The Exchange Rate Insulation Puzzle

Giancarlo Corsetti, Keith Kuester, Gernot Müller, and Sebastian Schmidt

Fourth Biennial Conference on New Dimensions of Monetary Policy
Warsaw, 22-23 September 2022

The question

Do flexible exchange rates insulate economies from foreign shocks?

- Yes, according to received wisdom informed by the classics
- Meade (1951), Friedman (1953), Mundell (1962), Fleming (1962), Eichengreen Sachs (1985) ... Schmitt-Grohé Uribe (2016)

The question

Do flexible exchange rates insulate economies from foreign shocks?

- Yes, according to received wisdom informed by the classics
- Meade (1951), Friedman (1953), Mundell (1962), Fleming (1962), Eichengreen Sachs (1985) ... Schmitt-Grohé Uribe (2016)

Basic idea

- Consider drop in foreign demand, due to, say, contractionary policy shift abroad
- Exchange rate peg: monetary policy constrained to shadow foreign monetary stance
- Flex exchange rate: free to choose how far to expand in order to boost domestic absorption and depreciate currency & expenditure switching

The question

Do flexible exchange rates insulate economies from foreign shocks?

- Yes, according to received wisdom informed by the classics
- Meade (1951), Friedman (1953), Mundell (1962), Fleming (1962), Eichengreen Sachs (1985) . . . Schmitt-Grohé Uribe (2016)

Basic idea

- Consider drop in foreign demand, due to, say, contractionary policy shift abroad
- Exchange rate peg: monetary policy constrained to shadow foreign monetary stance
- Flex exchange rate: free to choose how far to expand in order to boost domestic absorption and depreciate currency & expenditure switching

One of the most fundamental tenets in international macro

- But—as we confront it with the data—we find not much empirical support

This paper documents an "exchange rate insulation puzzle"

Euro area (EA) monetary policy shocks generate large spillovers to neighbor countries

- Exchange-rate regime **irrelevant**: no insulation for floaters
- Exchange rate of floaters moves very little **conditional** on identified EA shocks
- Yet **unconditional** FX vola of floaters much higher ($\rightarrow$ disconnect puzzle)

Europe as a lab to study insulation property of exchange rate regime

- Stay clear of US-dominated global financial cycle (Rey 2013)
- Spillovers on 20 geopolitical neighbors of EA: fairly homogeneous
- Large variation in the exchange-rate regime vis-à-vis the euro (unrelated to fundamentals)

Paper revisits this puzzle in light of modern theory

State-of-the-art open-economy model (Gopinath et al 2020, Itskhoki Muhkin 2021)

- Dominant currency pricing: limited expenditure switching
- Incomplete markets and portfolio demand shocks: high FX vola under float

Calibrate model to EA and generic neighbor

- Accounts unconditional moments of the data: notably exchange rate disconnect
- Float affords considerable insulation: **evidence remains puzzling in light of modern theory**

Inspect mechanism in model

- Monetary policy sufficiently accommodative to allow for FX depreciation & insulation
- Actual policy “too” tight in the face of foreign MP shock? Why?

Related literature

Skepticism about exchange rate flexibility

- Devereux/Engel (2003), Rey (2013), Amiti et al. (2018), Gopinath et al. (2020), Obstfeld (2020)

Exchange-rate regime and economic performance

- Classic studies: Bayoumi/Eichengreen (1994), Baxter/Stockman (1989), Levy-Yeyati/ Sturzenegger (2003), Broda (2004)
- More recently: Schmitt-Grohé and Uribe (2016), Obstfeld (2020), Itskhoki/Mukhin (2021)

Monetary autonomy and policy framework

- FoF: Calvo Reinhart (2002), di Giovanni Shambaugh (2008), Klein Shambaugh (2015)
- Trilemma: Shambaugh (2004), Obstfeld et al (2005), Goldberg (2013), Edwards (2015)
- Optimal policy: de Paoli (2009), Devereux/Engel (2003), Galí/Monacelli (2005), Senay/Sutherland (2015), Mukhin (2018), Egorov/Mukhin (2020), Corsetti et al (2020)

International transmission of shocks

- Fed (global financial cycle): Bluedorn Bowlder (2010), Miranda-Agrippino Rey (2020), Rey (2013), Bräuning Ivashina (2019), Iacovello Navarro (2019), Jordà et al (2019)
- ECB shocks: Jarocinski (2020), Altavilla et al. (2019)
- Credit shocks in the euro area: Gilchrist/Mojon (2018), EA information shocks: Jarocinski (2021)

Classifying exchange rate regime

- Ilzetzki/Reinhart/Rogoff (2019)

Data euro-area shocks and fx-rate regime of its neighbors

Data set w/ monthly observations for period 1999 to 2018

- Euro area (EA 11) as the source of shocks
- 20 neighbor countries with different exchange rate policy vis-à-vis euro: EU28 net of EA11, plus EFTA3: Iceland, Norway, Switzerland
- Baseline: monetary shocks (Jarociński Karadi, 2020)

Data euro-area shocks and fx-rate regime of its neighbors

Data set w/ monthly observations for period 1999 to 2018

- Euro area (EA 11) as the source of shocks
- 20 neighbor countries with different exchange rate policy vis-à-vis euro: EU28 net of EA11, plus EFTA3: Iceland, Norway, Switzerland
- Baseline: monetary shocks (Jarociński Karadi, 2020)

Exchange rate regime in neighbor countries, based on Ilzetzki Reinhart Rogoff (2019)

- Floats: IRR category 9 (broad bands or managed float) through 14 (free float)
- Category 9: Exchange rate does not fluctuate by more than two percent *per month* in 80 percent of the months over a five-year window. Pegs: rest (including euro membership)
- Some 1800/4800 country-month observations qualify as float

Variation of exchange-rate regime across time and space

4800 monthly observations of which 1773 are floats (table shows change only)

	Bulgaria	Croatia	Cyprus	Czechia	Denmark	Estonia	Greece	Hungary	Iceland	Latvia	Lithuania	Malta	Norway	Poland	Romania	Slovakia	Slovenia	Sweden	Switzerland	United Kingdom
1999M1	0	0	0	0	0	0	0	1	0	1	0	1	1	1	1	0	0	1	1	1
1999M2	0	0	0	0	0	0	0	1	0	1	0	1	1	1	1	0	0	0	1	1
2000M1	0	0	0	1	0	0	0	1	0	1	0	1	1	1	1	0	0	0	1	1
2000M11	0	0	0	1	0	0	0	1	1	1	0	1	1	1	1	0	0	0	1	1
2001M1	0	0	0	1	0	0	0	1	1	1	0	0	1	1	1	0	0	0	1	1
2001M4	0	0	0	1	0	0	0	1	1	1	0	0	1	1	0	0	0	0	1	1
2001M9	0	0	0	1	0	0	0	1	1	0	0	0	1	1	0	0	0	0	1	1
2004M8	0	0	0	1	0	0	0	1	1	0	0	0	1	1	1	0	0	0	1	1
2005M1	0	0	0	1	0	0	0	1	1	1	0	0	1	1	1	0	0	0	1	1
2006M7	0	0	0	1	0	0	0	1	1	1	0	0	1	1	0	0	0	0	1	1
2008M9	0	0	0	1	0	0	0	1	1	1	0	0	1	1	0	0	0	1	1	1
2009M4	0	0	0	1	0	0	0	0	1	1	0	0	1	1	0	0	0	1	1	1
2009M7	0	0	0	1	0	0	0	0	1	0	0	0	1	1	0	0	0	1	1	1
2011M9	0	0	0	1	0	0	0	0	1	0	0	0	1	1	0	0	0	1	0	1
2015M2	0	0	0	1	0	0	0	0	1	0	0	0	1	1	0	0	0	1	1	1

Business cycles in our sample

Baxter Stockman (1989) observations holds for our sample

- Unconditionally: exchange rate of floaters is volatile
- Business cycles of pegs and floats look rather similar (disconnect puzzle)

	Peg		Float	
	$\sigma(x_i)$	$\rho(x_i, x^{EA})$	$\sigma(x_i)$	$\rho(x_i, x^{EA})$
Δ FX	**1.17**	–	**3.65**	–
GDP	4.07	0.66	3.36	0.68
HICP infl.	0.60	0.49	0.93	0.32

Estimate spillovers: empirical model

Estimate local projection while conditioning on exchange rate regime

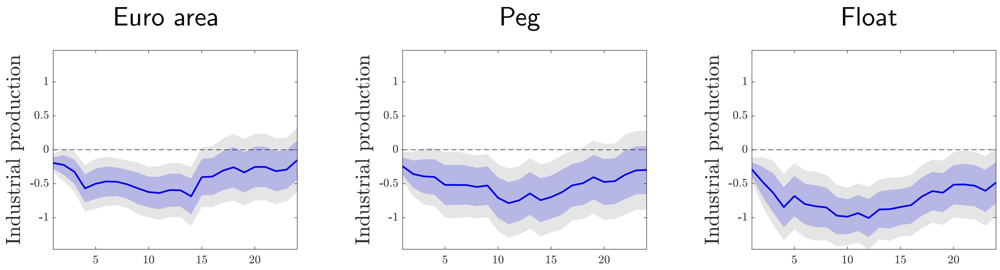
$$\underline{x_{n,t+h}} \quad = \quad \alpha_{n,h} + \mathbf{z}'_{n,t} \cdot \boldsymbol{\beta}_h + \underline{\gamma_h^f \, \mathbb{I}_{n,t-1} \, \bar{\epsilon}_t} + \underline{\gamma_h^p \, (1 - \mathbb{I}_{n,t-1}) \, \bar{\epsilon}_t} + u_{n,t+h}, \;\; t = 1, ..., T.$$

- $\bar{\epsilon}_t$: euro-area shock
- Variable of interest: $x_{n,t+h}$; $\mathbb{I}_{n,t-1} = 1$ if float
- Controls $\mathbf{z}_{n,t}$: twelve lags of dependent variable and shocks (baseline)

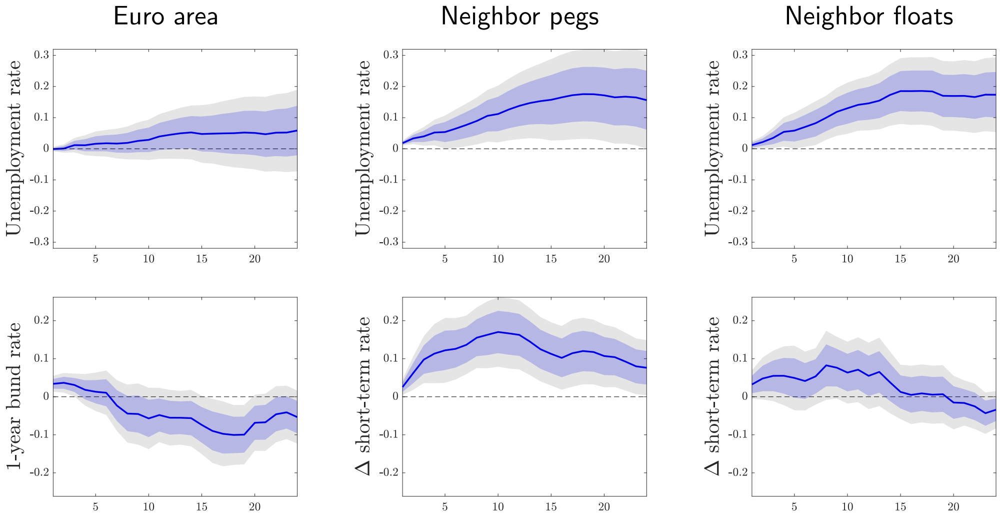
Evidence: euro-area monetary tightening

Jarociński Karadi (2020) shock

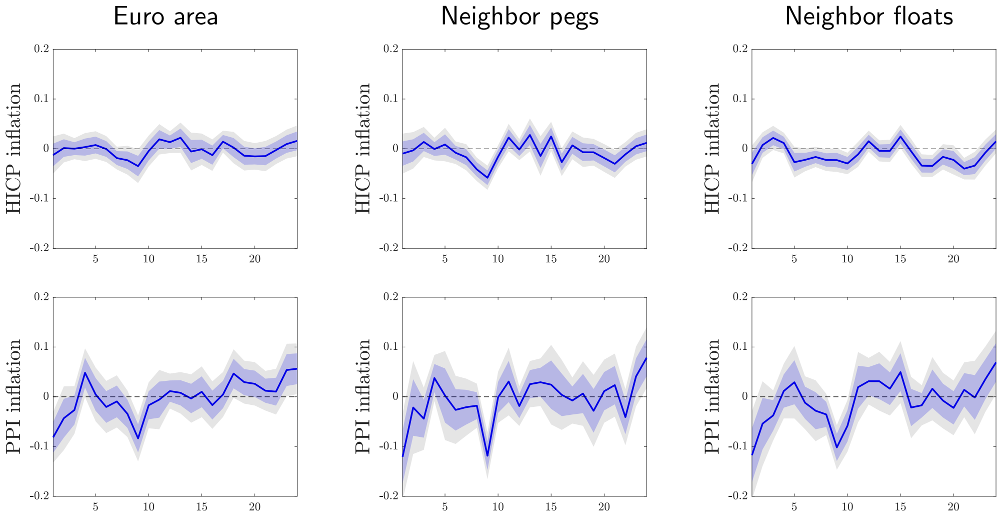
- Euro area monetary policy shocks generate large real spillovers on neighbor countries
- Exchange rate regime makes no difference: no insulation under float



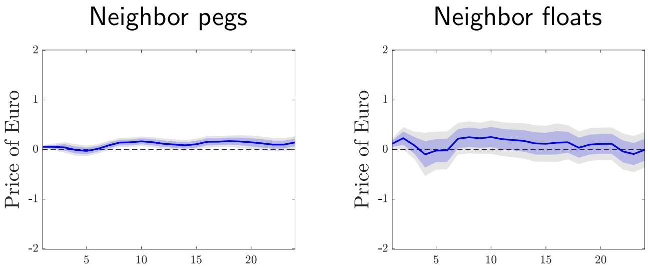
No difference in other dimensions either



Inflation spillovers also basically identical



Response of bilateral euro-exchange rates



Conditional on the shock, exchange rate hardly moves

We find comparable patterns for other shocks

- Euro-area central bank information shocks (Jarociński Karadi 2020)
- Euro-area credit shocks (Gilchrist Mojon 2018)

Robustness

- Classification of the exchange rate regime,
  - clearest pegs (Bulgaria, Croatia, Denmark), clearest floats (UK, Norway, Poland)
  - exclude intermediate cases
- Country groups
  - Without accession countries
  - Only Central and Eastern European countries, or exclude them.
- Crisis episodes and countries,
  - drop Cyprus, Greece.
  - drop global financial crisis 08-09
- Additional controls:
  - for US mp, for example,
  - or financial conditions

Endogeneity of exchange rate regime

- Assume flexible exchange rate is a shock absorber.
- If some neighbors particularly vulnerable to what happens in EA, they may opt for float.
- Then, the response of floaters may reflect relative vulnerability.

But—turns out—floats appear no more vulnerable than pegs:

	Peg	Float
Size (in percent of EA GDP)	0.9	5.0
Trade openness vis-à-vis EA	42.2	40.6
Capital account openness (Chinn Ito index)	1.9	2.1
Terms of trade volatility	3.7	2.5

Modern Theory

How puzzling is the lack of insulation in light of modern theory?

- Which accounts for limited pass-through/expenditure switching

Assess issue in state-of-the-art models; tie our hands in two ways

1. Simulate Gopinath et al (2020) model **as is**: compare peg and float
2. Adopt and calibrate version of Itskhoki Mukhin (2021) to EA and generic neighbor

In both instances, we find that **model predicts insulation just like the classics**

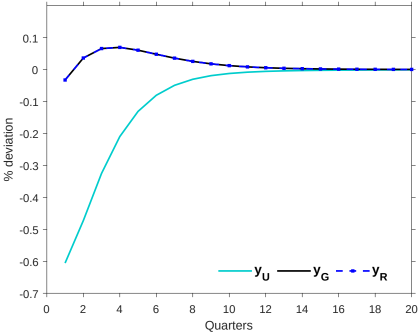
- Thus, theory predicts more insulation that what we find in the data

Three country model of Gopinath et al (2020): full insulation under float

Output effect of contractionary monetary policy shock in dominant currency country U

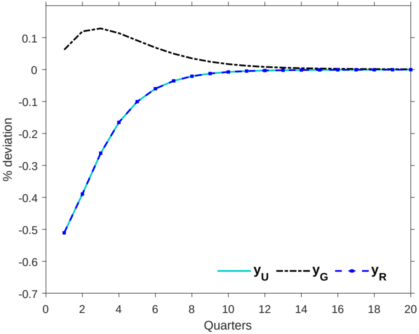
Flexible exchange rates in G and R

Gopinath et al: Figure 2.E



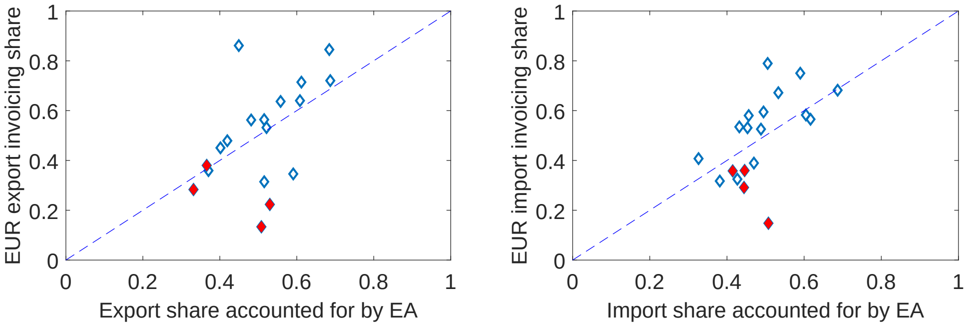
G floats, R pegs to dominant currency

Our simulation



For our 20 neighbor countries euro appears as dominant currency

Permanent floaters in red: UK, Nor, Swe, Ice (UK is outlier)



Sources: Gopinath et al (2015) and IMF Directions of Trade Statistics

An NK model with limited pass-through

Two countries

- Foreign (euro area) large, Home small (neighbor country)
- Dominant currency pricing: Home exports and imports priced in euro

Key features

- Monopolistic competition and sticky prices
- Roundabout production with imported inputs for realistic pass-through
- Consumption home bias, incomplete markets, portofolio demand shocks
- Monetary policy follows conventional Taylor-type interest rate rule with interest rate smoothing in Foreign and Home (if floating)

Largely standard (Itskhoki Mukhin, 2021): skip formal exposition here

- Strategy: calibrate model to second moments, assess extent of insulation against foreign shock under float

Calibration

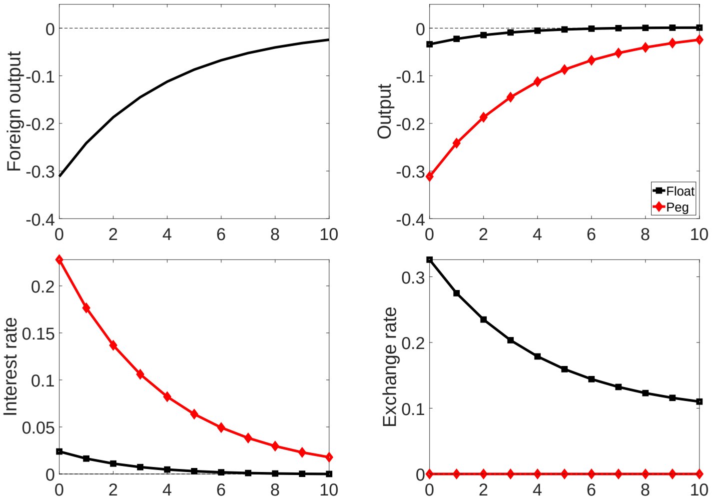
Parameters	Description	Values
A. Preferences		
β	Discount factor	0.995
φ	Inverse of labor supply elasticity	0.5
ϵ	Elasticity of substitution intermediate goods	10
η	Trade elasticity	2
υ	1 - Home bias (imports/GDP = 0.3)	0.1
B. Production and price setting		
α	Share of intermediate inputs in production	2/3
ω	Price adjustment costs	400
C. International financial markets		
γ	Response of spread to net foreign assets	0.001
D. Monetary policy: interest-rate rule (Foreign & Float)		
ρ_{r^*}	Interest rate smoothing	0.85
α_{π^*}	Response to CPI-inflation	1.25
α_{y^*}	Response to output	0.025

Parameters	Description	Values
E. Foreign shocks (monetary)		
σ_{ε^*}	Standard deviation monetary policy shock	0.25/400
ρ_{Z^*}	AR(1) parameter productivity shock	0.935
σ_{Z^*}	Standard deviation productivity shock	0.0024
ρ_{ξ^*}	AR(1) parameter preference shock	0.935
σ_{ξ^*}	Standard deviation preference shock	0.016
F. Home shocks		
χ_Z	productivity spillover	0.9
ρ_Z	SOE-specific productivity shock, AR(1)	ρ_{Z^*}
σ_Z	Standard deviation productivity shock	$(1-\chi_Z)3\sigma_{Z^*}$
χ_ξ	demand preference shock spillover	0
ρ_ξ	SOE-specific preference shock, AR(1)	ρ_{ξ^*}
σ_ξ	Standard deviation preference shock	$(1-\chi_\xi)3\sigma_{\xi^*}$
χ_ε	monetary shock spillover	0
ρ_ε	AR(1) parameter monetary policy shock	ρ_{ε^*}
σ_ε	Standard deviation monetary policy shock	$(1-\chi_\varepsilon)\sigma_{\varepsilon^*}$
G. International financial markets		
ρ_{ζ^*}	AR(1) parameter intern. financial shock	0.5
σ_{ζ^*}	Standard deviation intern. financial shock	0.016

Calibrated model predicts exchange-rate disconnect

	data					model				
x_i	σ_{x_i}	ρ_{x_i,y_i}	$\rho_{x_i,x_i(-1)}$	$\rho_{x_i,x_{EA}}$	$\rho_{x_i,y_{EA}}$	σ_{x_i}	ρ_{x_i,y_i}	$\rho_{x_i,x_i(-1)}$	$\rho_{x_i,x_{EA}}$	$\rho_{x_i,y_{EA}}$
A. Float										
Δ FX	3.65	0.12	0.17	–	0.03	3.65	0.32	-0.24	–	-0.04
GDP	3.36	1.00	0.76	0.68	0.68	3.23	1.00	0.70	0.41	0.41
HICP infl.	0.93	0.29	0.51	0.32	0.19	1.15	0.41	-0.18	0.17	0.04
B. Peg										
Δ FX	1.17	0.05	0.04	–	0.01	0.00	0.00	0.00	–	0.00
GDP	4.07	1.00	0.85	0.66	0.66	3.39	1.00	0.94	0.51	0.51
HICP infl.	0.60	0.20	0.37	0.49	0.31	0.32	0.45	0.95	0.96	0.49

Foreign monetary policy shock: float provides quite some insulation



Inspecting the mechanism

Why is there so much insulation in theory?

- Monetary policy sufficiently accommodating in calibrated model
- Even SOE not that open to start with

Solve simplified version of the model in closed form

- Linearized equilibrium conditions (symmetric zero-inflation steady state)
- Complete financial markets
- Unitary trade elasticity and infinitely elastic labor supply
- Shocks are Markov, persist with prob μ, else cease forever
- Focus on contractionary Foreign monetary policy shock that implies: $y_L^* < 0$

DCP: insulation is indeed incomplete

Benchmark: flex-price allocation (only in Home)

$$s_t^n = -y_t^* \text{ and } y_t^n = 0.$$

- Terms of trade weaken if external shock recessionary, absorb any effect on activity: complete insulation

Sticky prices, DCP: irrespective of monetary policy in Home, actual terms of trade constant

$$s_t = 0.$$

- No divine coincidence: trade-off between output and inflation stabilization
- Compare alternative monetary regimes under float

A Taylor rule in Home: $r_t = \alpha \cdot \pi_{H,t}$

Real spillovers: one can show that, while contractionary shock lasts:

$$0 > y_t^L = \upsilon y_L^*.$$

Spillovers limited by economy's openness. Responding to output implies even more insulation.

Nominal exchange rate:

$$e_t^L = -y_L^* - (t+1)\pi_L^*.$$

Absorbs foreign inflationary drift. One-time depreciation ⇒ expenditure switching of domestic consumers, stabilizing domestic demand for domestic production.

Nominal spillovers: solution for CPI inflation

$$\pi_t^L = \begin{cases} -\upsilon y_L^* > 0 & \text{t=0} \\ 0 & \text{otherwise.} \end{cases}$$

Depreciation translates into initial bout of headline inflation.

A CPI-Taylor rule in Home: $r_t = \alpha \cdot \pi_t$

CPI inflation:

$$\pi_t = v(\pi_t^* + \Delta e_t) + (1 - v)\pi_{H,t} \equiv 0$$

Rule leans implicitly against exchange-rate movements

- Preventing depreciation and, eventually insulation
- A resolution to the puzzle?

A CPI-Taylor rule in Home: $r_t = \alpha \cdot \pi_t$

CPI inflation:

$$\pi_t = \upsilon(\pi_t^* + \Delta e_t) + (1 - \upsilon)\pi_{H,t} \equiv 0$$

Rule leans implicitly against exchange-rate movements

- Preventing depreciation and, eventually insulation
- A resolution to the puzzle?

No

- Would need counterfactually strict inflation targeting ($\alpha \to \infty$) to account for the extent of spillovers in the data
- Also, model no longer get unconditional disconnect right

Conclusion

Exchange rate insulation puzzle

- Time-series evidence: float provides no insulation against euro area shocks
- State-of-the-art quantitative international macro model: insulation under standard Taylor rules (but also under optimal policy for DCP)

Lack of insulation in the data is thus puzzling (both in light of classics and modern theory)

- Why are actual policy makers tolerating exposure of output and employment to external shocks?