Fiscal regimes and the exchange rate*

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*The views expressed in this paper are those of the authors and do not necessarily reflect those of the Bank for International Settlements and the Swiss National Bank.

Introduction

- Fiscal support during the pandemic has raised government debt to unprecedented levels
  - AEs: 104% of GDP (2019) $\rightarrow$ 122% of GDP (2021)
  - EMEs: 55% of GDP (2019) $\rightarrow$ 65% of GDP (2021)
- In the last year, inflationary pressures have started to arise forcing CBs to raise policy rates
- This environment has brought the monetary-fiscal nexus back into the spotlight
  - MP affects real value and financing cost of government debt
  - FP affects aggregate demand and inflation
  - Both supply assets that provide liquidity services
- We focus on the effect of their interaction on the exchange rate

This paper

- Study BRL/USD daily movements around monetary (fiscal) policy announcements and find evidence of two regimes
- In response to a contractionary monetary (expansionary fiscal) shock, the domestic currency tends to
  - appreciate (no-effect) during normal times (Ricardian fiscal regime)
  - depreciate during periods of fiscal distress (non-Ricardian fiscal regime)
- We propose a simple model of sovereign default with
  1. stochastic fiscal regimes
  2. asymmetric recovery rates between domestic and foreign investors
- Sovereign risk drives the currency excess return
  $\Longrightarrow$ domestic policies affect the exrate through debt sustainability

Empirical approach

- Empirical model

$$\Delta e_t = \alpha_t + \beta_t \xi_t + \boldsymbol{\gamma} \Delta \mathbf{X}_t^\top + \varepsilon_t$$

  - Δe_t is the daily log change of the BRL/USD exchange rate
  - ξ_t is the (monetary/fiscal) policy surprise at policy announcement

- The object of interest is the sign of β_t and its evolution
  1. Identify fiscal regimes using narrative evidence:

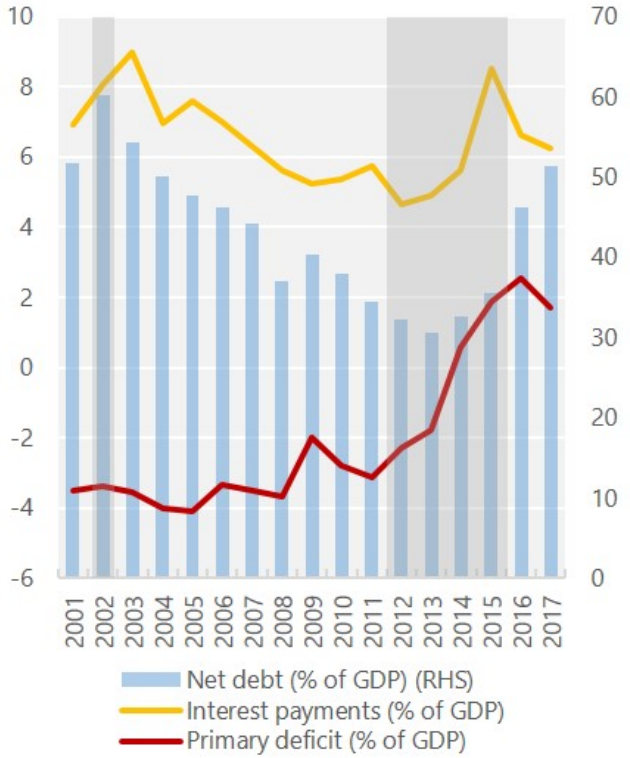
$$\beta_t = (1 - \mathbf{1}_t)\, \beta_R + \mathbf{1}_t \beta_N$$

     where $\mathbf{1}_t = 1$ during non-Ricardian regimes
  2. Unobserved fiscal regimes:

$$\beta_t = \beta\,(s_t)$$

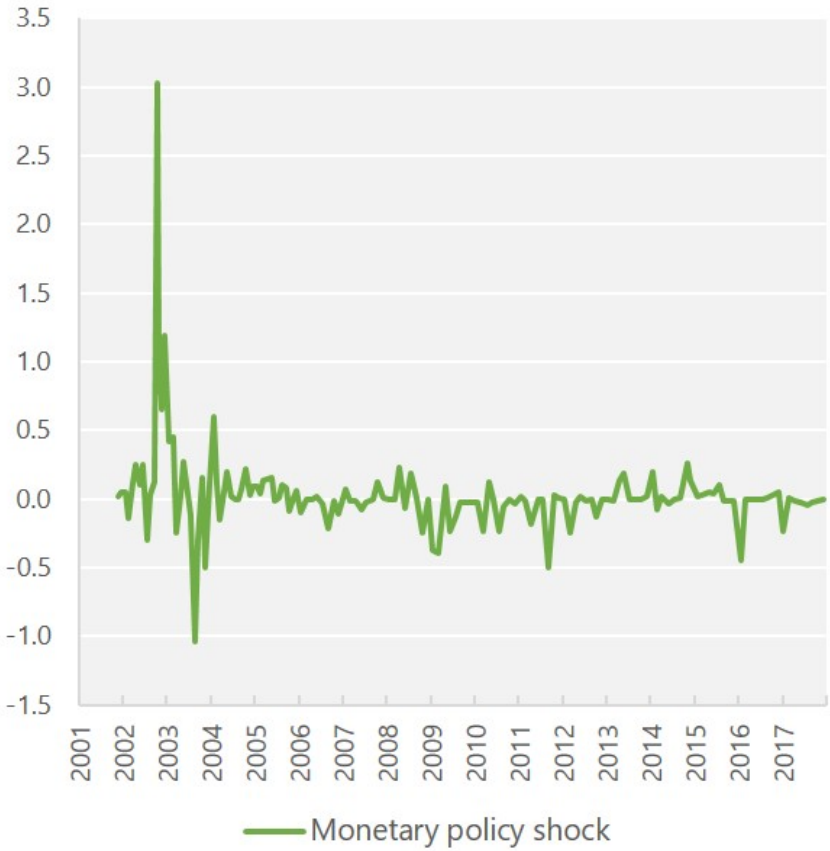
     where s_t is a hidden state that follows a two-state Markov chain

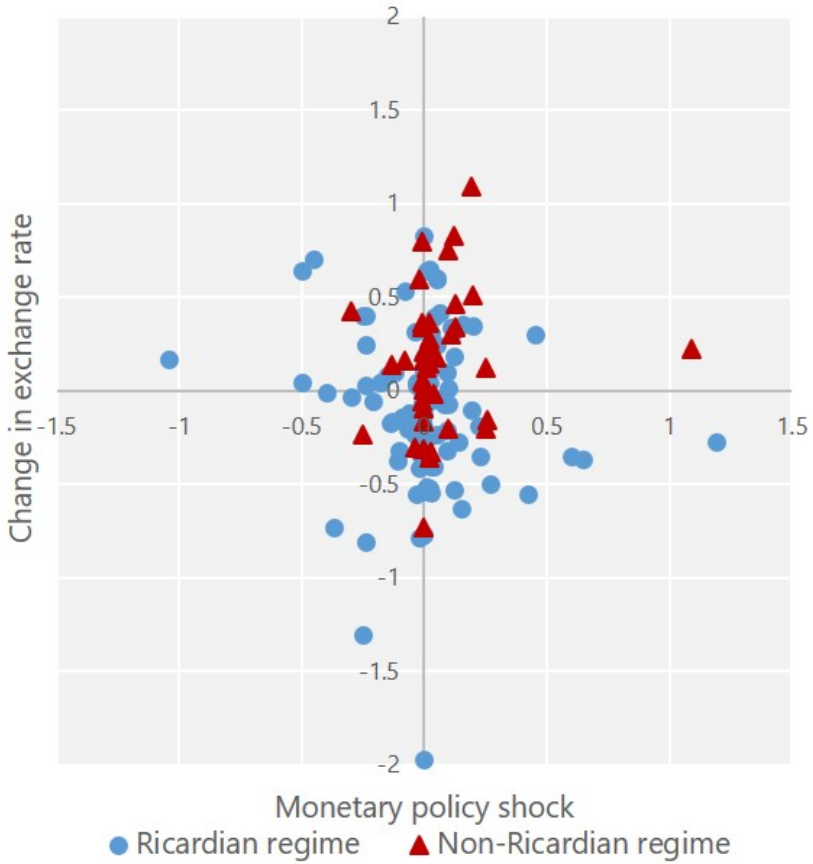
Non-Ricardian fiscal regimes



- Two episodes (exact dates using CDS spread dynamics):
  1. runoff to Lula election: Mar-Oct 2002
  2. uncontrolled fiscal expansion: Jan 2012-Dec 2015

Monetary policy shocks





- Announced minus avg expected (BCB survey) Selic target rate
- 147 interest rate decisions, from Nov 2001 to Dec 2017
  - decision distribution: 42 $\uparrow$, 50 $=$, 55 $\downarrow$
  - shock distribution: 71 $>$, 17 $=$, 59 $<$

Exchange rate response to MP shocks

	Unconditional		Fiscal regimes			
	(1)	(2)	(3)		(4)	
			R	N	R	N
Constant	-0.02	0.01	-0.09**	0.14**	-0.05	0.16***
	(0.03)	(0.03)	(0.04)	(0.06)	(0.04)	(0.06)
$i - \mathbb{E}[i]$	**0.14**	**0.14**	**-0.22**	**0.25*****	**-0.25****	**0.27*****
	(0.12)	**(0.12)**	**(0.13)**	**(0.04)**	**(0.12)**	**(0.04)**
Δ VIX		0.06*			0.06*	
		(0.03)			(0.03)	
Δ Comm. Prices		-0.07***			-0.07***	
		(0.03)			(0.03)	
Δ 2 year T-note		0.18			0.08	
		(0.68)			(0.64)	
Constant (diff.)			0.23***		0.21***	
			(0.07)		(0.07)	
$i - \mathbb{E}[i]$ **(diff.)**			**0.46*****		**0.52*****	
			(0.14)		**(0.12)**	
R^2	0.01	0.11	0.11		0.21	
No. of observations	147	147	147		147	

Note: Robust standard errors in parenthesis. Statistical significance at the 10%, 5% and 1% levels is denoted by *, **, and ***.

Markov-switching regression

- Empirical model

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Exchange rate response in the two regimes

		Monetary policy				Fiscal policy			
		(1)		(2)		(3)		(4)	
		State 1	State 2	State 1	State 2	State 1	State 2	State 1	State 2
Transition	State 1	0.95	0.05	0.96	0.04	0.95	0.05	0.97	0.03
matrix	State 2	0.06	0.94	0.06	0.94	0.07	0.93	0.08	0.92
Constant		-0.11	0.09	-0.06	0.14**	-0.12**	0.01	-0.07	-0.01
		(0.18)	(0.17)	(0.05)	(0.06)	(0.05)	(0.07)	(0.05)	(0.08)
policy shock		**-0.14**	**0.19**	**-0.21***	**0.23****	**-0.02**	**0.08*****	**-0.01**	**0.09*****
		(0.43)	**(0.39)**	**(0.13)**	**(0.09)**	**(0.02)**	**(0.02)**	**(0.02)**	**(0.02)**
Δ VIX				0.06*				0.13***	
				(0.03)				(0.03)	
Δ Comm. Prices				-0.07***				-0.04	
				(0.03)				(0.03)	
Δ 2 year T-note				0.02				1.37**	
				(0.72)				(0.70)	
Volatility		0.40		0.37		0.44		0.40	
		(0.05)		(0.03)		(0.03)		(0.03)	
Obs.		147				177			

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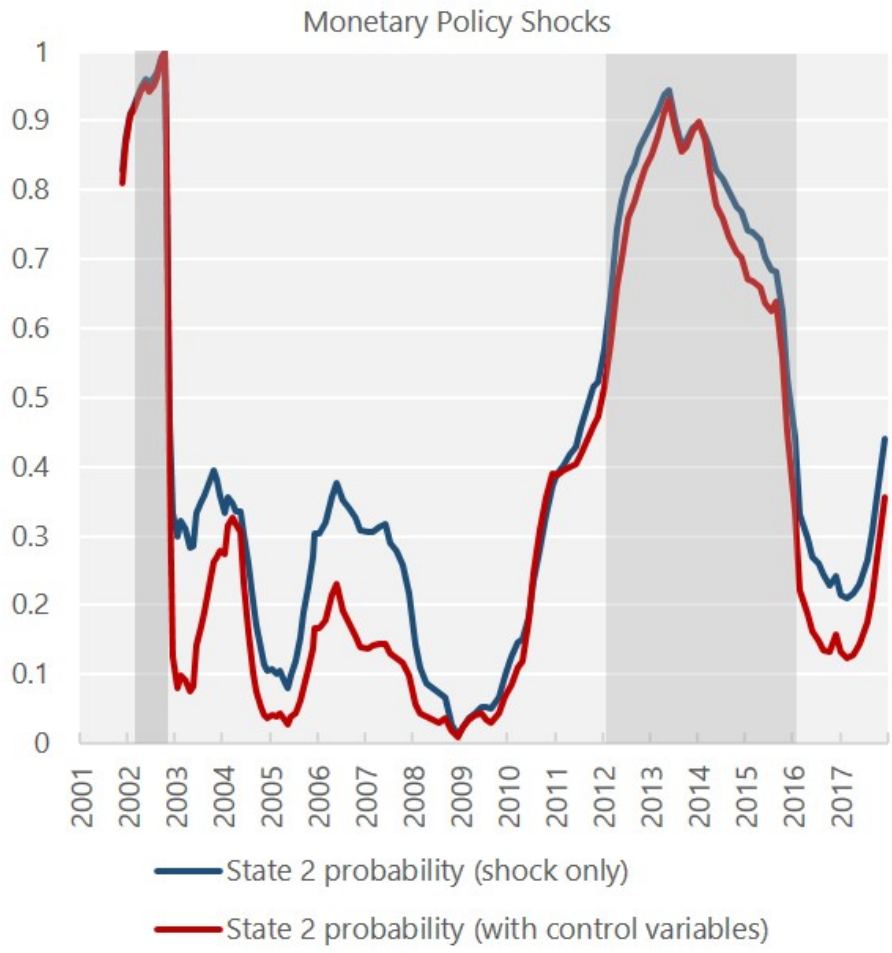
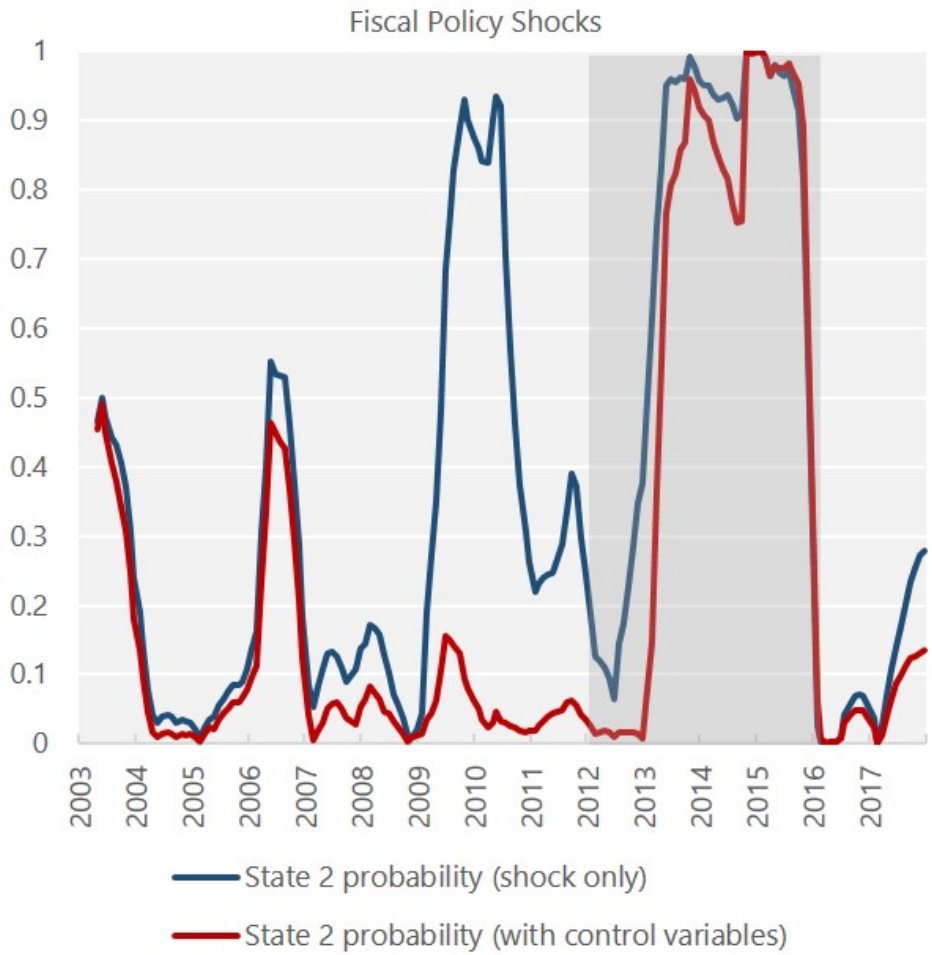
Estimated probabilities





The model

- Continuous-time NK-SOE model...
- Central bank: sets the interest rate at which households

$$i(t) = [\rho + (1 + \phi_\pi)\,\pi_H(t)] + \varepsilon_i(t)$$

where $\phi_\pi > 0 \implies$ monetary policy is always active

- Government: finances exogenous expenditure $G(t) = \varepsilon_g(t)$ and follows the fiscal rule

$$T(t) - \bar{T} = \psi_b^x \left(B(t) - \bar{B}\right)$$

where $B(t)$ is total real debt and x denotes the fiscal regime

1. $\psi_b^R >> 0 \implies$ Ricardian regime (passive fiscal policy)
2. $\psi_b^N \approx 0 \implies$ non-Ricardian regime (active fiscal policy)

Sovereign bonds and default

- The government issues two short-term (instantaneous) bonds:
  - Home-currency bond, pays the interest rate $i_H(t)$
  - Foreign-currency bond, pays the interest rate $i_F(t)$
- Complete financial markets integration
  - Home and Foreign investors can buy both bonds
- The government can default on its (total) debt
  - default is a stochastic event with endogenous probability $\eta(t)$
  - $\eta(t)$ is determined in equilibrium by the government budget constraint
- Upon default foreign investors are subject to higher haircuts
  - Domestic creditors recover a fraction χ of credits
  - Foreign creditors recover $\chi^* < \chi$

Exchange rate and default risk

- The (modified) uncovered interest parity condition

$$\mathbb{E}\left[\frac{d\mathcal{E}(t)}{\mathcal{E}(t)}\right] = i(t) - i^*(t) - (\chi - \chi^*)\,\eta(t)$$

- Default risk drives the currency excess return
  - an increase in $\eta(t)$ depreciates the exchange rate

- An increase in $\eta(t)$ raises sovereign bonds spreads
  - increase in $i_H(t)$ too low for foreign investors
  - increase in $i_F(t)$ too high for domestic investors

- Della Corte et al (2021): an increase in a country's CDS spread is accompanied by a depreciation of its currency [...] mainly driven by default expectations (rather than distress risk premia)

Equilibrium default probability

- The government defaults on its total debt
- Default is a stochastic event that follows a Poisson process with probability $\eta(t)$
- The intertemporal budget constraint of the government is

$$B(t) = \mathbb{E} \int_t^{\infty} e^{-\int_t^k (i(z) - \pi_H(z) - \xi(z)(\chi - \chi^*)\eta(z) + \ldots)dz} (T(k) - G(k))\, dk$$

- To solve, assume that default risk is proportional to debt:

$$\eta(t) = \max\left\{0, \eta^x \frac{B(t) - \bar{B}}{\bar{B}}\right\}$$

Monetary policy shocks - fixed fiscal regimes

Proposition

The elasticity of the exchange rate to the shock $\varepsilon_i(0) = \varrho\bar{\varepsilon}_i > 0$ *is*

- *in the Ricardian equilibrium*

$$\frac{e^R(0)}{\bar{\varepsilon}_i} = -1 + \frac{\kappa\omega\phi_\pi}{\kappa\omega\phi_\pi + \varrho(\rho+\varrho)}$$

- *in the non-Ricardian equilibrium*

$$\frac{e^N(0)}{\bar{\varepsilon}_i} = \frac{e^R(0)}{\bar{\varepsilon}_i} + \underbrace{\frac{\varrho(\rho+\varrho)\left(\rho-\psi_b^N\right)}{\kappa\omega\phi_\pi + \varrho(\rho+\varrho)} \frac{1-\iota+\frac{\kappa\omega\phi_\pi\frac{1-\alpha}{\rho+\varrho}-\rho}{\kappa\omega\phi_\pi(1-\alpha)+\alpha\rho^2}\frac{\kappa\omega\phi_\pi}{\rho+\varrho}}{\frac{\rho\xi\kappa\omega\phi_\pi}{\kappa\omega\phi_\pi(1-\alpha)+\alpha\rho^2}-\iota\left(\rho-\psi_b^N\right)}}_{\text{debt channel} > 0}$$

- Foreign-currency debt (ι) tends to amplify the response of the exchange rate in the non-Ricardian equilibrium

Monetary policy shocks - Markov-switching fiscal regimes

Proposition

Let $\psi_\pi^R = \psi_\pi^N = 1$, $\psi_b^N = 0$, $\psi_b^R \downarrow \rho$, *and* $\iota = 0$. *Then the elasticity of the exchange rate to the shock* $\varepsilon_i(0) = \varrho\bar{\varepsilon}_i > 0$ *in the MS model is*

$$\frac{e^R(0)}{\bar{\varepsilon}_i} = \left.\frac{e^R(0)}{\bar{\varepsilon}_i}\right|_{\sigma^N=0} + \sigma^N \Xi$$

and

$$\frac{e^N(0)}{\bar{\varepsilon}_i} = \left.\frac{e^N(0)}{\bar{\varepsilon}_i}\right|_{\sigma^R=0} - \sigma^R \Xi$$

where $e^x(0)/\bar{\varepsilon}_i|_{\sigma^{-x}=0}$ *is the response of the exchange rate in regime* $x \in \{R, N\}$ *in the deterministic model.*

Conclusion

- Study BRL/USD daily movements around monetary (fiscal) policy announcements and find evidence of two regimes
- In response to a contractionary monetary (expansionary fiscal) shock, the domestic currency tends to
  - appreciate in normal times
  - depreciate during periods of fiscal distress
- We rationalize these fact with a sovereign default model featuring
  - stochastic fiscal regimes
  - asymmetric recovery rates between domestic and foreign investors
- Sovereign risk drives the currency excess return.
  $\Longrightarrow$ domestic policies affect the exrate through debt sustainability