Interactions between fiscal and monetary policy in South Africa

By Mulalo Mamburu[1]

Abstract

In South Africa, post-global financial crisis (GFC) public debt accumulation has been more pronounced than in peer economies and the increase in debt-service costs preceded the post-pandemic global rise in interest rates. As such, debt sustainability and the fiscal outlook more broadly has been a central focus in financial markets and those interest interested in domestic macroeconomic policy for a while.

This paper analyses the interaction between fiscal and monetary policy in emerging markets (EMs), with a particular focus on the South African context. First, it explores the special case of fiscal dominance among inflation-targeting emerging markets since the GFC. Second, it uses impulse responses to analyse other ways in which fiscal policy and monetary policy may affect each other in the South African context. While there is no evidence of fiscal dominance among EMs during the period under review, it finds that the bilateral exchange rate with respect to the US Dollar is significant in EM monetary policy reaction functions. In the South African context, the bilateral exchange rate depreciates and remains persistently weaker in response to sovereign risk shocks, while the monetary policy rate increases in response to a sovereign risk shock. Thus, the study finds that fiscal policy can affect monetary policy through the impact of sovereign risk.

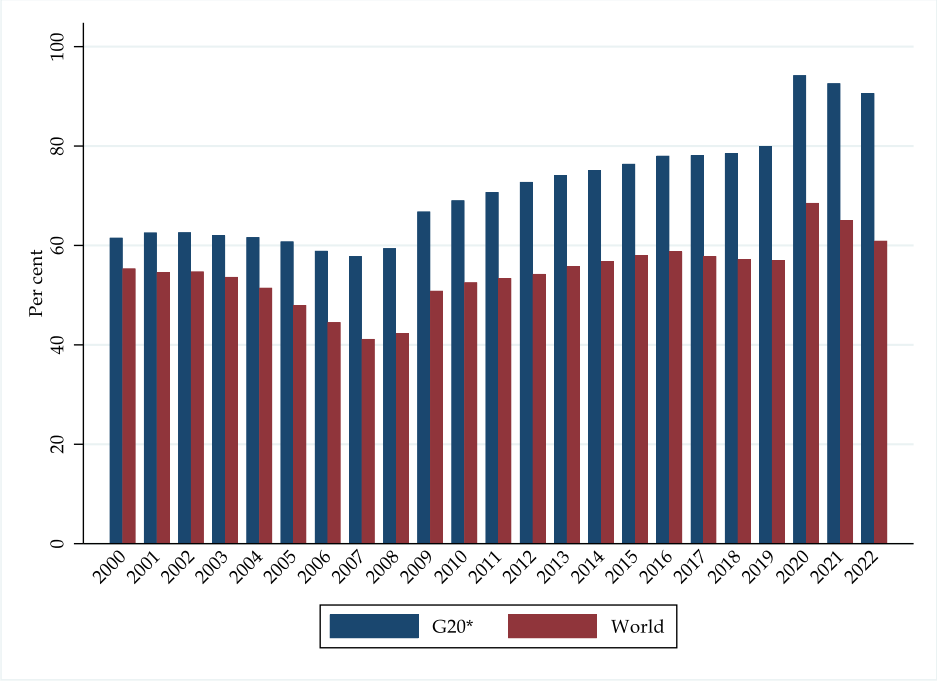
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1. Introduction

Global developments in the 21st century have renewed interest in the interaction between fiscal and monetary policy. As Figure 1 shows, public debt has steadily increased since the GFC as an increase in global liquidity and ultra-low interest rates in advanced economies increased demand for emerging- and frontier-market debt among global investors in a search for returns (Kose at al., 2021a), allowing borrowers to issue more debt at favourable interest rates. Furthermore, policy responses to the Covid-19 pandemic posed a fiscal shock to governments, raising sovereign debt stocks to their highest levels since 1970 (Kose et al., 2021b).

Figure 1: Global public debt-to-GDP

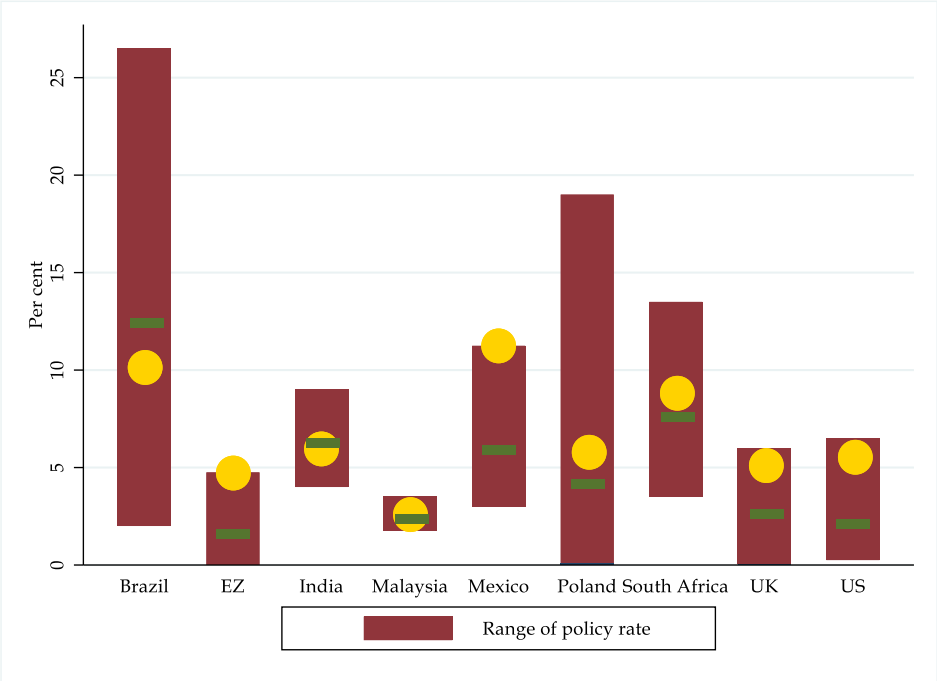


Source: IMF. *G20 excluding Mexico

Although outstanding sovereign debt was rising for years prior to the pandemic, the relatively low level of interest rates contained concerns about debt sustainability and the impact of sovereign debt levels on monetary policy. However, the post-pandemic global inflation shock has led to the highest nominal interest rates in a generation in many economies, as shown in Figure 2, and these issues have become more salient. Particularly among sovereigns with shorter debt maturity profiles, there is a growing concern that debt-service costs might become

unsustainable, especially if inflation remains elevated and necessitates tighter monetary policy for longer.

Figure 2: Selected policy rates since 2000



Source: Bloomberg

In South Africa, public debt accumulation has been more pronounced than in peer economies and the increase in debt-service costs preceded the pandemic. Debt sustainability and the fiscal outlook more broadly have therefore been a central focus in financial markets and those interest interested in domestic macroeconomic policy for a while. This has included the question of the impact of sovereign risk on domestic monetary policy, and the prospect of fiscal dominance in South Africa.

This paper analyses the interaction between fiscal and monetary policy in emerging markets, with a particular focus on the South African context. First, I take the special case of fiscal dominance, a topic of strong interest in the literature, as a starting point and analyse the phenomenon among emerging markets since the GFC. Consistent with pre-GFC studies, I find that while the exchange rate is significant in the monetary policy reaction functions of inflation-targeting EM economies, there is no evidence of fiscal dominance among these economies during the period of interest. Second, I consider other ways beyond the narrow definition of fiscal dominance in which fiscal and monetary policy may affect each other by

examining the interactions between variables that are relevant to fiscal and monetary policy in the South African context. Using impulse responses derived from the local projection (LP) approach of Jordá (2005), I show that the exchange rate, a significant driver of monetary policy among EMs, depreciates in response to sovereign-risk shocks, and this effect on the exchange rate is persistent. I also provide evidence that the monetary policy stance may remain persistently tighter following a sovereign risk shock compared with initial levels.

The paper proceeds as follows: Section 2 provides a broad overview of the literature on fiscal-monetary policy interactions. Section 3 considers the special case of fiscal dominance by extending an earlier study by Zoli (2005) on fiscal dominance in EMs. Section 4 employs a local linear projection approach to examine interactions with monetary policy in South Africa. The paper concludes with Section 5.

2. Literature review

2.1. The interaction between fiscal and monetary policy

The interaction between fiscal and monetary policy has resurged as a topic of interest in recent years, given the broad-based increase in fiscal spending since the onset of the Covid-19 pandemic and the post-Covid inflation shock. There are at least two key ways in which monetary and fiscal policy might be expected to influence one another. On one hand, monetary policy can affect fiscal policy through the impact of real interest rates: an increase real rates in response to inflationary pressures may affect debt sustainability (Leith & Wren-Lewis, 2000). On the other hand, fiscal policy can affect monetary policy through the impact of government spending on aggregate demand and real wages (Woodford, 2001). Dodge (2002) argues that significant spillovers also exist between the credibility of either policy, such that fiscal policy credibility can affect the credibility and effectiveness of monetary policy, and vice versa.

More generally, Leeper (1991) analyses the interaction between fiscal and monetary policy in a stochastic model. He defines “active” and “passive” fiscal policy according to the constraints faced by the authority: an active authority acts independently of the state of government debt and sets its policy instrument as it sees fit, whereas a passive authority responds to government debt shocks and sets its policy instrument to balance to government budget. For its part, monetary policy is also characterised as active or passive depending on its responsiveness to the fiscal position. When monetary policy is active and fiscal policy is passive, the central bank is unconstrained and can set the nominal interest rate to respond strongly to inflation while the government passively adjusts direct taxes to balance the budget. When monetary policy is passive and fiscal policy is active, the government does not

sufficiently adjust direct taxes in response to a deficit shock and the central bank allows the money stock to grow to prevent an explosive path for real government debt. In Leeper's model, both regimes where one authority is active and the other is passive result in a unique and stable equilibrium, while a regime in which both authorities are unresponsive to government debt leads to an unstable outcome with an explosive government debt path.

2.2. The transmission channels of fiscal policy to monetary policy

The literature features various ways in which fiscal policy can affect monetary policy as outlined above. A notable strand of work along this line is the fiscal theory of the price level (FTPL), which views the price level as determined solely by the government's total liabilities comprising of government debt and money supply. The real value of government liabilities is equal to the sum of expected primary government surpluses. Woodford (2001) describes a system in which fiscal policy can affect the price level through a wealth effect: given the relationship between the government budget balance and taxes, lower expected surpluses make households feel wealthier, increasing aggregate demand and raising the price level. Cochrane (2005) argues that nominal government liabilities are a residual claim to primary government surpluses similar to how stocks are a residual claim to a company's expected earnings. To address some criticisms of the FTPL, Cochrane (2005) develops a model with zero money demand where the central equilibrium condition that determines the price level is the relation between government liabilities and primary surpluses. He argues that a government can affect the price of nominal liabilities and thus the price level because it defines these liabilities in the same way a firm defines its stock and can undertake corporate actions which affect its share price. However, as noted by Bassetto (2008), the FTPL remains controversial, with detractors citing issues such as fundamental economic misspecification problems that have implications for the equilibria derived under the FTPL (Buiter, 2002).

Besides the government-liability channel proposed by the FTPL, fiscal policy might also affect monetary policy through sovereign risk. Arellano et al. (2020) expect sovereign default risk to be inflationary by raising inflation expectations in the economy, resulting in tighter monetary policy. Bonam and Lukkezen (2019) modify a standard New Keynesian model by introducing a sovereign risk premium that forms a wedge between the risk-free rate and the sovereign yield and is nonlinear in its relationship to government in that the risk premium increases in debt elasticity at higher levels of government debt. They show that in the presence of sovereign risk, a stable and unique equilibrium may not be possible when the government pursues a countercyclical fiscal policy, even if monetary policy is active and fiscal policy is passive. Therefore, the existence of sovereign risk increases the significance of the fiscal

authority's commitment to managing debt dynamics, regardless of the stance of the central bank. Increases in sovereign risk are also associated with exchange rate depreciation (Della Corte et al., 2022), which may have implications for monetary policy in an emerging market setting (Devereaux et al., 2006).

Furthermore, in line with Dodge's (2002) argument about fiscal-monetary policy credibility spillovers, fiscal policy can also have an impact on inflation expectations. Using Brazil as a case study, Montes and de Hollanda Lima (2022) find that fiscal spending and credibility both have a significant impact on the size of the inflation risk premium, which would have consequences for monetary policy to the extent that the inflation risk premium is a reflection of the anchoring of inflation expectations and monetary policy credibility (Buraschi & Jiltsov, 2005).

While economic theory points to a positive relationship between government spending and price levels, the effect of fiscal multipliers and their drivers may result in different outcomes in the actual interaction between fiscal and monetary policy. Several scholars have found evidence for smaller fiscal multipliers among emerging markets (Hory, 2016) and that the composition of government spending affects its impact with investment spending having larger multipliers (Ilzetzki et al., 2013). Furthermore, there is also evidence that fiscal multipliers are negative when public debt is high (Nickel et al., 2014). In a country with a negative fiscal multiplier such as South Africa (Janse van Rensburg et al., 2022), government spending does not have a positive impact on aggregate demand and real wages, with implications for the impact on inflation and monetary policy.

2.3. Other factors relevant for transmission of monetary policy

For small, open economies such as emerging markets, there are other variables related to both fiscal and monetary policy that can affect the conduct and effectiveness of monetary policy. Following the GFC, there has been growing interest in the spillover of monetary policy from major economies such as the United States and the impact of such spillovers on international financial conditions. Rey (2015) argues that because of financial globalisation, there is a global financial cycle in which financing conditions are set by the main world financing centres and transmitted to the rest of the world regardless of exchange rate regime.

In this strand of literature, financial conditions are transmitted through capital flows and asset prices that respond to monetary policy conditions in a centre economy such as the US. In Degasperi et al.'s (2020) financial transmission channel of monetary policy, a Fed rate hike is transmitted along the yield curve and reduces the prices of risk assets; they find that a

contractionary US monetary policy shock is followed by a depreciation in foreign currencies against the US Dollar and a reduction in global risk appetite and cross-border flows, supporting the existence of a global financial cycle. By contrast, Cerutti et al. (2017) find no evidence of a global financial cycle driving changes in capital flows. In Kalemli-Ozcan's (2019) study of US monetary policy and risk spillovers, changes in US monetary policy also impact emerging-market monetary policy through risk premia and capital flows, and the sensitivity of the emerging markets' capital flows drives their monetary policy response to changes in US monetary conditions.

2.4. Fiscal dominance as a special case of fiscal-monetary policy interaction

Fiscal dominance can be considered a particular form of interaction between fiscal and monetary policy that aligns with Leeper's (1991) active fiscal – passive monetary policy regime. In their seminal paper, Sargent and Wallace (1981) define a fiscal-dominant regime as one in which the fiscal authority independently sets its budgets and announces current and future deficits and surpluses. In this way, it determines the revenue that must be generated through bond sales and seignorage and it affects the conduct of monetary policy via the demand for government debt and its impact on inflation. They note that in a fiscal-dominant regime, if the primary deficit cannot be financed solely by bond sales, then the monetary authority is forced to create new money and tolerate higher inflation. In a monetary policy implementation framework such as South Africa's, this could manifest in the central bank maintaining more ample liquidity conditions in the market to enable banks to absorb the higher supply of government bonds implied by persistent fiscal deficits. Sargent and Wallace conclude that if primary fiscal deficits are exogenous, then tighter current monetary policy implies higher inflation in future as the fiscal authority will eventually face the limit on demand for its bonds.

Other scholars have since built on the Sargent-Wallace model of fiscal dominance beyond money aggregate-targeting frameworks. McCallum (1984) uses a theoretical model to argue that persistent primary fiscal deficits financed by bond issuance are inflationary. Zoli (2005) conceptualises the Sargent-Wallace theory as a question of whether primary balances as set by the fiscal authority are exogenous or responsive to current government liabilities. This study estimates the empirical relationship between fiscal and monetary policy for a group of EMs and finds no evidence of fiscal dominance in the sample countries (Section 4.3.1. provides a more detailed discussion of the methodology employed by Zoli (2005)). Ahmed et al. (2021) consider the responsiveness of fiscal variables to interest rates as a form of fiscal dominance, and find some evidence of fiscal dominance among non-inflation targeting EMs.

Unconventional monetary policies including large central bank purchases of sovereign debt have also prompted work on the spectre of fiscal dominance in advanced economies (Bordo & Levy, 2021).

Blanchard (2005) proposes yet another approach to the concept of fiscal dominance for a small, open economy which accounts for the impact of fiscal risk on monetary policy transmission. In his model, real interest rates affect sovereign risk and the exchange rate, which in turn affect inflation. If an increase in the real interest rate under inflation targeting also increases the probability of default on government debt, then it may make government debt less attractive and lead to a real depreciation of the exchange rate and higher inflation. In this case, inflation targeting would have perverse outcomes where monetary tightening leads to a real depreciation and higher inflation. This outcome is more likely the higher the initial level of debt, the higher the proportion of foreign-currency denominated debt and the higher the price of risk. Indeed, this theory fits well with Brazil's experience during its macroeconomic crisis in 2002-2003.

This paper contributes to several strands of literature on the relationship between fiscal and monetary policy. It provides empirical evidence on the existence of fiscal dominance among inflation-targeting emerging markets; to my knowledge, no such study has been undertaken in the post-GFC era. The chapter also contributes to the literature on the impact of risk premia on monetary policy among emerging markets, with a specific focus on the sovereign risk premium. Finally, the chapter also provides additional evidence on the importance of exchange rate changes for emerging-market monetary policy. In particular, the study contributes to the literature on the interaction between sovereign risk and exchange rates, and the impact of this covariance on monetary policy in an emerging-market context.

3. Empirical analysis of fiscal dominance in emerging markets

3.1. Data and methodology

I begin the empirical analysis of fiscal-monetary interactions by considering the special case of fiscal dominance in EMs. To do so, I follow the approach of Zoli (2005) and Ahmed et al. (2021) who use a monetary policy reaction function to test the responsiveness of monetary policy to changes in fiscal policy. In these papers, a monetary authority that accommodates loose fiscal policy by being less responsive to inflationary pressures is evidence of fiscal dominance.

Zoli (2005) estimates the following monetary policy reaction function for seven EMs:

$$i_t = \varphi_0 + \varphi_1 i_{t-1} + \varphi_2 (INFL_t^e - INFL^*) + \varphi_3 OUTPUTGAP_{t-1} + \varphi_4 \Delta RPB_{t-1} + \omega_t$$

(1)

where i_t is the monetary policy interest rate in period *t*, $INFL_t^e$ is expected inflation in period *t*, $INFL^*$ is the inflation target, $OUTPUTGAP_t$ is the difference between actual output and potential output in period *t-1* and ΔRPB_t is the change in the real primary balance in period *t-1*. The study finds no evidence of fiscal dominance in any of the countries under review.

I adopt the reaction function in equation (1) and use it in a panel approach. Specifically, I estimate the following basic equation:

$$i_{it} = \varphi_{i0} + \varphi_1 i_{it-1} + \varphi_2 (INFL_{it}^e - INFL_i^*) + \varphi_3 OUTPUTGAP_{it-1} + \varphi_4 \Delta FISCAL_{it-1} + \omega_{it}$$

(2)

where i_{it} is the monetary policy rate of country *i* at time *t*, $INFL_{it}^e - INFL_i^*$ is the expected deviation of inflation from its target rate in country *i* output in period *t*, $OUTPUTGAP_t$ is the difference between actual output and potential output in period *t-1* and $\Delta FISCAL_{it}$ is the change in country *i,'*s fiscal stance in period *t-1*, proxied alternately by the fiscal balance and net government lending. Furthermore, I consider specifications that alternately include the variable $\Delta REER_{it}$, the real effective exchange rate, and ΔBER_{it}, the bilateral exchange rate with respect to the USD, to control for the potential responsiveness of monetary to changes in exchange rates as in Ahmed et al. (2021). These variables enter the model with no lag as I expect central banks to respond to developments in the exchange rate markets contemporaneously, in line with Zoli (2005) and Ahmed et al. (2021).

The panel includes nine EMs with sufficient data coverage for the main period under review, 2000 to 2023. These include five countries[2] from Zoli (2005) and four additional countries[3] that were not in the earlier study.

I compile the data at the annual frequency as fiscal variables are typically reported or calculated at this level. The key policy rates, bilateral exchange rate, and actual GDP data are obtained from the IMF's International Financial Statistics, while the fiscal variables and historical inflation forecasts are obtained from the IMF's historical World Economic Outlook forecasts. Data on the real effective exchange rate is taken from the Bank of International Settlements. Each country's inflation target is obtained from Jahan (2012), with the midpoint taken for countries that use an inflation targeting band. Lastly, to derive the output gap, I generate quasi-real time potential GDP estimates that only consider the data available in real

[2] Brazil, Colombia, Mexico, Poland, South Africa.
[3] Hungary, Indonesia, Russia, Turkey.

time to produce trend-cycle decompositions using the Hodrick-Prescott filter (Orphanides, 2001). I take the first year of actual output data availability for a given country as its starting year for estimating potential output, ranging between 1993 for Mexico to 2005 for Colombia. The regression analysis covers the period from 2012 to 2023, with earlier data used to estimate initial potential output for the period of interest.

In line with Ahmed et al. (2021), I make use of panel methods to estimate the model. Panel methods have several advantages, including more degrees of freedom and sample variability which allow for more efficient estimates than those produced by time series data. Panel data also allow for the observation of dynamic relationships by relying on inter-country differences in the case of this study to reduce collinearity that may be problematic with time series data. (Hsiao, 2007). While I initially estimate the model using fixed effects, I note that the small N, small T construction of my panel may result in unreliable estimates. I therefore also estimate the model using the feasible generalised least squares (FGLS) estimator, which addresses the likely serial correlation between observations and asymptotically results in a more efficient estimator than ordinary least squares (Bai et al. 2021).

Table 1: Panel data summary statistics

	Observations	Mean	Std Dev	Min	Max
Key policy rate (%)	209	8.89	8.37	0.33	78.22
Inflation deviation (percentage	216	2.13	5.28	-2.72	50.42
Inflation rate (%)	215	7.39	8.55	-0.87	71.84
Change in inflation rate (ppt)	206	-0.02	5.30	-25.19	52.39
Output gap (% of GDP)	124	0.16	1.91	-7.05	4.87
Exchange rate variables					
Change in REER (%)	207	0.00	0.09	-0.24	0.26
Change in BER (%)	207	0.04	0.13	-0.33	0.67
Fiscal variables					
Change in operating balance (% of	100	-0.34	2.65	-17.33	7.08
Change in structural balance (% of	202	-0.09	1.85	-7.89	6.92
Change in net lending (% GDP)	206	-0.09	2.14	-10.44	9.33

There are several reasons why an extension of the Zoli (2005) analysis is useful. First, that paper covered the period from 1998 to 2003. Since many jurisdictions only adopted inflation targeting around 2000, the sample is restrictive. As this study covers a longer time period in which all countries were inflation targeting, it benefits from more EM experience with inflation targeting and the effects this regime has had on price and output growth stability (Gonçalves & Salles, 2008) as well as central bank credibility (Bordo & Siklos, 2014). Second, since the time period covered in this analysis comprises the post-GFC era, it allows us to observe the potential dominance of fiscal policy over monetary policy during a time which featured considerable structural changes among EMs and the global economy. In particular, global interest rates declined considerably in line with lower inflation (See Ha et al. (2022) and Mazumder (2018), for instance) in some countries and lower term premia (Cohen et al., 2018) in AEs amid the introduction of unconventional monetary policies in those jurisdictions. These factors contributed to increased demand for riskier assets amid a search for positive returns by global investors, supporting an increase in public and corporate EM debt issuance (Kose et al., 2021a). Consequently, the review period saw a combination of broad-based increases in public debt and varying experiences with inflation among EMs, an interesting setting for observing potential accommodation by monetary policy. Taken together, such an exercise would provide some insight about the general responsiveness of EM central banks to the fiscal policy stance following structural changes to the global economy as well as to the central banks' operations and credibility.

3.2. Results

Table 2 reports the FGLS regression results from equation (2) and some extensions to the baseline model. Consistent with evidence from other papers evaluating policy reaction functions (see Coibion & Gorodnichenko (2012) and Turkay (2017), for instance), the coefficient on the lagged interest rate is large and highly statistically significant, indicating persistence in the key policy rate. The output gap has a positive and consistently significant coefficient, with the size of the coefficient comparable to the results for the individual emerging markets considered in Zoli (2005). As expected, an increase in actual output relative to potential is associated with a higher monetary policy rate.

In terms of the relationship between the key monetary policy rate and price levels, I start with the specification including the deviation of inflation expectations from the target as per equation (2). The coefficient of the lagged inflation deviation is positive as expected, such that a higher deviation from target is associated with a higher key policy rate in the subsequent year, however this variable is insignificant across most specifications. I therefore consider

alternative measures of price levels that central banks might be sensitive to, namely the inflation rate measured as the annual change in the consumer price index (CPI) and the change in the inflation rate. The coefficient on the lagged inflation rate is consistently significant and positive: higher inflation is associated with a higher key policy rate in the subsequent year. The change in the inflation rate also has a significant relationship with the key policy rate, albeit less so than the inflation rate itself. Notably, both of these variables' coefficients are larger than the inflation deviation, consistent with Zoli (2005) even though her sample included a period prior to the introduction of inflation targeting. This may suggest that emerging-market central banks are more concerned with the absolute level of inflation and its trend than its relationship to the inflation target. Table 4 and Table 5 report the full results for regressions using the inflation rate and the change in t as measures of the price variable (Annexure Section A).

Table 2: Feasible generalised least squares estimates of the monetary policy reaction function

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Key policy rate (t-1)	0.762 ***	0.762 ***	0.759 ***	0.756 ***	0.827 ***	0.826 ***	0.767 ***	0.764 ***	0.766 ***	0.765 ***
	(0.0779)	(0.0784)	(0.0753)	(0.0754)	(0.0647)	(0.0646)	(0.0794)	(0.0797)	(0.0782)	(0.0786)
Output gap (t-1)	0.212 ***	0.192 ***	0.208 ***	0.191 ***	0.196 ***	0.182 ***	0.213 ***	0.192 ***	0.208 ***	0.183 ***
	(0.1361)	(0.1325)	(0.1323)	(0.1285)	(0.1318)	(0.1276)	(0.1365)	(0.1325)	(0.1362)	(0.1328)
Structural balance (diff) (t-1)	0.044		0.039		0.027		0.049		0.058	
	(0.0871)		(0.0849)		(0.0873)		(0.0888)		(0.0872)	
Net lending (diff) (t-1)		0.019		0.013		-0.001		0.019		0.021
		(0.0884)		(0.0865)		(0.0878)		(0.0885)		(0.0880)
Inflation deviation (t-1)	0.111 *	0.108					0.110 *	0.108	0.103	0.099
	(0.1396)	(0.1417)					(0.1394)	(0.1417)	(0.1395)	(0.1419)
CPI (t-1)			0.194 **	0.195 **						
			(0.0508)	(0.0510)						
CPI (diff) (t-1)					0.123 *	0.129 *				
					(0.0478)	(0.0483)				
REER (diff)							0.016	0.008		
							(1.9771)	(1.9720)		
Bilateral FX rate (diff)									0.113 **	0.104 **
									(1.7543)	(1.7674)
Observations	116	116	116	116	116	116	116	116	116	116

Standardised beta coefficients; Standard errors in parentheses.

*p<0.10, **p<0.05, ***p<0.01

The exchange rate variables are defined such that an increase represents a depreciation of the domestic exchange rate. I expect the coefficient on the exchange rate variables to be positive, such that a depreciation is associated with a higher policy rate. I find that a depreciation in the REER has a small and statistically insignificant impact on the key monetary policy rate, whereas a depreciation specifically with respect to the USD - as reflected by BER – has a significant impact with the expected sign. A 1-percent depreciation in the BER is associated with a key policy rate that is 10.4 to 11.3 basis points (bps) higher; this result is robust to alternative measures of price levels.

The REER is measured against a trade-weighted basket of bilateral exchange rates, such that it can serve as a measure of international competitiveness. By contrast, I interpret the BER as an indication of the financial channel, in line with Avdjiev et al. (2019) and Hofmann et al. (2022). As such, I infer that the significant relationship between the policy rate and BER reflects the important role that financial flows play in emerging markets, while the insignificance of the REER suggests less concern with global competitiveness relative to trade partners.

Finally, I find the fiscal variables to be mostly statistically insignificant and economically small, with a 1 percentage-point (ppt) increase in the structural balance associated with a 2.7 to 6 bps higher key monetary policy rate, while a 1 ppt increase in net government lending is associated with a key monetary policy rate that is only up to 2 bps higher. Notably, the positive signs of these coefficients would suggest that a decline in the fiscal balance, that is an increase in the deficit, would be followed by a lower policy rate, which would be consistent with accommodative monetary policy. However, since the coefficients are small and not significant even at the 10% level, I conclude that there is no evidence of fiscal dominance among emerging markets during the period under review.

4. Interactions with monetary policy in South Africa

4.1. Data and methodology

While the previous section provides insight into or regarding the general monetary policy orientation of the post-GFC era, it provides limited understanding of how different variables relevant for monetary policy and fiscal policy affect one another in a more dynamic fashion. First, the panel construction of the data results in broad findings about EMs in general, as opposed to detailed findings regarding specific countries. More importantly, the analysis is

undertaken on an annual basis due to the data available for fiscal variables. However monetary policy can change several times in a given year, while other variables potentially relevant to both fiscal and monetary policy can also change throughout the year. Therefore, an analysis focused specifically on South Africa using higher-frequency data can yield additional insights regarding how fiscal policy might affect the conduct or stance of monetary policy.

While Section 3 did not find evidence of fiscal dominance in the panel data analysis, there are other ways in which fiscal policy can have a significant impact on monetary policy, especially in the case of emerging markets. In particular, elevated levels of or changes in sovereign risk can affect monetary policy directly by raising inflation expectations, as proposed by Arellano et al. (2020). Sovereign risk can also indirectly affect monetary policy through its relationship with the exchange rate (Della Corte et al., 2022). The previous section finds that changes in the exchange rate have significant bearing on the monetary policy stance of emerging markets, in line with evidence from Zoli (2005) and Devereax et al. (2006), while sovereign risk has been shown to have a significant relationship with exchange rate risk in South Africa. This raises the prospect that sovereign risk can indirectly affect South African monetary policy through its impact on the exchange rate.

To investigate this, I first model the response of the exchange rate to sovereign risk shocks over a horizon of 12 months as follows:

$$y_{t+h} = \beta_h^o + \beta_h^1 S_t + \beta_h^2(L) y_{t-1} + \beta_h^3(L) X_{t-1} + \epsilon_h \quad (3)$$

where y_{t+h} is the logged ZARUSD h months ahead; S_t is a shock to South African sovereign risk, measured by the local currency credit spread (LCCS); X is a vector of control variables including the value of the US Move index to capture volatility in global interest rate markets; an index of a basket of major nominal exchange rates against the USD; and the South African repo rate. In order to control for serial correlation of the error term and persistent effects, I also include six lags of the dependent and independent variables. The coefficients $\hat{\beta}_1^1$ to $\hat{\beta}_{12}^1$ estimate the response of the variable of interest to the shock variable over the 12-month horizon.

Figure 3: Sovereign risk and exchange rate co-movement, 2008 to 2023



Source: Bloomberg

I use local linear projections (LLPs) to estimate my impulse responses. LLPs use direct forecasting with the model re-estimated for each forecast horizon, thus the projections are local to each forecast horizon (Jordà, 2005). Specifically, for the linear case

$$y_{t+h} = \alpha_h + \beta_h s_t + \gamma_h X_t + v_{t+h}; \qquad v_{t+h} = u_{t+h} + \psi_1 u_{t+h-1} + \cdots + \psi_h u_t$$

(4)

where s_t is a shock administered at time *t* and X_t is a vector of exogenous variables, the impulse response is

$$IR(h) = E[y_{t+h}|s_t = s_1; X_t] - E[y_{t+h}|s_t = s_0; X_t] = \beta_h(s_1 - s_0)$$

(5)

The set of h regressions in equation (3) are local linear projections (LLPs), estimated using ordinary least squares (OLS), while the $\widehat{\beta_h^1}$ estimates constitute the impulse response function (IRF). Notably, the error terms v_{t+h}include a moving average from time *t* to *t+h*, and this serial correlation must be corrected for more efficient estimates. I therefore use Newey-West corrections for the error terms, consistent with Jordà (2005). I note, however, that Ramey (2022) argues that lag-augmentation in LLPs has advantages over using use Newey-West corrections, as the latter can lead to downward-biased standard errors.

The use of LLPs presents several advantages. They do not require the specification and estimation of the true multivariate dynamic system itself. While impulse responses estimated by vector autoregressions (VARs) are more efficient than LLP estimates when the VAR is correctly specified, LLPs are consistent and more robust to lag length misspecification such that the underlying data generating process need not be known (Jordà, 2005). Nevertheless, Plagbørg-Moller and Wolf (2021) show that in population, LLPs and VARs estimate the exact same impulse responses, and for a fixed number of *p* lags the two estimated impulse responses will be approximately the same out to horizon *p*. Jordà and Taylor (2024) also note their usefulness in analyses involving nonlinearities, state-dependence and cumulative responses.

The wide confidence intervals produced by LLPs and the challenges they pose for inference are noted in the literature. Jordà (2023) notes that while the shape of the IRF is the point of interest in LLPs, researchers make inferences about the shape the IRF based on confidence intervals. This is incorrect, as confidence intervals are for individual estimates in the impulse response path, and these coefficients are serially correlated (Jordà, 2009). Instead, Inoue et al. (2023) propose constructing significance bands based on the characteristics of the joint distribution. Specifically, they propose a joint probability test that the estimated impulse responses lie within the following band:

$$P\left(\bigcap_{h=0}^{H-1}\left\{\zeta_{\alpha/2H}\frac{\sigma}{\sqrt{T-h}} < \hat{\beta}_h < \zeta_{1-\alpha/2H}\frac{\sigma}{\sqrt{T-h}}\right\}\right) \geq 1-\alpha \qquad (6)$$

where $\zeta_{\alpha/2H}$ is the critical value of a standard normal variable at α/2, Bonferroni adjusted to avoid spurious rejection of the null hypothesis with increasing horizons. An IRF with coefficients that fall outside the significance bands is considered to be different from zero. I use the asymptotic approximation as proposed by Inoue et al. (2023) to construct significance bands for all my IRFs.

I compile data at the monthly frequency in order to take advantage of the variability of the financial market variables on one hand and changes in the repo rate on the other hand, which can occur up to six times a year. I obtain the data from Bloomberg, with the exception of the LCCS which I derive as per Du and Schreger (2016). The analysis focuses on the period January 2008 to December 2023, in line with the limited availability of derivates data for EMs prior to 2008, including South Africa.

Table 3: South African analysis summary statistics

	Number of obs	Mean	Std Dev	Min	Max
ZARUSD	192	12.18335	3.636713	6.5686	19.7255
LCCS	192	60.0517	56.37575	-45,00	261.59
Repo rate	192	6.341146	1.903813	3.5	12,00
USD Index	192	89.77096	9.717466	71.802	112.117
Move index	192	85.27229	33.89384	39.21	214,00

While the period under review features interesting structural changes for EMs at large, as discussed earlier, it is also characterised by South African-specific developments that are relevant for the interaction between monetary and fiscal policy. As the stock of outstanding sovereign debt grew steadily since the GFC, market perceptions of sovereign default risk have gradually increased since late 2015. The notable deterioration in the fiscal position after the onset of the Covid-19 pandemic drove further increases in the sovereign risk premium. In line with a stronger USD and growing concerns about idiosyncratic South African risks (Fedderke, 2021), the exchange rate steadily depreciated since 2012, while the repo rate varied in line with a headline inflation rate that fluctuated in the range 4-6%. Following the global loosening of monetary policy in response to the Covid-19 pandemic, the repo rate increased from an historical low of 3.5% in September 2021 to a 14-year high of 8.25% by December 2023. These changes in the fiscal position and monetary policy stance amid variability in the exchange rate and domestic inflation provide a useful backdrop to analyse the interactions between these variables.

4.2. Results

In this section I present cumulative IRFs obtained from estimates of equation (3) using LLPs. The IRFs are presented with one and two standard deviation error bands and significance bands as per equation (6). The IRFs are estimated over a 12-month horizon.

Figure 4.4: Cumulative response of the exchange rate to sovereign risk shocks

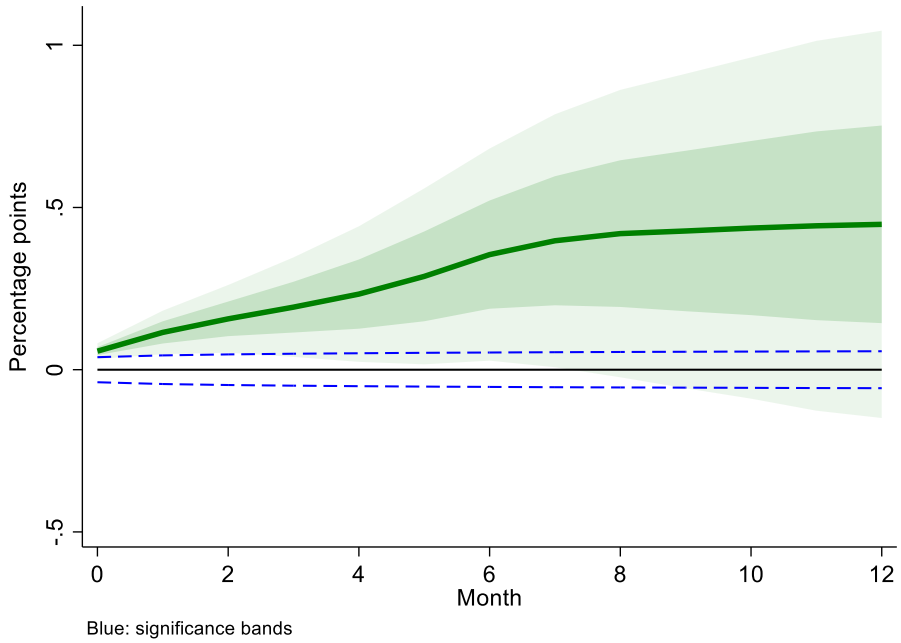


Figure 4 reports the cumulative response of the ZARUSD to a shock in sovereign risk, as measured by the LCCS. Throughout the analysis, I define a shock as a one-month change in a given variable exceeding one standard deviation. A LCCS shock results in a depreciation in the ZARUSD; this impact persists throughout the forecast horizon, reaching a peak depreciation of 0.45 percentage points compared to the initial level after about six months. The persistence of the ZARUSD response to the shock indicates that the exchange rate does not return to its initial level, and given the importance of the exchange rate in EM monetary policy reaction functions as shown in Section 3, this likely has implications for domestic monetary policy over the forecast horizon.

After estimating the response of the exchange rate to sovereign risk shocks, I consider other responses that may be relevant for monetary policy. I model the response of the repo rate to a sovereign risk shock as follows:

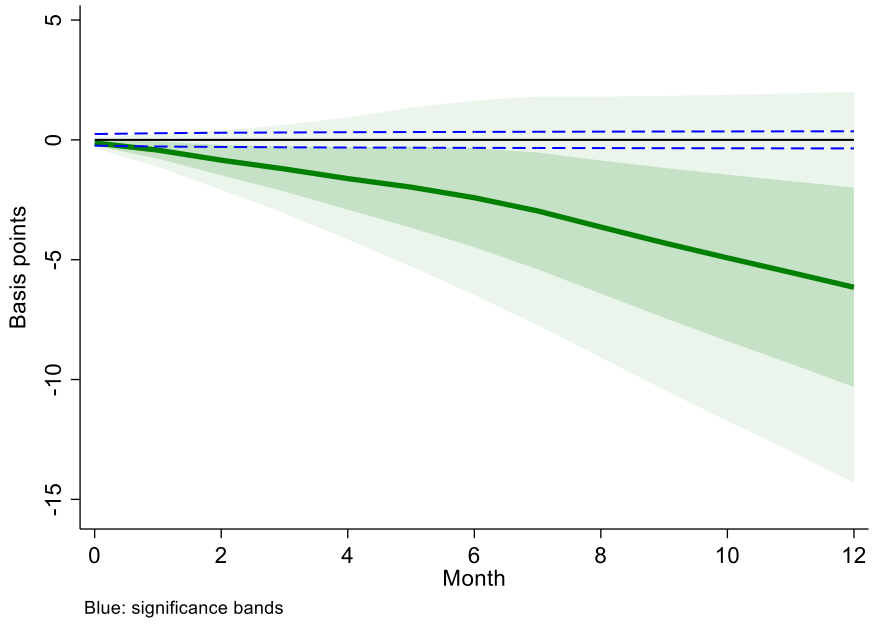
$$y_{t+h} = \beta_h^o + \beta_h^1 S_t + \beta_h^2(L) y_{t-1} + \beta_h^3(L) X_{t-1} + \epsilon_h \quad (7)$$

where y_{t+h} is the repo rate h months after the shock; S_t is a shock to South African sovereign risk, measured by the LCCS; X is a vector of control variables including the value of the US Move index to capture volatility in global interest rate markets; the USD index; and the ZARUSD. Figure 5 illustrates the impulse response over a 12-month horizon: the repo-rate response to a LCCS shock lasts throughout the horizon period and is statistically different from

zero, as evidenced by the impulse response path lying outside the significant bands. Unexpectedly, a sovereign risk premium innovation leads to a lower repo rate than the initial level, by only 6.7 bps. Contrary to the front-loaded impact that fiscal risk has on the ZARUSD, this effect accelerates after five months, which may be due to the persistence of interest rates compared with the relative volatility in the exchange-rate market.

Given the impact of sovereign risk shocks on the repo rate, I also consider the response of domestic money market rates to innovations in sovereign risk, as proxied by the 3-month Jibar rate. The money market rate is indicative of actual short lending and borrowing rates in the financial system, with the strength of the relationship between this rate and the key policy rate a signal of the strength of monetary policy transmission (Kalemlli-Ozcan, 2019). To the extent that a shock affects the spread between the repo rate and Jibar rate, then, it also affects the transmission of monetary policy.

Figure 5: Cumulative response of the repo rate to sovereign risk shocks

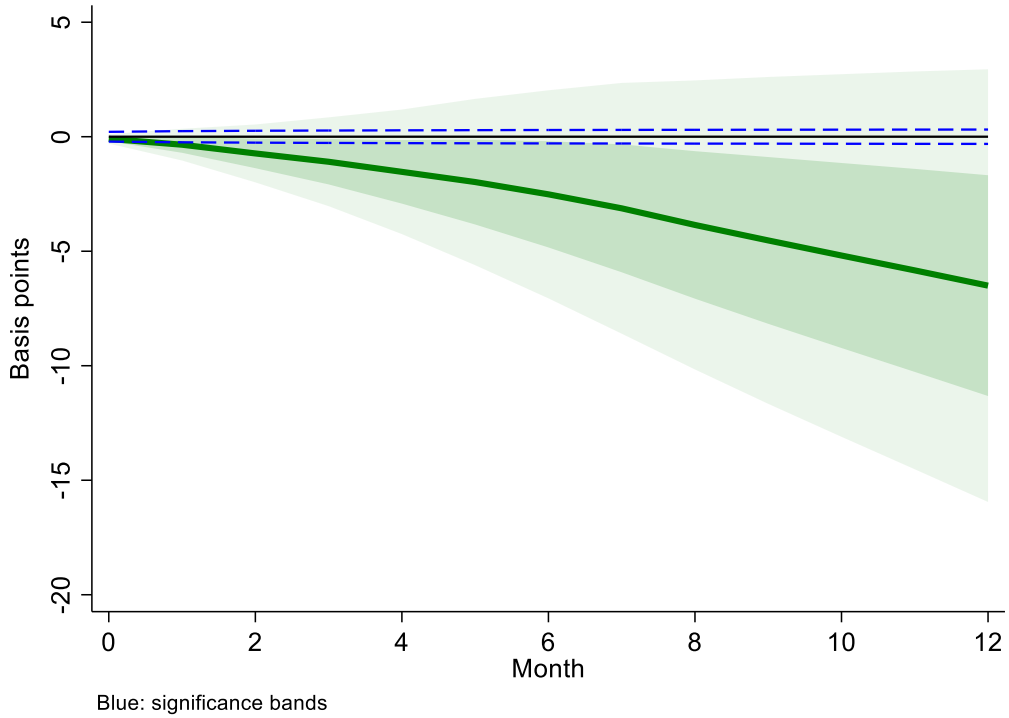


The Jibar rate also falls in response to a sovereign risk shock, with a maximum impact observed in a decline of 0.7 bps after 8 months, and it remains persistently lower throughout the horizon (Figure 6). Thus, this impulse response path is statistically different from zero but economically small, consistent with the response of the repo rate. Notably, the spread between the Jibar rate and the repo rate, interpreted as a risk spread in line with Kalemli-Ozcan (2019), also has a significant response to sovereign risk shocks. The risk spread narrows after a few months following such a shock, consistent with the greater sensitivity of the Jibar rate to fiscal

risk shocks relative to the repo rate. The risk spread also remains lower than its initial level after a year, however this effect reaches a maximum of only 0.1 bps.

The finding of domestic short-term interest rates declining in response to sovereign risk shocks is consistent with passive monetary policy in the Leeper (1991) framework, with a monetary authority that accommodates fiscal policy through weaker responsiveness to changes in inflation. This is because a higher sovereign risk premium can have adverse have implications for the government's cost of borrowing on newly-issued debt. On the other hand, the unexpected response could also be a function of the source of the sovereign risk shock, such as a demand shock that affects the fiscal position but also necessitates a loosening of monetary policy. Specifically, the onset of the Covid-19 pandemic led to a significant increase in the sovereign risk premium, while it was also followed by central bank intervention that included historic reductions in the repo-rate to address the expected impact of the pandemic on the economy. In that case, the response of the repo-rate to the sovereign risk shock would not be an indication of passive monetary policy.

Figure 6: Cumulative response of the Jibar rate to sovereign risk shocks



To test whether the market dynamics during the Covid-19 financial market shock are dominating the responses of interest rates to the LCCS shock, I produce local projections for

a restricted sample that excludes the onset of the pandemic and the post-pandemic period. Specifically, I run the regressions for the period January 2008 until December 2019 and compare the pre-Covid impulse responses with those of the full sample. As shown in Figure 7, the full sample response of the repo rate to a sovereign risk shock appears to be driven by the unusual market conditions at the onset of the pandemic: in the pre-Covid period, the repo rate increased by up to 1.26 bps in the 12 months following a LCCS shock. While the effect is statistically different from zero and persistent throughout the forecast horizon, its modest size suggests that the direct impact of sovereign risk shocks on the repo rate were marginal. Consistent with the pre-Covid response of the repo rate, the response of the Jibar rate to a sovereign risk shock is also positive, statistically significant but modest in size (Figure 12).

As an alternative approach to accounting for the impact of the Covid shock on these impulse responses, I include an indicator variable for the year 2020 in my LLP regressions on the full sample. Specifically, I modify equation (3) as follows:

$$y_{t+h} = \beta_h^o + \beta_h^1 S_t + \beta_h^2(L) y_{t-1} + \beta_h^3(L) X_{t-1} + \beta_h^4(L) COVID_{t-1} + \epsilon_h \quad (8)$$

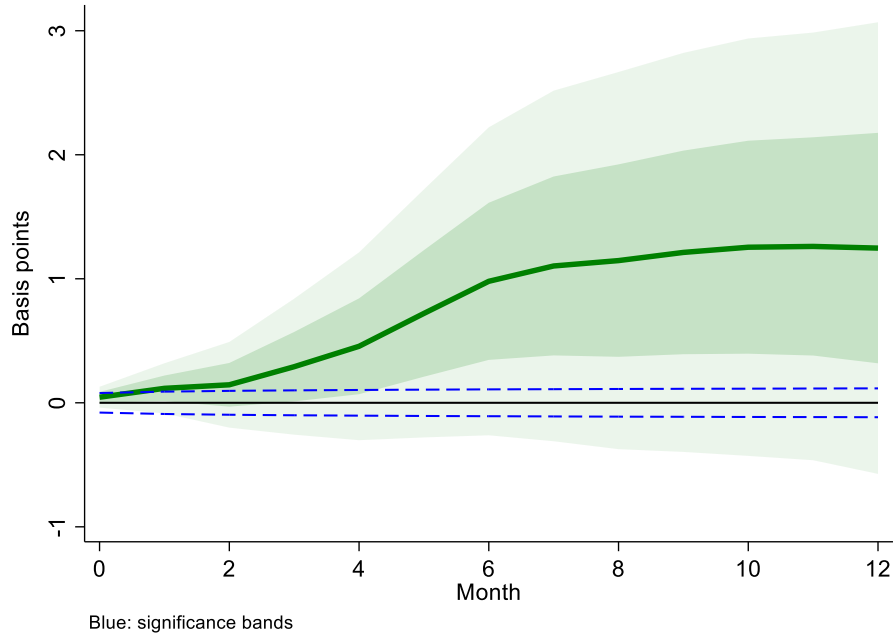
where $COVID_{t-1}$ takes the value 1 for each month in 2020 and 0 otherwise. As shown in Figures 15 to 19 (Annexure Section B), the impulse responses including the Covid indicator variable retain a similar shape to the full sample impulse responses, although they are flatter such that the response is smaller. Most impulse responses remain statistically significant as they lie outside the significance band; the notable exception is the repo rate response to an exchange rate shock, is insignificant at nearer horizons.

The persistence of the counterintuitive responses to shocks in the full sample, such as the response of the repo rate to a sovereign shock, even after the inclusion of a Covid indicator variable may suggest a fundamental change in the state of the economy after 2020. In such a case, the standard LLP estimator, which captures the direct or average effect throughout the sample period, would potentially mischaracterise the impulse responses in different states of the economy. In the literature, several studies address this issue by estimating state-dependent LLPs. Cloyne et al. (2023) propose an approach that employs the Kitagawa-Blinder-Oaxaca decomposition to derive two main components of impulse responses, a direct and indirect effect. In this framework, the direct effect captures the average effect estimated by standard LLPs while the indirect effect accounts for varying responses to a shock by state or over time.

Empirically, Jordà and Taylor (2016) employ an extended LLP framework and show that the impact of fiscal consolidation on growth depends on the state of the economy, with austerity

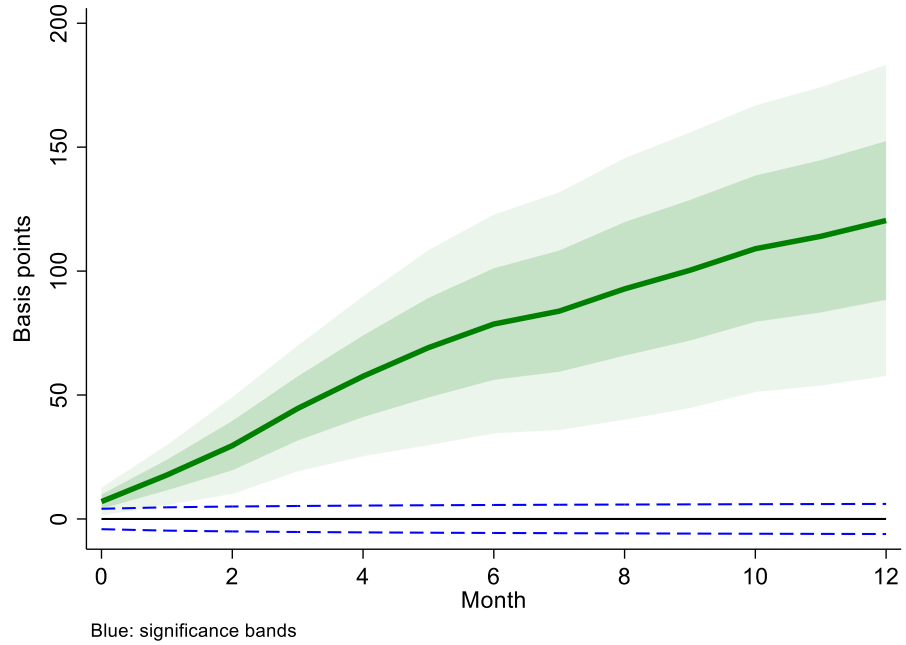
imposing a larger drag on economic growth during a recession than a boom. In terms of their validity, Gonçalves et al. (2022) illustrate that the state-dependent LLP estimator will be asymptotically valid at any finite horizon if the information set used to define the state variable includes only exogenous variables. Given that the state of the economy is endogenous to model variables in macroeconomic applications, for instance, they note the considerable implication the exogeneity requirement has for empirical work.

Figure 7: Pre-Covid cumulative response of the repo rate to sovereign risk shocks



I also consider other impulse responses that are of interest in the interaction between fiscal and monetary policy. Evidence from Section 4.3 suggests that a bilateral exchange-rate depreciation is associated with higher key policy rates in a given year, however we may also be interested in how the repo rate responds to larger exchange-rate movements as represented by a ZARUSD shock. In the restricted sample, I find that a ZARUSD shock has a significant positive impact on the repo rate, with the policy rate rising by a cumulative 128 bps relative to its initial level a year following the shock (Figure 8). Notably, the repo rate steadily increases throughout the year following the initial ZARUSD shock, indicating the lasting impacts that ZARUSD shocks have on domestic monetary policy. By contrast, in the full sample I find that the repo-rate response to a ZARUSD shock is contrary to a priori expectations: following a ZARUSD shock, the repo rate steadily *declines* by up to 98 bps (Figure 9). As with short-term interest rates, this effect appears to be driven by the 2020 market shock.

Figure 8: Pre-Covid cumulative response of the repo rate to exchange rate shocks



A ZARUSD shock also has a significant, albeit less persistent, impact on the sovereign risk premium. Sovereign risk increases in response to a shock depreciation in the local currency, rising by as much as 38 bps after 5 months before tapering back to the initial level by the end of the forecast period (Figure 13). While the effect of the exchange rate on sovereign risk is transitory, it can impair demand for government bonds among global investors during a period of global risk aversion and thereby raise sovereign borrowing costs (Hofmann et al. 2016). In the full sample, the sovereign-risk response to a ZARUSD shock is larger and more persistent, reaching 103 bps a year after the shock (Figure 10).

Finally, I model the response of the sovereign risk premium to a shock in the repo rate. In the restricted sample, the sovereign risk premium increases by a cumulative 83 bps in the 8 months following a repo rate shock (Figure 14). While the effect moderates towards the end of the forecast horizon, sovereign risk remains higher compared to its initial level a year after the shock. This effect is in line with a priori expectations, as a repo rate shock would increase sovereign borrowing costs and the sustainability of debt service costs. By contrast, in the full sample the sovereign risk premium steadily declines in the year following a repo rate shock (Figure 11) This negative relationship likely reflects the events of the pandemic-related market shock, when the sovereign risk premium continued to increase amid bond market dysfunction after the South African Reserve Bank's (SARB) first repo rate of the crisis, a significant reduction of 100 bps. After moderating on the introduction of the SARB's bond purchase

programme in late March, sovereign risk premia increased again following the central bank's second policy rate cut of 100 bps in mid-April before gradually normalising from May.

Taken together, the impulse responses reported here provide several insights regarding monetary-fiscal interactions in South Africa. Sovereign-risk shocks lead to a persistently weaker ZARUSD, which earlier evidence suggests is associated with a higher repo rate. When considering an observation period excluding the pandemic-related financial market shock of 2020, shocks in the sovereign risk premium also lead to marginally higher interest rates a year after the shock. By contrast, the results for the full sample including the market shock are characterised by unexpected impulse responses such as a sovereign risk shock resulting in short-term interest rate declines. Given that such responses are consistent with passive monetary policy that accommodates fiscal policy, an analysis that overlooks the market developments of early 2020 can support incorrect conclusions of fiscal dominance of domestic monetary policy.

Conclusion

The domestic monetary policy outlook remains uncertain amid global economic uncertainty and historically elevated long-term domestic inflation expectations. Meanwhile, sovereign debt and the sovereign risk premium are set to remain elevated given the long-term maturity profile of public debt and high debt-service costs. In this environment, the various ways in which monetary and fiscal policy interact will remain a salient issue for domestic macroeconomic policy for some time to come.

This paper has shown that while I do not find evidence of fiscal dominance among inflation-targeting emerging markets, the bilateral exchange rate with respect to the USD is a significant factor in the monetary policy reaction functions of the economies considered. The bilateral exchange rate, in the South African context at least, depreciates and remains persistently weaker following a sovereign risk shock. The domestic monetary policy rate also responds to a shock increase in sovereign risk, and remains higher for some time after the initial shock. Taken together, this suggests that while fiscal variables such as the primary fiscal deficit and net lending may not directly affect the monetary policy stance, fiscal policy can affect monetary policy through the effect of sovereign risk. Therefore, to the extent that sovereign risk shocks will continue to be experienced in South Africa, they will have a tightening effect on monetary policy.

The paper also highlights the importance of accounting for the unusual market dynamics seen during the Covid market shock, as well as the potential long-term impact the shock may have

had on the interaction between macro-financial variables. In the analysis presented in this paper, a failure to allow for the post-2019 relationships between variables would support an incorrect conclusion of monetary policy accommodation of fiscal policy by the SARB during the full period under review. A valuable extension of paper could explore fiscal-monetary policy interactions in a state-dependent LLP framework in line with developments in LLP empirical methods.

Annexure Section A

Table 4: Panel regression results using the inflation rate

	(1)	(2)	(3)	(4)	(5)	(6)
Key policy rate (t-1)	0.764	0.808	0.761	0.755	0.807	0.753
	(0.0757)***	(0.1259)***	(0.0757)***	(0.0755)***	(0.1071)***	(0.0756)***
Output gap (t-1)	0.209	0.124	0.189	0.203	0.081	0.180
	(0.1327)***	(0.1354)	(0.1288)***	(0.1320)***	(0.1161)	(0.1287)***
Structural balance (diff) (t-1)	0.047			0.055		
	(0.0867)			(0.0847)		
Net lending (diff) (t-1)			0.014			0.017
			(0.0869)			(0.0860)
Inflation rate (t-1)	0.199	0.143	0.197	0.195	0.062	0.194
	(0.0507)**	(0.0977)	(0.0510)**	(0.0507)**	(0.0859)	(0.0509)**
REER (diff)	0.028	0.167	0.019			
	(1.9432)	(2.5540)***	(1.9341)			
Bilateral FX rate (diff)				0.121	0.357	0.112
				(1.7057)**	(1.7909)***	(1.7141)**
Observations	116	67	116	116	67	116

Standardised beta coefficients; Standard errors in parentheses

*p<0.10, **p<0.05, ***p<0.01

Table 5: Panel regression results using the change in the inflation rate

	(1)	(2)	(3)	(4)	(5)	(6)
Key policy rate (t-1)	0.835	0.959	0.832	0.824	0.871	0.822
	(0.0657)***	(0.0647)***	(0.0653)***	(0.0648)***	(0.0519)***	(0.0647)***
Output gap (t-1)	0.195	0.173	0.180	0.191	0.107	0.172
	(0.1324)***	(0.1405)**	(0.1281)***	(0.1314)***	(0.1183)	(0.1277)***
Structural balance (diff) (t-1)	0.034			0.044		
	(0.0892)			(0.0869)		
Net lending (diff) (t-1)			-0.000			0.002
			(0.0884)			(0.0872)
Change in inflation rate (t-1)	0.125	0.014	0.131	0.121	-0.018	0.129
	(0.0478)*	(0.0612)	(0.0485)*	(0.0472)*	(0.0487)	(0.0478)*
REER (diff)	0.026	0.182	0.020			
	(1.9696)	(2.5297)***	(1.9580)			
Bilateral FX rate (diff)				0.121	0.386	0.114
				(1.7201)**	(1.7107)***	(1.7236)**
Observations	116	67	116	116	67	116

Standardised beta coefficients; Standard errors in parentheses.

*p<0.10, **p<0.05, ***p<0.01

Annexure Section B

Full sample cumulative impulse responses

Figure 9: Cumulative repo rate response to a ZARUSD shock

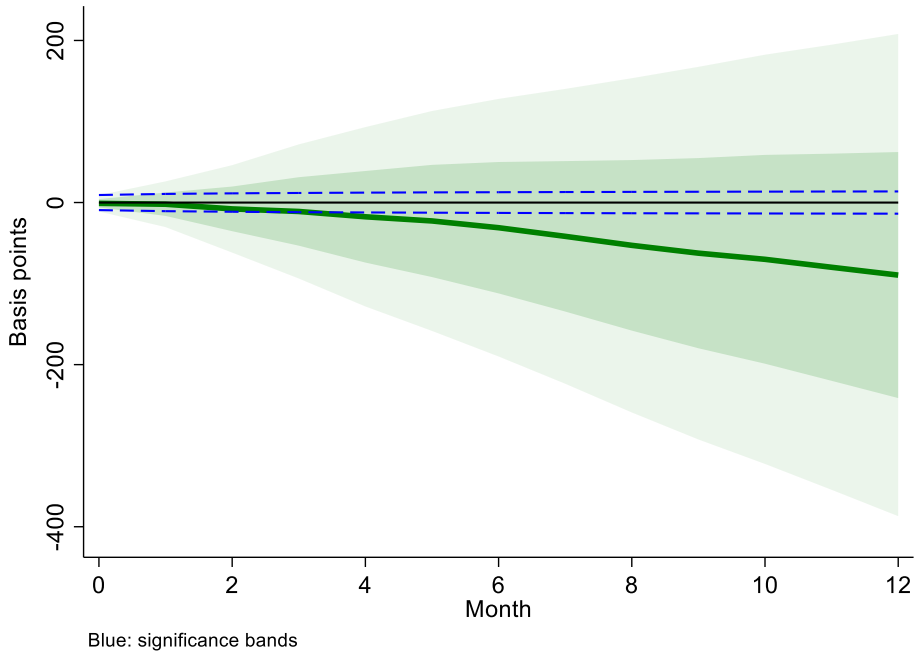


Figure 10: Cumulative sovereign-risk response to a ZARUSD shock

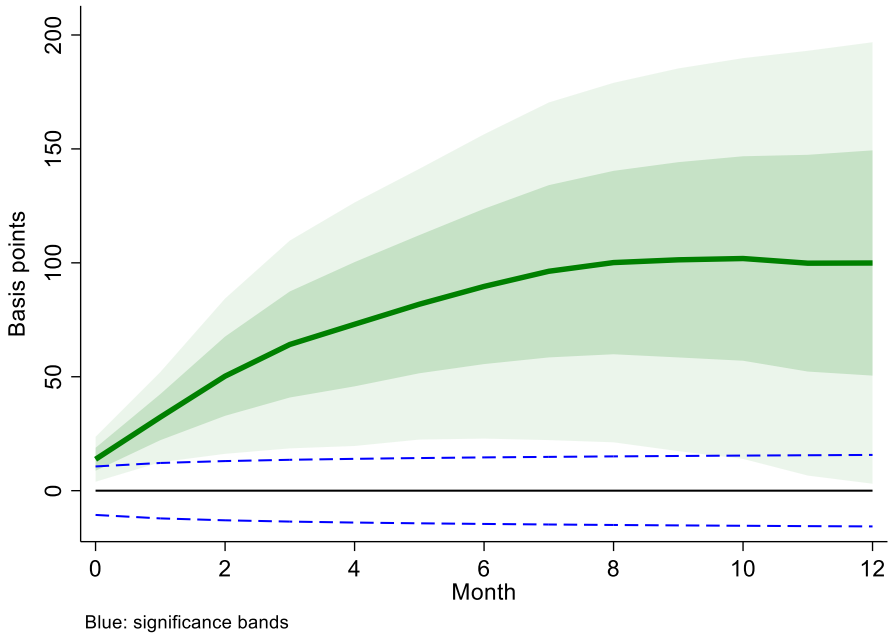
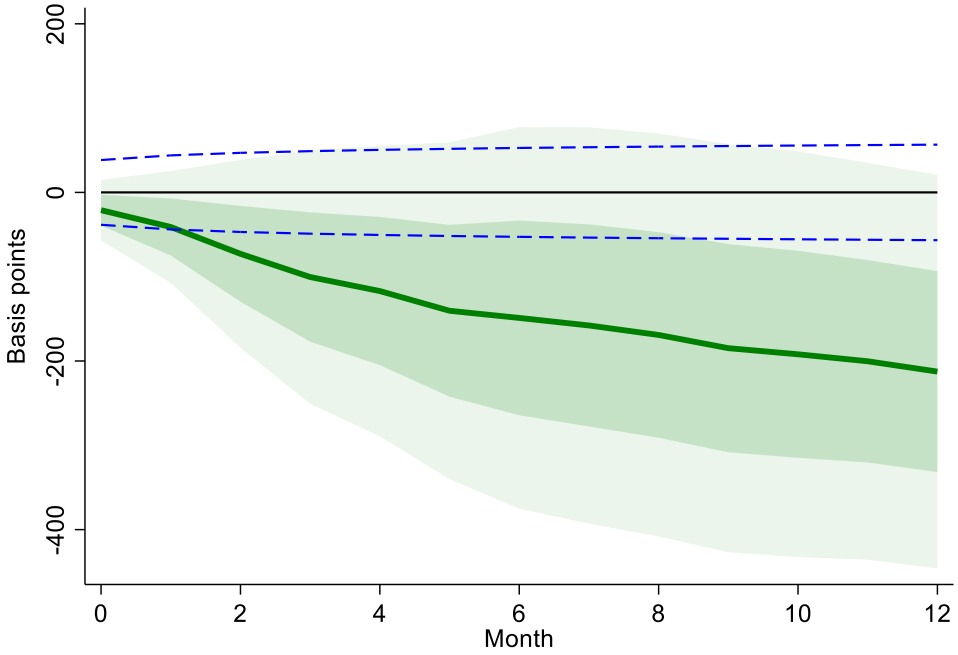


Figure 11: Cumulative sovereign risk response to repo-rate shock



Blue: significance bands

Restricted sample cumulative impulse responses

Figure 12: Cumulative Jibar response to sovereign risk shock

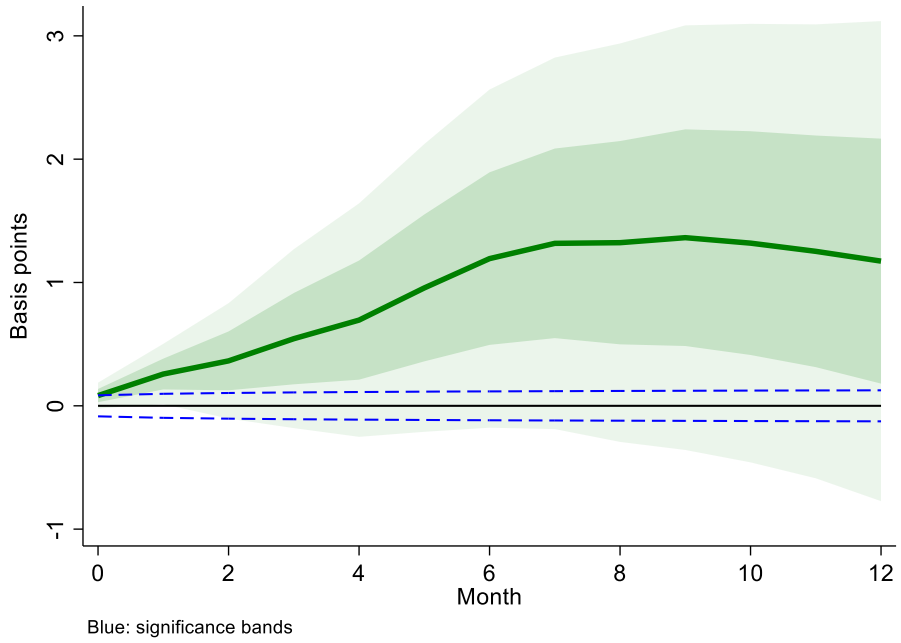


Figure 13: Cumulative sovereign-risk response to a ZARUSD shock

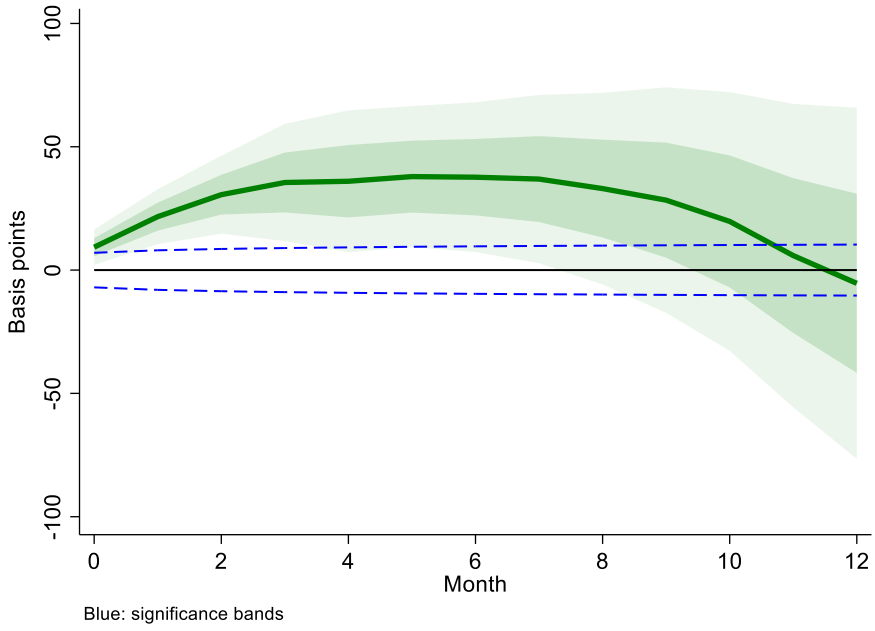
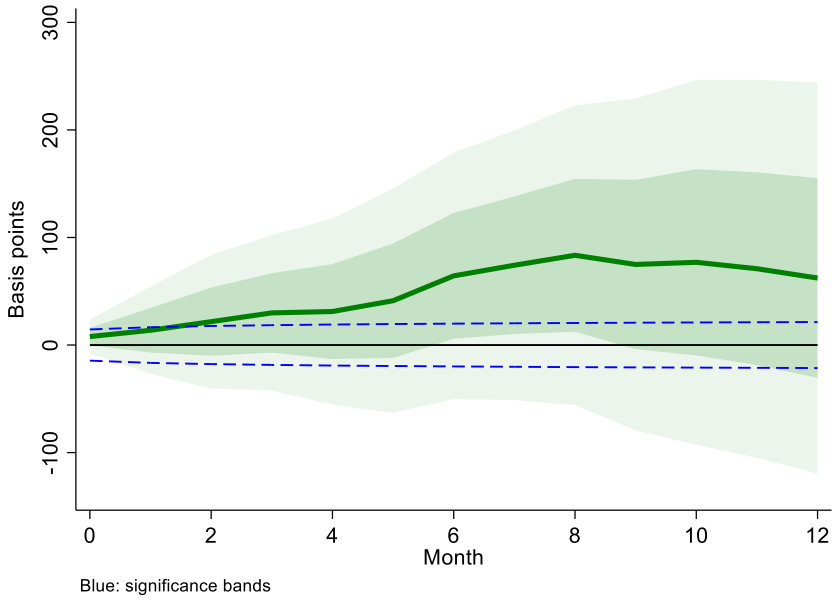


Figure 14: Cumulative sovereign risk response to repo-rate shock



Full sample cumulative impulse responses with Covid indicator

Figure 15: Cumulative ZARUSD response to sovereign-risk shock

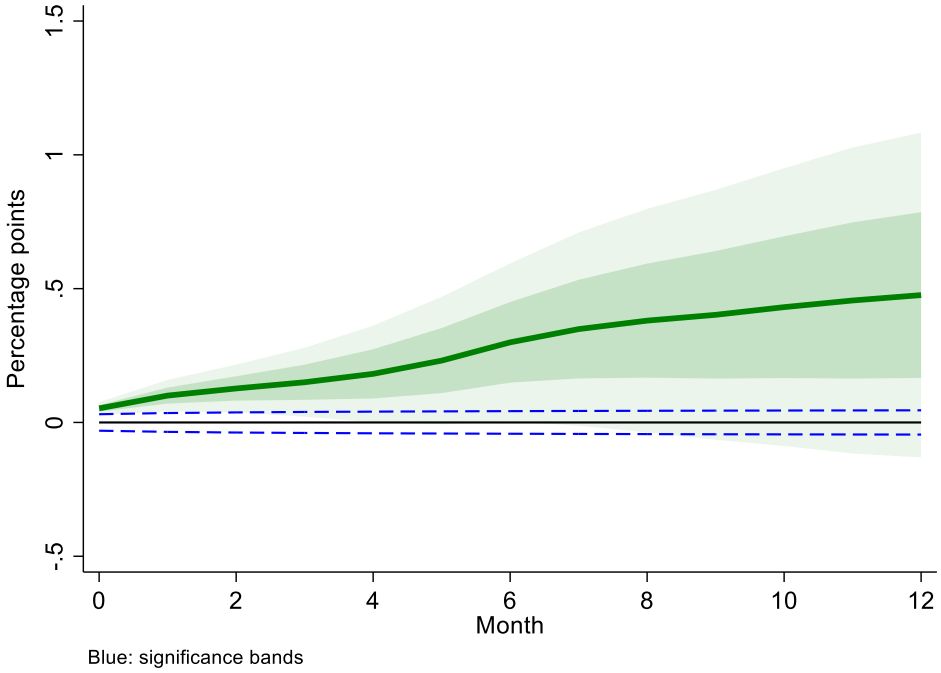


Figure 16: Cumulative repo rate response to a sovereign risk shock

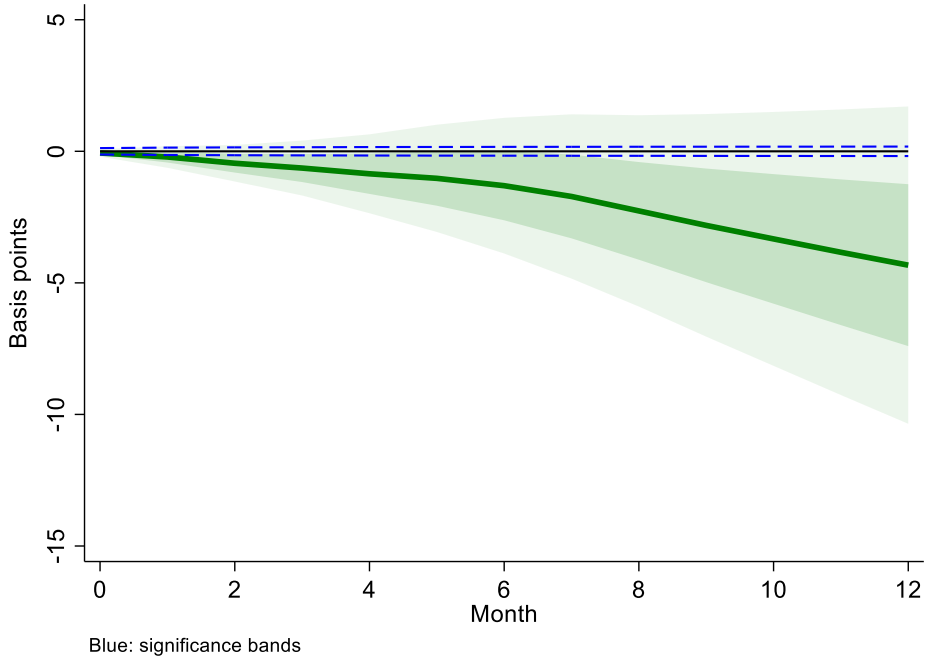


Figure 17: Cumulative repo rate response to a ZARUSD shock

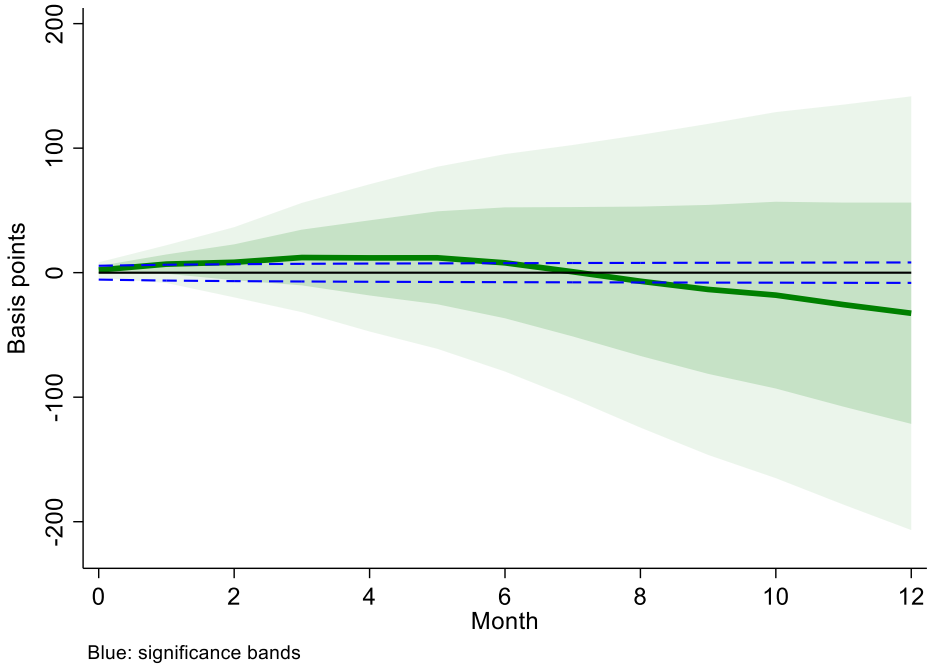


Figure 18: Cumulative sovereign risk response to repo-rate shock

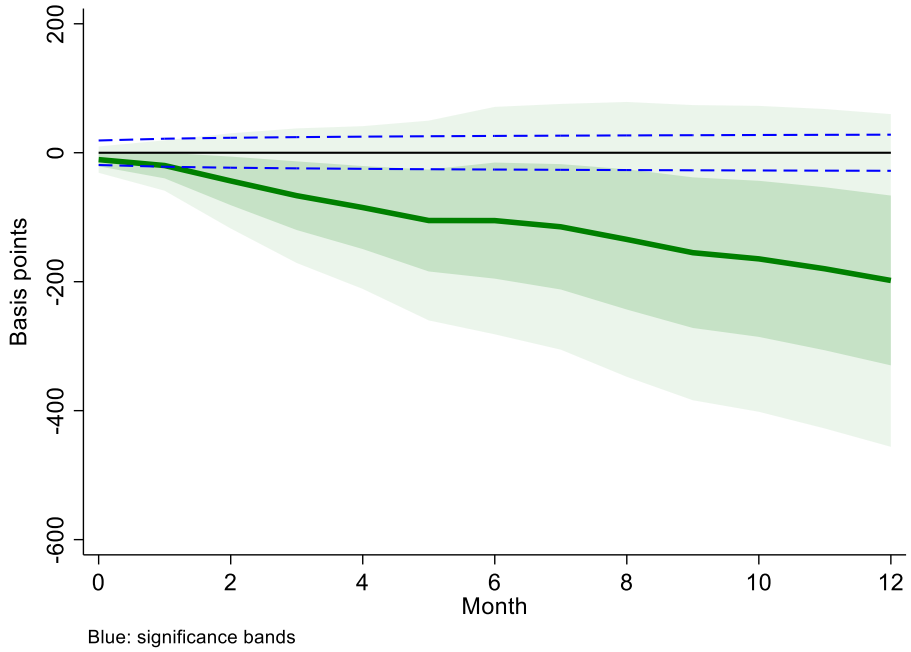
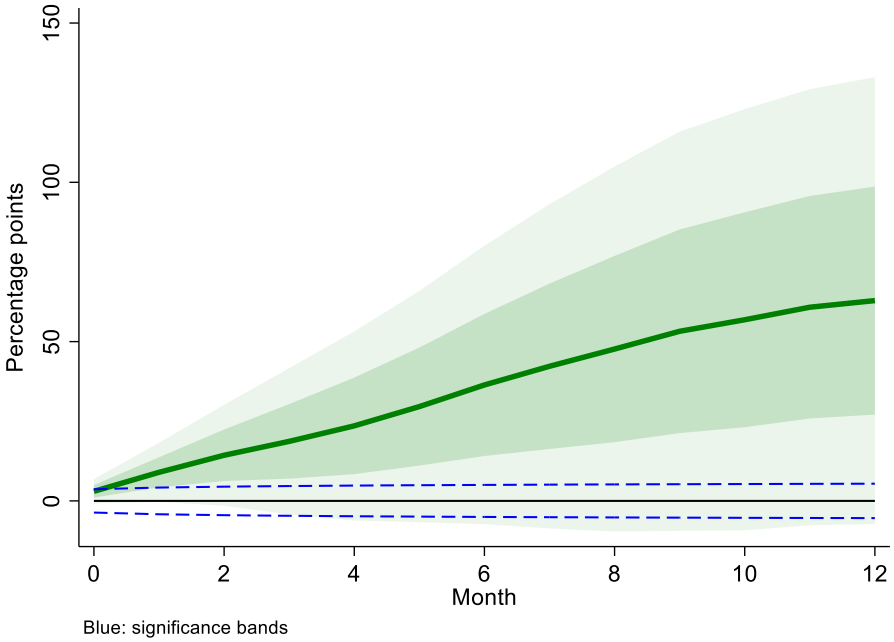


Figure 19: Cumulative ZARUSD response to repo-rate shock



References

Ahmed, R., Aizenman, J., & Jinjarak, Y. (2021). Inflation and exchange rate targeting challenges under fiscal dominance. *Journal of Macroeconomics*, *67*, 103281.

Arellano, C., Bai, Y., & Mihalache, G. P. (2020). *Monetary policy and sovereign risk in emerging economies (nk-default)* (No. w26671). National Bureau of Economic Research.

Avdjiev, S., Bruno, V., Koch, C., & Shin, H. S. (2019). The dollar exchange rate as a global risk factor: evidence from investment. *IMF Economic Review*, *67*, 151-173.

Bai, J., Choi, S. H., & Liao, Y. (2021). Feasible generalized least squares for panel data with cross-sectional and serial correlations. *Empirical Economics*, *60*, 309-326.

Bassetto, M. (2008). Fiscal theory of the price level. *The New Palgrave Dictionary of Economics*, *1*, 409-412.

Beltran, D., Garud, K., & Rosenblum, A. (2017). Emerging market nonfinancial corporate debt: how concerned should we be?.

Blanchard, O. (2005). Fiscal dominance and inflation targeting: lessons from Brazil.

Bonam, D., & Lukkezen, J. (2019). Fiscal and monetary policy coordination, macroeconomic stability, and sovereign risk premia. *Journal of Money, Credit and Banking*, *51*(2-3), 581-616.

Bordo, M. D., & Levy, M. D. (2021). Do enlarged fiscal deficits cause inflation? The historical record. *Economic Affairs*, *41*(1), 59-83.

Bordo, M., & Siklos, P. (2014). *Central bank credibility, reputation and inflation targeting in historical perspective* (No. w20693). National Bureau of Economic Research.

Buiter, W. H. (2002). The fiscal theory of the price level: A critique. *The Economic Journal*, *112*(481), 459-480.

Buraschi, A., & Jiltsov, A. (2005). Inflation risk premia and the expectations hypothesis. *Journal of Financial Economics*, *75*(2), 429-490.

Cerutti, E., Claessens, S., & Rose, A. K. (2017). *How important is the global financial cycle? Evidence from capital flows* (No. w23699). National Bureau of Economic Research.

Cloyne, J., Jordà, Ò., & Taylor, A. M. (2023). *State-dependent local projections: Understanding impulse response heterogeneity* (No. w30971). National Bureau of Economic Research.

Cochrane, J. H. (2005). Money as stock. *Journal of Monetary Economics*, *52*(3), 501-528.

Cohen, B. H., Hördahl, P., & Xia, F. D. (2018). Term premia: models and some stylised facts. *BIS Quarterly Review September*.

Coibion, O., & Gorodnichenko, Y. (2012). Why are target interest rate changes so persistent?. *American Economic Journal: Macroeconomics*, *4*(4), 126-162.

Degasperi, R., Hong, S., & Ricco, G. (2020). The global transmission of US monetary policy.

Della Corte, P., Sarno, L., Schmeling, M., & Wagner, C. (2022). Exchange rates and sovereign risk. *Management Science*, *68*(8), 5591-5617.

Devereux, M. B., Lane, P. R., & Xu, J. (2006). Exchange rates and monetary policy in emerging market economies. *The Economic Journal*, *116*(511), 478-506.

Dodge, D. (2002). The interaction between monetary and fiscal policies. *Canadian Public Policy/Analyse de politiques*, 187-201.

Du, W., & Schreger, J. (2016). Local currency sovereign risk. *The Journal of Finance*, *71*(3), 1027-1070.

Fedderke, J. W. (2021). The South African–United States sovereign bond spread and its association with macroeconomic fundamentals. *South African Journal of Economics*, *89*(4), 499-525.

Gonçalves, C. E. S., & Salles, J. M. (2008). Inflation targeting in emerging economies: What do the data say?. *Journal of Development Economics*, *85*(1-2), 312-318.

Gonçalves, S., Herrera, A. M., Kilian, L., & Pesavento, E. (2024). State-dependent local projections. *Journal of Econometrics*, 105702.

Ha, J., Kose, M. A., & Ohnsorge, F. (2022). From low to high inflation: Implications for emerging market and developing economies. *Available at SSRN 4074459*.

Hofmann, B., Shim, I., & Shin, H. S. (2016). Sovereign yields and the risk-taking channel of currency appreciation.

Hofmann, B., Shim, I., & Shin, H. S. (2022). Risk capacity, portfolio choice and exchange rates. *Available at SSRN 4028446*.

Hory, M. P. (2016). Fiscal multipliers in emerging market economies: can we learn something from advanced economies?. *International Economics*, *146*, 59-84.

Hsiao, C. (2007). Panel data analysis—advantages and challenges. *Test*, *16*(1), 1-22.

Ilzetzki, E., Mendoza, E. G., & Végh, C. A. (2013). How big (small?) are fiscal multipliers?. *Journal of monetary economics*, *60*(2), 239-254.

Inoue, A., Jordà, Ò., & Kuersteiner, G. M. (2023). Significance Bands for Local Projections. Federal Reserve Bank of San Francisco.

Jahan, S. (2012). Inflation targeting: Holding the line. *Finance & Development*, *4*, 72-73.

Janse Van Rensburg, T., de Jager, S., & Makrelov, K. H. (2022). Fiscal multipliers in South Africa after the global financial crisis. *South African Journal of Economic and Management Sciences*, *25*(1), 4191.

Jordà, Ò. (2005). Estimation and inference of impulse responses by local projections. *American economic review*, *95*(1), 161-182.

Jordà, Ò. (2009). Simultaneous confidence regions for impulse responses. *The Review of Economics and Statistics*, *91*(3), 629-647.

Jordà, Ò. (2023). Local Projections for Applied Economics. *Annual Review of Economics*, *15*, 607-631.

Jordà, Ò., & Taylor, A. M. (2016). The time for austerity: estimating the average treatment effect of fiscal policy. *The Economic Journal*, *126*(590), 219-255.

Jordà, Ò., & Taylor, A. M. (2024). “Local Projections.” Federal Reserve Bank of San Francisco Working Paper 2024-24.

Kalemli-Özcan, Ş. (2019). *US monetary policy and international risk spillovers* (No. w26297). National Bureau of Economic Research.

Kose, M. A., Nagle, P., Ohnsorge, F., & Sugawara, N. (2021a). *Global waves of debt: Causes and consequences*. World Bank Publications.

Kose, M. A., Nagle, P., Ohnsorge, F., & Sugawara, N. (2021). *What Has Been the Impact of COVID-19 on Debt? Turning a Wave into a Tsunami* (No. 16775). CEPR Discussion Papers.

Leeper, E. M. (1991). Equilibria under ‘active’ and ‘passive’ monetary and fiscal policies. *Journal of monetary Economics*, *27*(1), 129-147.

Leith, C., & Wren-Lewis, S. (2000). Interactions between monetary and fiscal policy rules. *The Economic Journal*, *110*(462), 93-108.

Mazumder, S. (2018). Inflation in Europe after the great recession. *Economic modelling*, *71*, 202-213.

McCallum, B. T. (1984). Are bond-financed deficits inflationary? A Ricardian analysis. *Journal of political economy*, *92*(1), 123-135.

Montes, G. C., & de Hollanda Lima, N. T. (2022). Discretionary fiscal policy, fiscal credibility and inflation risk premium. *The Quarterly Review of Economics and Finance*, *85*, 208-222.

Nickel, C., & Tudyka, A. (2014). Fiscal stimulus in times of high debt: Reconsidering multipliers and twin deficits. *Journal of Money, Credit and Banking*, *46*(7), 1313-1344.

Orphanides, A. (2001). Monetary policy rules based on real-time data. *American Economic Review*, *91*(4), 964-985.

Plagborg-Møller, M., & Wolf, C. K. (2021). Local projections and VARs estimate the same impulse responses. *Econometrica*, *89*(2), 955-980.

Rey, H. (2015). *Dilemma not trilemma: the global financial cycle and monetary policy independence* (No. w21162). National Bureau of Economic Research.

Sargent, T. J., & Wallace, N. (1981). Some unpleasant monetarist arithmetic. *Federal reserve bank of minneapolis quarterly review*, *5*(3), 1-17.

Turkay, M. (2017). Heterogeneity across emerging market central bank reaction functions. *Central Bank Review*, *17*(3), 111-116.

Woodford, M. (2001). Fiscal requirements for price stability.

Zoli, E. (2005). How does fiscal policy affect monetary policy in emerging market countries?.

Appendix A

Table A1: panel regression results using CPI

	(1)	(2)	(3)	(4)
Key policy rate (t-1)	0.764	0.761	0.755	0.753
	(0.0757)***	(0.0757)***	(0.0755)***	(0.0756)***
Output gap (t-1)	0.209	0.189	0.203	0.180
	(0.1327)***	(0.1288)***	(0.1320)***	(0.1287)***
Change in structural balance (t-1)	0.047		0.055	
	(0.0867)		(0.0847)	
Change in net lending (t-1)		0.014		0.017
		(0.0869)		(0.0860)
CPI (t-1)	0.199	0.197	0.195	0.194
	(0.0507)**	(0.0510)**	(0.0507)**	(0.0509)**
Change in REER	0.028	0.019		
	(1.9432)	(1.9341)		
Change in bilateral FX rate			0.121	0.112
			(1.7057)**	(1.7141)**
Observations	116	116	116	116

Standardized beta coefficients; Standard errors in parentheses. * p<0.10, ** p<0.05, *** p<0.01

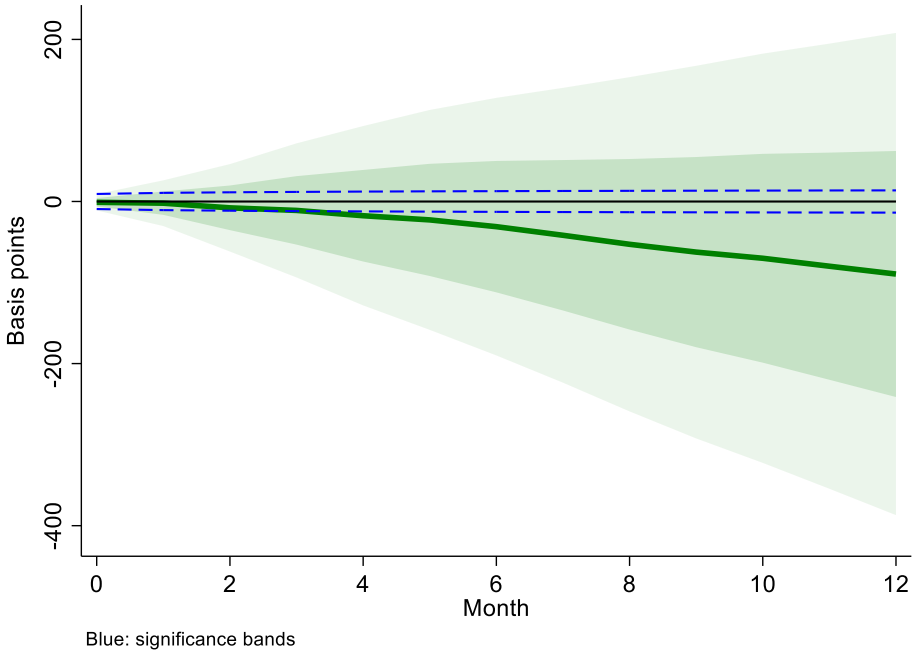
Table A2: panel regression results using change in CPI

	(1)	(2)	(3)	(4)
Key policy rate (t-1)	0.835	0.832	0.824	0.822
	(0.0657)***	(0.0653)***	(0.0648)***	(0.0647)***
Output gap (t-1)	0.195	0.180	0.191	0.172
	(0.1324)***	(0.1281)***	(0.1314)***	(0.1277)***
Change in structural balance (t-1)	0.034		0.044	
	(0.0892)		(0.0869)	
Change in net lending (t-1)		-0.000		0.002
		(0.0884)		(0.0872)
Change in CPI (t-1)	0.125	0.131	0.121	0.129
	(0.0478)*	(0.0485)*	(0.0472)*	(0.0478)*
Change in REER	0.026	0.02		
	(1.9696)	(1.9580)		
Change in bilateral FX rate			0.121	0.114
			(1.7201)**	(1.7236)**
Observations	116	116	116	116

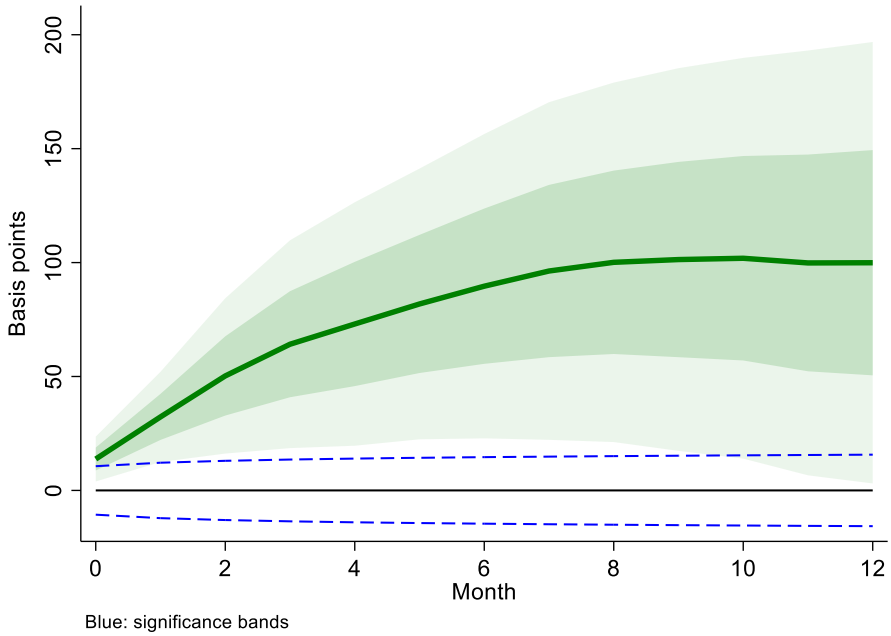
Standardized beta coefficients; Standard errors in parentheses. * p<0.10, ** p<0.05, *** p<0.01

Appendix B: Full sample cumulative impulse responses

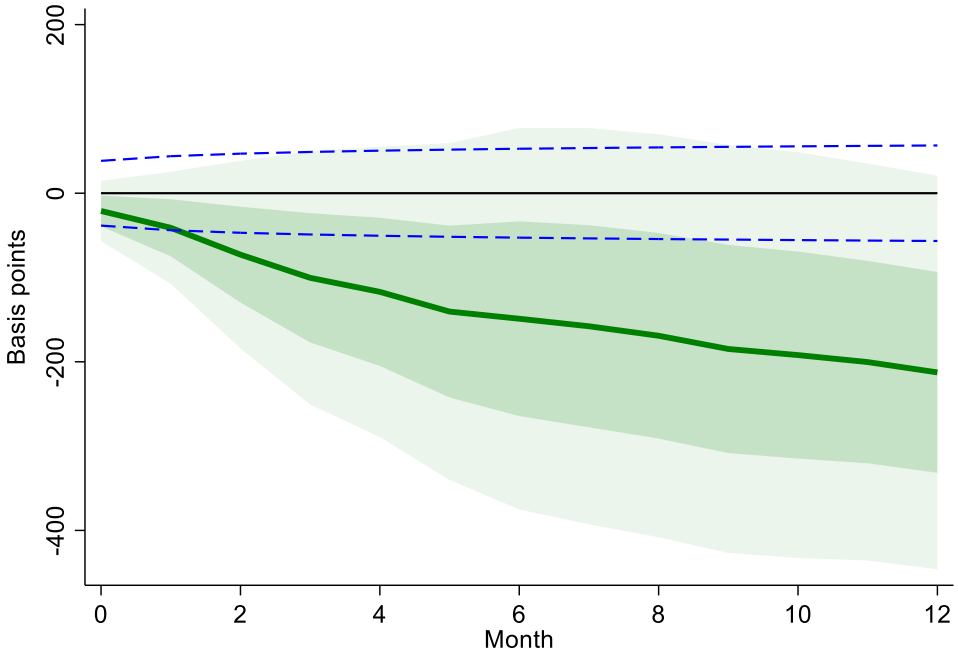
Cumulative repo rate response to a ZAR shock



Cumulative sovereign-risk response to a ZAR shock



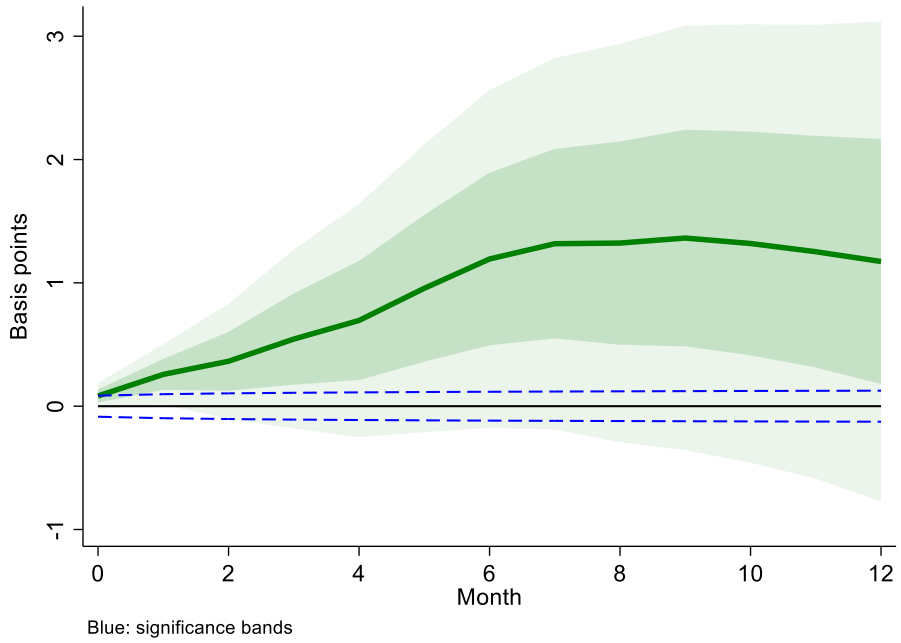
Cumulative sovereign risk response to repo-rate shock



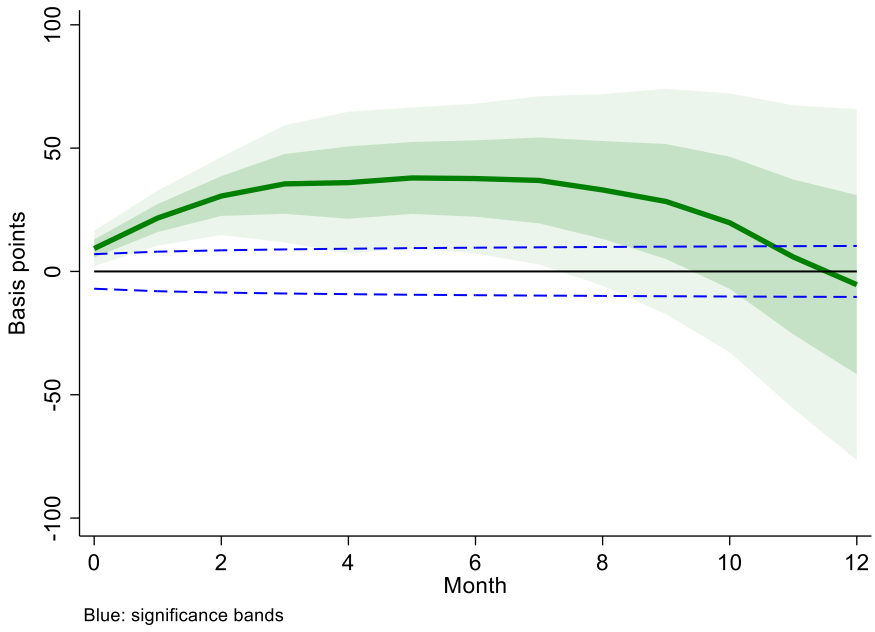
Blue: significance bands

Appendix C: Restricted sample cumulative impulse responses

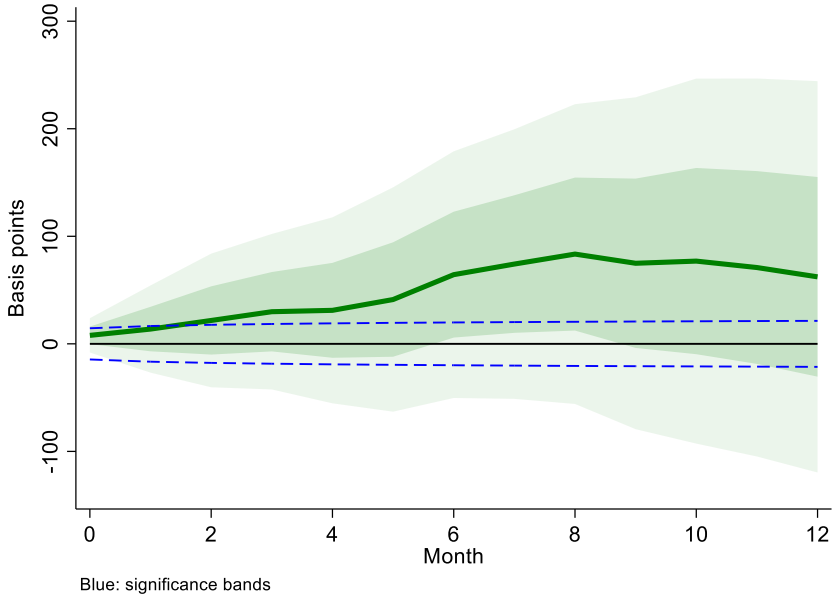
Cumulative Jibar response to sovereign risk shock



Cumulative sovereign-risk response to a ZAR shock

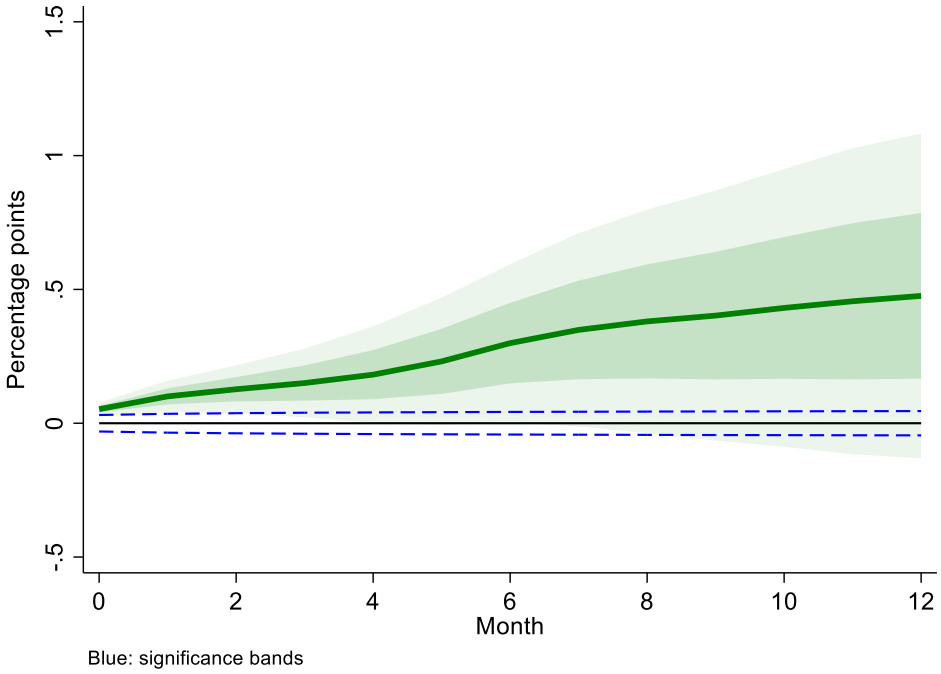


Cumulative sovereign risk response to repo-rate shock

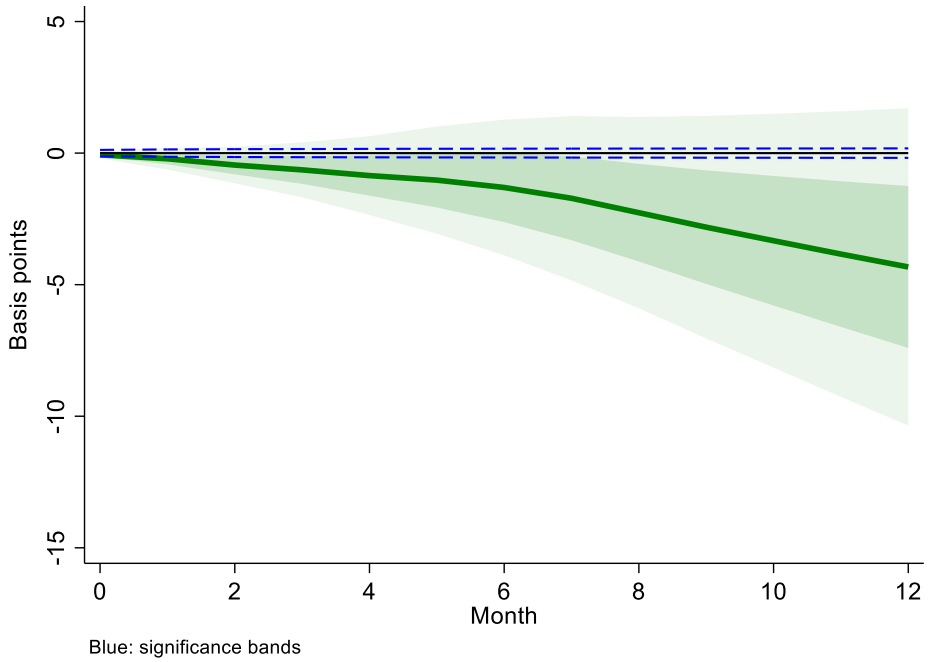


Appendix D: Full sample cumulative impulse responses with Covid indicator

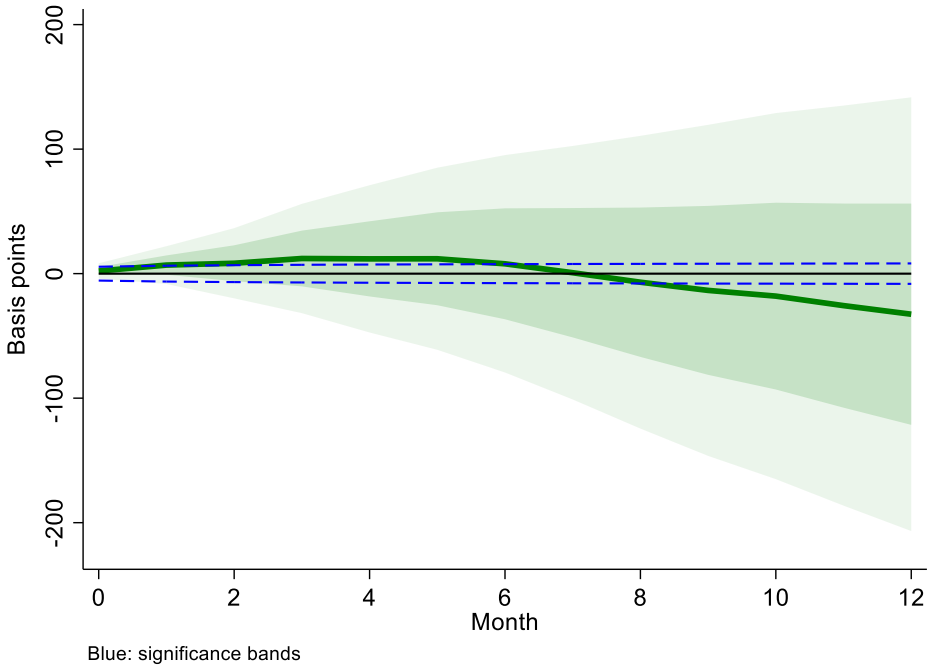
Cumulative ZAR response to sovereign-risk shock



Cumulative repo rate response to a sovereign risk shock

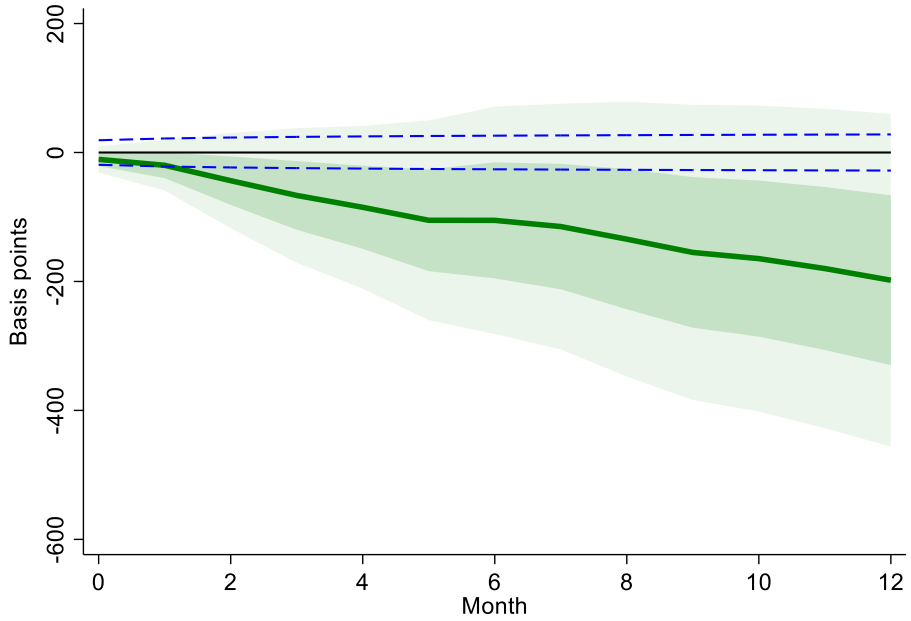


Cumulative repo rate response to a ZAR shock



Blue: significance bands

Cumulative sovereign risk response to repo-rate shock



Blue: significance bands

Cumulative ZAR response to repo-rate shock

