Foreign-currency exposures and the financial channel of exchange rates: Eroding monetary policy autonomy in small open economies?

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The views expressed in the paper are those of the authors and not those of the BIS, the ECB or the ESCB.

Motivation

- Classic trilemma literature: FX variation in a floating regime
  Shambaugh (2004); Obstfeld et al. (2005); Klein and Shambaugh (2015)
  - reduces spillovers from US to local MP
  - confers monetary policy autonomy
- In the presence of foreign-currency exposures
  - FX variation may amplify rather than dampen spillovers from US MP
    Bruno and Shin (2015)
  - implying a MP trade-off between financial stability and macroeconomic stabilisation
    Aoki et al. (2018)
  - local MP may (or may not) find it optimal to reduce FX variation by mimicking US MP
    Cespedes et al. (2004); Choi and Cook (2004); Cook (2004); Devereux et al. (2006); Elekdag and Tchakarov (2007); Gertler et al. (2007); Rappoport (2009); Faia (2010); Kolasa and Lombardo (2014); Davis and Presno (2017); Akinci and Queralto (2019); Mimir and Sunel (2019)
- **Evidence for "fear-of-floating" driven by foreign-currency exposures?**

This paper

- Estimate MP reaction functions for a panel of 26 SOEs for 2000-2017
- SOE MP responds to base-country MP over and above what we would expect to observe if macroeconomic stabilisation was the only policy objective
- Additionally, SOE policy rate particularly sensitive to base-country policy rate when
  - external balance sheet is net **short** in foreign currency
  - net short positions stem from **debt** instruments
  - base-country monetary policy is **tightened** rather than loosened
- SOE mimics base-country MP even after controlling for ERPT to CPI, FX reserves, capital controls and macro-prudential measures

Outline

Motivating the regression equation

- “Fear-of-floating” motive reflected in $\alpha > 0$ in the MP reaction function

$$i_t^p = \phi \cdot x_{t+M}^f + \alpha \cdot \Delta^e s_{t+1} \quad (1)$$

- $\Delta^e s_{t+1}$ is an expectation of a **counterfactual** FX that would result if MP did **not** react to financial stability concerns due to foreign-currency exposures but instead followed

$$\widetilde{i}_t^p = \widetilde{\phi} \cdot x_{t+M}^f \quad (2)$$

- Cannot test $H_0 : \alpha > 0$ in (1) as $\Delta^e s_{t+1}$ is **not observed**; however, UIP implies

$$\Delta^e s_{t+1} = i_t^{p*} - \widetilde{i}_t^p = i_t^{p*} - \widetilde{\phi} \cdot x_{t+M}^f \quad (3)$$

- We can then rewrite the MP reaction function in (1) as

$$i_t^p = (\phi - \alpha\widetilde{\phi}) \cdot x_{t+M}^f + \alpha \cdot i_t^{p*} \quad (4)$$

Estimated MP reaction function

- We estimate dynamic fixed effects panel regressions

$$i^p_{it} = \chi_i + \rho i^p_{i,t-1} + (1-\rho)\left(\boldsymbol{\phi}'\boldsymbol{x}^f_{i,t+M} + \boldsymbol{\kappa}'\boldsymbol{z}_t + \alpha \cdot i^p_{b_i,t}\right) + \nu_{it} \quad (5)$$

  - i^p_{it} is the local policy rate
  - $\boldsymbol{x}^f_{i,t+M}$ includes real-time forecasts of local fundamentals
  - z_t includes global variables
  - $i^p_{b_i,t}$ is the policy rate of economy i's base-country b_i

- $Corr(i^p_{it}, i^p_{b_i,t})$ due to common shocks captured by $\boldsymbol{x}^f_{i,t+M}$ and $\boldsymbol{z}_t$

- We test whether foreign-currency exposures ξ_{it} induce fear-of-floating in

$$\begin{aligned} i^p_{it} &= \chi_i + \rho i^p_{i,t-1} + \theta \xi_{it} \\ &+ (1-\rho)\left[\boldsymbol{\phi}'\boldsymbol{x}^f_{i,t+M} + \boldsymbol{\kappa}'\boldsymbol{z}_t + \alpha_1 \cdot i^p_{b_i,t} + \alpha_2 \cdot (i^p_{b_i,t} \times \xi_{it})\right] + \nu_{it} \end{aligned} \quad (6)$$

Data and sample

- 26 AEs and EMEs during 2000m1-2017m12
- Base countries: EA for Europe, US otherwise
- CE real-time one-year ahead forecasts of GDP growth and CPI inflation in $\boldsymbol{x}^{f}_{i,t+M}$
  Comparison of Consensus Economics and central bank projections
- Change in VIX and commodity prices in z_t
- FX regime classification of Klein and Shambaugh (2015)
- Wu and Xia (2016) shadow rate for $i^{p}_{i,t}$

Country sample

Advanced	AUS, CAN, NOR, NZL, SWE
EM Europe	CZE, HUN, POL, RUS
EM Asia	BGD, IDN, IND, KOR, LKA, MYS, PAK, PHL, THA
EM Latin America	BRA, CHL, COL, MEX, PER, PRY
EM Middle East and Africa	EGY, ISR, TUR, ZAF

Evidence for fear-of-floating

$$i^p_{it} = \chi_i + \rho i^p_{i,t-1} + (1-\rho)\left(\boldsymbol{\phi}'\boldsymbol{x}^f_{i,t+M} + \boldsymbol{\kappa}'\boldsymbol{z}_t + \alpha \cdot i^p_{b_i,t}\right) + \nu_{it}$$

	(1)	(2)	(3)	(4)	(5)
Real-time real GDP growth forecast	1.95^{***} (0.01)	3.34^{***} (0.00)	3.32^{***} (0.00)	4.20^{***} (0.00)	4.24^{***} (0.00)
Real-time CPI inflation forecast	1.75^{***} (0.00)	2.30^{***} (0.00)	2.44^{***} (0.00)	2.14^{***} (0.01)	2.11^{***} (0.01)
VIX	-0.22^{**} (0.02)	-0.31^{**} (0.04)	-0.37^{**} (0.02)	-0.35^{**} (0.03)	-0.37^{**} (0.02)
Commodity price inflation	5.57 (0.53)	13.29 (0.31)	17.07 (0.28)	19.07 (0.24)	14.85 (0.40)
Base-country policy rate	0.43^{***} (0.00)				
Lagged FX against base-country currency		0.04 (0.32)			
Lagged cumulated FX change against base-country currency			0.30^{*} (0.07)		
Lagged FX market pressure				0.24^{**} (0.04)	
Lagged cumulated FX market pressure					0.14^{*} (0.07)
R-squared (within)	0.12	0.12	0.12	0.15	0.15
Observations	4341	4331	4295	3072	3048
Countries	26	26	26	25	25

p-values in parentheses

Driscoll-Kraay robust standard errors.

$^{*}\ p < 0.1$, $^{**}\ p < 0.05$, $^{***}\ p < 0.01$

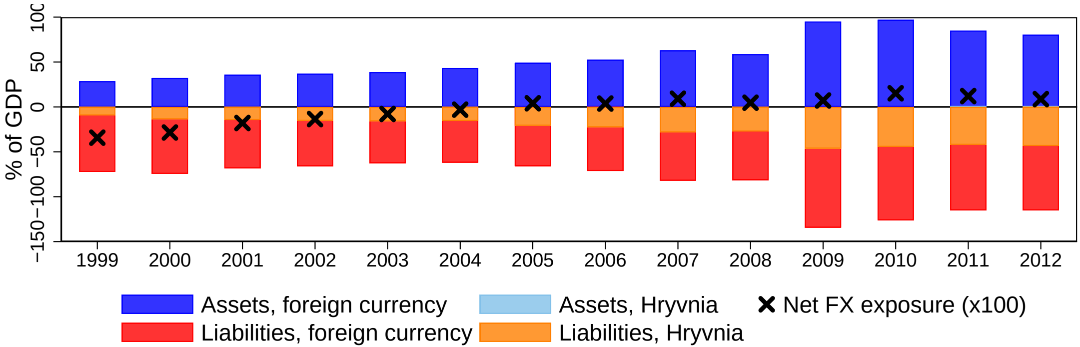
Exploring the role of foreign-currency exposures

- Recall the regression

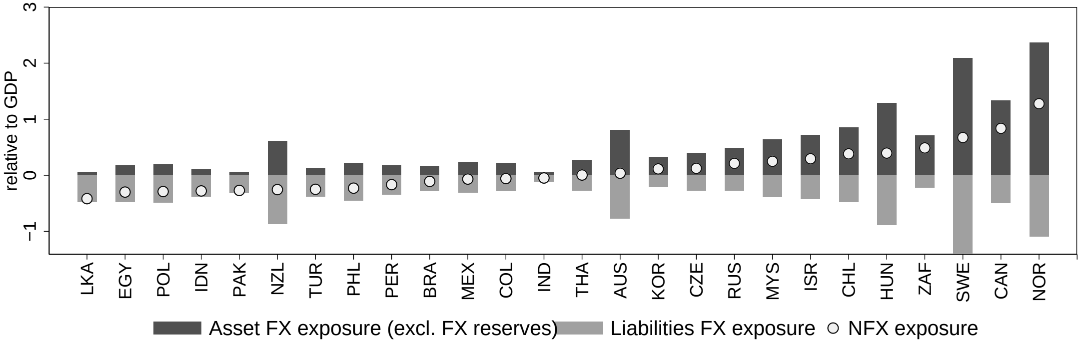
$$i^{p}_{it} = \chi_i + \rho i^{p}_{i,t-1} + \theta \xi_{it} + (1-\rho)\left[\boldsymbol{\phi}'\boldsymbol{x}^{f}_{i,t+M} + \boldsymbol{\kappa}'\boldsymbol{z}_t + \alpha_1 \cdot i^{p}_{b_i,t} + \alpha_2 \cdot (i^{p}_{b_i,t} \times \xi_{it})\right] + \nu_{it} \qquad (7)$$

- ξ_{it} represents various versions of foreign-currency exposures
  (Lane and Shambaugh, 2010; Benetrix et al., 2015)
- Data in most recent update by Benetrix et al. (2019)
  - only available until 2017
  - cover only countries included in the IMF External Balance Assessment (no UKR)

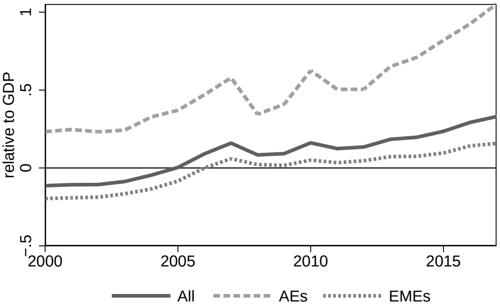
Net FX exposure data of Benetrix et al. (2015) for Ukraine

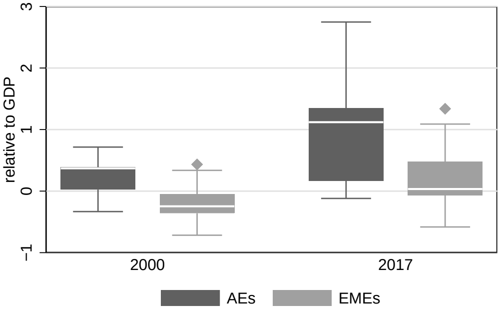


Average net foreign-currency exposures over 2000-2017

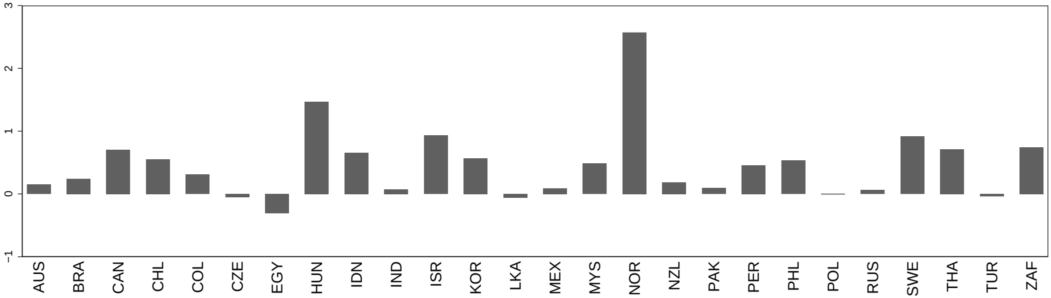


Evolution of net foreign-currency exposures over 2000-2017





Change in net foreign-currency exposures at the country level



$$i^p_{it} = \chi_i + \rho i_{i,t-1} + \theta\xi_{it} + (1-\rho)\left[\boldsymbol{\phi}'\boldsymbol{x}^f_{it} + \boldsymbol{\kappa}'\boldsymbol{z}_t + \alpha_1 i^p_{b_i,t} + \alpha_2(i^p_{b_i,t} \times \xi_{it})\right] + \nu_{it}$$

	(1)	(2)	(3)	(4)	(5)	(6)
Base-country policy rate	0.43*** (0.00)	0.40*** (0.00)	0.39*** (0.00)	0.37*** (0.00)	0.37*** (0.00)	0.38*** (0.00)
× FX assets rel. to GDP		−0.22 (0.19)				
× FX liabilities rel. to GDP		0.45*** (0.01)				
× NFX rel. to GDP			−0.10 (0.37)			
× NFX rel. to GDP × I(NFX≥ 0)				0.09 (0.17)		
× NFX rel. to GDP × I(NFX< 0)				−0.56*** (0.01)		
× Non-debt NFX rel. to GDP					0.11 (0.24)	0.12 (0.17)
× Debt NFX rel. to GDP					−0.30*** (0.01)	
× Debt NFX rel. to GDP × I(NFX≥ 0)						−0.13* (0.09)
× Debt NFX rel. to GDP × I(NFX< 0)						−0.50*** (0.00)
R-squared (within)	0.12	0.13	0.12	0.13	0.13	0.13
Observations	4341	4341	4341	4341	4341	4341
Countries	26	26	26	26	26	26

p-values in parentheses

Driscoll-Kraay robust standard errors. Coefficient estimates of real-time forecasts and global variables not reported.

$^{*}\ p < 0.1$, $^{**}\ p < 0.05$, $^{***}\ p < 0.01$

Exploring the role of foreign-currency exposures

- Positive vs. negative net foreign-currency exposures
  - FX variation makes borrowing constraint bind only in case of net short positions?
- Foreign-currency exposures in debt vs. non-debt instruments
  (Milesi-Ferretti and Tille, 2011; Forbes and Warnock, 2012; Lane and Milesi-Ferretti, 2012)
  - State-dependent payoffs and absence of rollover risk for FDI and equity reduce appeal of stabilising FX?
- Base-country policy rate tightening vs. loosening
  (Han and Wei, 2018; Cheng and Rajan, 2019)
  - Financial stability risks due to negative foreign-currency exposure only in case of depreciation pressures?

$$i^p_{it} = \chi_i + \rho i_{i,t-1} + \theta \xi_{it} + (1-\rho)\left[\boldsymbol{\phi}' \boldsymbol{x}^f_{it} + \boldsymbol{\kappa}' \boldsymbol{z}_t + \alpha_1 i^p_{b_i,t} + \alpha_2 (i^p_{b_i,t} \times \xi_{it})\right] + \nu_{it}$$

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Base-country policy rate	0.43^{***} (0.00)	0.40^{***} (0.00)	0.39^{***} (0.00)	0.37^{***} (0.00)	0.37^{***} (0.00)	0.38^{***} (0.00)
× FX assets rel. to GDP		-0.22 (0.19)				
× FX liabilities rel. to GDP		0.45^{***} (0.01)				
× NFX rel. to GDP			-0.10 (0.37)			
× NFX rel. to GDP × I(NFX≥ 0)				0.09 (0.17)		
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× Debt NFX rel. to GDP × I(NFX≥ 0)						-0.13^{*} (0.09)
× Debt NFX rel. to GDP × I(NFX< 0)						-0.50^{***} (0.00)
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- Base-country policy rate tightening vs. loosening
  (Han and Wei, 2018; Cheng and Rajan, 2019)
  - Financial stability risks due to foreign-currency exposure only in case of depreciation pressures?

	(1)	(2)	(3)	(4)
Base-country policy rate	0.43^{***} (0.00)			
$\times$ I($\Delta i^p_{b_i,t} \geq 0$)		0.51^{***} (0.00)	0.48^{***} (0.00)	-0.04 (0.85)
$\times$ I($\Delta i^p_{b_i,t} \geq 0$) $\times$ NFX exposure rel. to GDP			-0.09 (0.46)	
$\times$ I($\Delta i^p_{b_i,t} \geq 0$) $\times$ NFX exposure rel. to GDP $\times$ I(NFX ≥ 0)				0.43^{***} (0.00)
$\times$ I($\Delta i^p_{b_i,t} \geq 0$) $\times$ NFX exposure rel. to GDP $\times$ I(NFX < 0)				-1.01^{***} (0.01)
$\times$ I($\Delta i^p_{b_i,t} < 0$)		-0.14 (0.72)	-0.22 (0.59)	-0.58 (0.31)
$\times$ I($\Delta i^p_{b_i,t} < 0$) $\times$ NFX exposure rel. to GDP			-0.36 (0.39)	
$\times$ I($\Delta i^p_{b_i,t} < 0$) $\times$ NFX exposure rel. to GDP $\times$ I(NFX ≥ 0)				0.18 (0.46)
$\times$ I($\Delta i^p_{b_i,t} < 0$) $\times$ NFX exposure rel. to GDP $\times$ I(NFX < 0)				-0.95 (0.21)
R-squared (within)	0.12	0.12	0.13	0.13
Observations	4341	4341	4341	4341
Countries	26	26	26	26

p-values in parentheses

Driscoll-Kraay robust standard errors. Coefficient estimates of real-time forecasts and global variables not reported.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Robustness

- Additionally control for ERPT to consumer prices, FX reserves, macro-prudential policies, capital controls, and current account balance
  (Hausmann et al., 2001; Cheng and Rajan, 2019; Fernandez et al., 2016; Aizenman et al., 2017; Davis, 2017; Alam et al., 2019)
- Alternative samples
  - Dropping the zero-lower bound or GFC periods, extend to 2019 using extrapolated data
  - Drop AUS, HUN, NZL, NOR, SWE
  - Consider “floats” only (i.e. no “soft-pegs”)
- Alternative regression specifications
  - Include time fixed effects
  - Trend component of foreign-currency exposures
  - Lagged rather than contemporaneous base-country policy rate
  - Additional controls (nowcasts, VSTOXX, global economic activity)

Summary

- Estimate MP reaction functions for 26 SOEs for 2000-2017
- Examine role of foreign-currency exposures for sensitivity of SOE to base-country MP
- SOE mimics base-country MP in particular in case of
  - **negative** foreign-currency exposures
  - stemming from **debt** instruments
  - **depreciation** pressures in the face of base-country MP **tightenings**

A note on the econometrics

(Pesaran and Shin, 1999)

- If there is a LR levels relationship, inference on the parameters of interest $\widehat{\beta}_j = -\widehat{\widetilde{\beta}}_j / \widehat{\widetilde{\rho}}_j$ is **standard** in

$$\Delta i^p_{it} = \chi_{ij} + \widetilde{\rho}_j \cdot i_{i,t-1} + \widetilde{\boldsymbol{\phi}}_j \cdot \boldsymbol{x}^f_{it} + \widetilde{\boldsymbol{\kappa}}_j \cdot \boldsymbol{z}_t + \widetilde{\alpha}_j \cdot i^p_{b_i,t} + \nu_{it} \tag{8}$$

  regardless of the integration properties of the variables

- Notice that if $\boldsymbol{x}^f_{it}, z_{it}, i^p_{it} \sim I(1)$
  - $\widehat{\alpha}_j$ is even "super-consistent" (for given T lower $P(|\widehat{\alpha}_j - \alpha_j| > \epsilon)$)
  - Inference on $\widehat{\widetilde{\boldsymbol{\phi}}}_j$, $\widehat{\widetilde{\boldsymbol{\kappa}}}_j$, and $\widehat{\widetilde{\alpha}}_j$ is **non-standard**

- Estimating a static Taylor rule instead of (8) is risky, especially when $\boldsymbol{x}^f_{it}, z_{it}, i^p_{it} \sim I(1)$; in case of
  - co-integration: Super-consistent $\widehat{\alpha}_j$, but non-standard inference
    (FM-OLS has standard inference but is dominated by the ARDL estimator)
  - no co-integration: Spurious regression

- Using ARDL model is more efficient than VECM if $\boldsymbol{x}^e_{it}, z_{it}, i^p_{b_i,t}$ are weakly exogenous to i^p_{it} (monetary neutrality, SOE assumption)

Return

GDP growth and CPI inflation expectations x_{it}^{e}

- Use Consensus Economics data as CB projections not publicly available
  - at monthly frequency
  - for all economies in the sample
- Are Consensus Economics forecasts good measures of CB projections?
- For a set of publicly available CB projections, we estimate

$$x_{it}^{f,cb,h} = a_i^h + b^h \cdot x_{it}^{f,ce,h} + e_i^h, \quad h = 0, 1 \tag{9}$$

which yields

	(1) $y_{it}^{e,cb}$	(2) $y_{i,t+1}^{e,cb}$	(3) $\pi_{it}^{e,cb}$	(4) $\pi_{i,t+1}^{e,cb}$
CE forecast	0.91***	0.96***	0.85***	0.67***
	(0.00)	(0.00)	(0.00)	(0.00)
Fixed effects	Yes	Yes	Yes	Yes
R-squared	0.94	0.83	0.94	0.91
Observations	485	363	516	483

p-values in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Return

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