Macroeconomic Interactions and the Cost of Fiscal Stimulus in South Africa

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SAMNet 2021

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Introduction

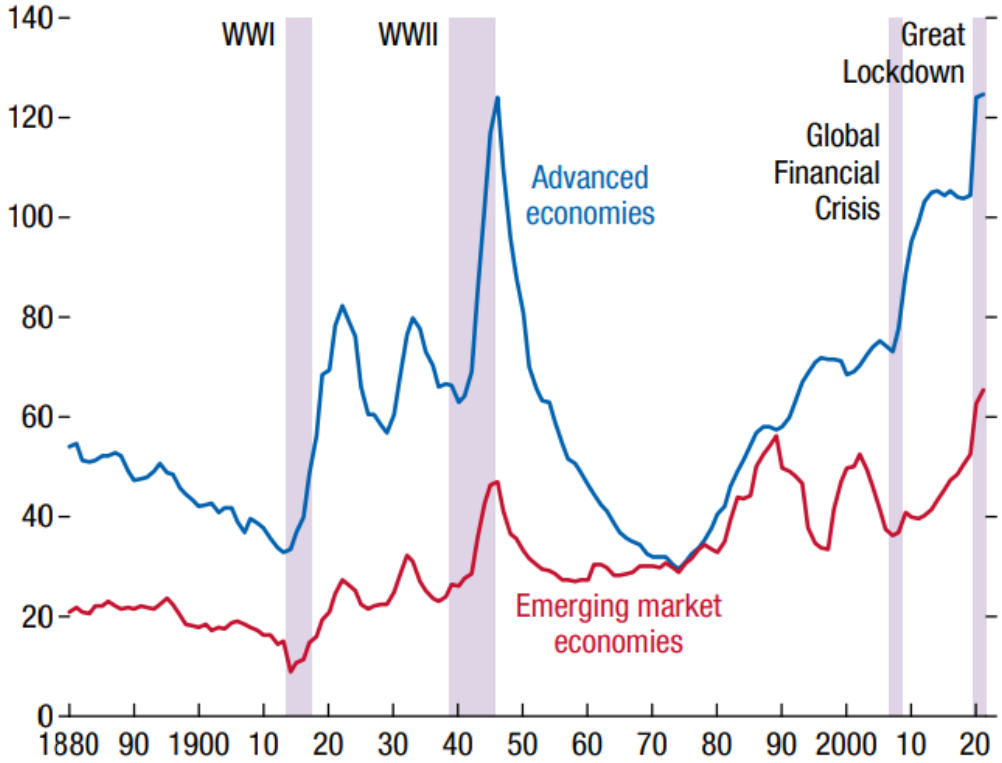
- Following the Great Financial Crisis, large-scale fiscal expansion programs
  - Emerging markets and developing countries put in place expansionary fiscal policies:
    - South Africa: R846 bn (~$100 bn)
  - American Recovery and Reinvestment Act (ARRA) launched in 2009: $803 bn
  - European Economic Recovery Plan (EERP) in 2008: €200 bn

Introduction

- Renewed interest in understanding the economic consequences of fiscal policy interventions: tax and government spending multipliers
  - Mertens and Ravn (2011, 2013, 2014, 2019), Caldara and Kamps (2008, 2017) ; Romer and Romer (2010), Ramey (2011, 2017), Ramey and Zubairy (2014), Mountford and Uhlig (2009), Auerbach and Gorodnichenko (2012), Barnichon and Matthes (2017)
- State-dependent multipliers?

Introduction

- These programs were mainly financed through deficits and debt emissions



Sources: IMF, Historical Public Debt Database; IMF, World Economic Outlook database; Maddison Database Project; and IMF staff calculations.
Note: The aggregate public-debt-to-GDP series for advanced economies and emerging market economies is based on a constant sample of 25 and 27 countries, respectively, weighted by GDP in purchasing-power-parity terms. WWI = World War I; WWII = World War II.

Introduction

- These programs were mainly financed through deficits and debt emissions, leading to a sharp increase in the debt stock

- As a consequence, concerns about the sustainability of public debt resurfaced:
  - e.g. De Graeve et al (2015), Cochrane (2011, 2019), Leeper and Walker (2013), Sims (2011), Dewachter and Toffano (2012), Davig and Leeper (2011) ...

Introduction

- At the same time, Monetary Policy has responded in an unprecedented fashion:
  - Through conventional instruments
  - With unconventional instruments

- $\Longrightarrow$ How does the combination of monetary and fiscal policy affect sovereign yields?

Aim of the paper

- We study the response of sovereign yields to fiscal policy shocks in South Africa between 1972 and 2019...
- ... taking into account Monetary and Fiscal Policy regimes (e.g. Davig and Leeper, 2011)
- We identify regime shifts in policy preferences with Markov-Swichting regressions
  - 2 Fiscal policy regimes:
    - Passive: aim is to stabilize debt
    - Active: does not try to stabilize debt
  - 2 Monetary policy regimes:
    - Active: the Taylor principle holds (aggressive response to inflation developments)
    - Passive: the Taylor principle does not hold
- This leads to four combinations of regimes: MAFP, MAFA, MPFP, MPFA

Related Studies

- Large and long debate about the impact of deficits on sovereign yields, both theoretical and empirical:
  - (e.g. Evans, 1985 ; Evans, 1987 ; Evans and Marshall, 2007 ; Hamilton, 1988 ; Dillen, 1997 ; Ardagna, 2004 ; Gruss and Mertens, 2009 ; Laubach, 2009, ...)

- Non-linearities are an important feature:
  - Dewachter and Toffano (2012) show that deficit raises yields in FA compared to FP in the United States
  - Davig and Leeper (2011) study fiscal shocks with monetary-fiscal regimes
  - Ellingsen and Soderström (2011): the response of yields depend on the source of policy change (exogenous vs. endogenous)

Outline

Methodology

Fiscal Policy

- Long history of fiscal policy rules (Bohn, 1998 ; **Favero and Monacelli, 2005** ; Burger and Calitz, 2021):

$$d_t = \rho^{s_t^F} d_{t-1} + \left(1 - \rho^{s_t^F}\right) \bar{d}_t + \sigma^{s^F} \epsilon_t^{s_t^F} \quad (1)$$

$$\bar{d}_t = c^{s_t^F} + \gamma_y^{s_t^F} (y_t - y_t^*) + \delta^{s_t^F} d_t^S \quad (2)$$

where d_t: primary deficit, $y_t - y_t^*$: output gap, d_t^S : stabilizing deficit (HP-filter).

- $s_t^F = \{Passive, Active\}$: Fiscal policy stance.

- *Passive Fiscal Policy* if:
$\left|\rho^{s_t^F=P}\right| < 1,\ c^{s_t^F=P} = 0 \text{ and } \delta^{s_t^F=P} = 1$

Methodology

Fiscal Policy

- Debt-accumulation equation:

$$b_t = \left(\frac{1 + i_t^d}{1 + g_t} \right) b_{t-1} + d_t \tag{3}$$

where b_t: debt-to-GDP ratio, i_t^d: interest rate paid on debt, and g_t: growth rate of nominal GDP, d_t: public deficit.

- Stabilizing the debt-to-GDP ratio implies that $b_t = b_{t-1}$. Substituting $b_t = b_{t-1}$ in equation (3):

$$d_t^S = \left(\frac{g_t - i_t^d}{1 + g_t} \right) b_{t-1} \tag{4}$$

Methodology

Monetary Policy and Interaction with Fiscal Policy

- Follows a standard Taylor (1993) rule extended with a foreign exchange market variable:

$$r_t = a^{s_t^M} + \gamma_\pi^{s_t^M}(\pi_t - \pi^*) + \gamma_y^{s_t^M}(y_t - y_t^*) + \gamma_\zeta^{s_t^M}\zeta_t + \epsilon_t^{s_t^M}, \quad (5)$$

where π_t: yoy inflation rate, π^*: target inflation rate, $y_t - y_t^*$: output gap, and ζ_t: depreciation rate.

- Monetary Policy is active if the Taylor principle holds: $\gamma_\pi^{s_t^M = A} \geq 1$.
  - Different strategies may be needed to elicit sound monetary regimes (high/low volatility,...)
- Fiscal regimes are interacted with Monetary regimes to create the four cases
  - Ideally, modeled jointly, but too demanding on the available data

Methodology

Local projections

- The linear form of the local projections (Jordà (2005)) reads:

$$
\begin{aligned}
q_{t+h} - q_{t-1} = {} & \widehat{\beta_{t+h}^{shock}} \cdot shock_t \\
& + \Sigma_{j=1}^{J} \left[\beta_{j,t+h}^{y} \cdot g_{t-j} + \beta_{j,t+h}^{\pi} \cdot \pi_{t-j} + \beta_{j,t+h}^{d} \cdot d_{t-j} + \beta_{j,t+h}^{q} \cdot q_{t-j}^{m} \right] \\
& + \alpha_{t+h} + \beta_{t+h}^{X} X_t + \beta_{t+h}^{\kappa} \kappa_t + \eta_{t+h}
\end{aligned}
\tag{6}
$$

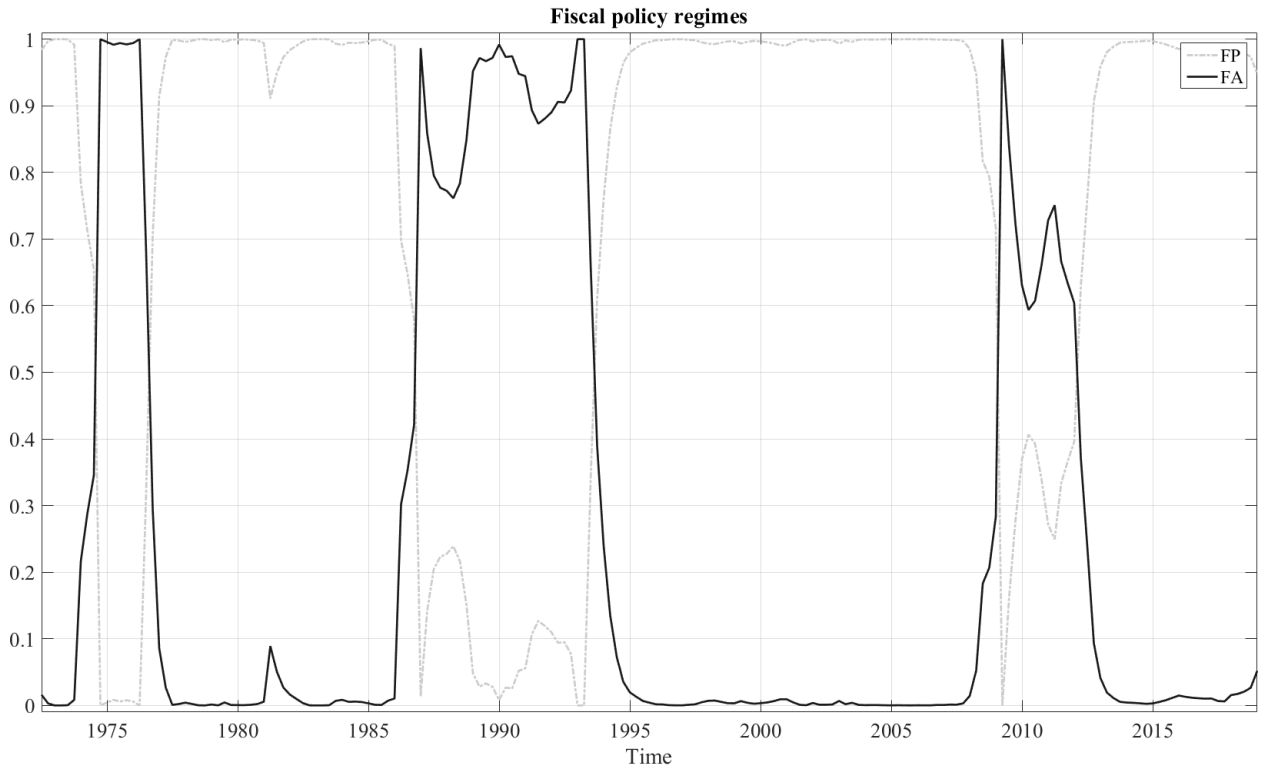
where q^m: yield of maturity m, g: the yearly real output growth rate, π: is the yearly inflation rate, α: constant, X_t: exogenous variables, κ_t: temporal trends, η_{t+h}: residuals. In (6), $j = 1, \ldots, J$ lags.

- $shock_t$: deficit shock obtained from the fiscal rule. Its coefficient is the IRF.

- In its non-linear form, Equation (6) is interacted with the regime probabilities.

Results

Regimes - Fiscal Policy

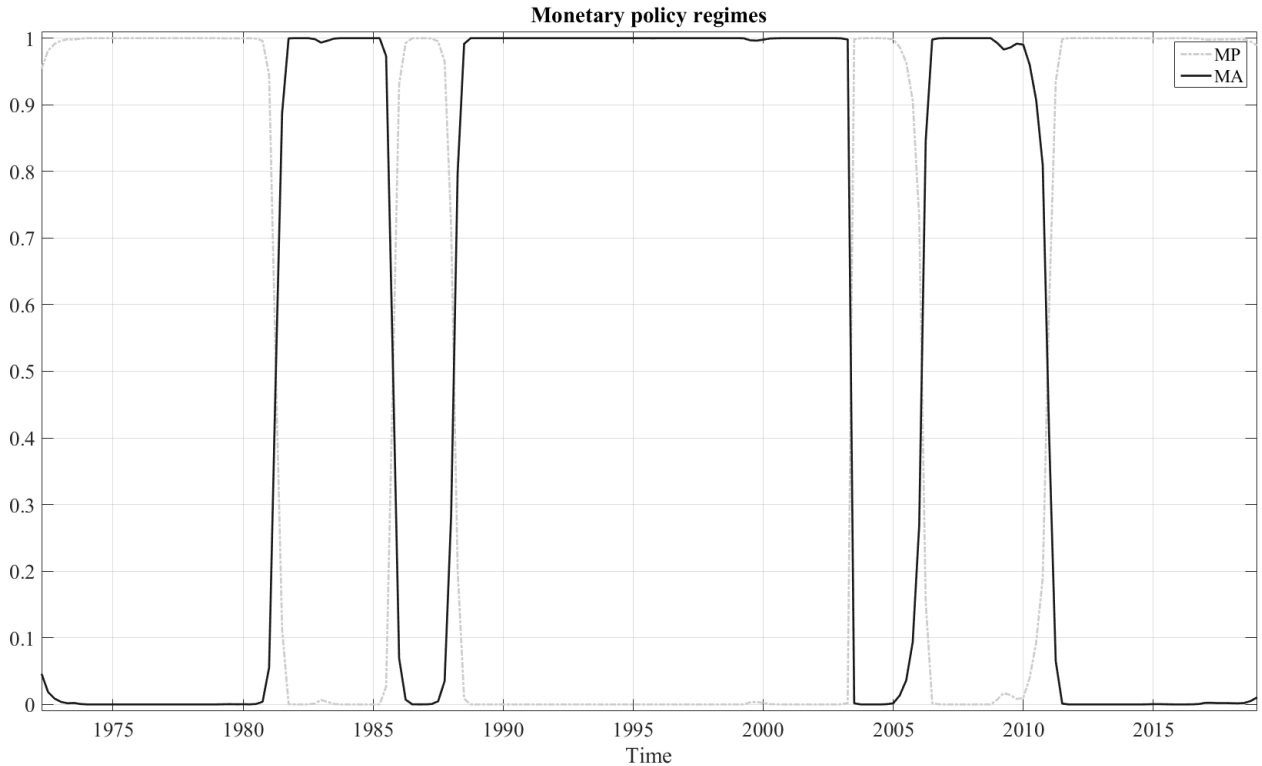


- Regimes well-anchored in the literature (Swanepoel, 2004 ; Burger and Marinkov, 2012 ; Calitz, Du Plessis and Siebrits, 2013 ; Sibeko and Isaacs, 2020)

Fiscal regimes

Results

Regimes - Monetary Policy

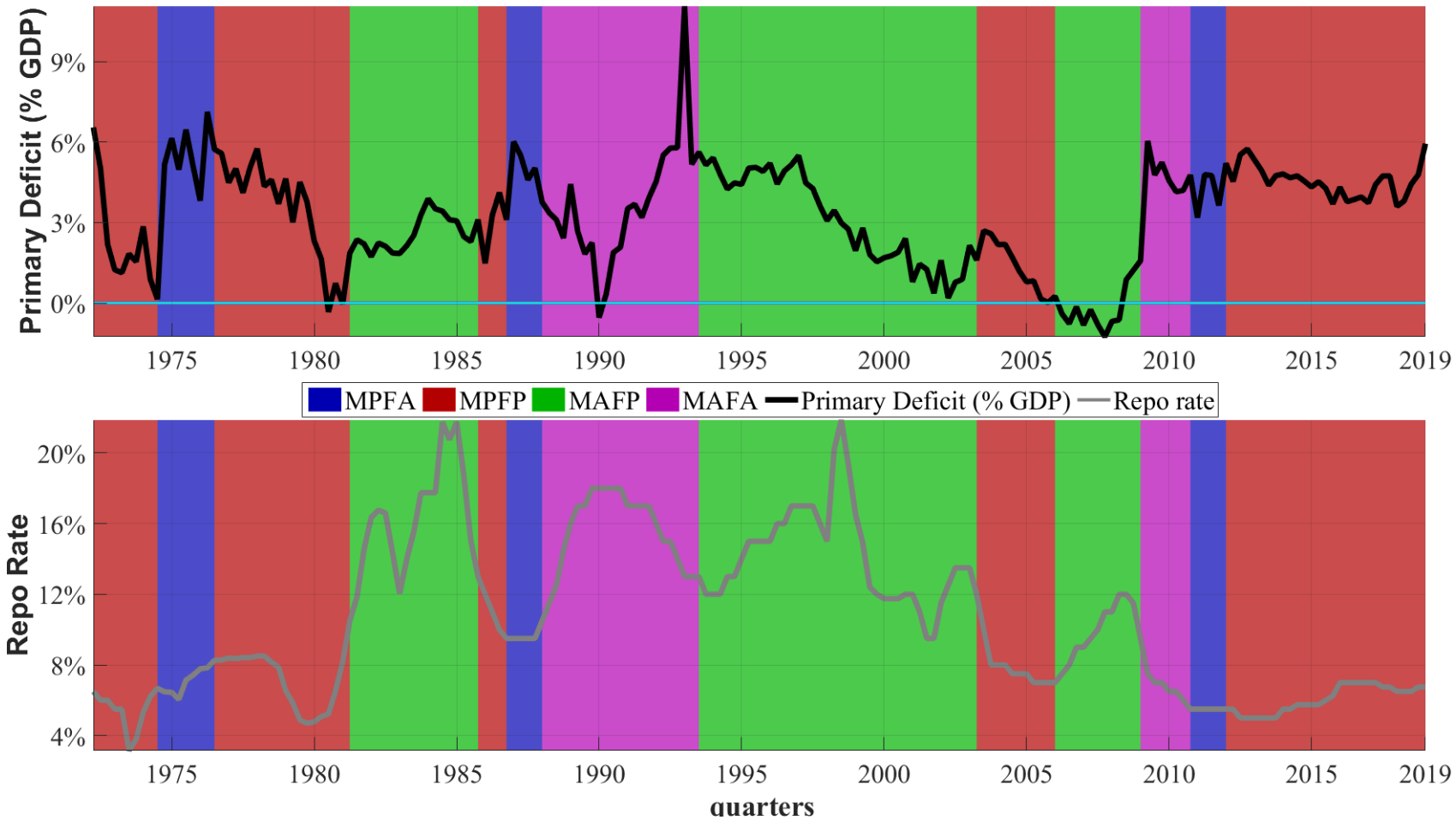


- Episodes of Active Monetary Policy fit the narrative of the fight of the SARB against inflation (Aaron and Muellbauer, 2002, 2007 ; Coco and Viegi, 2019)

Monetary regimes

Results

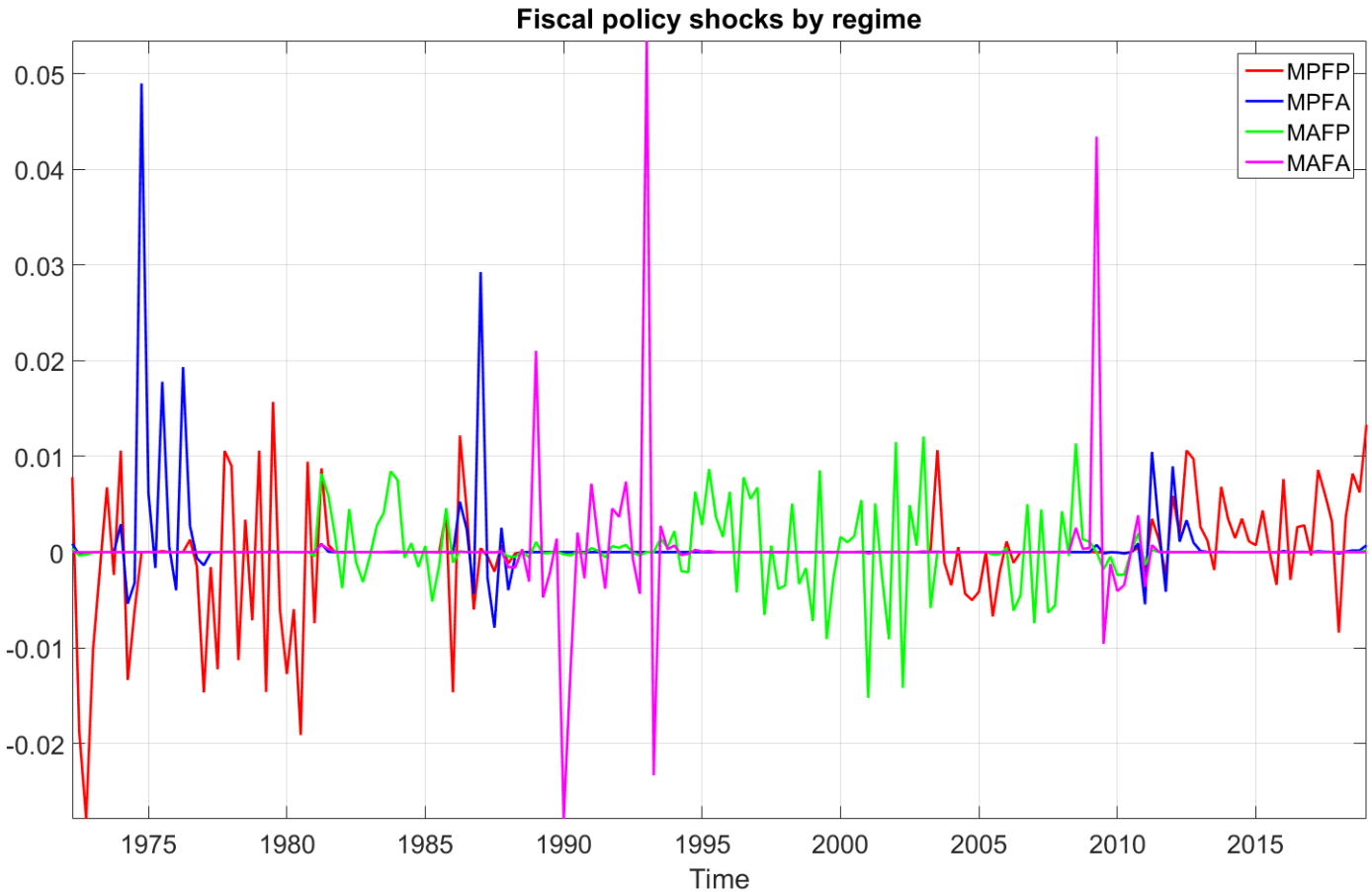
Monetary Fiscal Interactions



MP and inflation in South Africa

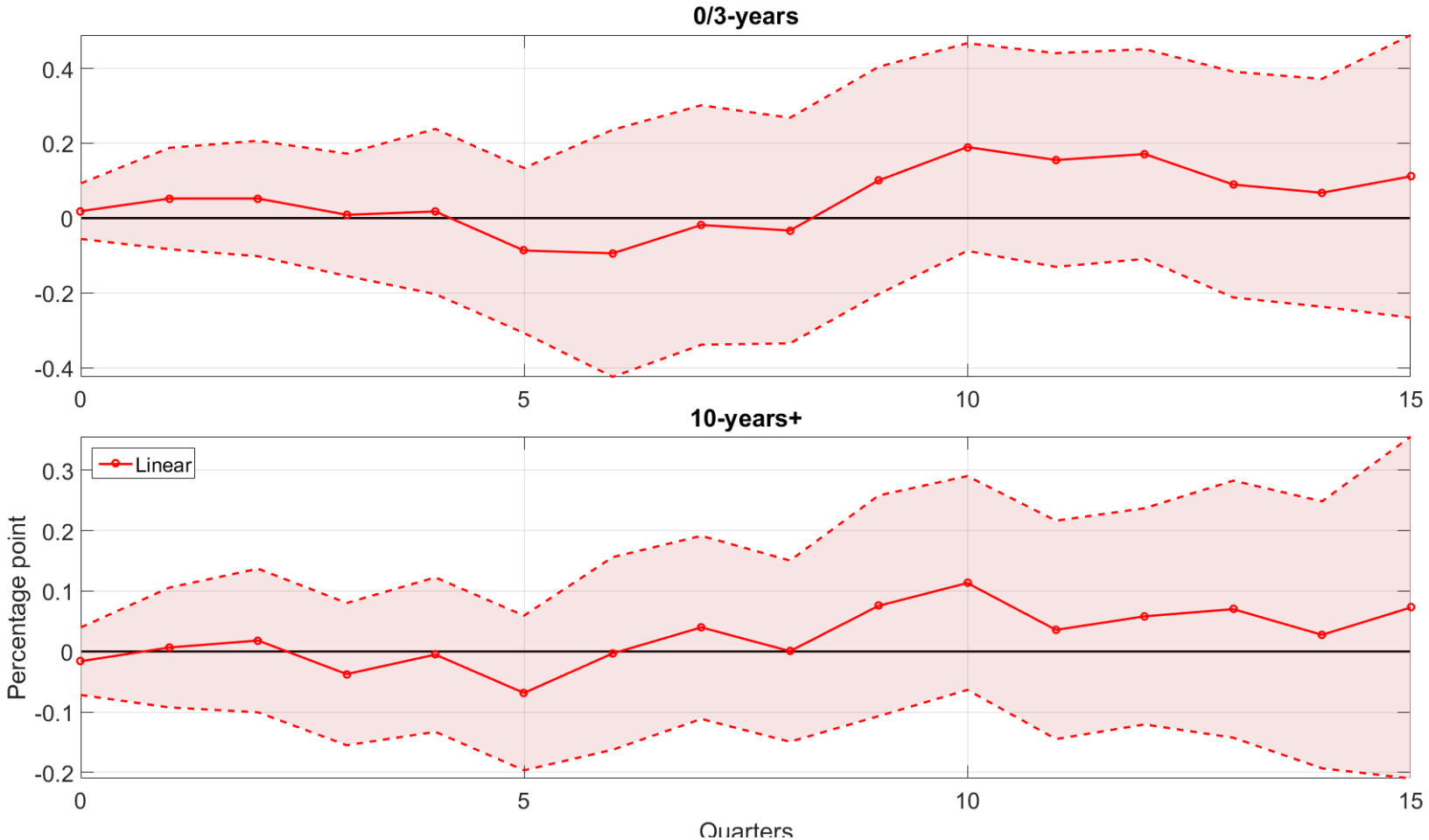
Results

Fiscal policy shocks



Results

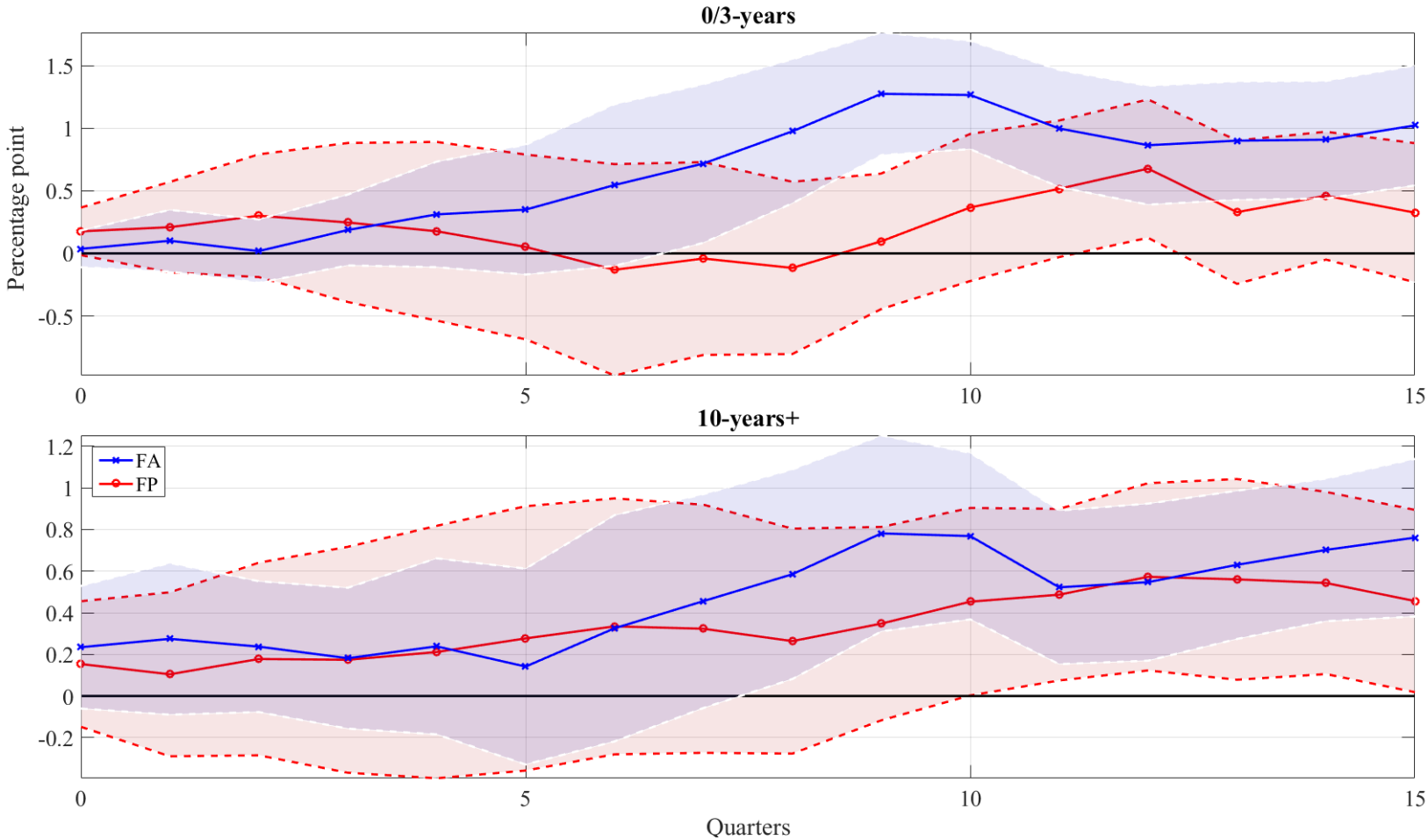
Yields response to deficit shocks - Linear



Response of macro variables

Results

Yields response to deficit shocks - FA vs. FP

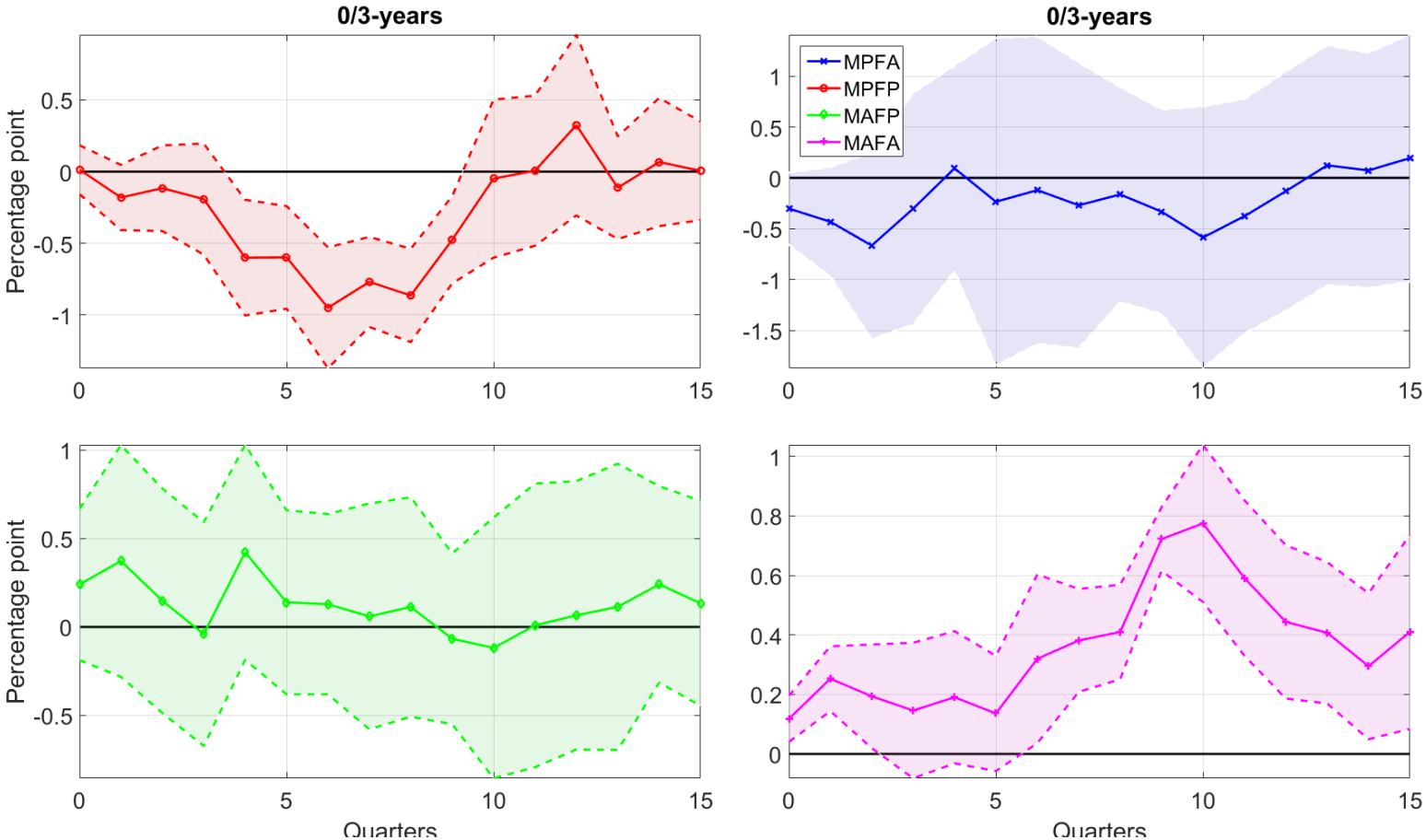


Response of macro variables

Results

Yields response to deficit shocks - MonFisc Interactions

$$FP \Longrightarrow FA$$

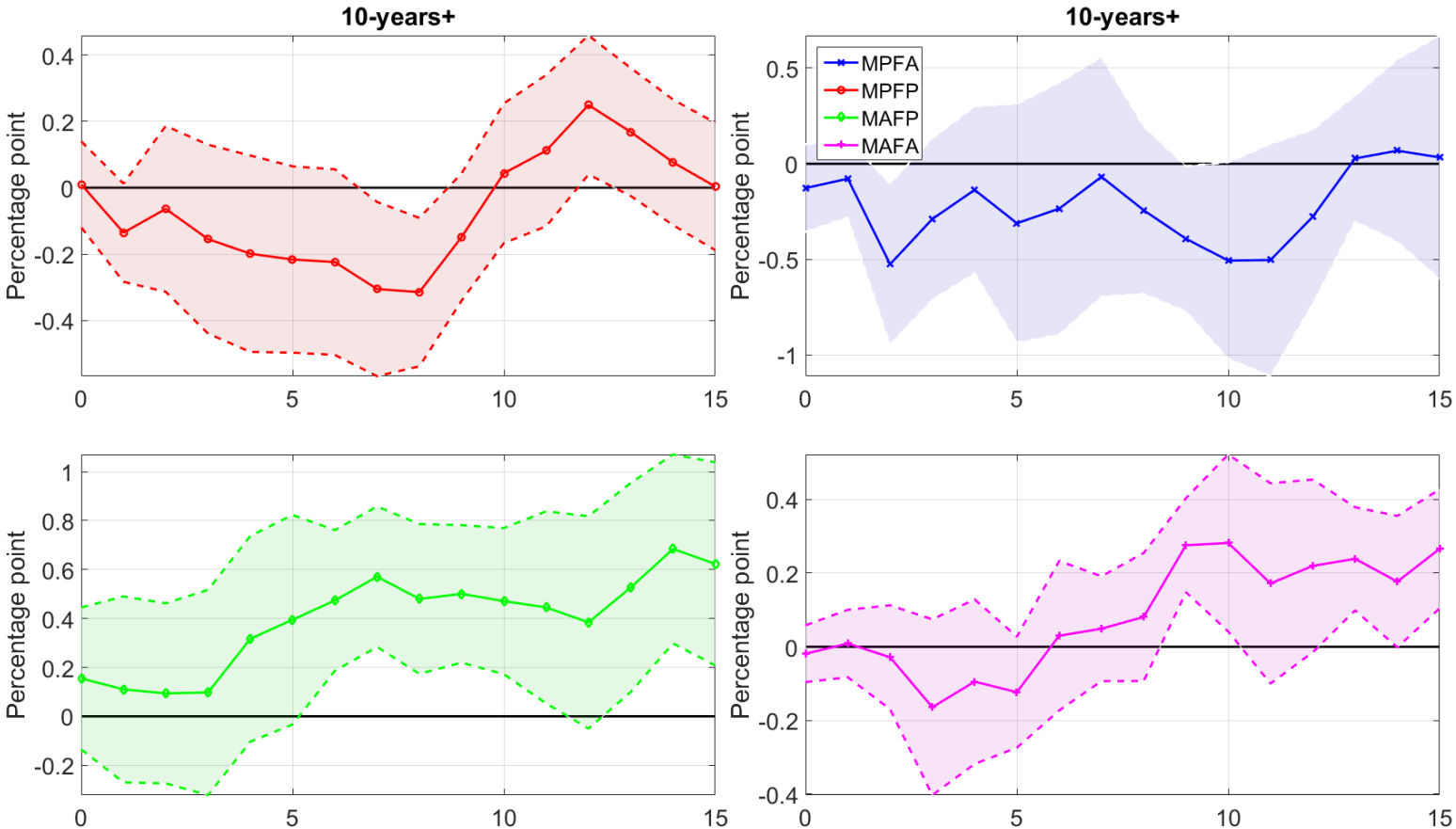


$$MP \Downarrow MA$$

Results

Yields response to deficit shocks - MonFisc Interactions

$$FP \Longrightarrow FA$$



$$MP \Downarrow MA$$

Response of macro variables

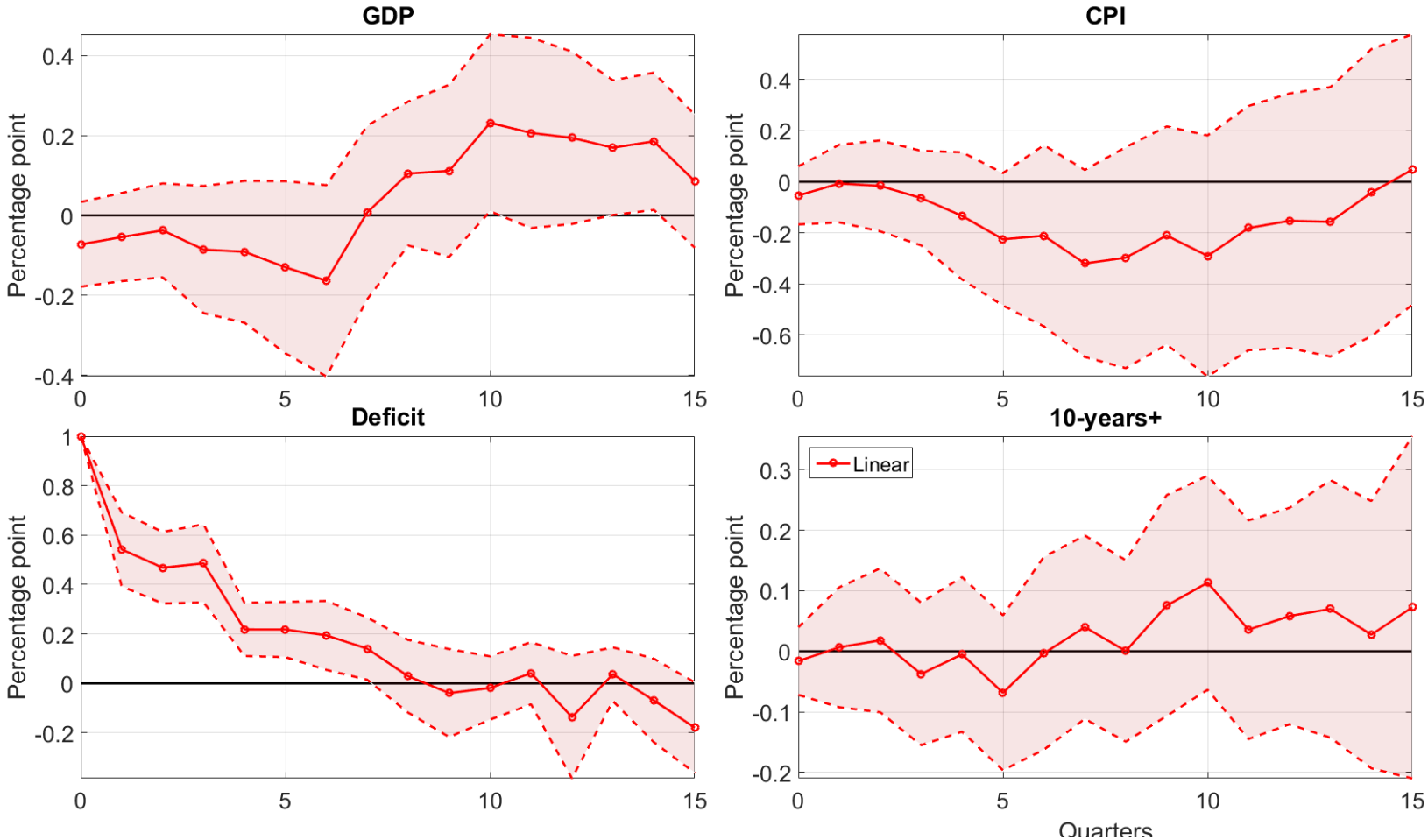
Conclusions

- We present economically-grounded regimes stemming from Fiscal and Monetary Policy in the framework of Leeper (1991)
- Swings in policy preferences imply different responses of sovereign yields in South Africa:
  - Yields responses are **higher in FA** than in FP, irrespective of Monetary Policy
  - Yields responses are **higher in MA** than in MP, irrespective of Fiscal Policy
  - Maturity-specific responses $\Rightarrow$ need for a comprehensive yield curve modelling framework?
- These new findings therefore contribute to the ongoing debate about the macroeconomic impacts of Fiscal Policy.

Thank you

Results

Response of variables to deficit shocks - Linear



Response of yields

Results

Fiscal Policy

	Estimates of fiscal policy rule (1972Q1:2019Q1)						
	c	ρ	γ	δ	$p_{FP,FP}$	$p_{FA,FA}$	*Log Lik.*
Panel (a)	Single-regime model						
	0.008***	0.782***	-0.122***	0.138			578.46
	(0.002)	(0.045)	(0.055)	(0.249)			
Panel (b)	Markov-switching model: $\lvert\rho^{s_t^F=FP}\rvert < 1$, $c^{s_t^F=FP.} = 0$, $\delta^{s_t^F=FP.} = 1$, $\delta^{s_t^F=FA.} < 0$						
FP	*0*	0.95***	-0.003	*1*	0.97		606.06***
		(0.046)	(0.045)				
	0.028***	0.22	-0.709***	-2.000		0.91	
FA	(0.007)	(0.14)	(0.219)	(1.231)			

Note: The table reports the estimates of the feedback policy rule in Equation (1). We report the estimates for each regression separately together with their standard errors in parenthesis. Superscripts ***, **, * indicate significance levels of 1, 5 and 10%, respectively. Numbers in italic are fixed parameters.

Return to probabilities

Results

Monetary Policy

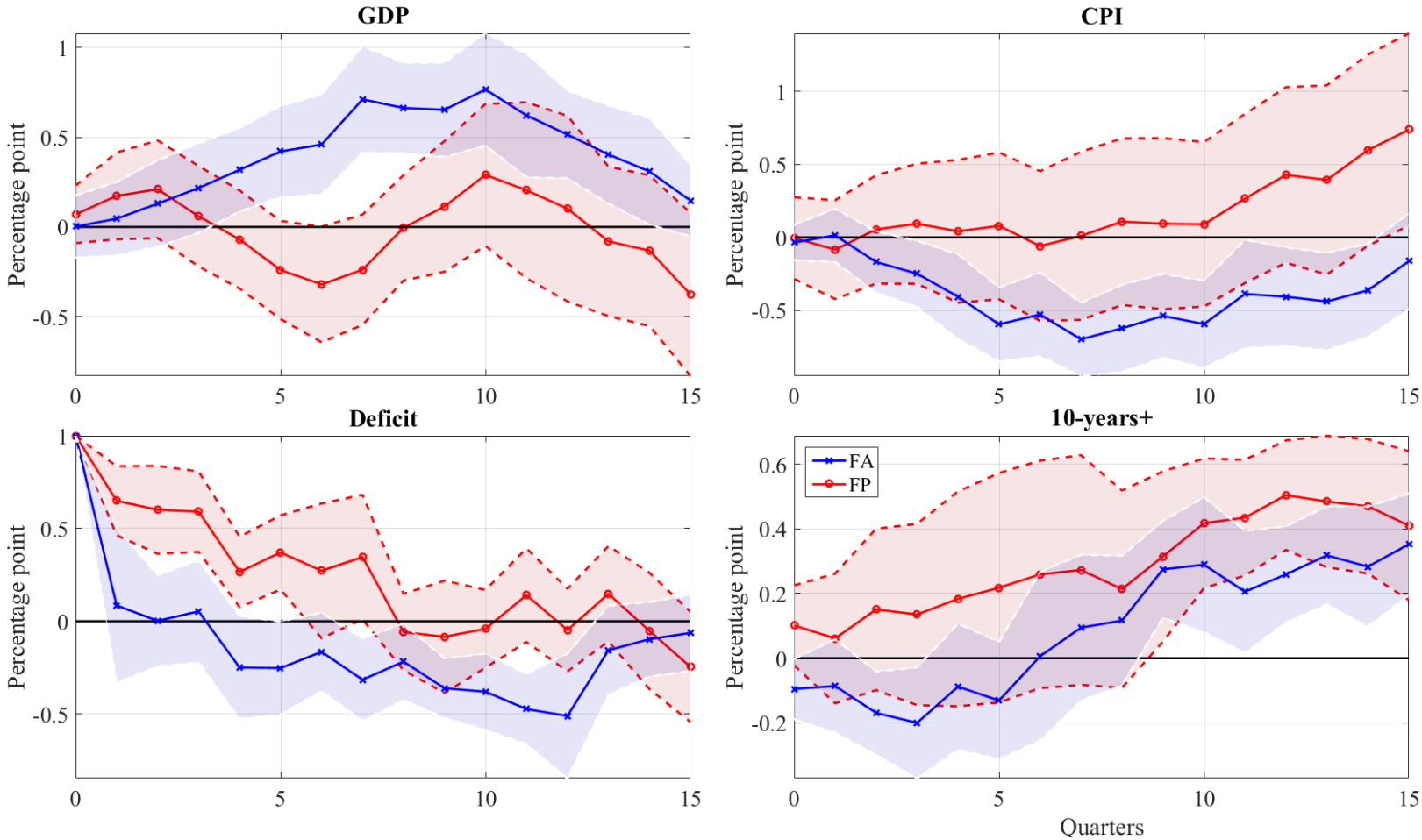
	Estimates of monetary policy rule (1972Q1:2019Q1)						
	a	γ_π	γ_y	γ_ζ	$p_{MP,MP}$	$p_{MA,MA}$	*Log Lik.*
Panel (a)	Single-regime model						
	0.071***	0.371***	0.328*	0.08***			337.32
	(0.007)	(0.065)	(0.19)	(0.028)			
Panel (b)	Markov-switching model: $\gamma_\pi^{s_t^M=MA} > 1$; $\gamma_\pi^{s_t^M=MP} < 1$						
MP	0.06***	0.092***	-0.491***	-0.052	0.95		460.81***
	(0.002)	(0.02)	(0.117)	(0.134)			
MA	0.032***	1.000***	-0.065	0.062***		0.84	
	(0.006)	(0.06)	(0.148)	(0.025)			

Note: The table reports the estimates of the Taylor rule in Equation (5). We report the estimates for each regression separately together with their standard errors in parenthesis. Superscripts ***, **, * indicate significance levels of 1, 5 and 10%, respectively.

Return to probabilities

Results

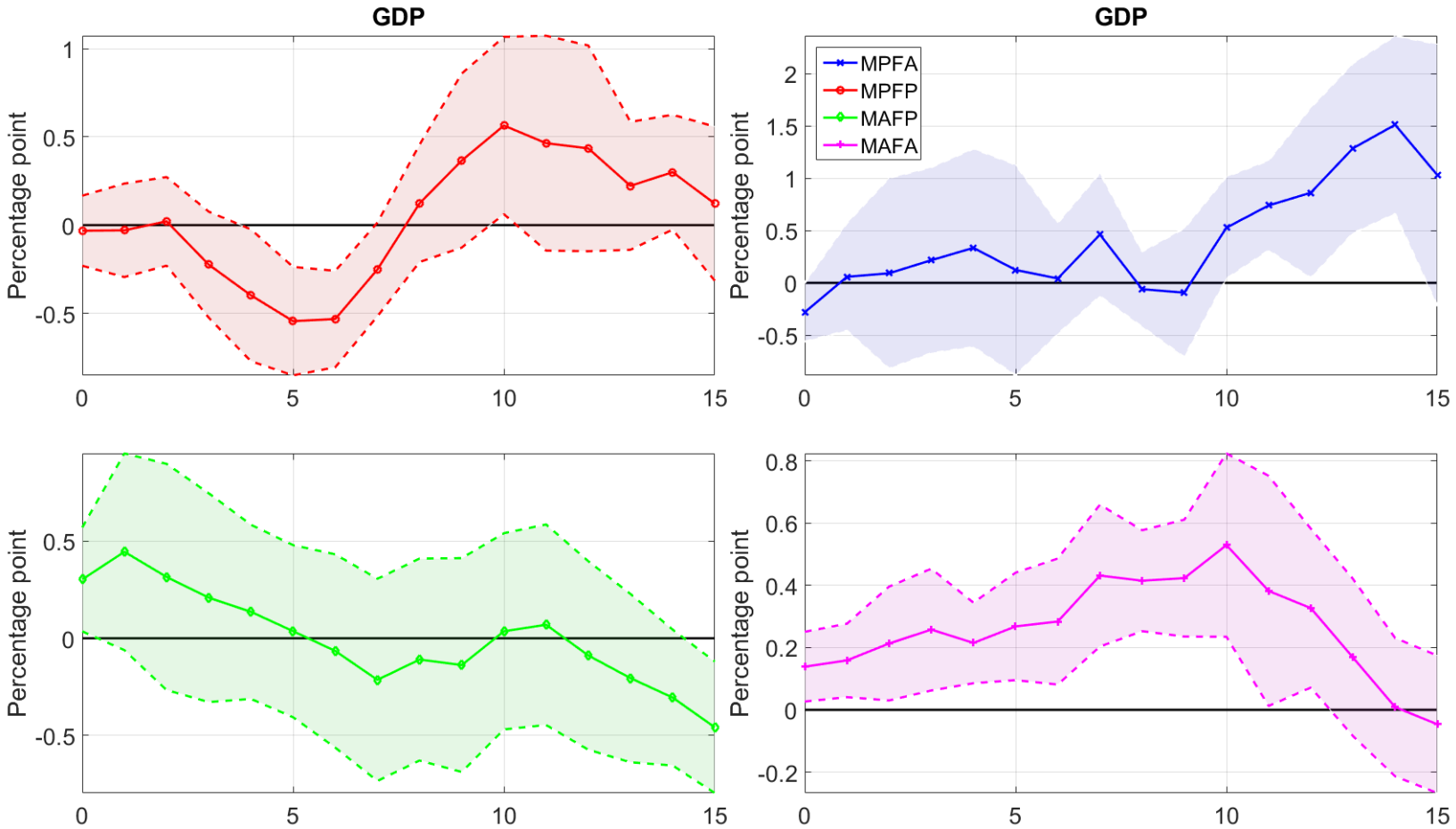
Response of variables to deficit shocks - FA vs. FP



Response of yields

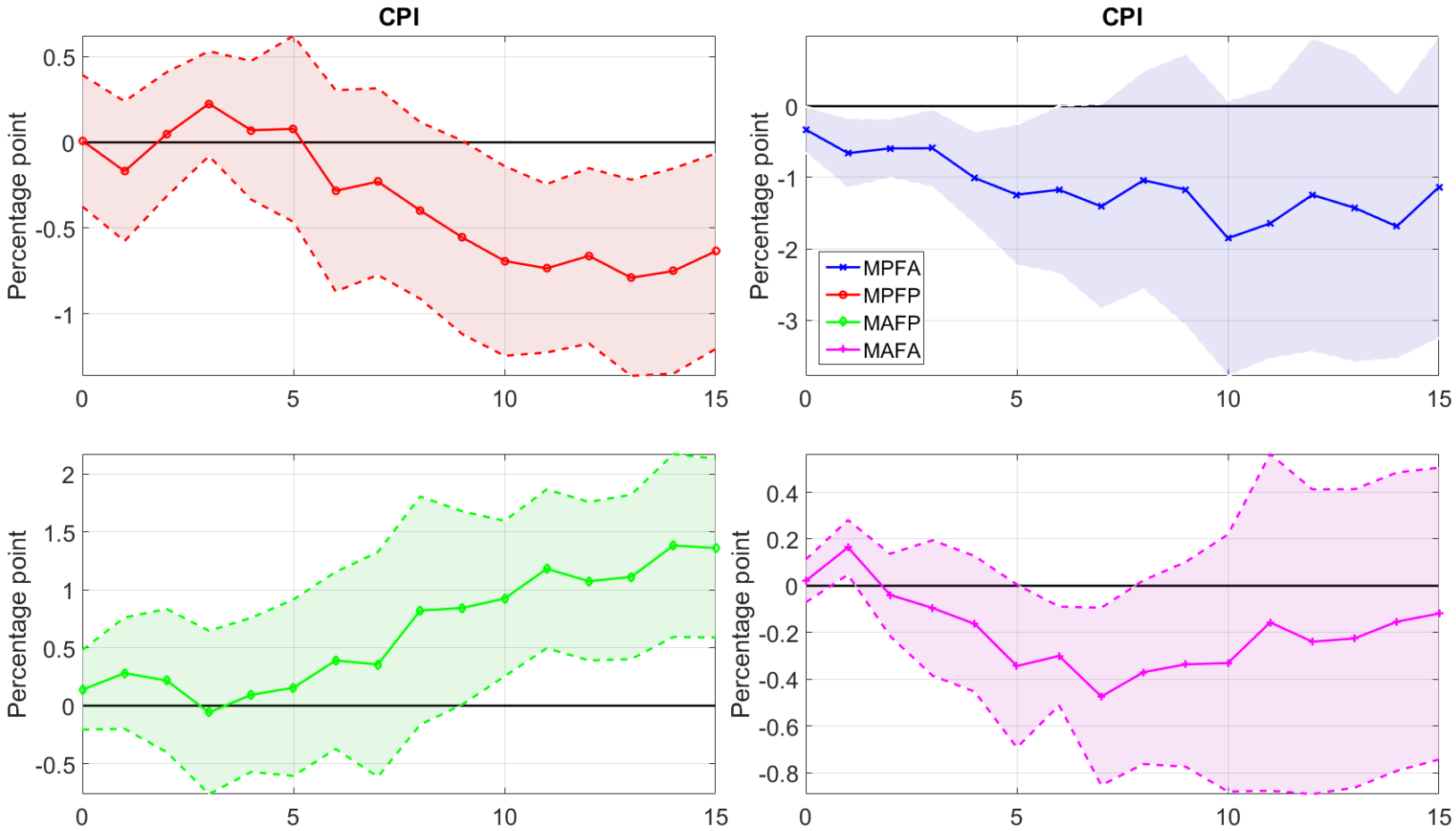
Results

Response of variables to deficit shocks - MonFisc interactions



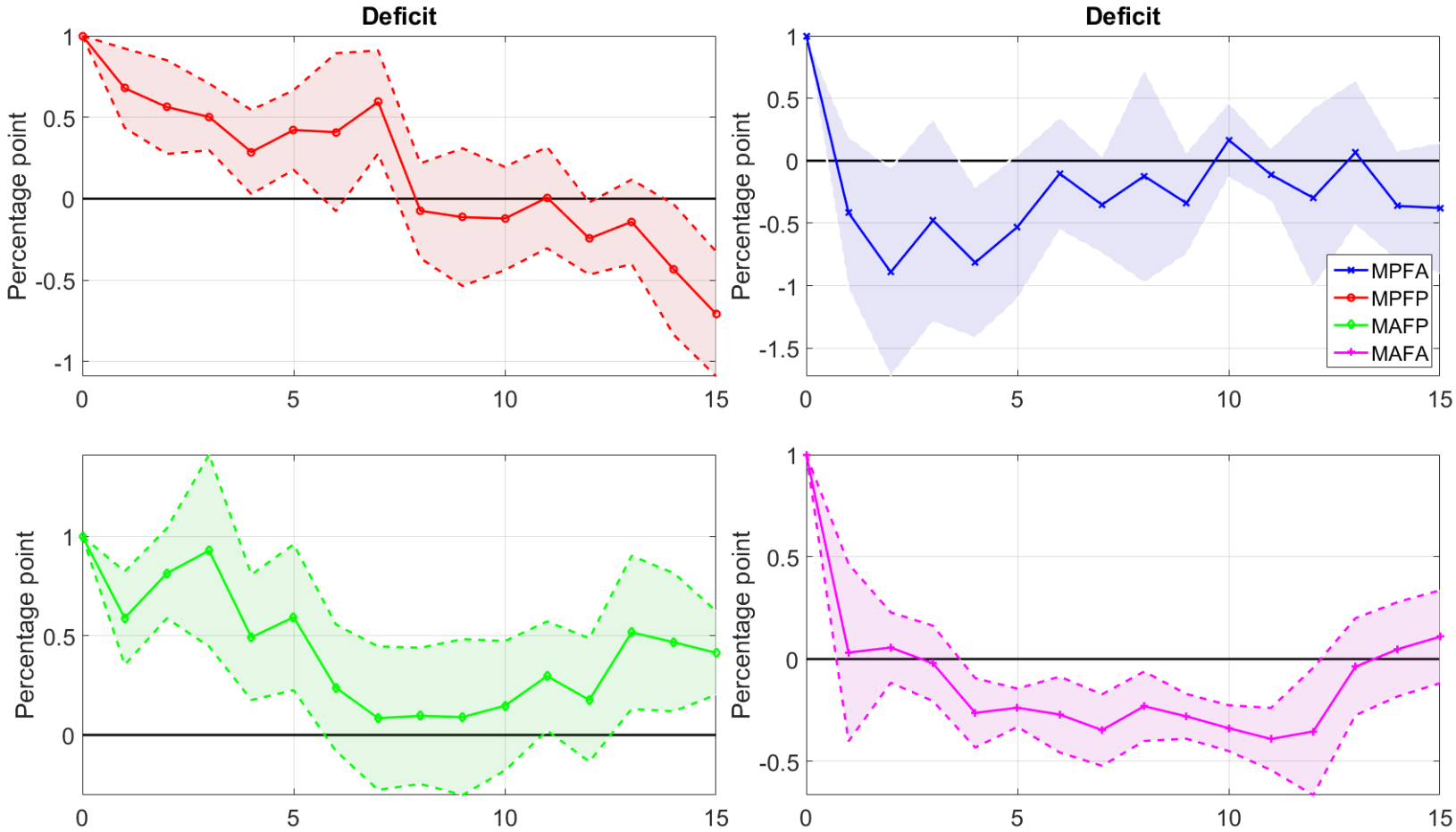
Results

Response of variables to deficit shocks - MonFisc Interactions



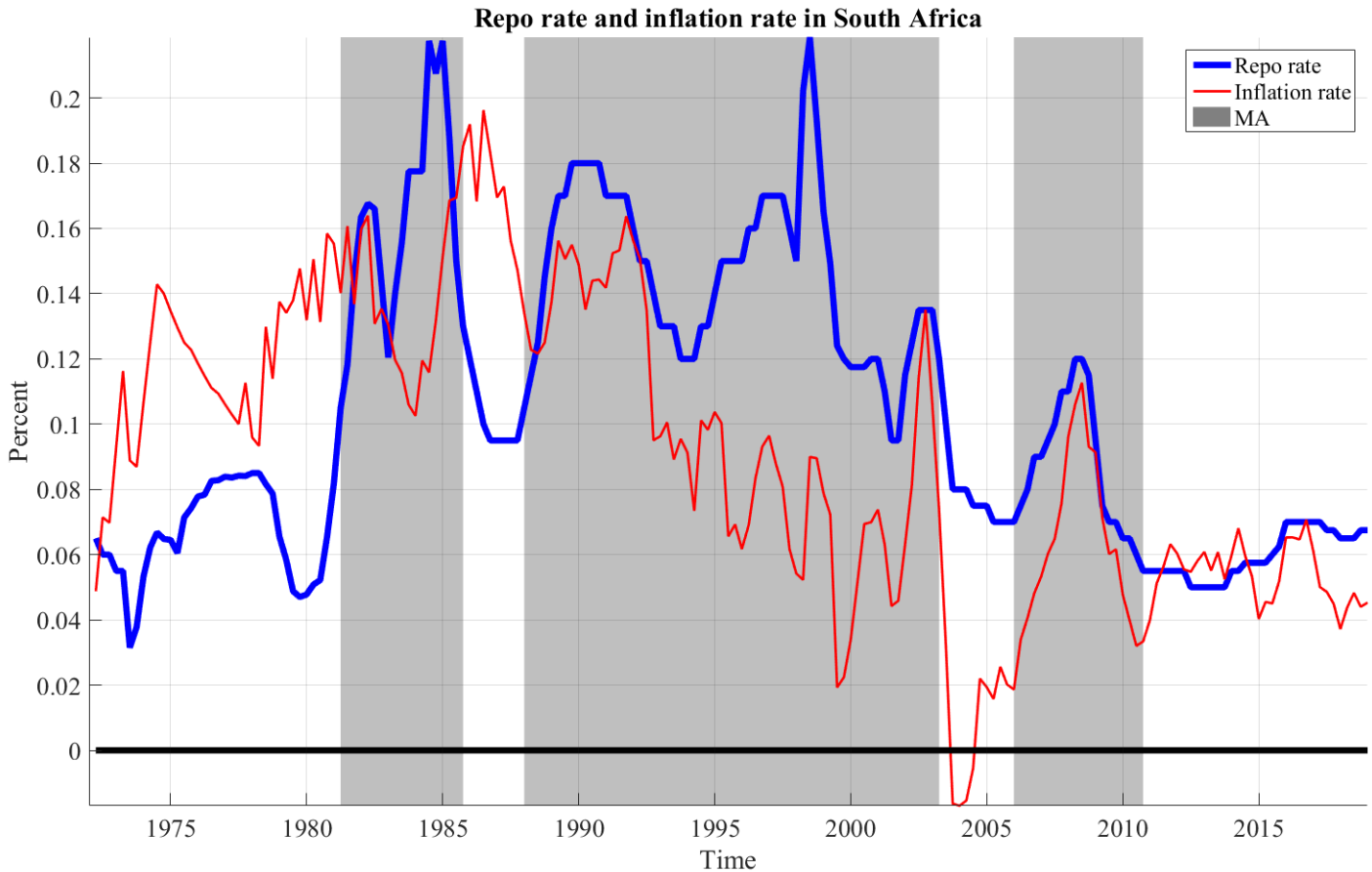
Results

Response of variables to deficit shocks - MonFisc Interactions



Response of yields

Monetary Policy and Inflation in South Africa



Back to probabilities