly in recent decades. Countries with high levels of public debt often face an increased risk premium and constraints to monetary policy effectiveness. There is extensive literature on fiscal policy and the risk premium and their impact on the macroeconomy and monetary policy. Empirical studies show that an increase in a government's budget deficit ultimately leads to an increase in long-term bond yields. This is due to concerns around the government's financing requirements and its ability to repay its debt, causing the country's risk premium to rise to compensate investors for this heightened fiscal risk. Fiscal risk refers to the uncertainty around government finances and a deterioration in fiscal balances, which can arise from various sources such as unexpected changes in revenue and expenditure. This uncertainty can significantly affect bond yields and the risk premium. When investors believe there is high fiscal risk, they demand higher yields on government bonds to compensate for the increased risk of default on repayment or for possible inflationary pressures. This leads to an increase in the risk premium and therefore bond yields.

Studies have found that fiscal shocks, particularly those related to higher government spending, have a significant negative impact on bond yields. In general, an increase in government spending raises inflation expectations, leading to higher bond yields and a higher risk premium. The relationship between fiscal policy and bond yields is also influenced by the overall domestic economy and the fiscal stance, as noted by Bretscher, Hsu and Tamoni (2020). Kumar and Baldacci (2010) also show that fiscal stance, institutional and structural conditions, and the domestic economy influence the magnitude of the impact of higher deficits and public debt on long-term interest rates. This highlights the complex challenges faced by highly indebted countries in managing their fiscal and monetary policies effectively. The literature on the relation between fiscal policy and interest rates has largely focused on long-term interest rates, under the rationale that changes in budget deficits or government debt lead to an adjustment in expected future short-term rates and, if the expectations hypothesis holds, an immediate change in long-term rates, following the consensus that long-term sovereign

[1] I thank Nicola Viegi, Nelisa Bambani, Lebo Siboyi and Mokgabiso Tshenkeng for their valuable contributions and assistance.

yields are mostly determined by expectations of inflation, (trend) growth and the risk premium. While most of the literature has focused solely on long-term bonds or bonds of specific maturities, Afonso and Martins (2012) have analysed the impact of fiscal policy on the entire sovereign yield curve in the United States (US) and Germany. A few studies have assessed this impact at specific time horizons but not on the entire yield curve. We rely on this approach and attempt to also understand how fiscal policy affects the shape of the South African sovereign yield curve. This paper thus contributes to the literature on fiscal policy's effect on bond yields and the yield curve as a whole for South Africa.

In this paper, we assess the impact of an increase in debt or a deterioration in fiscal balances on bond yields and the entire yield curve through its level, slope and curvature components. This indirectly also has an impact on monetary policy and the transmission mechanism. Findings in the literature and theory suggest that higher fiscal deficits or weaker fiscal metrics generally result in a higher risk premium and a depreciated currency as investors demand more foreign currency (capital outflows), which could create inflationary pressure, resulting in the central bank having to intervene.

The literature also finds that expansionary fiscal policy generally boosts overall demand and may become inflationary when fiscal expansions are sufficiently large or occur in environments characterised by high public debt, elevated inflation or weak monetary-policy credibility. This would require the central bank to intervene by tightening policy to dampen demand and contain inflationary pressures (Romero and Marín 2017; de Rugy and Salmon 2022; Brandao-Marques et al. 2023). This brings to light the issue of fiscal dominance. There is also the crowding-out effect, whereby the government funds a higher deficit by competing with private-sector borrowing, effectively inducing higher interest rates in the economy and thus reducing private investment. This has complicated macroeconomic implications. Lastly, expansionary or deteriorating fiscal policy influences the expectations channel. If agents expect persistent government deficits, this will influence the inflation expectations of various economic agents, inducing them to adjust wages and prices accordingly, thereby contributing to inflation.

All of these effects potentially cause changes in the yield curve, which may pose challenges for monetary policy actions. We therefore analyse the macroeconomic and financial spillovers of fiscal shocks in South Africa. Our results show that a deterioration in fiscal balances is associated with lower economic growth and higher inflation expectations, a result that contrasts with conventional Keynesian predictions but is consistent with non-Keynesian fiscal effects documented by Giavazzi and Pagano (1990) and the framework proposed by Blanchard (1990).

We further find that adverse fiscal shocks lead to a currency depreciation and an increase in the sovereign term premium. In bond markets, higher perceived fiscal risk is associated with rising long-term government bond yields and a steeper yield curve, with the adjustment occurring primarily through the term premium. This finding is consistent with evidence that the steepness of South Africa's yield curve reflects elevated compensation for fiscal, macroeconomic and credit risk embedded in long-dated bonds (Steenkamp and Erasmus 2022).

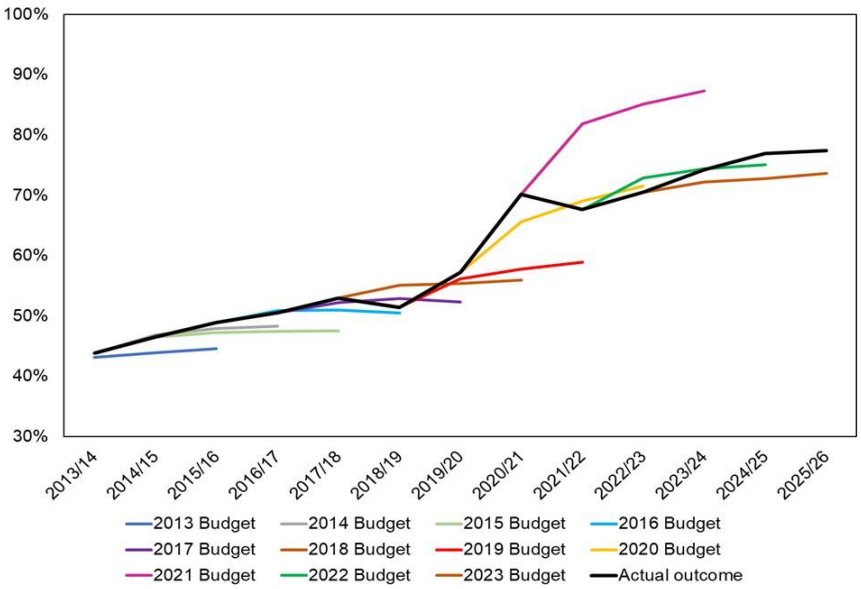
More broadly, our results align with the international macro finance literature showing that weak fiscal fundamentals and low fiscal credibility raise the sovereign risk premium in emerging market economies, even when monetary policy remains credible (Kumar and Baldacci 2010; Khalid and Nguyen 2025). The findings support the view that elevated fiscal risk can weaken monetary policy transmission by reducing the sensitivity of long-term yields to policy rate changes (Greenwood, Hanson and Stein 2015; Kose et al. 2022).

The paper is structured as follows. Section 2 provides a historical review of South Africa's fiscal performance. Section 3 focuses on the impact of country's fiscal performance on the sovereign yield curve and risk premium. Section 4 provides empirical evidence of the impact of fiscal risk on bond yields using a large Bayesian vector autoregression model. Section 5 provides a summary of the findings and concluding remarks.

2. National Treasury's fiscal performance

Over the last decade, South Africa's debt-to-GDP ratio rose quite rapidly, from about 44% in 2013/14 to over 70% in 2023/24. Furthermore, National Treasury has overshot the projected debt-to-GDP ratio set out in the national budget each year since 2013/14 – with the exception of fiscal years 2018/19, 2021/22 and 2022/23. Debt has not stabilised since the global financial crisis, with each budget prior to 2022 having to postpone the expected date of debt stabilisation and raise the level at which this would be expected to be achieved. National Treasury has, until recently (fiscal year 2025/26), been unable to achieve the fiscal adjustment needed to stabilise debt. Figure 1 shows that the projected debt-to-GDP ratio given in each budget since the 2013/14 fiscal year lies below the black line, which represents actual debt-to-GDP outcomes.[2]

Figure 1: Debt-to-GDP projections and actual outcomes



Source: National Treasury, SARB.

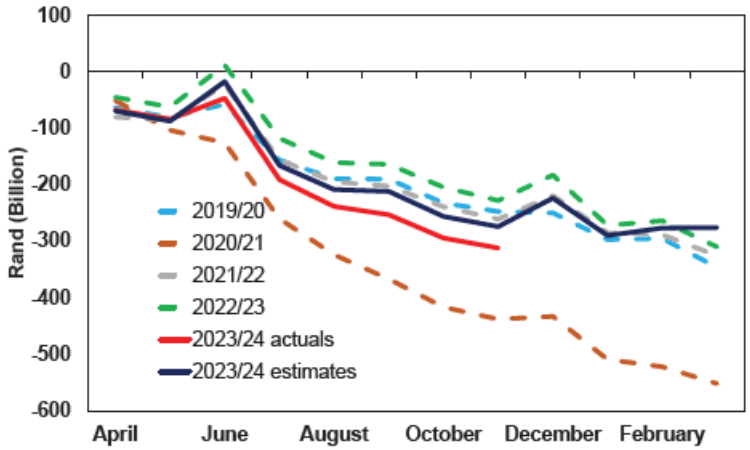
In Figure 2a, the main budget balance projections for the 2023/24 fiscal year appear to be optimistic, with actual outcomes (red line) lying below the projection made earlier in the year (blue line), likely resulting in higher fiscal risk or worse fiscal metrics than anticipated. This would generally lead to a higher risk premium and exchange rate

[2] This holds true except for the 2021 budget, where the actual outcomes were below the projections. Additionally, for the 2020 budget, the actual outcome was lower than the projected debt-to-GDP ratio in the final forecast years, and for the 2022 budget, the actual outcome was below the projected debt-to-GDP ratio in the early years of the forecast period.

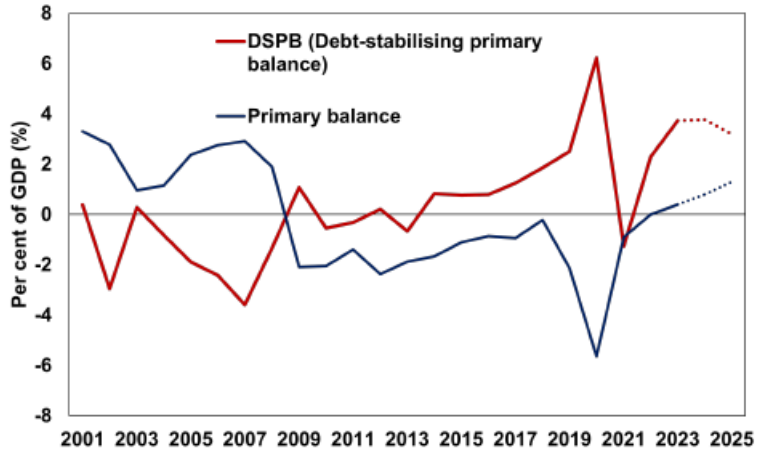
depreciation. Figure 2b shows the debt-stabilising primary budget balance that National Treasury is required to achieve for debt to stabilise.

Figure 2: National Treasury budget projections

2a: National Treasury budget balance outcomes



2b: Debt-stabilising primary budget balance



Source: National Treasury, SARB.

The size of the debt-stabilising primary balance (*DSPB**) is dependent on the real rate of economic growth *g*, the real effective rate of interest on government debt *r* and a long-term debt level or the debt target *d,* as shown below:

$$DSPB^* = \left(\frac{r-g}{1+g}\right) * d \qquad (1)$$

We use the concept of the debt-stabilising primary balance as a local accounting benchmark, defined as the primary balance that would keep the public debt-to-GDP ratio constant at its current level, conditional on contemporaneous macroeconomic conditions. Importantly, this concept does not impose or assume that real growth rates or real interest rates are constant over time. The familiar closed-form expression for the stabilising balance arises under certainty and fixed parameters and is used purely for expositional convenience. In implementation, the stabilising primary balance is recomputed period by period as macroeconomic conditions evolve, and debt sustainability is assessed in a forward-looking and probabilistic manner, consistent with modern International Monetary Fund (IMF) debt sustainability analysis frameworks that allow for time-varying growth, interest rates and fiscal outcomes. The red line in Figure 2b shows the estimated primary budget balance, which is the balance required to stabilise South Africa's debt to GDP at its long-term trend.

It is clear that surpluses are needed to stabilise debt. However, South Africa has been running budget deficits since 2008 – indicated by the blue line in the figure. National Treasury is committed to stabilising debt, projecting that government will run primary budget balance surpluses in the forecast years – from 2026/27 to 2028/29. However, unforeseen negative shocks may arise, causing higher expenditure or revenue shortfalls, bringing the National Treasury's forecast credibility into question. This has implications for the pricing of bond yields and the risk premium, given that investors require compensation for this uncertainty around fiscal risk.

3. South Africa's fiscal metrics and bond yield performance

The potential relationship between fiscal metrics – particularly public debt – and long-term government bond yields is often discussed in the context of monetary policy transmission and sovereign risk pricing. In the South African context, fiscal developments have frequently been highlighted as one possible factor associated with the level and slope of the sovereign yield curve. South Africa's sovereign yield curve is notably steep relative to those of many other emerging market economies (see Figure 4). This pattern coincides with periods of heightened fiscal pressures and evolving perceptions about fiscal sustainability. Existing studies suggest that fiscal developments can be reflected in the sovereign bond risk premium, and short-term movements in bond yields around fiscal announcements are often interpreted as

market responses to new information about the fiscal outlook. In South Africa, changes in long-term bond yields have, on several occasions, occurred close in time to major fiscal announcements. For example, long-term yields rose by around 10 basis points following the 2022 national budget announcement. This market reaction may be consistent with increased uncertainty or reassessments related to unaddressed expenditure pressures, including the public-service wage bill, the Eskom debt transfer, national health insurance proposals and uncertainty surrounding the future of the COVID-19 social relief of distress grant (see Figure 3).[3]

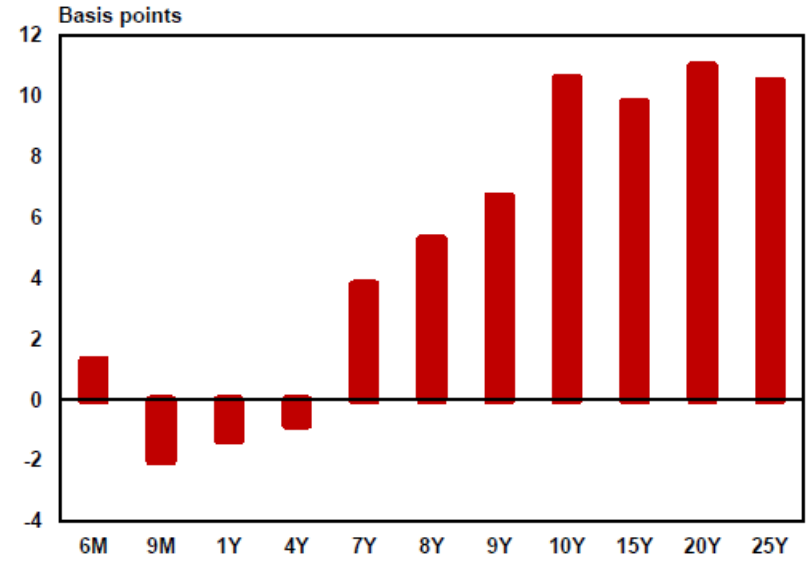
By contrast, the 2023 national budget was accompanied by greater clarification regarding Eskom support and the broader energy crisis, while also aligning more closely with market expectations ahead of the announcement. In this case, bond yields declined on average by about 8 basis points across maturities from the four-year segment. These contrasting episodes illustrate how yields may move in response to changes in perceived fiscal risks or uncertainty, with more favourable or clarifying information often coinciding with lower yields, while heightened uncertainty or weaker perceived fiscal positions may coincide with higher yields.

Figure 3 presents changes in bond yields on the day of selected fiscal announcements and the following day. While these movements should not be interpreted as causal evidence, they are consistent with the broader literature suggesting that macroeconomic and policy announcements can be rapidly incorporated into asset prices as investors revise expectations about future interest rates and associated risks (Afonso and Martins 2012; Hördahl, Remolona and Valente 2015).

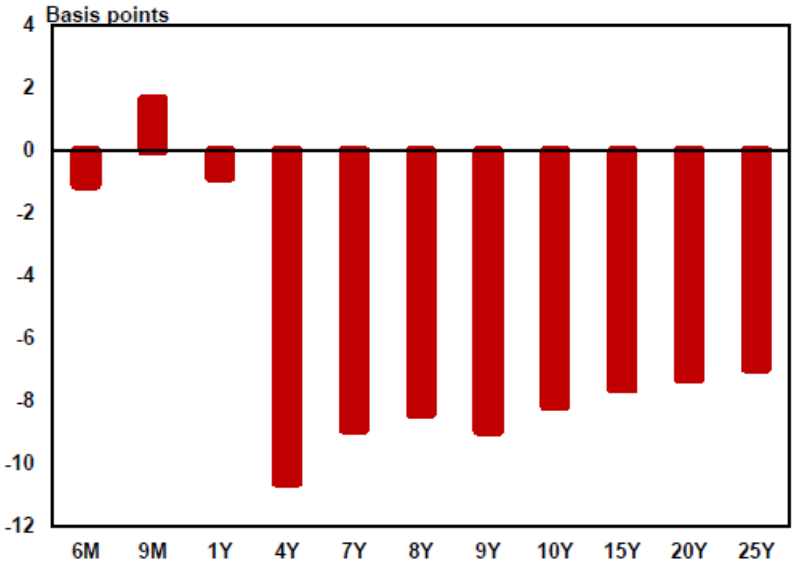
[3] Eskom is a state-owned enterprise that supplies most of South Africa's electricity. It has faced persistent financial and operational challenges, including a large debt burden, governance shortcomings and capacity constraints, leading to repeated fiscal support from National Treasury.

Figure 3: Changes in bond yields across the yield curve

3a: 2022 budget (basis point change)



3b: 2023 budget (basis point change)



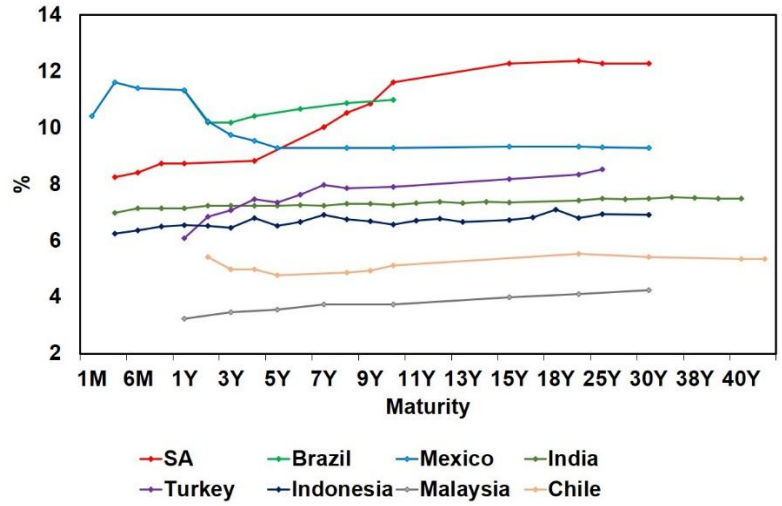
Source: Bloomberg.

Against a backdrop of deteriorating fiscal balances and ongoing concerns around fiscal sustainability, an elevated sovereign risk premium and associated yield pressures have remained a recurring feature of the South African macrofinancial environment. This is also reflected in the JP Morgan Emerging Markets Bond Index Plus (EMBI+)

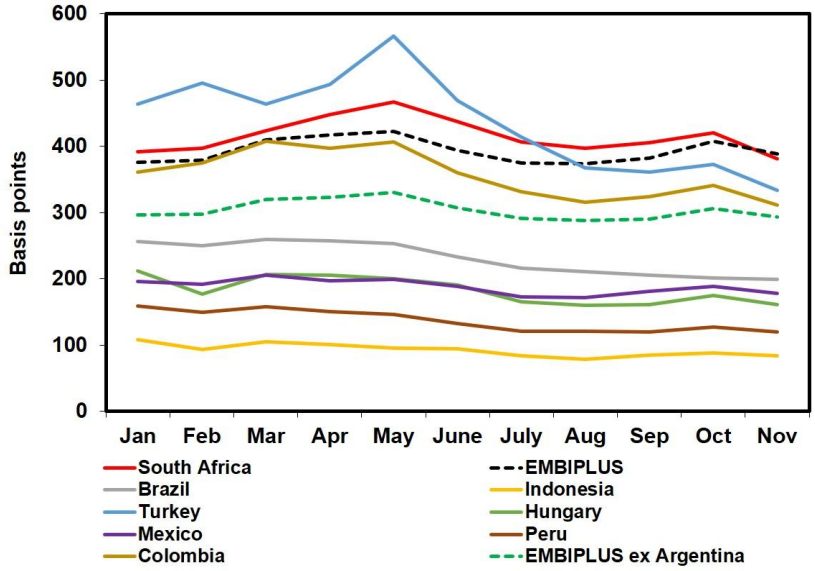
series for South Africa, which indicates a relatively high risk premium compared with peer economies.[4]

Figure 4: South Africa's yield curve and risk premium

4a: Sovereign yield curves



4b: Risk premium (EMBI)



Source: Bloomberg, SARB.

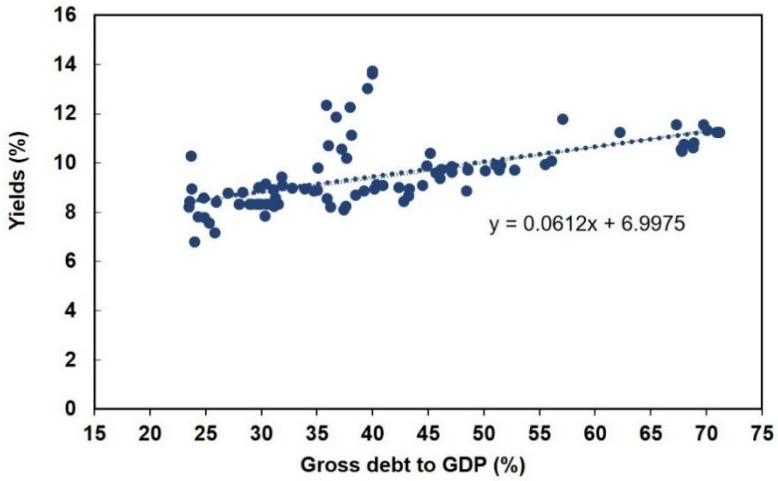
The broader literature on fiscal policy and interest rates has primarily focused on long-term yields, motivated by the view that changes in fiscal balances or public debt may

[4] Yield curve data are from Bloomberg (June 2023), and risk premium measures are based on JP Morgan EMBI data for 2023.

be associated with adjustments in expectations about future short-term rates, inflation expectations and the risk premium (Tanzi and Lutz 1991). Under the expectations hypothesis, such revisions would be reflected relatively quickly in long-term interest rates (Afonso and Martins 2012; Hördahl, Remolona and Valente 2015). In the South African data, simple descriptive evidence points to a co-movement between fiscal indicators and long-term government bond yields. Figure 5 plots selected fiscal metrics alongside long-term yields over the period 2000–2023. The fitted linear relationship suggests that periods associated with higher debt-to-GDP ratios or weaker fiscal balances have tended to coincide with higher long-term yields. Based on this simple correlation, a 1 percentage point increase in the debt-to-GDP ratio, or a 1 percentage point deterioration in fiscal balances, is associated with an increase in long-term yields of roughly 6–9 basis points.[5]

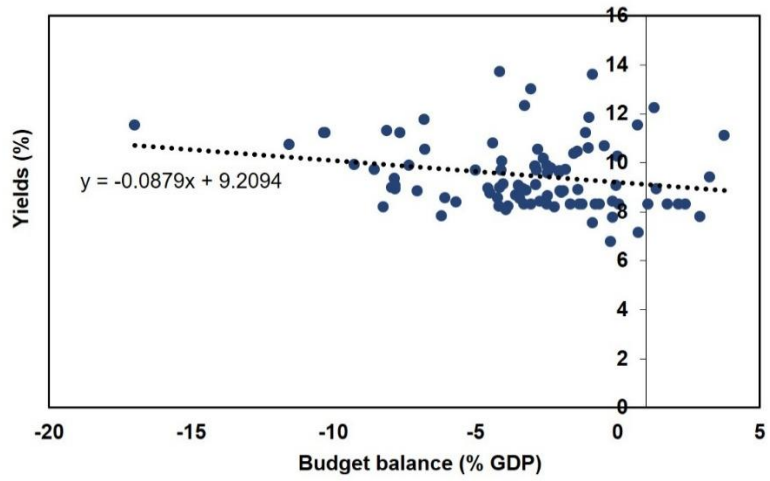
Figure 5: Impact of fiscal metrics on yields

5a: Long-bond yield and gross debt



[5] These magnitudes are broadly comparable with ranges between 9 and 12 basis points reported for other countries.

5b: Long-bond yield and fiscal balance



Source: Bloomberg, SARB.

4. Impact of fiscal risk on the risk premium

There is an established body of research in macro finance that examines the relationship between fiscal positions and sovereign borrowing costs, considering factors such as expected inflation, default risk and the term premium. Since the global financial crisis, developments in this field have enhanced empirical identification and expanded analysis to both advanced and emerging economies. Consistent with the empirical literature, a percentage point negative shock to fiscal policy (i.e. an exogenous increase of 1 percentage point in the public debt-to-GDP ratio) is associated with an increase in long-term sovereign yields of approximately 3–4 basis points in advanced economies and 30–40 basis points in emerging market and developing economies, reflecting differences in fiscal credibility, market depth and the risk premium. These effects are influenced by debt levels, institutional quality, investor base composition and prevailing global risk conditions.

Seminal evidence for the United States by Laubach (2009) estimates that a 1 percentage point rise in the debt-to-GDP ratio is associated with an increase of 3 to 4 basis points for forward long-term rates, with much of the move attributed to the term premium rather than expectations of short rates. Recent replication and methodological refinements by Plante, Richter and Zubairy (2025) find a 3 basis point increase in the 5-year Treasury rate for every 1 percentage point rise in debt to GDP, again largely driven by term premium dynamics. Gruber and Kamin (2012) find that,

for a G7 panel, a 1 percentage point rise in the ratio of the structural fiscal deficit to GDP increases bond yields by 15 basis points in the long run, and a 1 percentage point rise in the net debt ratio increases yields by 2 basis points. Kumar and Baldacci (2010) examine a panel of 31 advanced and emerging market economies and find that bond yields increase significantly when the overall fiscal balance or the primary fiscal balance deteriorates – an increase in the overall fiscal deficit of 1 percent of GDP pushes up bond yields by 17 basis points. In emerging markets, Nose and Menkulasi (2025) find that a 1 percentage point increase in expected primary deficits leads to a persistent 36 basis point rise in 10-year domestic bond yields over 2.5 years, with larger effects during the COVID-19 pandemic. The impact is greater when domestic banks are the primary financiers of deficits, highlighting the sovereign–bank nexus.

This suggests that significant changes in the fiscal stance are reflected in the persistence and responsiveness of long-bond yields. In this paper, however, we aim to assess the impact of fiscal risk not only at the long end of the yield curve but on its entire shape. In the next section we first estimate the yield curve for South Africa and then use the estimated level, slope and curvature of the yield curve in a large Bayesian vector autoregression (BVAR) model to understand the impact of a fiscal shock on the yield curve and macroeconomy.

4.1 Estimating the South African yield curve

Understanding the behaviour of interest rates across all maturities is essential for effective economic analysis and policymaking. While the monetary authority only has direct control over the very short-term interest rate through its policy rate, it is crucial for policymakers to understand how adjustments to short-term rates might influence medium- and long-term rates. These movements have significant implications for borrowing costs, investment decisions and overall aggregate demand within the economy. The yield curve is often used to understand this relationship as it illustrates the interest rates of bonds at various maturities, providing a visual representation of the relationship among these rates at a particular point in time. Typically, the yield curve rises from lower interest rates on short-term bonds to higher rates on longer-term bonds. In South Africa, the sovereign yield curve is notably steep (this characteristic primarily stems from the long structure of South Africa’s debt maturity

profile). This might suggest that changes in monetary policy have limited impact on long-term rates, which are largely driven by fiscal risk.

The South African government issues only a limited number of securities with different maturities. Consequently, prices and yields are available for only a select few maturities. To evaluate instruments across the entire maturity spectrum or yield curve, it is necessary to connect the observed yield points. This process enables analysis not just at observable maturities, but across the full range of possible maturities. Achieving this requires some form of curve-fitting or smoothing to construct a continuous yield curve from the discrete set of observed data over time. Yield curves, forward curves and discount curves are estimated from observed yields/bond prices and require the assumption of some model that defines the shape of the yield curve. The model should accurately fit the observed yields and reflect the historical shape of the curve, while also filling in missing data points to produce a smooth, continuous yield curve.

There are several methodologies for fitting a yield curve – for example, McCulloch (1975), McCulloch and Kwon (1993), and Vasicek and Fong (1982) used cubic and exponential spline interpolations to estimate the discount curve. However, these methods often generate curves with very specific shapes, which limits their applicability to data sets that share similar characteristics, as noted by Diebold, Li and Li (2006).

A widely used alternative is the family of factor models, with the Nelson-Siegel method being especially prominent. The Nelson-Siegel approach fits observed yield data while ensuring that the resulting estimated rates are both continuous and smooth. A key advantage of the Nelson-Siegel framework over other factor models is that the factor loadings are predetermined within the model, removing the need to estimate unobserved factors. The factor loadings implied in the Nelson-Siegel model produce yield curves that are consistent with various empirical properties of the yield curve (Diebold, Li and Li 2006).[6] The structure of the model is detailed in Equation (2) below.

In addition, the three-factor Nelson-Siegel model is capable, in principle, of capturing the common shapes observed in yield curves, such as the increasing and concave

[6] See Diebold, Ji and Li (2006) for an interpretation of the three factors.

profile, as well as other forms like downward sloping, upward sloping, humped or inversely humped curves. An effective yield curve model should not only replicate the historical average shape of the curve but also have the capacity to forecast future interest rates. The Nelson-Siegel model is well-suited to these objectives. It has gained popularity in term-structure modelling because it is parsimonious, easy to estimate and flexible, and provides superior forecasts compared to other term-structure models (Diebold and Rudebusch 2013). We therefore rely on this framework to fit a smooth yield curve for South Africa.[7]

To include the yield curve over time, we capture the entire term structure by including government bond yields at specific maturities, as well as including the level, slope and curvature of the South African yield curve. Litterman, Scheinkman and Weiss (1991) suggest that the shape of the yield curve may be parsimoniously represented by estimates of its level, slope and curvature. We estimate these factors using the dynamic Nelson and Siegel (1987) framework in which three latent factors are estimated using state-space specification and maximum-likelihood estimation with the Kalman filter. The Nelson-Siegel exponential approximation of the cross-section of yields is modelled as follows:

$$y(\tau)_t = \beta_1 + \beta_2\left(\frac{1-e^{-\lambda\tau}}{\lambda\tau}\right) + \beta_3\left(\left(\frac{1-e^{-\lambda\tau}}{\lambda\tau}\right) - e^{-\lambda\tau}\right) \quad (2)$$

where β_1, β_2 and β_3 are the latent factors that can be rewritten as the time-varying parameters that represent the level L_t, slope S_t and curvature C_t, respectively, as follows:

$$y(\tau)_t = L_t + S_t\left(\frac{1-e^{-\lambda\tau}}{\lambda\tau}\right) + C_t\left(\left(\frac{1-e^{-\lambda\tau}}{\lambda\tau}\right) - e^{-\lambda\tau}\right) \quad (3)$$

where y represents a bond yield at a specific maturity τ and λ is the decay factor.

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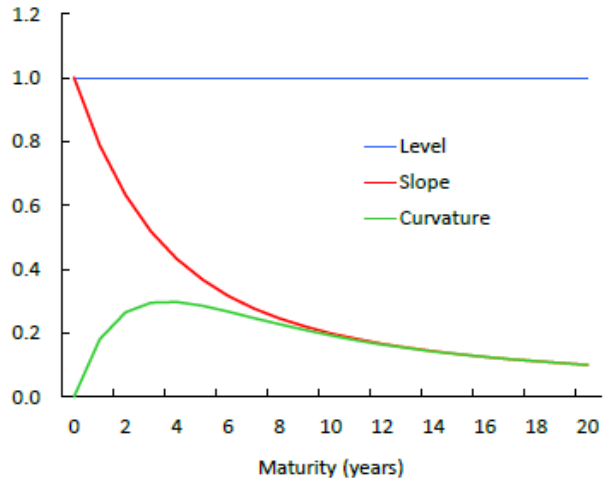
[7] Two SARB economic notes have shown that this a good fit for the South African yield curve: 'Estimating the South African yield curve' by Soobyah (2016), and 'The Nelson-Siegel models: which one holds the greatest predictive power?' by Soobyah and Tsokodibane (2017). These can be provided on request.

L_t is interpreted as the overall level of the yield curve or parallel shifts in the yield curve, as its loadings are equal for all maturities. It therefore captures the average yield across all maturities, indicating the general interest rate environment. S_t represents the slope of the yield curve with a maximum loading at the shortest maturity, and then the loading of this factor monotonically decays over time towards zero as the maturity increases to capture the steepness of the curve. The slope often reflects expectations about future interest rates and economic growth. The loading of factor C_t is zero at the shortest maturity. It then gradually increases until it reaches a maximum at the middle of the maturity spectrum before starting to fall back to zero as the maturity increases. C_t is therefore the curvature of the yield curve and naturally captures the typical hump shape or bend in the yield curve. It provides insight into market expectations of interest rate volatility or policy shifts.[8] Figure 6a shows the loadings of the three latent factors – the level, slope and curvature. Figure 6b shows estimates of the level, slope and curvature from the South African yield curve over time.

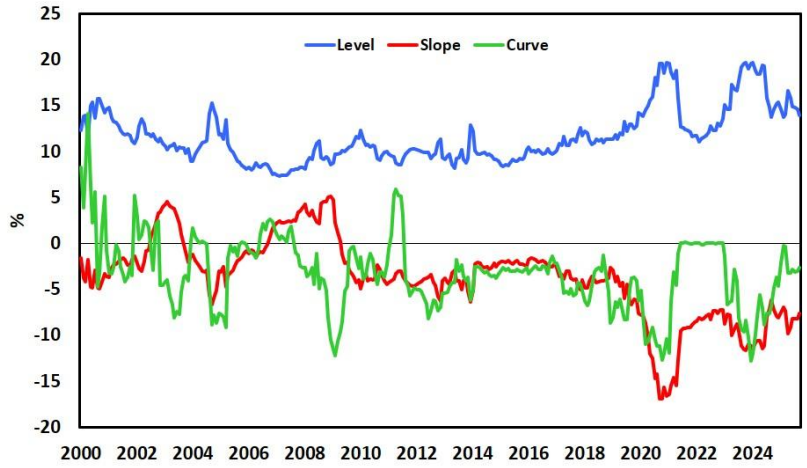
Figure 6: Level, slope and curvature of the yield curve

6a: Nelson-Siegel factor loadings



[8] Further details on the estimation and interpretation of the level, slope and curvature of the yield curve are provided in Soobyah and Steenkamp (2020).

6b: Estimates of the level, slope and curvature

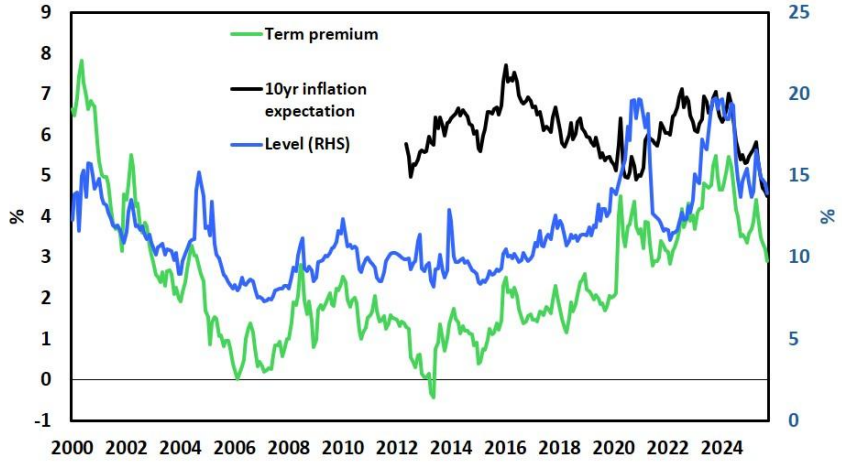


Source: Author's calculation.

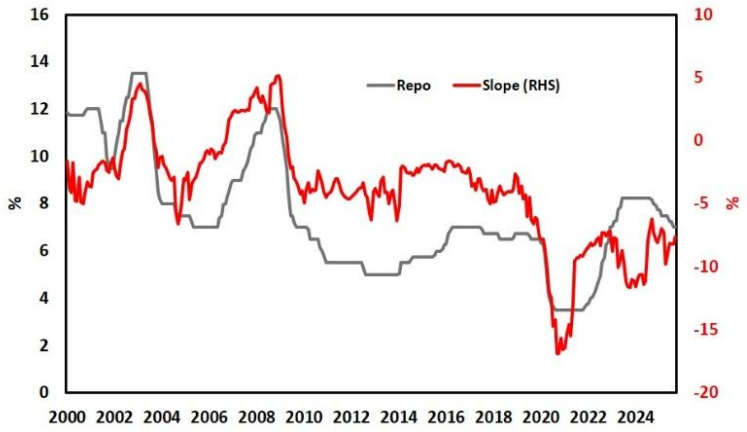
The level factor, L_t, is typically associated with the long end of the curve and generally captures the common long-run component of nominal yields, which reflects a combination of long-run inflation expectations, long-run real interest rate expectations and the risk premium. Figure 7 shows that the level factor and term premium co-move (with a correlation of 0.76), and there is some co-movement of the level with long-run inflation expectations towards the end of the period (correlation of 0.78 since 2022).

Figure 7: Level and scope

7a: The level factor vs inflation expectations and term premium



7b: The slope factor vs monetary policy rate



Source: SARB, author's calculation.

The level remains relatively stable over the period within the 7% to 15% range when the COVID-19 period is excluded. During the pandemic there was a big increase in the level, which was also a function of the market dysfunction that occurred around March 2020, but this corrected with the level falling back to pre-pandemic levels. It then spiked again in 2023 and 2024 as volatility in the South African rand increased and the US credit downgrade fuelled risk-off sentiment, which hit emerging market currencies hard, including the rand, resulting in an increase in bond yields across the yield curve. There was also a hike in the US Fed rate at the time that heightened global yield curves and exerted upward pressure on emerging market yields, including South Africa's.

The slope factor, S_t, mimics changes in the risk-free rate or monetary policy rate. When interest rates were rising in the early 2000s and around the global financial crisis, the slope factor increased, suggesting a flattening of the slope of the yield curve. This occurred as the short end of the yield rose in tandem with higher short-term policy rates faster than the long end of the yield curve, resulting in a flattening of the yield curve. The slope factor steepened shortly after the global financial crisis and has remained negative or steep since. It steepened even further around the pandemic period and again in late 2023 due to global yield increases, which lifted all maturities, especially long-dated bonds, which also came under pressure from domestic fiscal concerns and foreign selling. The deteriorating fiscal position, heightened term premium, a weak growth outlook and an unreliable power supply, which had constrained energy and

economic activity in energy-intensive sectors for some time, drove long-dated yields higher, leading to the steepening of the yield curve.

In the next section, we use these estimates of the level, slope and curvature to represent the South African sovereign yield curve. Diebold, Li and Li (2006) and Afonso and Martins (2012) suggest that the shape of the yield curve may be parsimoniously represented by estimates of its level, slope and curvature. This helps us to understand the impact of fiscal risk on the yield curve in a simple way.

4.2 Estimating a large BVAR

Most of the literature that focuses on fiscal shocks or risk has relied on small fiscal vector autoregression (VAR) models, which many have argued suffer from fiscal policy foresight, omitted variable bias and heterogeneity in the components of total government spending. They also do not allow one to capture the full feedback or spillover mechanism. In this paper, we therefore estimate a large Bayesian VAR, which allows one to include as many variables and subcomponents as possible. We estimate a large BVAR that imposes prior beliefs on the parameters to help overcome the curse of dimensionality in estimating large VARs. The BVAR has an independent Normal-Wishart prior. This class of priors allows for analytical tractability while imposing shrinkage on the autoregressive coefficients and the error variance–covariance matrix. The prior is motivated by two considerations: first, the short effective sample length relative to the dimensionality of the VAR; second, well-documented persistence in macroeconomic time series, which the prior incorporates by shrinking coefficients on longer lags and cross-variable interactions towards zero. The BVAR is estimated in similar spirit to the analysis by Barrios et al. (2009), Zhou (2021) and Afonso and Martins (2012), who estimate the drivers of long-bond yields and the impact of the potential drivers such as fiscal risk (measured by either debt to GDP or fiscal balances), credit risk, inflation expectations, global risk sentiment and global interest rates. We estimate a BVAR model using quarterly data over the period 2000 to 2024.[9] All variables are transformed either into logs or log differences unless they are already

[9] The model was also estimated over different sample periods with similar results in each case.

expressed in percentage units. We estimate the Bayesian model shown below with two lags and using independent Normal-Wishart priors:[10]

$$Z_t = c + \sum_{i=1}^{p} A_i Z_{t-i} + \mu_t$$

where c is a vector of constants; μ_t is the residual which is normally distributed; and Z_t is a vector comprised of several variables, some of which are fiscal variables (debt to GDP, budget balances, government revenue and expenditure). We follow Loate and Viegi (2025) in capturing the evolution of debt (in line with dynamic stochastic general equilibrium models) by including either the budget balance or all its components. We also include the output gap, inflation, 2-year-ahead inflation expectations and the repo rate. The output gap and inflation rate capture the business cycle and are shown to be important in explaining the dynamics of yield curve movements (Ang and Piazzesi 2003). The financial sector variables we include are the term premium, exchange rate volatility, the real effective exchange rate, the financial conditions index (FCI), the commodity price index (ICP), credit default swaps, the 10-year South African government bond (SAGB) yield, the 30-year SAGB yield, and the level, slope and curvature of the South African yield curve. The FCI and ICP are measures estimated by the South African Reserve Bank (SARB). The inflation expectations, term premium and government bond yields capture economic agents' expectations about future fiscal policy.[11]

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[10] Independent Normal-Wishart priors are commonly used in large BVAR models because they provide a structured yet computationally tractable way to regularise the estimation when the number of parameters explodes with many variables and lags. The overall tightness λ_1 is set at 0.1 and the cross-variable weighting for λ_2 is set at 0.5. The chosen tightness lies within the range commonly used in applied BVAR studies and is further justified by robustness checks showing that the qualitative impulse response patterns and economic conclusions are unchanged for reasonable alternative values of the tightness parameter. Robustness is assessed by re-estimating the model under alternative, but economically plausible, prior specifications. Across these alternatives, the qualitative features of the impulse responses – signs, relative magnitudes and persistence – remain unchanged. This suggests that the main conclusions are not an artefact of a particular prior choice, but reflect robust features of the data. In large BVARs, the independent Normal-Wishart prior combined with Gibbs sampling is preferable not because it is unrestrictive, but because it delivers transparent, scalable and diagnostically tractable regularisation – something alternative priors often sacrifice in high dimensions. The large BVAR is not without its own limitations or shortcomings: the prior and posterior distributions are shown in the annexures.

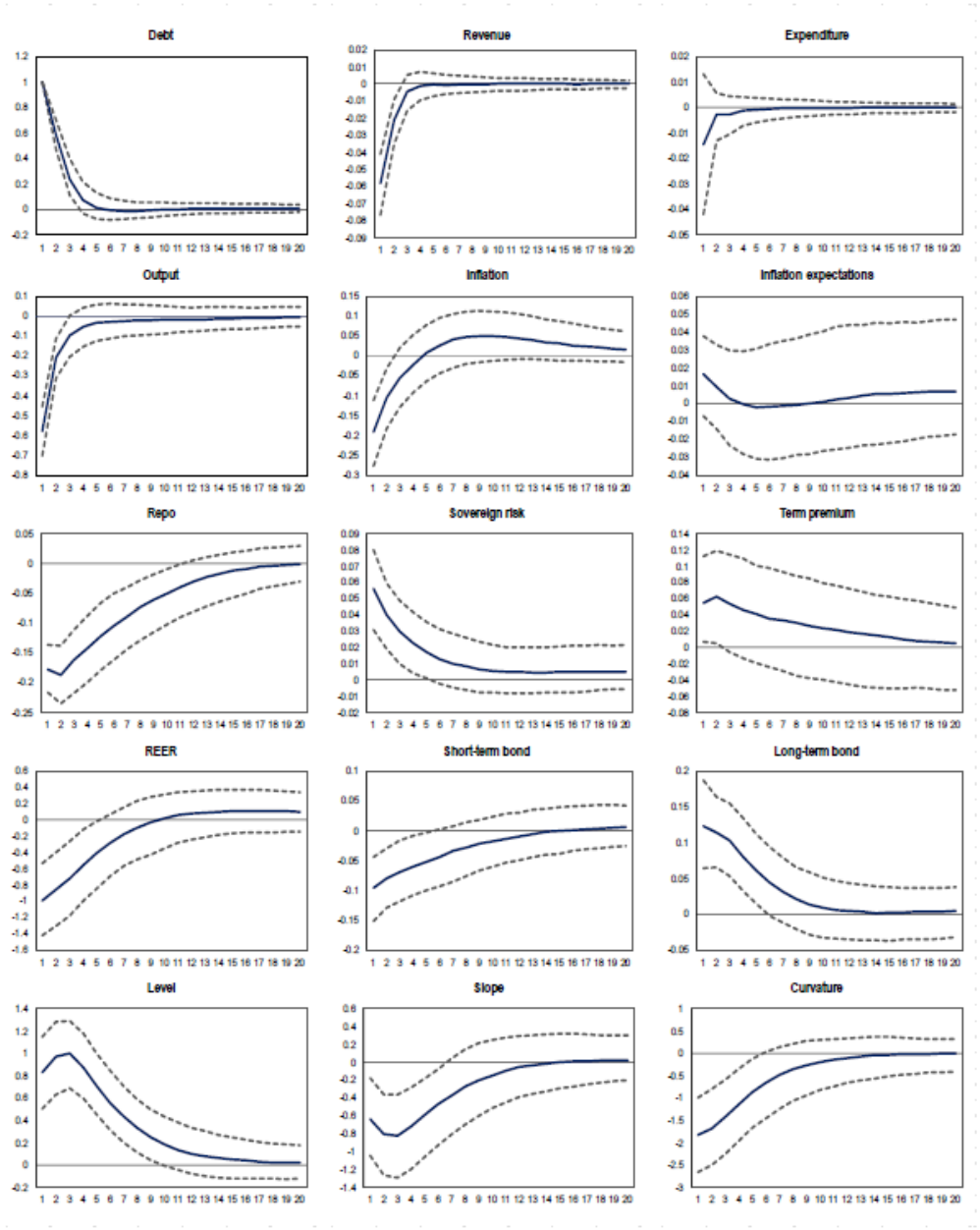
[11] The term premium estimates are calculated as per Soobyah and Steenkamp (2020). The output gap is sourced from the SARB's Quarterly Projection Model, which is estimated through a Kalman filter. The FCI and ICP are constructed by the SARB, details of which may be obtained on request.

The impulse response functions for key selected variables from the estimated BVAR are shown in Figure 8. These impulse responses reflect a somewhat negative supply-side shock. They show that weaker fiscal positions (via an increase in debt to GDP), result in a slowdown in growth, an initial fall in inflation and therefore a subsequent expansion in monetary policy – as observed with a lower repo rate.[12] Sovereign risk (proxied by credit default swap spreads), which represents the credit risk of South African government debt, rises as a result of the deteriorated fiscal balances. The term premium rises as a result of the increase in the sovereign risk premium, together with a fall in the real effective exchange rate, which is a depreciation of the currency – this reflects the debt sustainability channel.

This rise in the term premium, the sovereign risk premium and inflation expectations causes the long-term government bond yield to rise by around 12 basis points. The fall in the short-term bond yield and increase in long-term bond yield result in a steepening of the yield curve. This is primarily due to National Treasury or the debt finance supply channel, which captures the effect of changes in government debt and, consequently, the government's financing strategy, as reflected in financial markets through the increased supply of Treasury bonds and government bonds to finance new debt (Philippon and Dai 2005; Laubach 2009). An increase in government indebtedness most often means an increased supply of government bonds, a fall in bond prices and therefore a subsequent rise in bond yields. National Treasury often issues bonds at the long end of the yield curve, hence the rise in long-term bond yields.

[12] The impulse response functions are from a unit shock to the debt-to-GDP ratio.

Figure 8: Impulse response function from a shock to fiscal policy (debt to GDP)



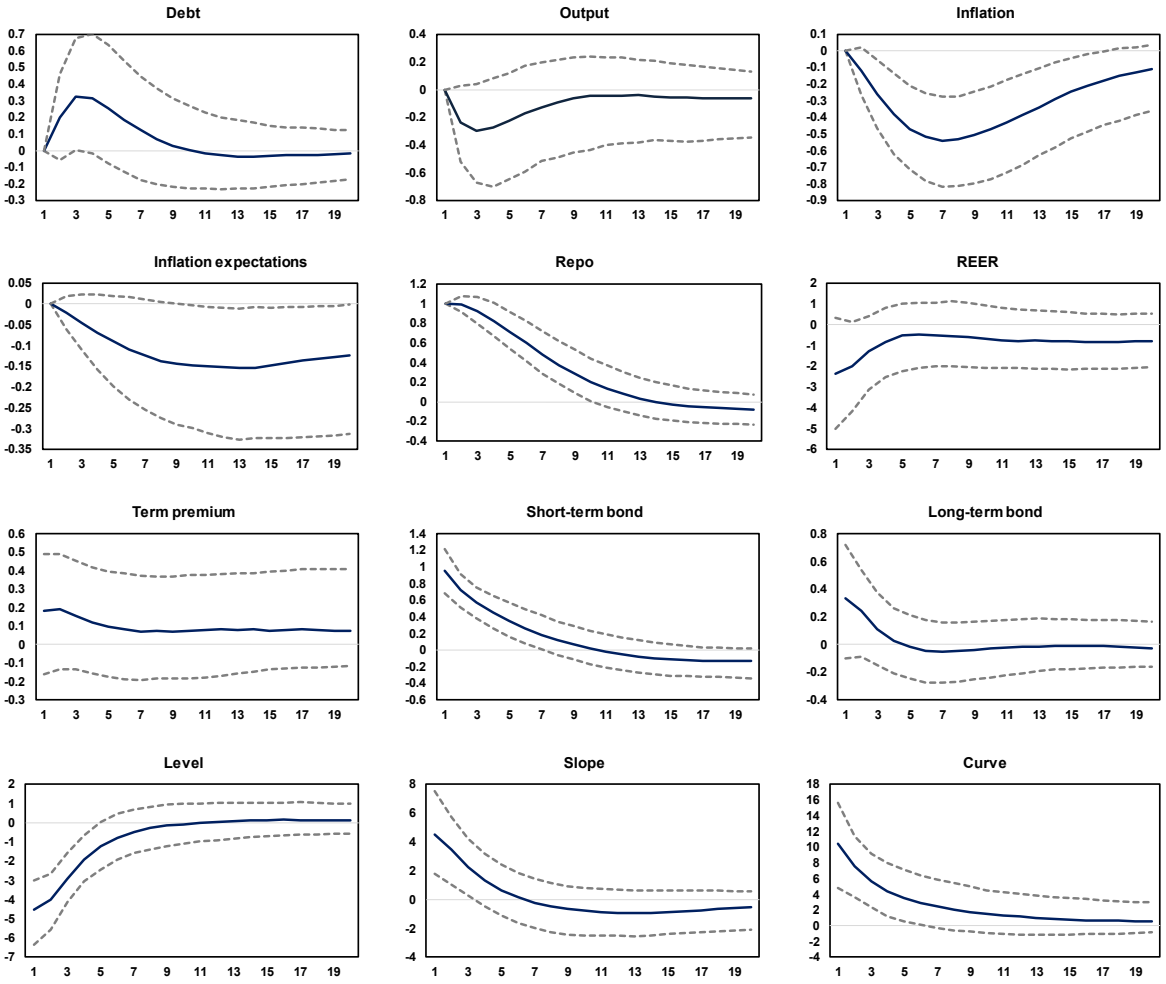
The impulse response functions also show a rise in inflation expectations, albeit not significant. If the higher debt or expenditure increases are interpreted as a signal that the fiscal authority is not committed to fiscal discipline and price stability, they can influence business and consumer expectations. Businesses may then increase their price-setting behaviour, and consumers may adjust their inflation expectations upward. Ultimately, this also speaks to the fiscal theory of the price level, which postulates that weaker fiscal metrics result in price instability and higher inflation expectations. The theory rests on the assumption that price stability is unattainable unless government debt equals the present value of taxes less spending. As a result, higher debt levels or weaker fiscal balances threaten inflation as the credibility of government to fully repay its debt falls (Fialho and Portugal 2005; Cochrane 2023). The impulse response functions therefore point to signs of fiscal-led inflation, which is further explored in Witheridge (2024).

Turning to the yield curve, the expansionary fiscal policy increases the risk premium and impedes the monetary policy transmission mechanism somewhat as the level of the yield curve shifts up on average by around 100 basis points at the peak. The slope of the yield curve falls, which indicates a steepening of the yield curve, and also follows the monetary policy reaction path. The curve of the yield curve also falls, suggesting that the market values the risk of long maturities vis-à-vis intermediate maturities more than it values the risk of intermediate maturities vis-à-vis short maturities. Yields increase overall and remain high, resulting in higher borrowing costs for governments. Higher borrowing costs may require further fiscal policy expansion, causing a vicious cycle of persistently higher debt. For this reason, even when investors expect the interest rate to be constant over time, the yield curve is positively sloped, reflecting the greater risk and uncertainties involved in longer maturities. The risks and uncertainties created are associated with macroeconomic shocks, such as fluctuations in economic activity and inflation expectations, as well as with pressures that arise from the poor conduct of fiscal policy (Mishkin 2000; Montes and Acar 2018).

We also assess what the responses are to a monetary policy shock – that is, a unit structural shock to the short-term policy rate, the repo rate. The impulse responses for a select few variables are given in Figure 9. These results suggest that a 1 percentage point shock or rise in the monetary policy repo rate causes the short-term bond yield

to rise by 100 basis points on impact as well as the long-term rate to rise, albeit by a smaller amount that is not statistically significant. This results in a level shift down in the yield curve and a flattening of the slope of the yield curve (as seen in a rise in the slope factor). This causes debt to rise as debt-service costs rise with an increase in bond yields. The rise in debt results in a contraction in economic activity, which suggests that higher spending or expansionary fiscal policy does not necessarily translate into boosting economic growth. This also indirectly speaks to the notion by Giavazzi and Pagano (1990) and Blanchard (1990) that at high debt levels and under credible policy adjustments, the expectations channel can dominate the traditional demand channel. Their results show that expansionary fiscal policy does not always raise growth when public debt is already high. At elevated debt levels, extra spending can weaken confidence, raise concerns about future taxes and debt sustainability, and reduce the credibility of policy. In these circumstances, fiscal consolidation rather than fiscal expansion supports economic activity. This finding is in line with the non-Keynesian fiscal-policy literature, including Giavazzi and Pagano (1990), who document cases where fiscal contractions were followed by stronger growth, and Blanchard (1990), who emphasises the role of expectations, credibility and debt sustainability. There is consequently a fall in inflation and inflation expectations. The currency depreciates with a fall in the real effective exchange rate following the rise in policy rates, which is contrary to expectations and suggests that the rise in debt increases the sovereign risk premium and thus causes the currency to depreciate. This almost reflects a fiscal dominant situation whereby higher interest rates do not attract capital flows at high levels of debt due to rising sovereign risk, resulting in a real depreciation of the currency rather than a real appreciation.

Figure 9: Impulse response functions from a shock to monetary policy (repo rate)



5. Conclusion

The literature on fiscal policy emphasises the relationship between fiscal policy and interest rates, noting that changes in government debt can lead to adjustments in long-term rates, influenced by inflation expectations and the risk premium. Our findings correspond with those found in the literature. They suggest that a deterioration in fiscal balances can lead to a slowdown in growth and higher inflation expectations, contrary to conventional Keynesian theory but in line with findings by Giavazzi and Pagano (1990) and the framework proposed by Blanchard (1990).

The rise in fiscal risk also affects the monetary policy transmission mechanism by causing a steepening of the yield curve and shifting the yield curve upwards. This is due to the higher sovereign risk premium and term premium, resulting in higher bond yields as investors demand to be compensated more for this risk. The impact of fiscal risk on bond yields depends on the current fiscal stance (Gruber and Kamin 2012), therefore highlighting the importance of fiscal discipline in maintaining lower bond yields. The term structure of interest rates plays an important role in fiscal and monetary policy transmission mechanisms through its impact on borrowing costs as this directly affects government financing costs, and through the interest rate channel as it affects how monetary policy is transmitted to other interest rates in the economy (Montes and Acar 2018; Walsh 2017).

Understanding the factors that shape the yield curve is important for both monetary and fiscal policy given that the yield curve reflects expectations about future changes in short-term interest rates and therefore the market's assessment of monetary policy conditions, as well as future fiscal policy and risk, and the state of the economy. Coordination is key as modern theories stress that neither monetary nor fiscal policy can ensure macroeconomic stability in isolation. In conclusion, South Africa's fiscal policy has led to a challenging debt trajectory and complex macroeconomic stability issues. The continuous rise in debt, driven by structural and circumstantial factors, has constrained fiscal space, increased borrowing costs, complicated monetary policy and poses significant risks to overall economic stability.

Annexures

Annexure A: Data transformation

Table A1: Database

Variables	Transformation	Units
Debt-to-GDP ratio	Levels	Ppt
Government expenditure	Log-differences	Percentage change
Government revenue	Log-differences	Percentage change
Output gap	Levels	Ppt
Inflation	Levels	Ppt
Inflation expectations	Levels	Ppt
Repo rate	Levels	Ppt
Financial conditions index	Levels	Index
Commodity price index	Levels	Index
CDS spreads	Log-levels	Ppt
Exchange rate volatility	Levels	Ppt
Real effective exchange rate	Log-levels	Index
Commodity price index	Log-levels	Index
JSE All Share Index	Log-levels	Index
Term premium	Levels	Ppt
Short-term bond rate	Levels	Ppt
Long-term bond rate	Levels	Ppt
Level	Levels	Ppt
Slope	Levels	Ppt
Curvature	Levels	Ppt

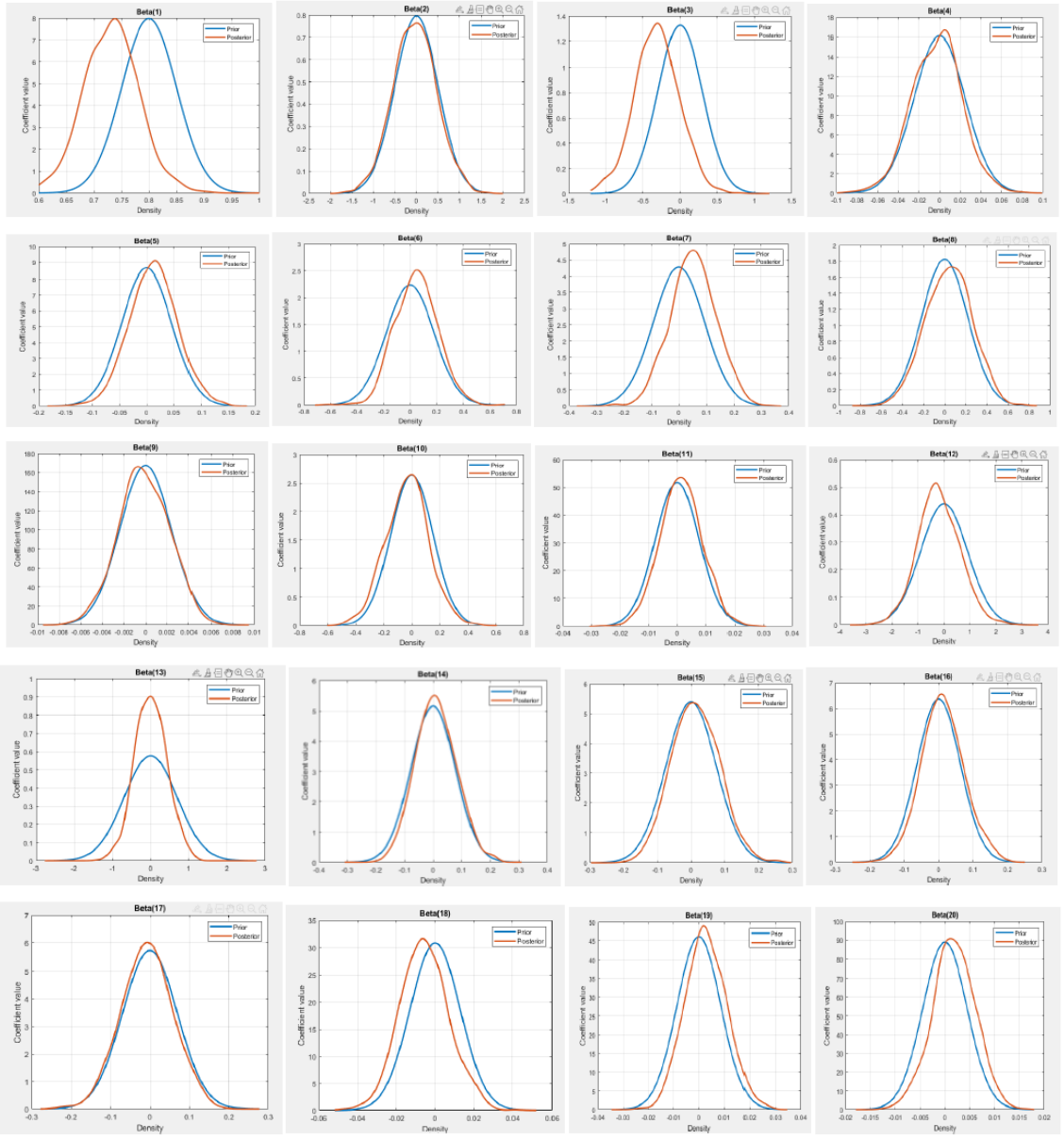
Note: Ppt = percentage point.

Source: All variables are sourced from the SARB and Bloomberg.

Annexure B: Prior vs posterior distributions

Figure B1 compares the prior and posterior distributions of each coefficient in the BVAR. The prior is mostly centred around zero, reflecting agnostic beliefs regarding the effect. After incorporating the data, the posterior shifts slightly towards either negative or positive values for the different coefficients. For most of the variables, the posterior remains close to the prior, suggesting that the prior exerts considerable influence. And since there is a high overlap, this suggests that there is agreement between the prior and the data.

Figure B1: Prior distributions vs posterior distributions



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