The Portfolio Channel of Capital Flows: A Small Open Economy Approach

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Contents

Motivation

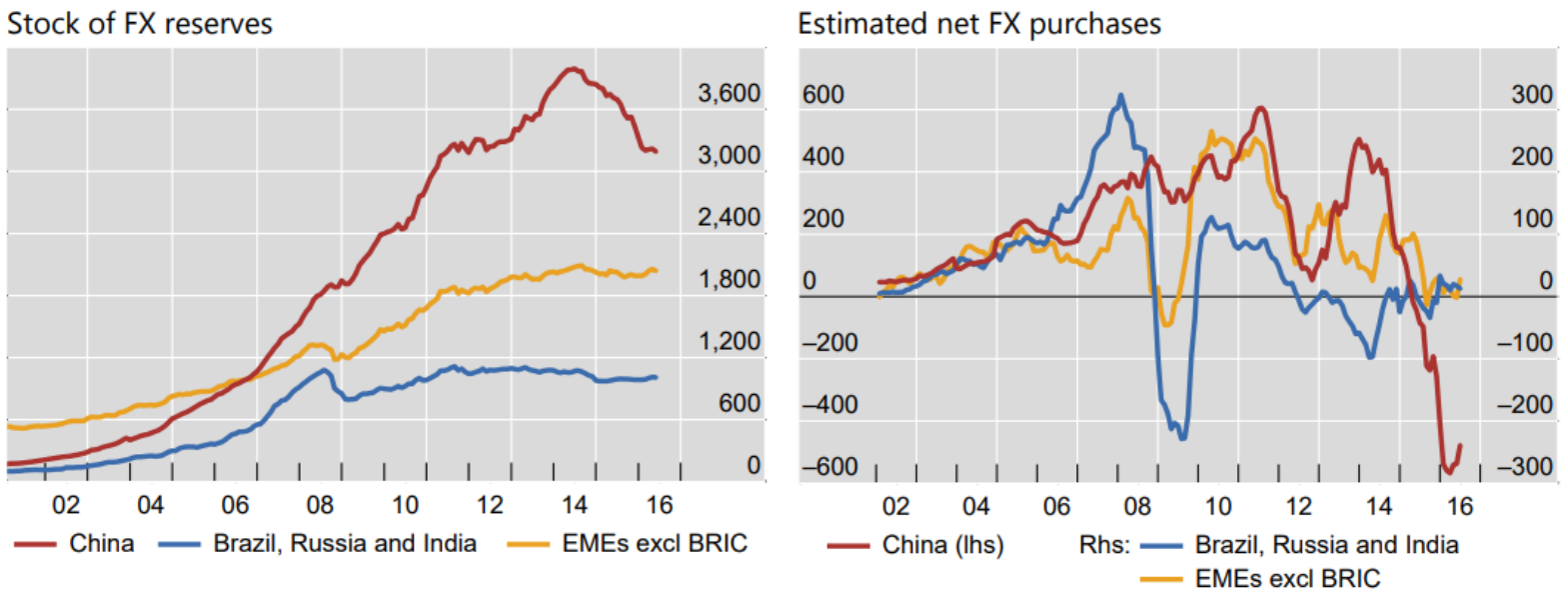
- Exchange rate determination has been one of the major puzzles in International Macroeconomics.
  - Meese & Rogoff (1983): Asset price models fail to explain variations in exchange rates.
  - Meese (1990): The proportion of exchange rate fluctuations that current economic models can predict is essentially zero.
- Microestucture Approach: Evans & Lyons (2002), Payne (2003) find a strong positive between order flow and returns in the FX market.
- Breedon & Vitale (2010) show that the order flow impacts in the returns of the exchange rate through portfolio and and information channels.

Motivation (2)

- *Microstrucure in th FX Market*
  - Lyons (1997), Evans & Lyons (2004), Bacchetta & van Wincoop (2006), Hau & Rey (2006), Breedon & Vitale (2010) present models on information and liquidity.
- *FX Intervention*
  - Vitale (2011): FXI model with a *signalling* a a portfolio channel.
  - Vitale (2003): FXI and monetary policy model.
- None of these models is full-scale SOE NK-DSGE model.

Motivation (3)

Figure 1: FX Intervention - Selected Countries (2002 - 2016)



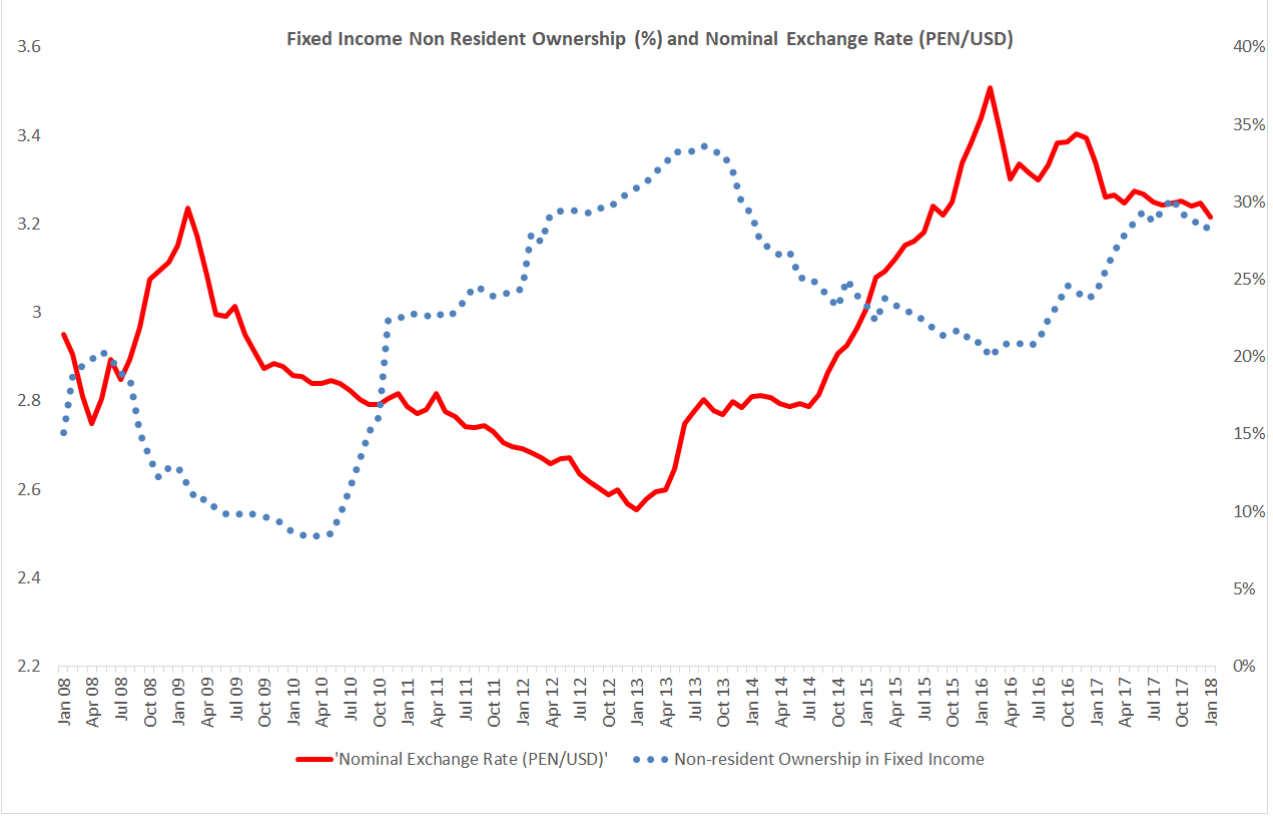
Source: Domanski, Kohlscheen & Moreno (2016)

Motivation (4)

- The workhorse SOE NK-DSGE used by central banks for policy analysis regularly assumes that the exchange rate is determined by a UIP condition and that the foreign position for domestic currency bonds is zero.
- We observe in the data that the position of non-resident investors in domestic currency bonds shows a strong correlation with the exchange rate.

Motivación (5)

Figure: Non-Resident Investor Holdings in Fixed Return Market and Nominal Exchange Rate (PEN/USD)



Source: BCRP

Motivation (6)

Questions that we need to address

- How does portfolio changes affect the economy?
- How does FXI operates?
- What are the channels?
- What is the optimal monetary and FXI policy design?
- Do results change when we move from partial equilibrium to a fully scale SOE NK-DSGE model?

What has it been done?

FXI in DSGE Models:

- Montoro & Ortiz (2013), Benes et al. (2015), Vargas et al. (2013), Escudé (2012), Blanchard et al. (2015); Cavallino (2015); Engle (2011); Adler, Lama & Medina (2016); Fanelli & Straub (2016); Gabaix & Maggiori (2015), Chang (2018); Itskhoski & Muhkin (mimeo).

What do we do?

1) **Extend the standard NK SOE DSGE model to incude:**

- A market of FX dealers.
- An explicit role for FX volatility.
- An explicit role for Non-Resident portfolio holdings.
- An interaction between monetary and FXI policies.

What do we find? (ongoing)

Porfolio shocks...

- impact FX markets and are transmitted to the rest of the economy.
- though the portfolio channel has an additional stabilization role through the current account.

FX intervention...

- Is a useful instrument for the stabilization of the economy.
- The stabilization role goes beyond offsetting the portfolio shocks.
- There are important interactions between monetary and FXI policies.

The Model

- NK-SOE DSGE with an FX market composed by risk averse dealers.
- Each *dealer* d pays the domestic interest rate i_t for the household assets for one period (myopic) and invest in foreign and domestic assets. *Dealers* maximize:

$$\max_{\varpi_t^{\iota,d,*}} -E_t e^{-\gamma \Omega_{t+1}^{\iota}}$$

where E_t is the rational expectations operator, γ is the absolute risk aversion coefficient. Ω_{t+1}^{ι} is the total return in domestic currency of the portfolio, given by:

$$\begin{aligned}
\Omega_{t+1}^{\iota} &= (1+i_t)\varpi_t^{d,\iota} + (1+i_t^*)S_{t+1}\varpi_t^{\iota,*,d} - (1+i_t)\left[A_t^{\iota,S}\right] \\
&= (1+i_t)\varpi_t^{\iota,d} + (1+i_t^*)S_{t+1}\varpi_t^{\iota,*,d} - (1+i_t)\left[\varpi_t^{\iota,d} + S_t\varpi_t^{\iota,*,d}\right] \\
&\approx (i_t^* - i_t + s_{t+1} - s_t)\varpi_t^{\iota,*,d}
\end{aligned}$$

The Model (2)

- Each individual dealer d demand for foreign currency is given by:

$$\varpi_t^{\iota,d*} = \frac{i_t^* - i_t + E_t s_{t+1} - s_t}{\gamma \sigma^2}$$

where $\sigma^2 = var_t\left(\Delta s_{t+1}\right)$ is the unconditional variance of the exchange rate. We assume this variance as a constant, determined by the volatility of shocks and the FXI policy.

- Aggregating across dealers we obtain a modified UIP condition:

$$E_t s_{t+1} - s_t = i_t - i_t^* + \gamma \sigma^2 (B_t^{d,*})$$

The Model (3)

- Non-resident investors (or carry traders) will have an exogenous demand for domestic bonds.

$$B_t^c + S_t B_t^{*,c} = 0$$

where:

$$B_t^{c,*} = \left(B_{t-1}^{c,*}\right)^{\rho_{bc,*}} \exp(\varepsilon_t^{b^{c,*}})$$

- The non resident investors will requiere to increase the supply of foreign currency instruments to increase their domestic currency portfolio.

Central Bank

- We introduce a Central Bank, which intervenes in the FX market (in addition to its inflation stabilization role.) The balance sheet of the Central Bank is given by:

$$S_t B^{cb,*} + B_t^{cb} = M_t^s + NW_t^{cb}$$

- where $B_t^{cb,*}$ represents the NIR and B_t^{cb} are the bonds issued by the central bank. M_t^s is the money supply and NW_t^{cb} represents the Central Bank's net worth. Its flow constraint is given by:

$$B_{t+1}^{cb} + S_{t+1} B_{t+1}^{cb,*} - M_{t+1}^s + P_t \Gamma_t^{cb} = (1+i_t^{cb}) B_t^{cb} + (1+i_t^{cb,*}) S_{t+1} B_t^{cb,*} - M_t^s$$

  where Γ_t^{cb} are the transfers to families.

- We abatract from central bank's net worth and money supply and assume:

$$B_t^{cb} + S_t B^{cb,*} = 0$$

- Thus, when the centrla bank sells foreign instruments, it will do so against domestic currency ones, sterilizing all FXI.

Bond Market Equilibrium and the Current Account

- Domestic bonds market equilibrium:

$$B_t^d + B_t^{cb} + B_t^c = 0.$$

- Holdings of foreign currency bonds by dealers (families) are determiend by the current account (log-linearized):

$$\phi_b \left(b_t - \beta^{-1} b_{t-1}\right) + \phi_{b^{cb}} \left(b_t^{cb} - \beta^{-1} b_{t-1}^{cb}\right) + \phi_{b^*} \left(rer_t + b_t^* - \beta^{-1} b_{t-1}\right) + \ldots$$
$$\ldots + \phi_{b^{*,cb}} \left(rer_t + b_t^{*,cb} - \beta^{-1} b_{t-1}\right) =$$
$$= t_t^{def} + y_t - \phi_C c_t + \frac{\phi_b + \phi_{b^{cb}}}{\beta} \left(i_{t-1} - \pi_t\right) + \frac{\phi_{b^*} + \phi_{b^{*,cb}}}{\beta} \left(i_{t-1}^* + rer - \pi_t^*\right)$$

FX Intervention

- "Discretion" benchmark:

$$B_t^{*cb} = \varepsilon_t^{cb,0}$$

- Nominal exchange rate rule:

$$B_t^{*cb} = -\phi_{\Delta s}\Delta s_t + \varepsilon_t^{cb,1}$$

- Reaction to Portfolio shocks:

$$B_t^{*cb} = -\phi_{rer} rer_t + \varepsilon_t^{cb,2}$$

Other equations of interest

- Aggregate demand (y_t)

$$y_t = \phi_C(c_t) + \phi_X(x_t) - \phi_M(m_t) + g_t \tag{1}$$

- Real exchange rate (rer_t)

$$rer_t = rer_{t-1} + \Delta s_t + \pi_t^* - \pi_t \tag{2}$$

- Total CPI (π_t):

$$\pi_t = \psi \pi_t^H + (1 - \psi)\, \pi_t^M + \mu_t \tag{3}$$

Other equations of interest (2)

- Domestic goods Phillips Curve (π_t^H):

$$\pi_t^H = \kappa_H \left(mc_t - t_t^H \right) + \beta E_t \pi_{t+1}^H \tag{4}$$

- Imported Goods Phillips Curve (π_t^M):

$$\pi_t^M = \kappa_M mc_t^M + \beta E_t \pi_{t+1}^M \tag{5}$$

- Exported Goods Phillips Curve (π_t^X)

$$\pi_t^X = \kappa_X mc_t^X + \beta E_t \pi_{t+1}^X \tag{6}$$

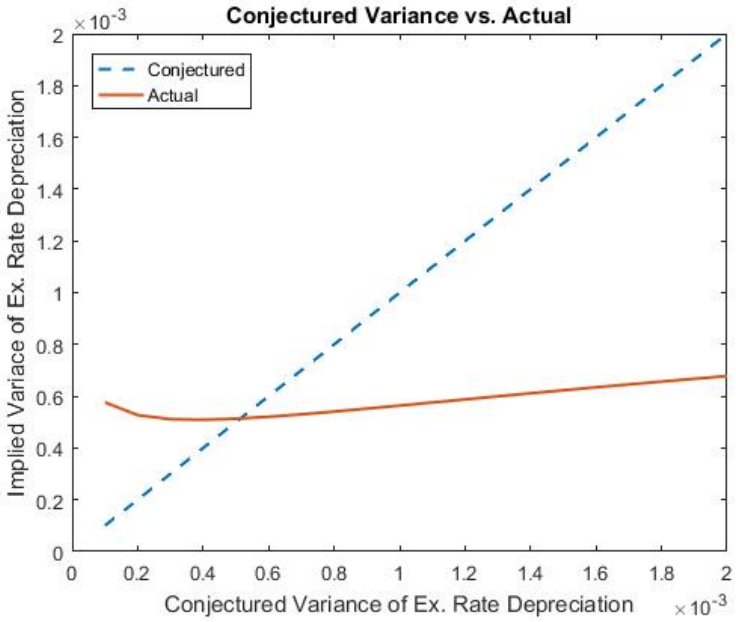
- Taylor Rule (i_t)

$$\hat{\imath}_t = \varphi_\pi(\pi_t) + \varphi_y(y_t) + \varepsilon_t^{int} \tag{7}$$

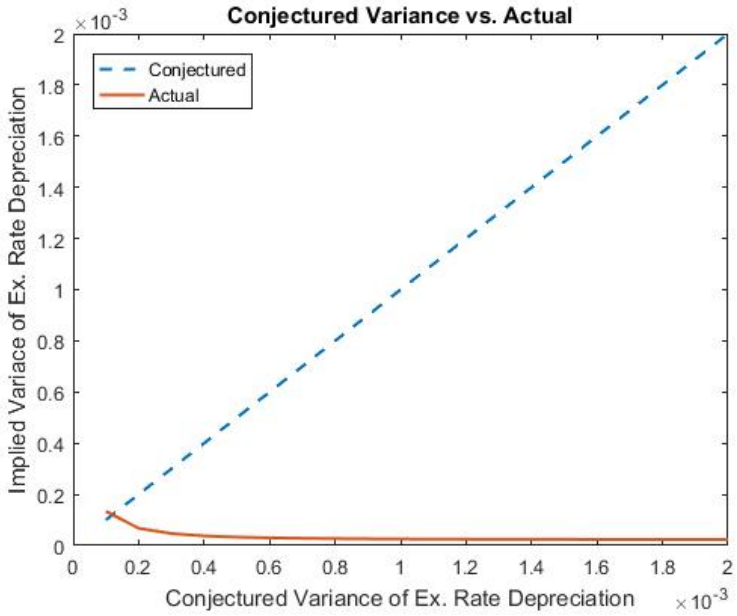
Baseline Calibration

Parameter	*Value*	*Description*
β	0.9975	Consumers time-preference parameter.
χ	0.5	Labour supply elasticity.
γ_c	1	Risk aversion parameter.
ε	0.75	Elast. of subst. btw. home and foreign goods.
ε_F	0.75	Elast. of subst. btw. exports and foreign goods.
ψ	0.6	Share of domestic tradables in domestic consumption.
θ_H	0.75	Domestic goods price rigidity.
θ_M	0.5	Imported goods price rigidity.
θ_X	0.5	Exported goods price rigidity.
ψ_b	0.01	Portfolio adjustment costs.
φ_π	1.5	Taylor rule reaction to inflation deviations.
γ	500	Absolute risk aversion parameter (dealers)
ϕ_ϖ	0.5	Net asset position over GDP ratio
ϕ_C	0.c	Consumption over GDP ratio
σ_x	0.01	S.D. of all shocks x
ρ_x	0.5	AR(1) coefficient for all exogenous processes
ϕ_{b^d}	0.1	Households domestic bonds over GDP ratio
$\phi_{b^{cb}}$	0.1	Central Bank outstanding bonds over GDP ratio
$\phi_{b^{c,*}}$	0.2	Non-resident domestic bonds holdings over GDP ratio

Results (1) - Equilibrium

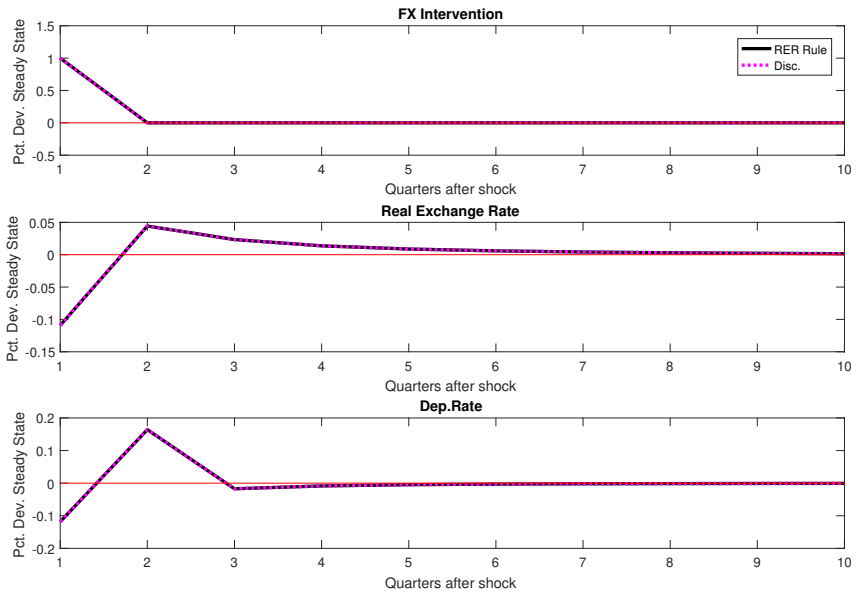


(a) No Intervención

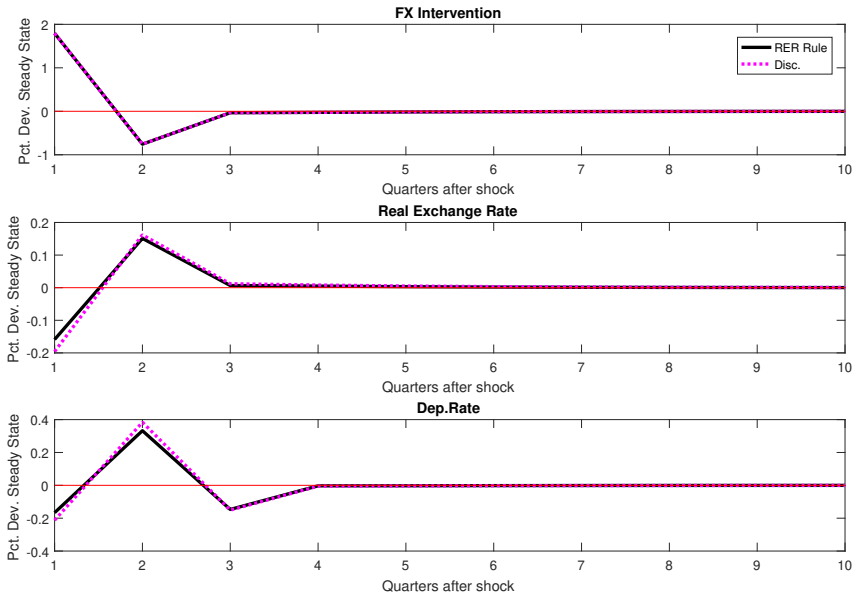


(b) Intervención ($\varphi_{\Delta s} = 10$)

Results (2) - Rules vs. "Discrection")

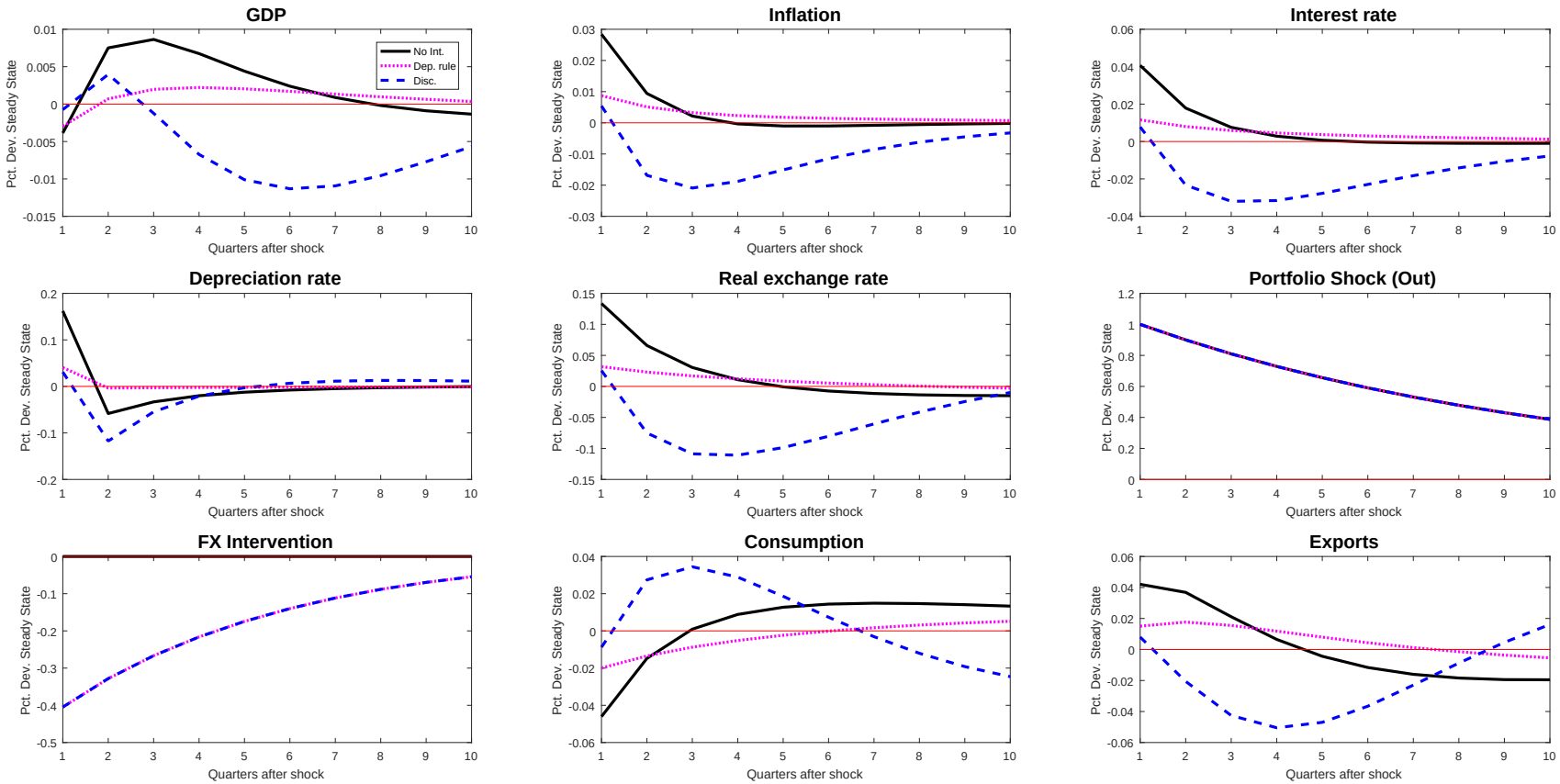


(c) Int. Rule 1



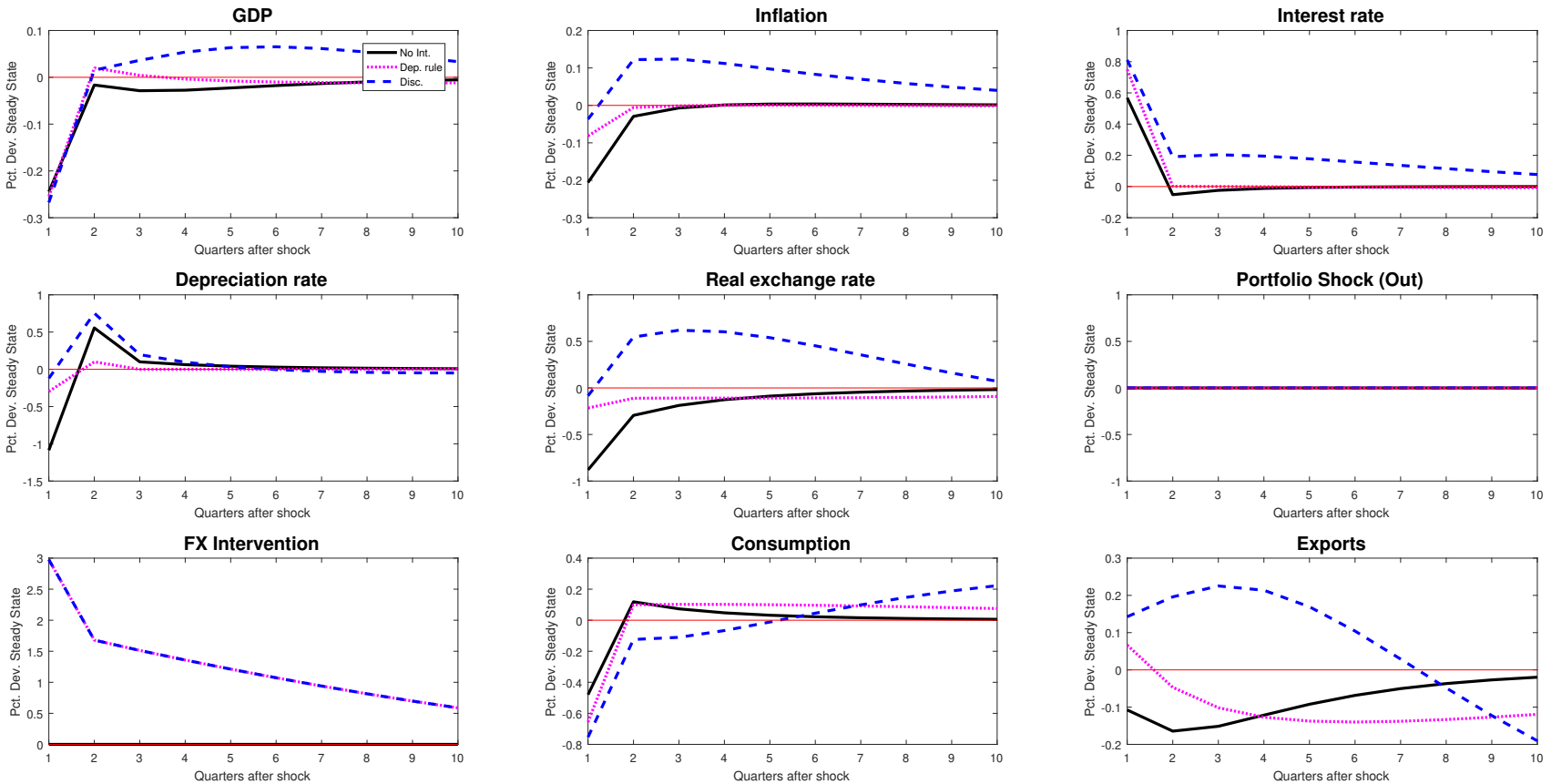
(d) Int. Rule 2

Results (3) - Rules vs. "Discretion" (Portfolio Shock)



(e) Int. Rule 1

Results (4) - Monetary Policy under rules (Interaction)

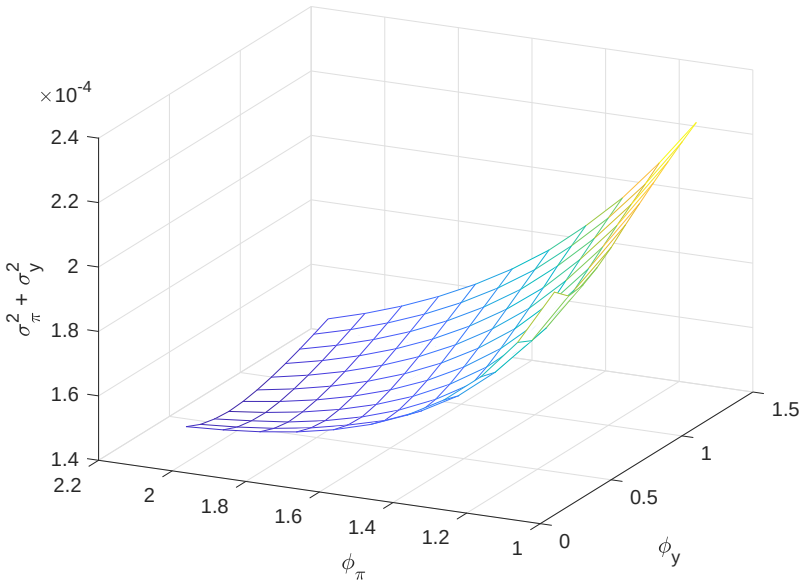


(f) Int. Rule 1

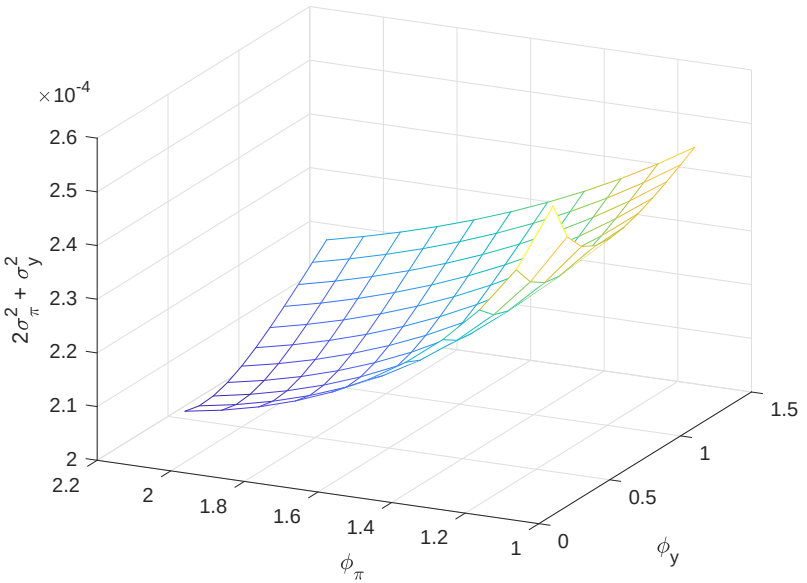
Results (5) - Optimality (ongoing)

- FXI impacts the economy in the expected direction: A forieng currency purchase by the CB generates a depreciation...
  - though, we are silent reagarding optimality.
- As a first approximation to the problem we generate a grid over Taylor rule paremeters (φ_y, φ_π) and FXI reaction ($\varphi_{\Delta s}$).
- Notice that exchange rate equilibrium volatility will vary with each set of paremeters, thus an "equilibrium" vale for the volatility must be reach in each point of the grid in the space $\left(\varphi_y,\ \varphi_\pi,\ \varphi_{\Delta s}\right)$

Results (6) - Optimality



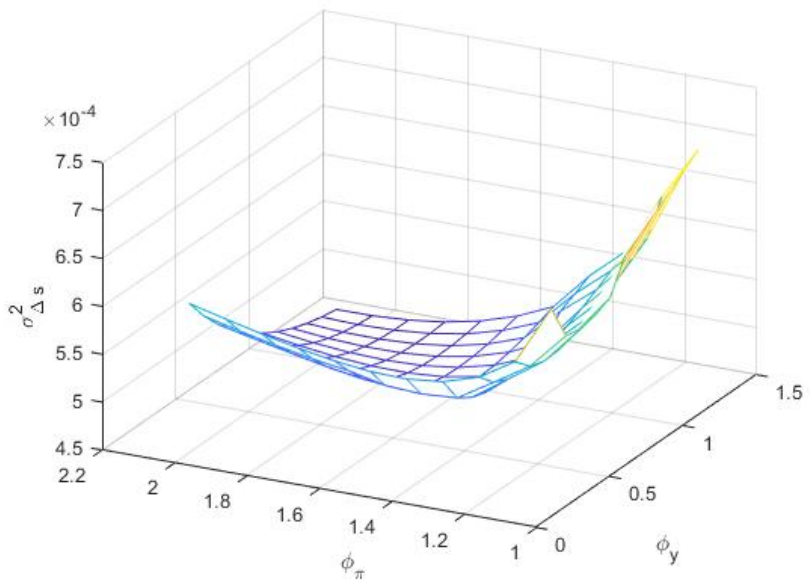
(g) No Int.



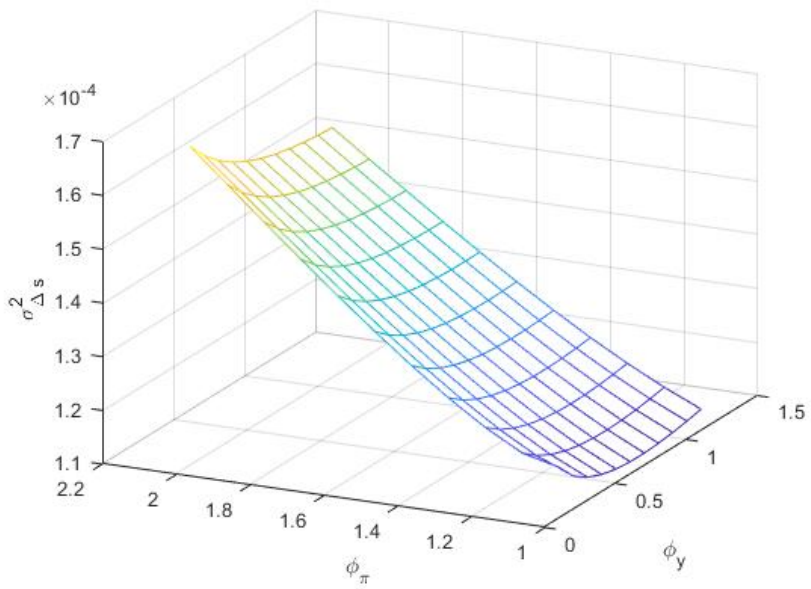
(h) Dep rule

Note: Figure shows the value of an ad hoc loss function for the Central Bank of the form $\mathcal{L} = 2 \times \sigma_\pi^2 + \sigma_y^2$ *for different values of parameters in the monetary policy function ruling the central bank's reaction to inflation* (ϕ_π) *and the output gap* (ϕ_y).

Results (7) - Optimality



(i) No Int.



(j) Dep rule

Note: Figure shows the equilibrium variance of the exchange rate ($\sigma^2_{\Delta s}$) for each combination of the Taylor rule parameters depicted in the respective upper figure.

Conclusions and Future Agenda

- We present an alternative model of exchange rate determination in general equilibrium that can be useful:
  - to explain certain *puzzles* in the literature of the New Open Economy Macroeconomics.
  - for policy analysis (central banks).
- Our results for FXI in general equilibrium show:
  - Effective as an instrument in face of financial shocks, but not so much in face of of real shocks or nominal external shocks;
  - FX intervention rules can have stronger stabilisation power than discretion as they exploit the expectations channel;

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Conference on Financial Stability and Sustainability

A discussion for “The Portfolio Channel of Capital Flows: A Small Open Economy Approach” by Ortiz and Montoro

Jorge Sabat

Finance Department

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The view on exchange rate interventions has evolved over time…

. . . it would do little harm for a government agency to speculate in the exchange market provided it held to the objective of smoothing out temporary fluctuations and not interfering with fundamental adjustments. And there should be a simple criterion of success—whether the agency makes or loses money. [MILTON FRIEDMAN 1953]

Taylor, D. (1982). Official intervention in the foreign exchange market, or, bet against the central bank. *Journal of Political Economy*, *90*(2), 356-368.

…from currency pegs, to fully flexible exchange rates, to macroprudential policy

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Economics

BIS Suggests Interventions, Regulation for Tackling Hot Money

By Anna Andrianova and Catherine Bosley
30 de junio de 2019 5:30 GMT-5

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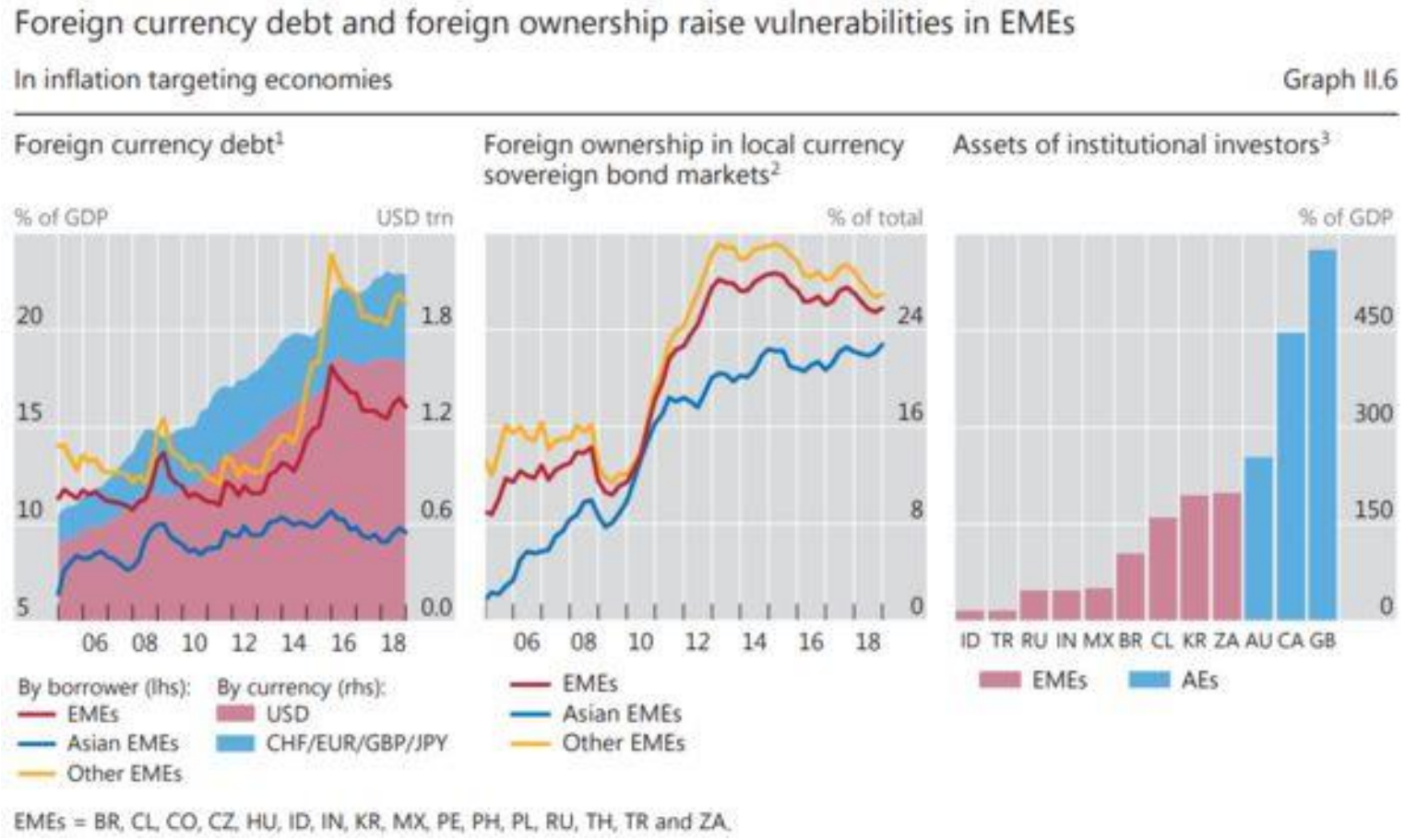
Foreign exchange interventions and macroprudential policy are tools available to emerging-market central banks for coping with hot money flowing through their economies, according to the Bank for International Settlements.

Exchange rate fluctuations

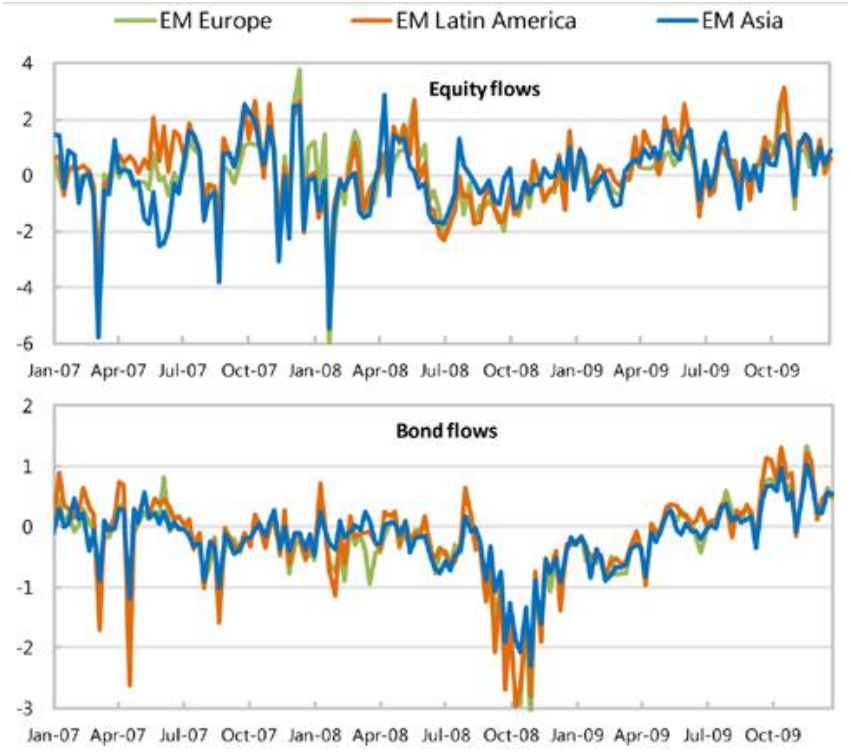
- The importance of the portfolio channel is well-recognized by practioners:

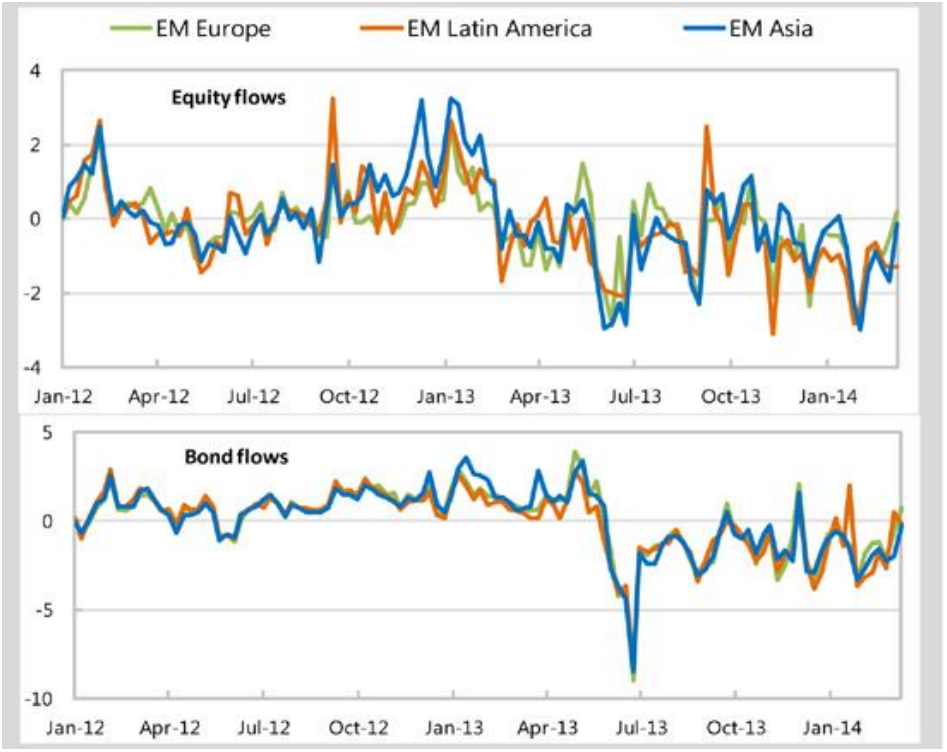
BIS arguments are closely related to the portfolio channel



Central Banks track outflows on a weekly basis

Z-score weekly fund flows (2007-2014)





Source: EPFR database, IMF staff calculations.

What does this paper do?

- Theoretically confirm the importance of the portfolio channel on FX markets interventions:
  - Portfolio channel can help to explain UIP deviations;
  - Portfolio and foreign interest rate shocks can be smoothed by FX interventions;
  - FX shocks coming from foreign inflation or output are not easily smoothed by Central Bank interventions;

The main mechanism to produce the results

- Adding a microstructure layer of FX dealers in the macroeconomic model:
  - FX dealers portfolio choice produces an endogenous risk premium;
  - FX interventions affects exchange rate trough the portfolio channel, volatility channel, and the expectations channel;

Sugestions

- Highlight the novelty of your paper with respect to Gabaix and Maggiori (2015):
  - Is trying different interventions rules the main contribution?;
- Applying simulated method of moments for structural estimation?;
- Add (or cite) evidence on sterilized intervention effectiveness:
  - Classification of financial versus fundamental shocks, Fornari, Stracca & Refet (2012);
- A robustness check? How your results change if a more sophisticated FX trader, a la Amat, Michalsky, and Stolz (2018), is in the FX market?