Macroprudential considerations on the exchange rate

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*The views expressed here are those of the author and not necessarily those of the Bank for International Settlements.

Two papers on macroprudential dimension of exchange rates

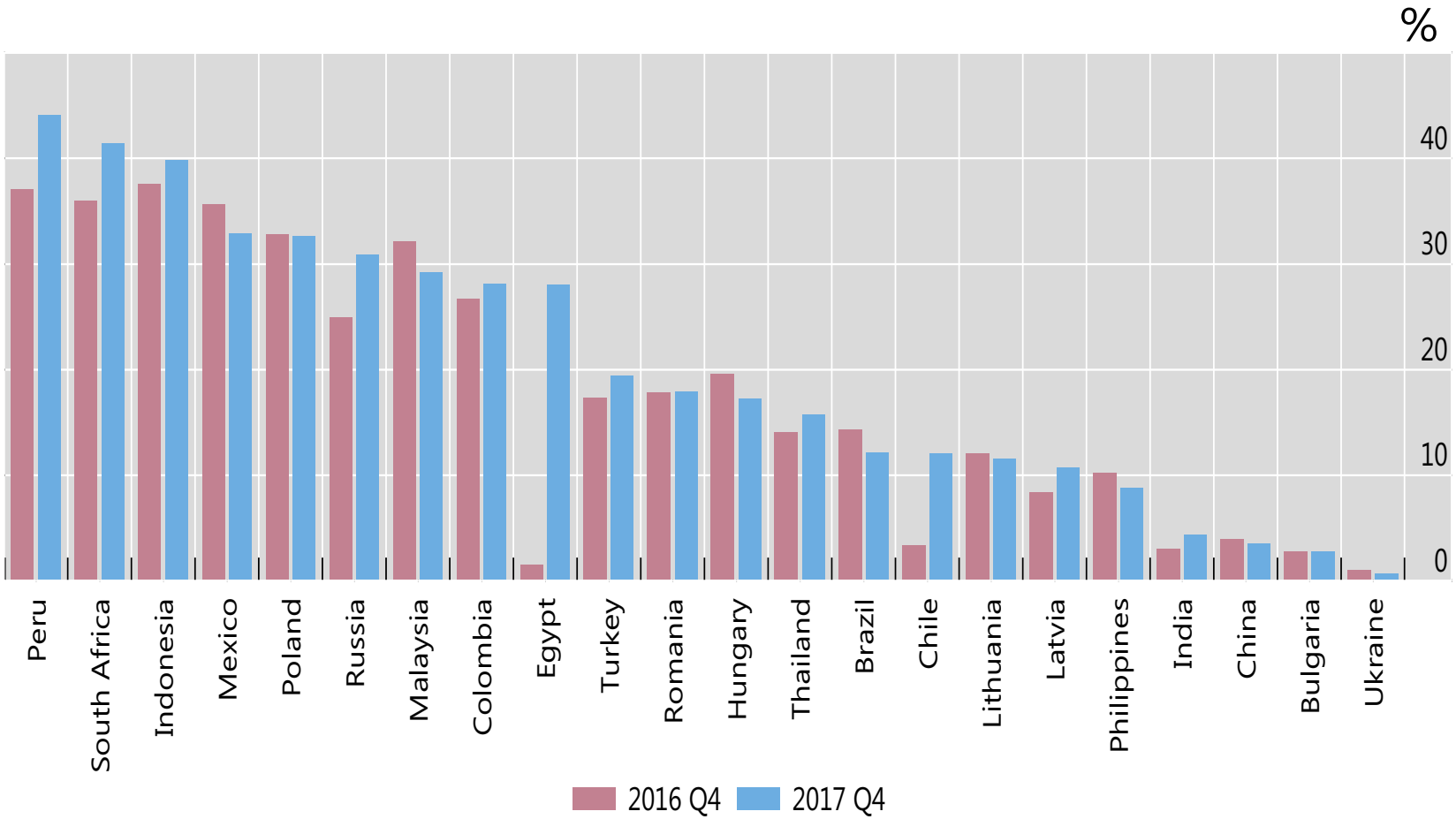
- "FX intervention and domestic credit: Evidence from high-frequency micro data" Hofmann, Shin and Villamizar-Villegas
  - BIS Working Paper 774 https://www.bis.org/publ/work774.htm

- "Bond risk premia and the exchange rate", Hofmann, Shim and Shin
  - BIS Working Paper P775 https://www.bis.org/publ/work775.htm

"Original Sin Redux"

(Carstens and Shin, *Foreign Affairs*, 15 March 2019)

Non-resident holdings of EME local currency sovereign bonds

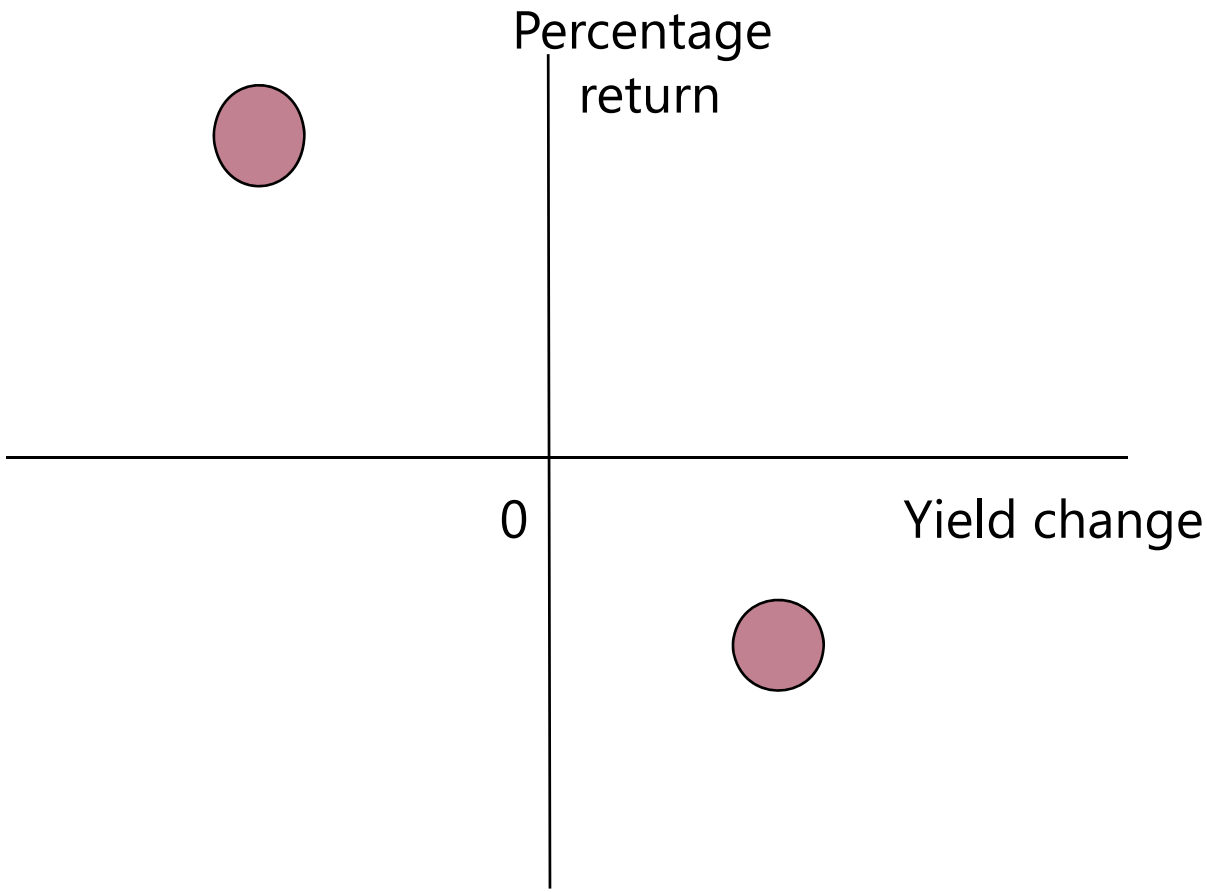


Source: World Bank

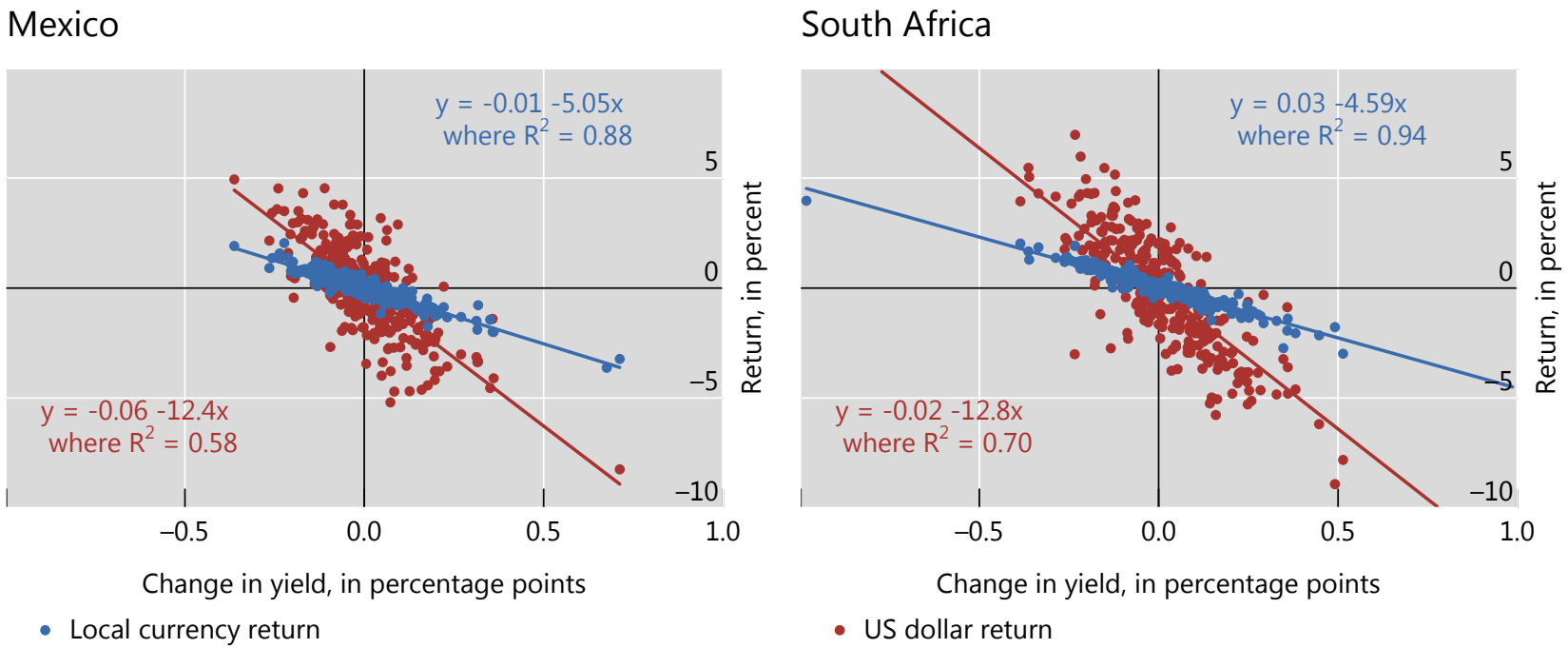
Two duration measures

$$\text{Duration} = -\frac{dP/P}{dr}$$

- Compare duration measures with:
  - Percentage return in local currency terms
  - Percentage return in dollar terms


Percentage
return
0
Yield change

EMEs local currency sovereign bond returns[1], January 2013 – October 2018

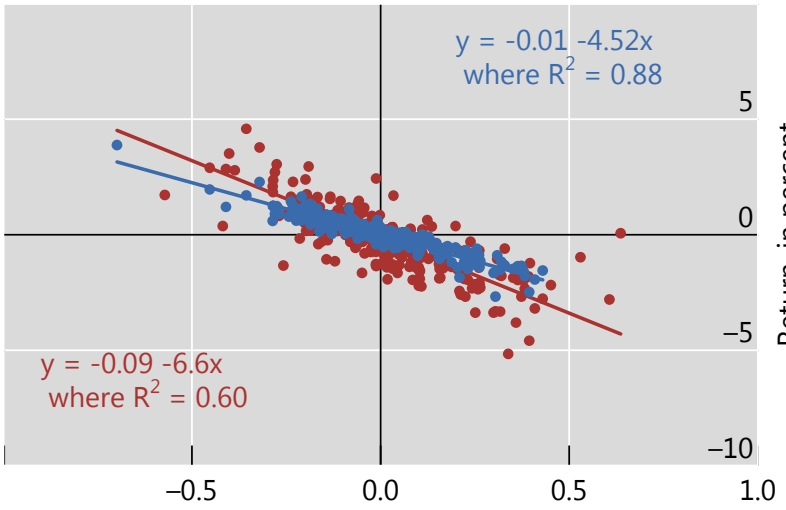


[1]Total return on bonds denominated in local currency as weekly change in JPMorgan GBI-EM principal return index in local currency and US dollar.

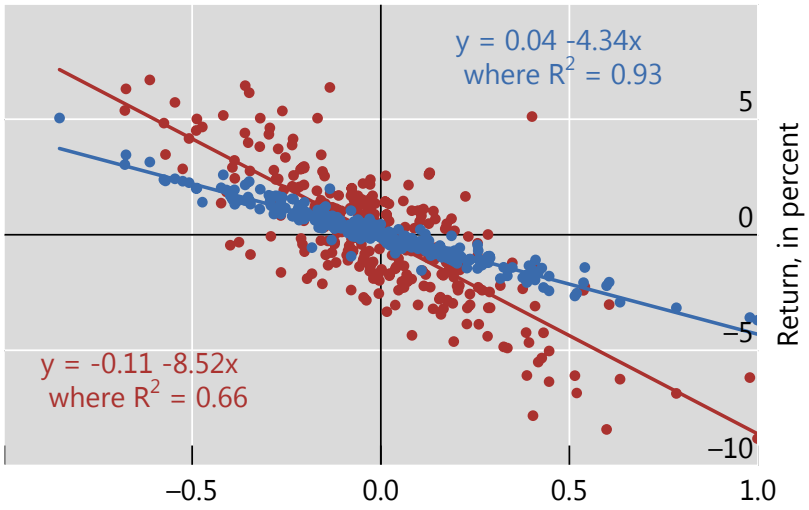
Sources: JPMorgan Chase; BIS calculations.

EMEs local currency sovereign bond returns[1], January 2013 – October 2018

Indonesia



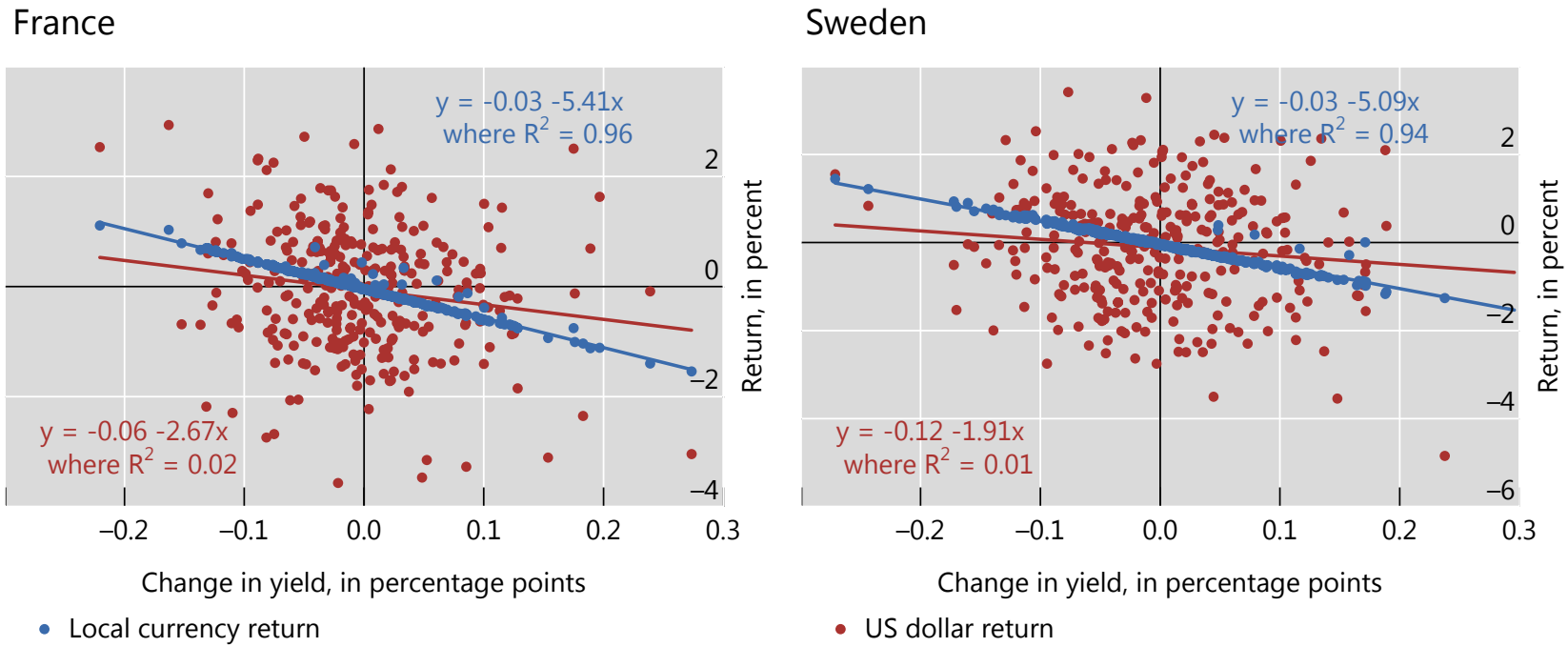
Brazil



[1]Total return on bonds denominated in local currency as weekly change in JPMorgan GBI-EM principal return index in local currency and US dollar.

Sources: JPMorgan Chase; BIS calculations.

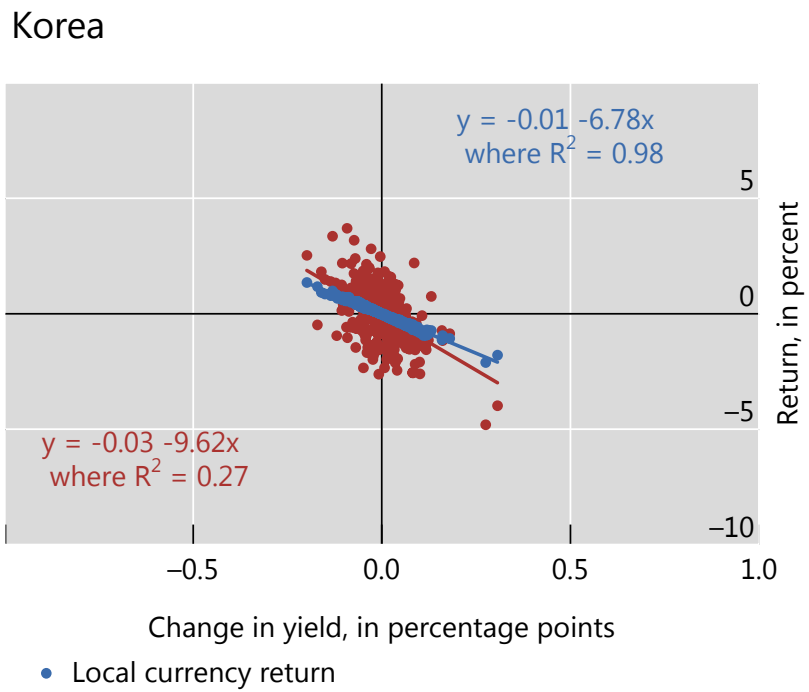
Advanced economies sovereign bond returns[1], January 2013 – October 2018

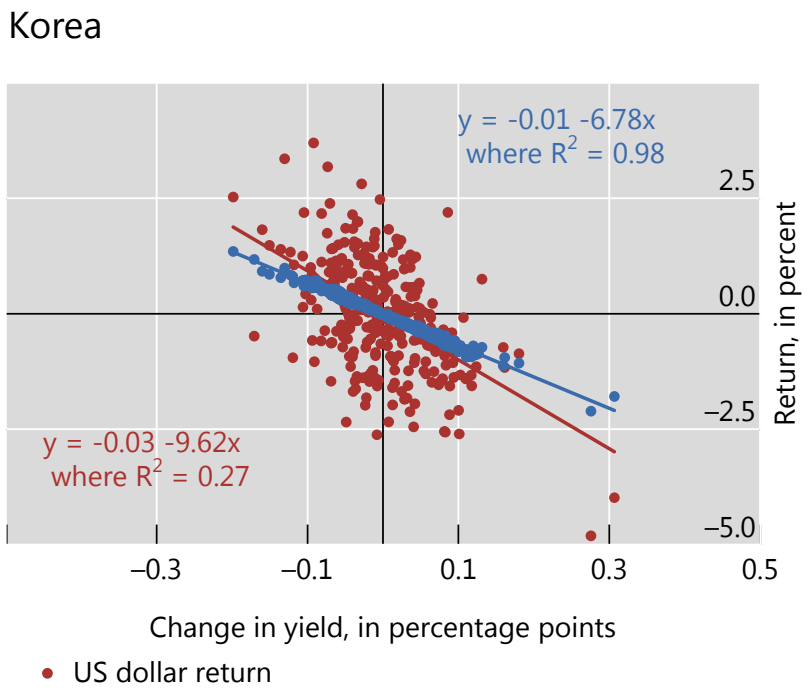


[1] GBI Global Country 5 to 7 year maturity indices for the selected economies.

Sources: JPMorgan Chase; BIS calculations.

KRW sovereign bonds[1], January 2013 – October 2018





[1]Total return on bonds denominated in local currency as weekly change in JPMorgan JADE Index principal return index in local currency and US dollar.

Sources: JPMorgan Chase; BIS calculations.

Three spread measures

- Local currency bond spread over US treasuries
- Dollar-denominated bond spread over US treasuries
- Du-Schreger spread
  - Local currency bond spread over (US treasuries + swap rate)
  - Interpretation as local currency spread achievable by a dollar-based investor who locks in exchange rate at outset

Impulse-responses using local linear projections

- Panel analysis in daily frequency using exchange rate shocks (changes on days of Fed and ECB monetary policy news)

- Local linear projection (LLP) approach (Jorda (2005))

$$s_{i,t+h} - s_{i,t-1} = \alpha_i + \rho \Delta s_{i,t-1} + \beta \Delta BER_{i,t-1} + \Gamma Z_{i,t-1} + \eta_{i,t+h}$$

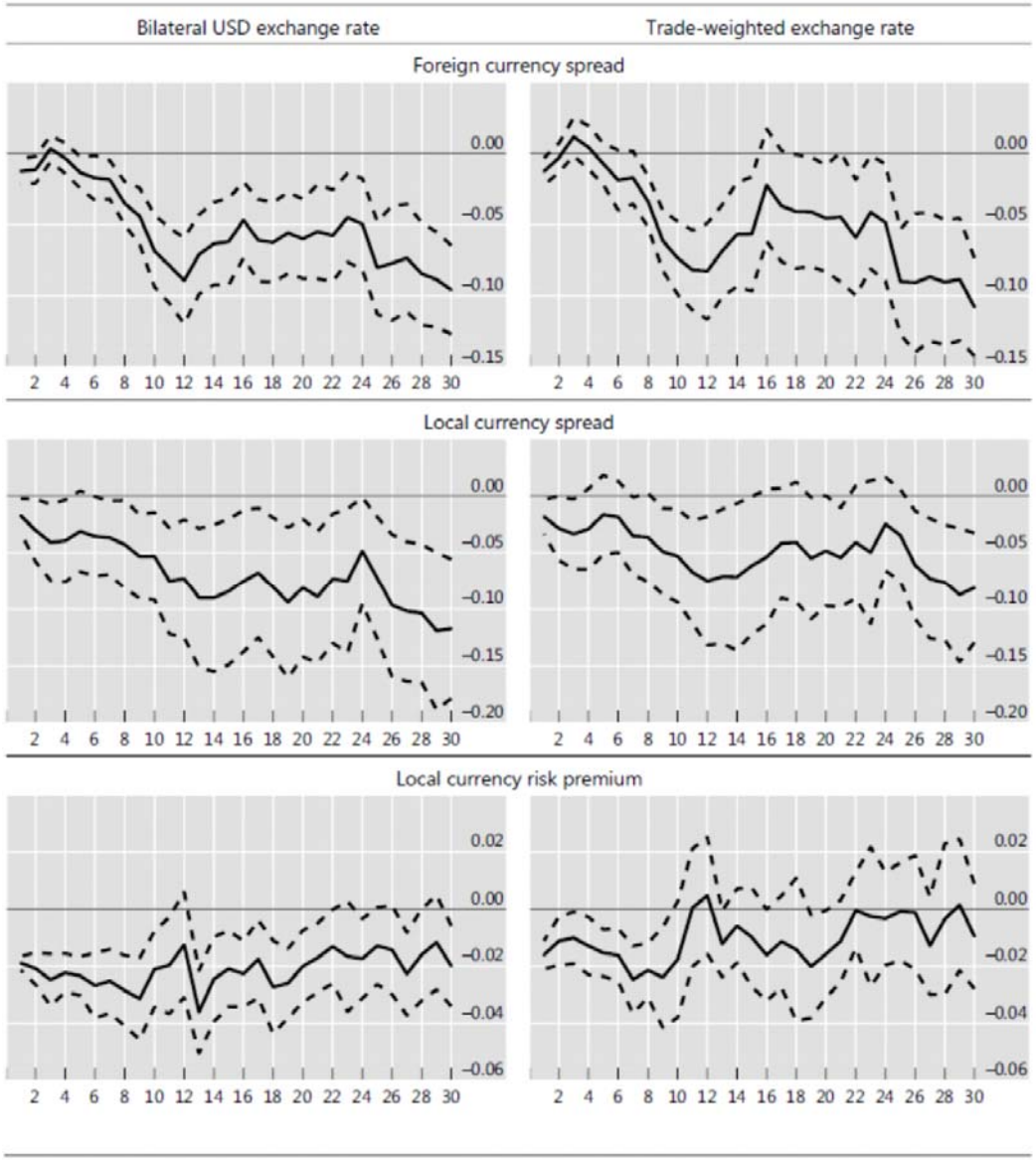
$$s_{i,t+h} - s_{i,t-1} = \alpha_i + \rho \Delta s_{i,t-1} + \beta \Delta NEER_{i,t-1} + \Gamma Z_{i,t-1} + \eta_{i,t+h}$$

- "Horse-race" LLP regressions with orthogonal *BER* and *NEER*

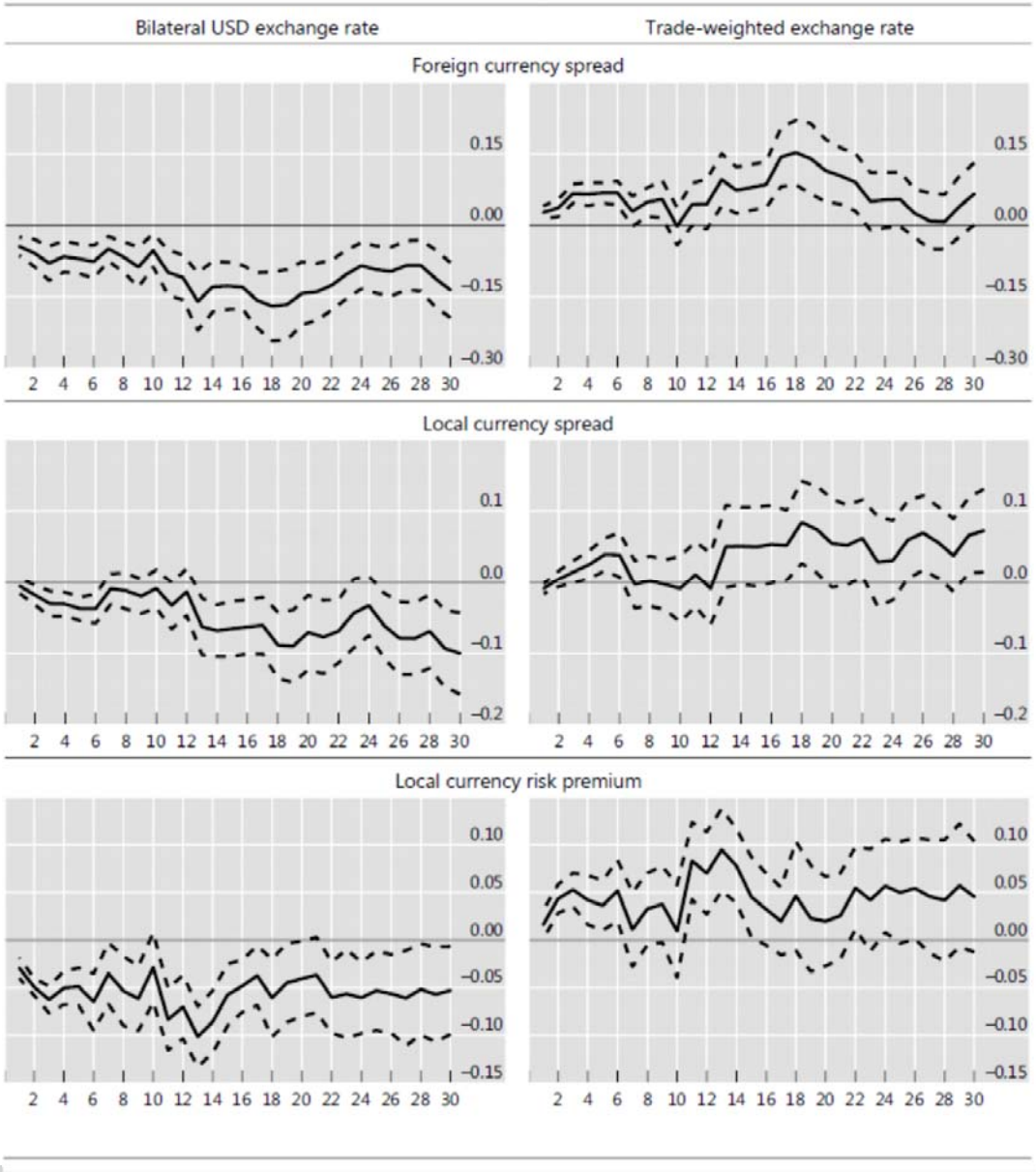
$$s_{i,t+h} - s_{i,t-1} = \alpha_i + \rho \Delta s_{i,t-1} + \beta \Delta BER_{i,t-1} + \delta \Delta NEER^{orth}_{i,t-1} + \Gamma Z_{i,t-1} + \eta_{i,t+h}$$

$$s_{i,t+h} - s_{i,t-1} = \alpha_i + \rho \Delta s_{i,t-1} + \beta \Delta NEER_{i,t-1} + \delta \Delta BER^{orth}_{i,t-1} + \Gamma Z_{i,t-1} + \eta_{i,t+h}$$

Impulse-responses using local linear projections



Impulse-responses of orthogonal exchange rate shocks



FX intervention and domestic credit

Wide gap between theory and practice

- Open economy macro models prescribe "benign neglect of the exchange rate"

- In practice, this maxim has been honoured more in its breach than in its observance
  - "Fear of floating" (Calvo and Reinhart (2002))
  - Interventions are prevalent (Frankel (2017))

- Evidence that FX intervention is effective in curbing exchange rate dynamics and financial conditions
  - Blanchard et al (2015), Fratzscher et al (2019)

Hofmann, Shin and Villamizar (2019)

- Currency appreciation reduces tail risks for a bank with a diversified loan portfolio

- Lending follows a Value-at-Risk (VaR) rule
  - Currency appreciation relaxes VaR constraint
  - Results in increased loan supply

- Two channels:
  - Risk-taking channel of the exchange rate (Bruno and Shin (2015))
  - "Crowding out" effect (Chang (2018), Ghosh et al (2018))

Main steps in the theory

Lemma 2 *Total lending C_i by bank i satisfies $C_i = \lambda E_i^C$ where λ is an increasing function of θ, and is identical across all i.*

Proposition 3 *Bank lending to domestic borrowers in pesos expands when the peso appreciates against the dollar.*

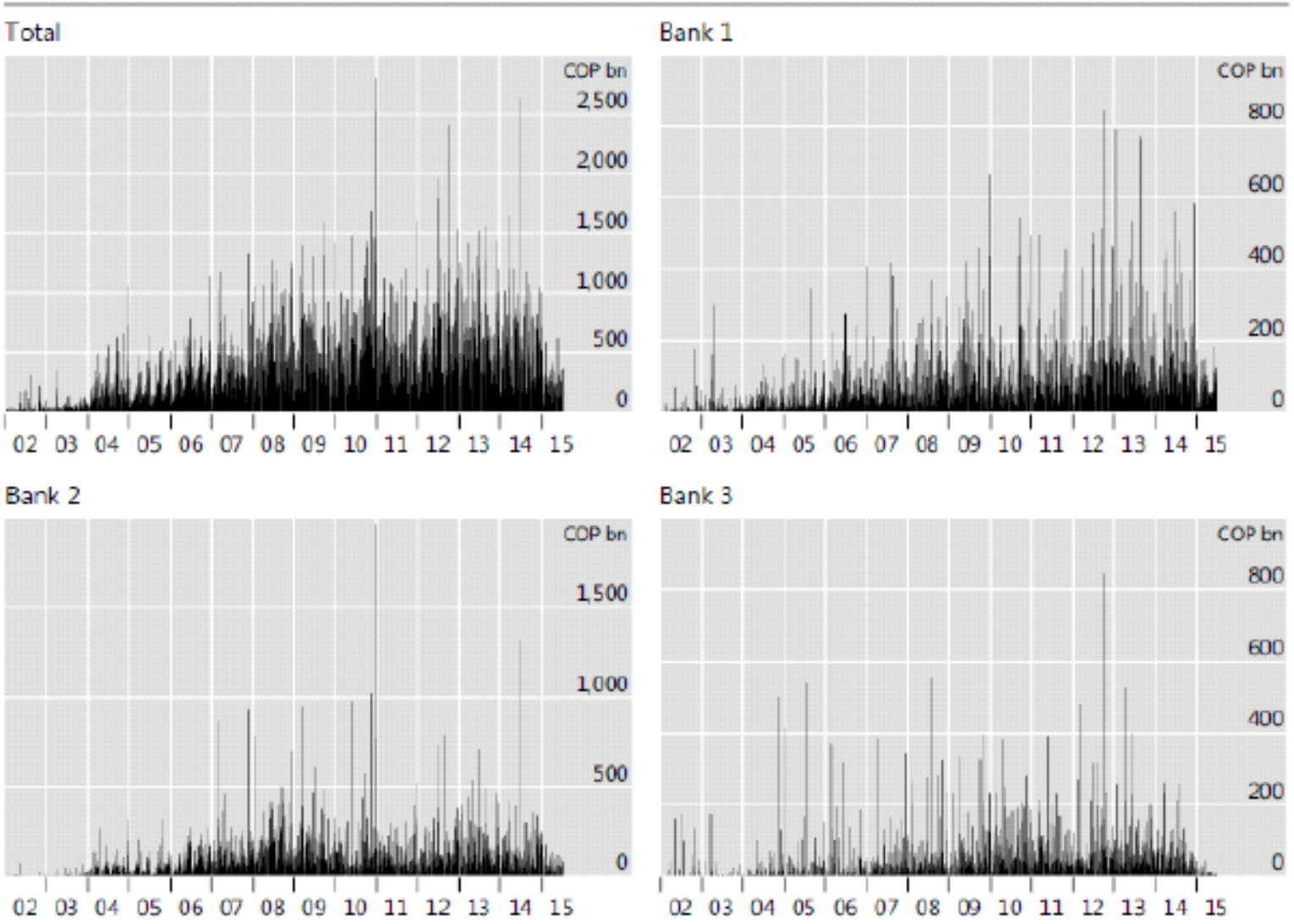
Proposition 4 *An increase in the stock of peso bonds reduces lending. This reduction is larger if the increased stock of peso bonds is accompanied by a depreciation of the peso against the dollar.*

$$\begin{aligned} C &= E^C \cdot \lambda(\theta) \\ &= \left(E - E^B\right) \cdot \lambda(\theta) \\ &= \left(E - \bar{B}/\mu\right) \cdot \lambda(\theta) \end{aligned}$$

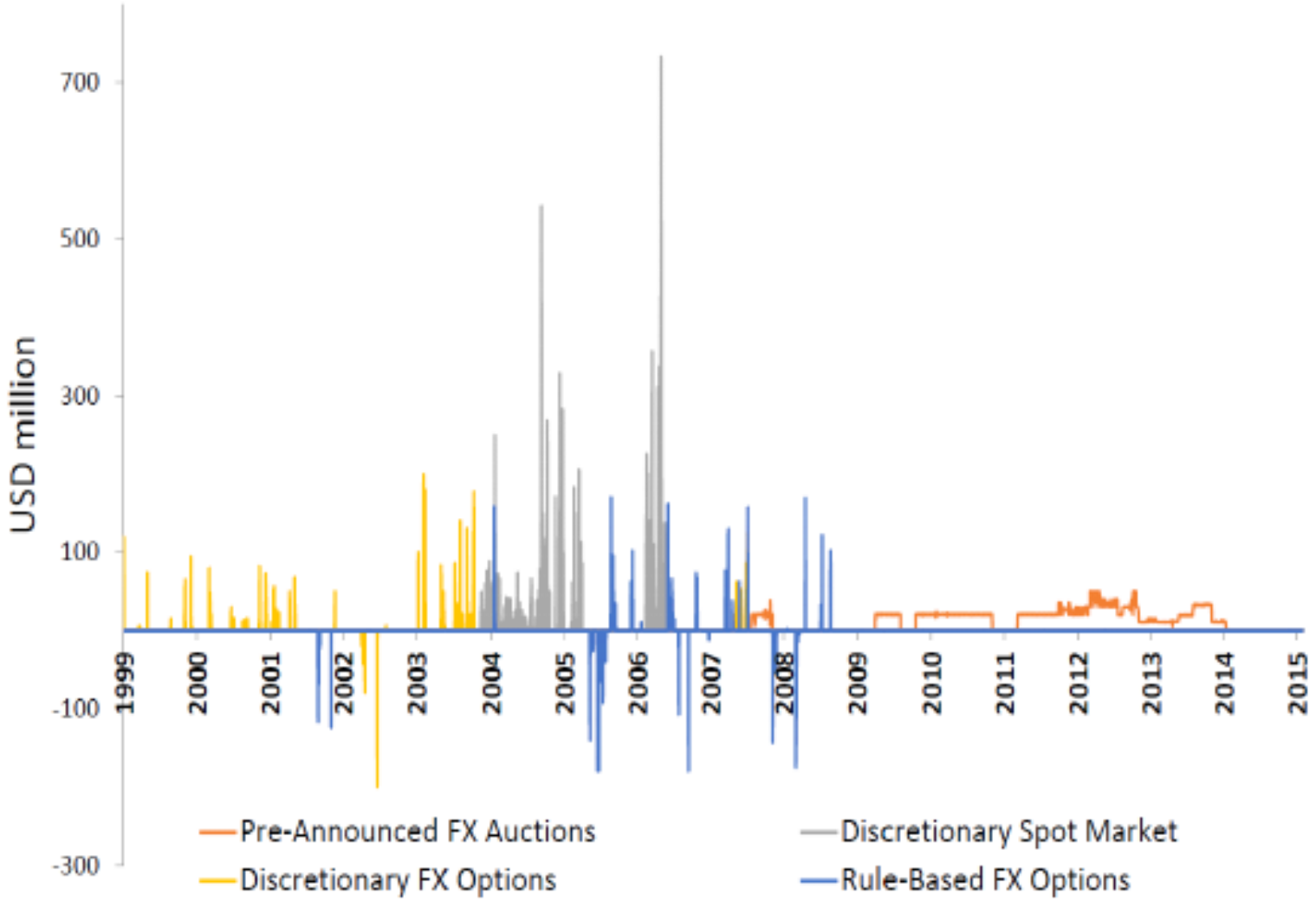
High frequency micro dataset from Colombia

- Daily data on FX intervention and sterilisation operations from the Bank of the Republic, Colombia
- Daily data on flow of new corporate loans from credit registry for 38 banks
- Sample spanning up to 15 years (2001-2015)

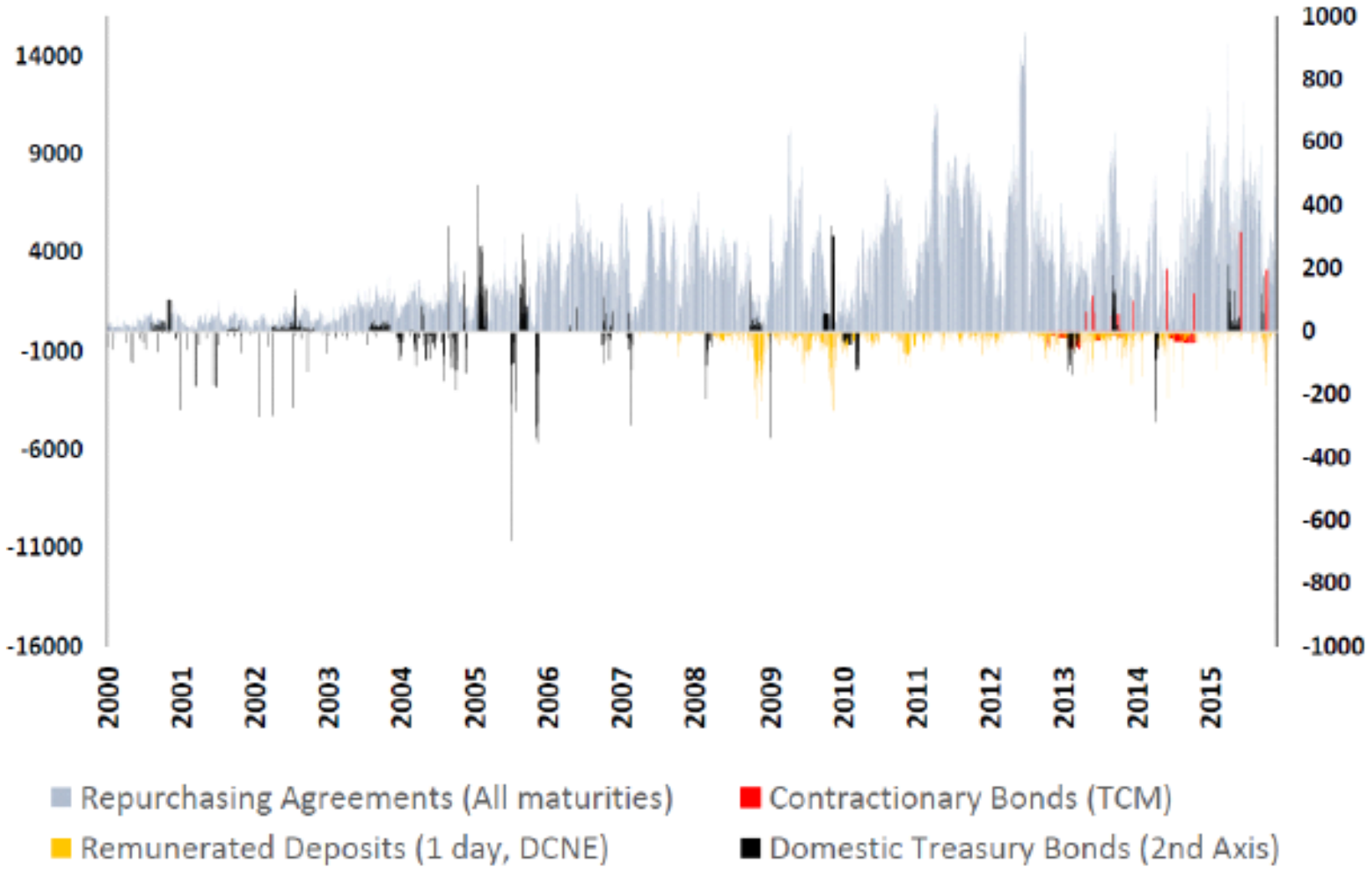
New corporate loans in Colombia



Sterilised FX interventions of the Bank of the Republic, Colombia



OMOs of the Bank of the Republic, Colombia



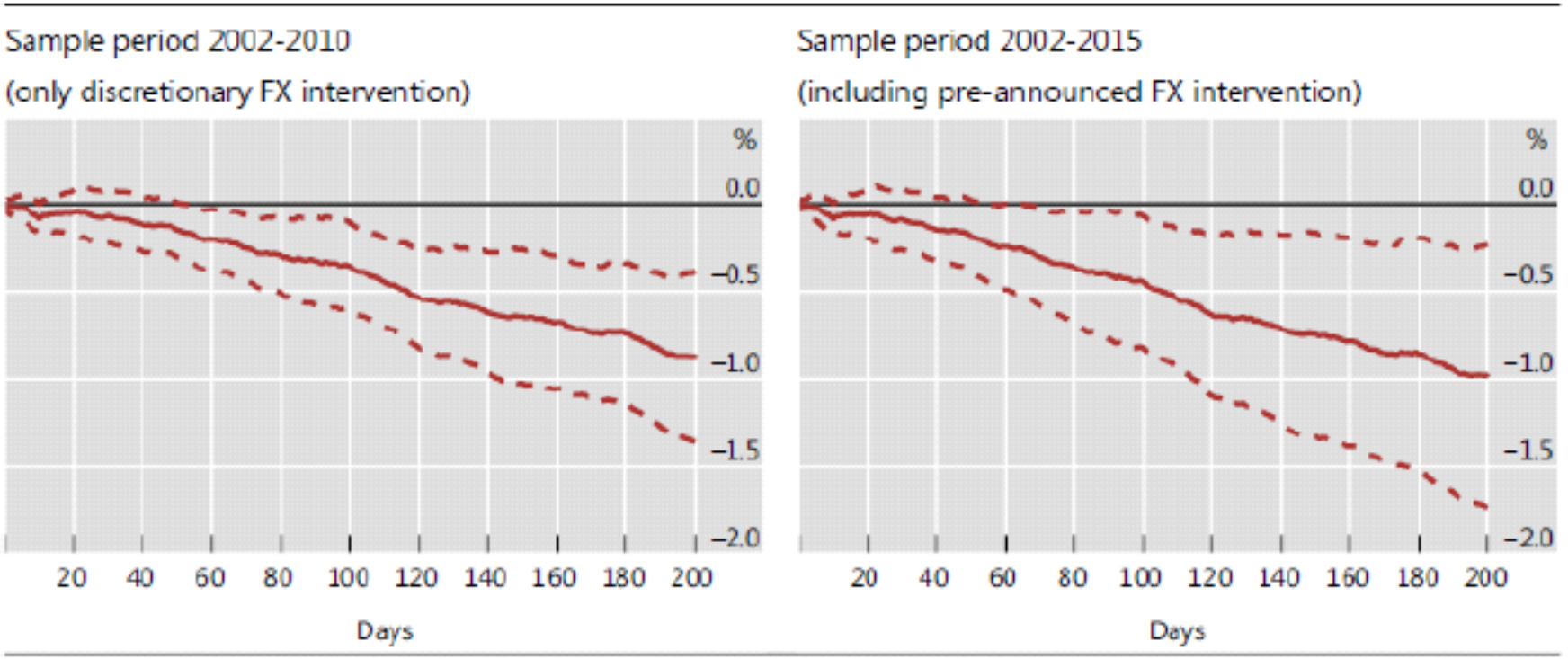
Methodology

- Panel analysis in daily frequency
- Local linear projection approach

$$Y_{i,t+h} = \alpha_{h,i} + \lambda_h y_{i,t-1} + \beta_h FXI_{t-1} + \Gamma_h Z_{i,t-1} + \Psi_h F_{t-1} + \varepsilon_{i,t+h}$$

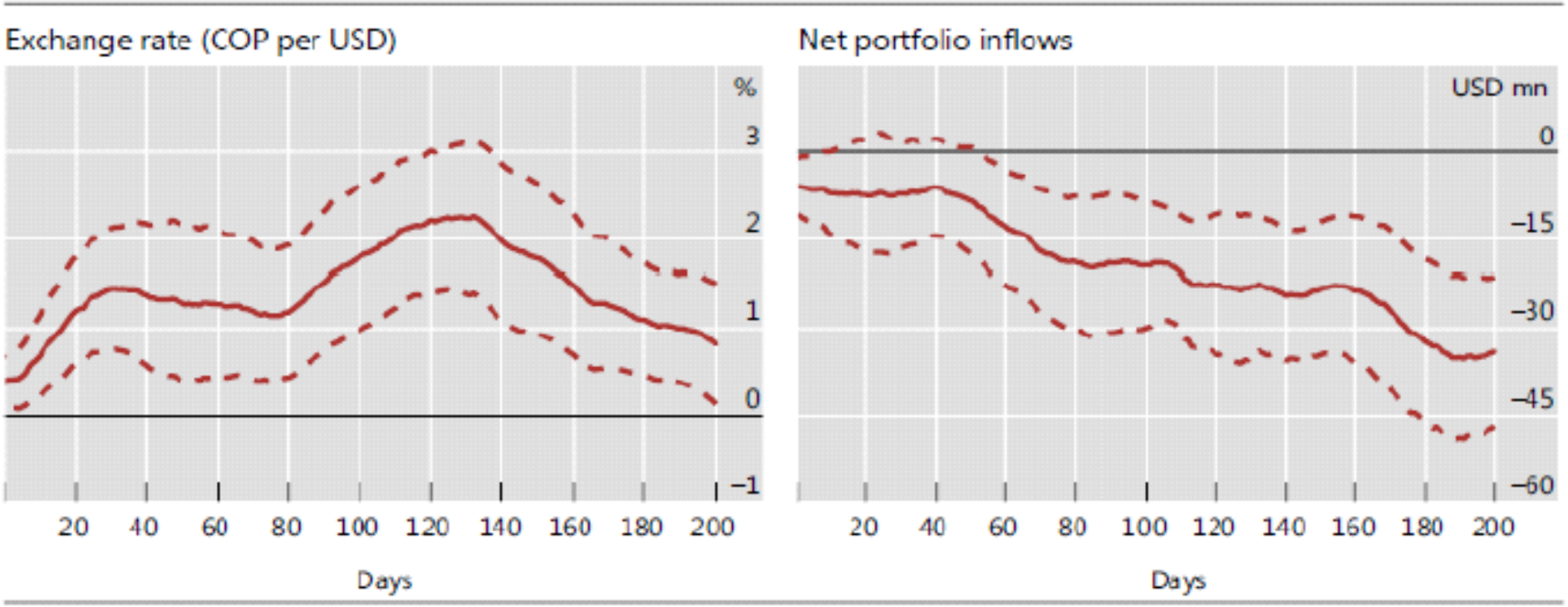
- For identification
  - Include large number of macro and bank controls
  - Focus on period of discretionary FX interventions (2001-2010)
    - Results are similar but weaker over the full sample

Impact of FXI on new corporate loans in Colombia



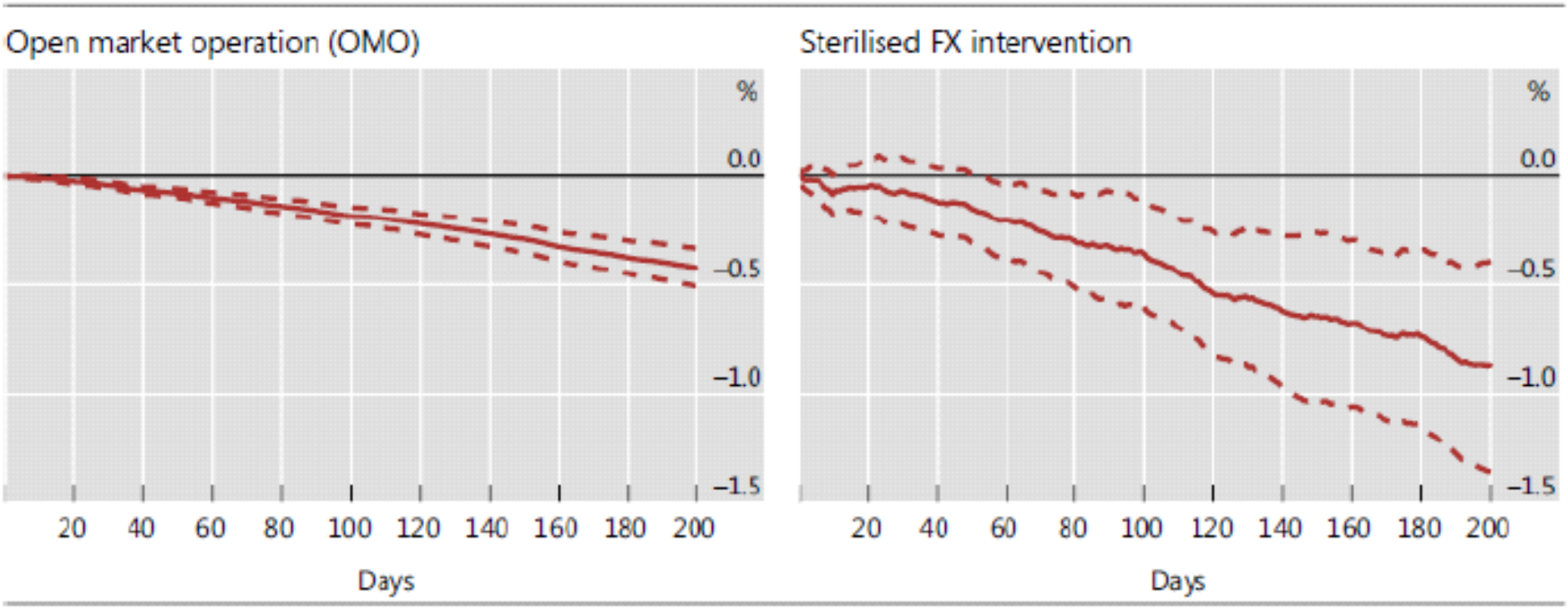
Size of impulse normalised to 30 million USD

Impact of FXI on exchange rate and capital flows



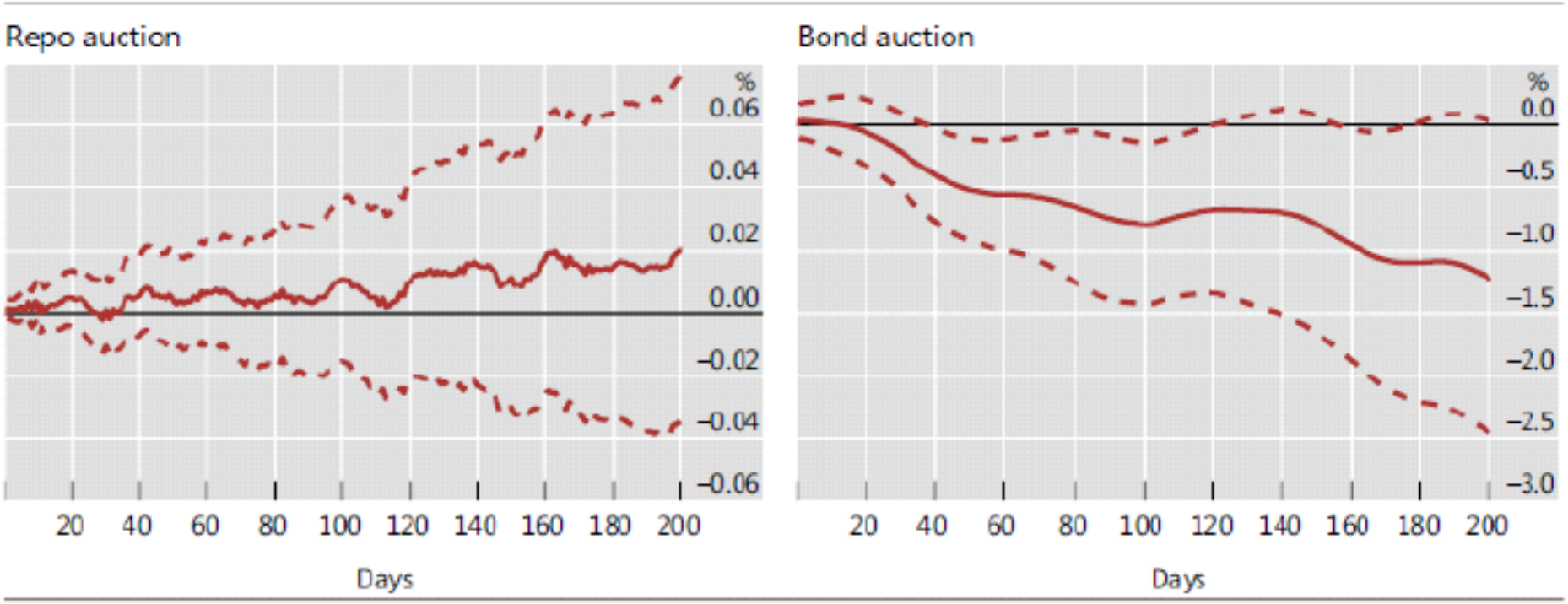
Size of impulse normalised to 30 million USD

Impact of central bank OMOs on new corporate loans



Size of impulse normalised to 30 million USD

Impact of bond and repo OMOs on new corporate loans



Size of impulse normalised to 30 million USD

Panel analysis of FX intervention impact across banks

- Identification of the effects of FX intervention through differences across banks (difference-in-difference)

- Financially weaker banks would be expected to be more responsive to FX intervention

$$Y_{i,t+h} = \alpha_{h,i} + \theta_{h,t} + \lambda_h y_{i,t-1} + \Theta_h FXI_{t-1} \times Z_{i,t-1} + \Gamma_h Z_{i,t-1} + \varepsilon_{i,t+h}$$

- Considering capitalisation, size, debt and provisions
  - "Bank lending channel" of FX intervention

FX intervention impact depending on bank characteristics

	20 Days	40 Days	60 Days	80 Days	100 Days
Capitalisation	0.020***	0.039***	0.058***	0.077***	0.097***
	(0.001)	(0.002)	(0.002)	(0.003)	(0.004)
Bank Size	0.014***	0.029***	0.044***	0.060***	0.077***
	(0.001)	(0.002)	(0.002)	(0.003)	(0.004)
Debt	-0.003***	-0.006***	-0.01***	-0.013***	-0.016***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Provisions	-0.017***	-0.033***	-0.049***	-0.065***	-0.082***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)
FXI*Capitalisation	0.10***	0.16***	0.19**	0.25**	0.31**
	(0.034)	(0.55)	(0.077)	(0.10)	(0.12)
FXI*Bank Size	0.11***	0.15***	0.18**	0.26***	0.31**
	(0.033)	(0.055)	(0.077)	(0.10)	(0.12)
FXI*Debt	-0.008***	-0.011**	-0.013*	-0.021**	-0.024**
	(0.003)	(0.005)	(0.007)	(0.009)	(0.012)
FXI*Provisions	-0.024	-0.036	-0.031	-0.035	-0.037
	(0.015)	(0.026)	(0.036)	(0.047)	(0.058)

Policy considerations

- Exchange rates bear on domestic credit and bond markets through the exchange rate risk-taking channel

- "Lean versus clean" debate:
  - "Leaning" complement to "cleaning" tools provided by the global financial safely net (GFSN)
  - Complementary tool (to MP and MaPs) in broader macro-financial stability framework (Agénor and Pereira da Silva (2019)

- Caveat: "beggar-thy-neighbour" trade competitiveness debate

- FX intervention needs to be assessed in broader context
  - Net benefits depend on fiscal costs
  - Weigh relative merits of regulation and FX intervention