Fukui, Nakamura and Steinsson: "The Macroeconomic Consequences of Exchange Rate Depreciations"

A Discussion

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Iceland, May 2024

Contributions of the paper

1. **Provides empirical evidence** that:
   - Regime-induced exchange rate depreciations are strongly expansionary.
   - Depreciations appear to impact economy mainly through cheap credit than expenditure switching.

2. Formulate and calibrate a **FDX-Driven SMOE NK model**:
   - UIP deviations that originate from noise traders + limits to arbitrage appear consistent with evidence.
   - Model extended to include to include capital flight shocks shown to be consistent with
     - Mussa Puzzle,
     - Backus-Smith Puzzle, and
     - Exchange Rate Disconnect (puzzle).

Empirics

What we knew before:

- **UIP violated**:

$$1 + i_t^D \neq \left(1 + i_t^F\right) \mathbb{E}_t \frac{\zeta_{ijt+1}}{\zeta_{ijt}}$$

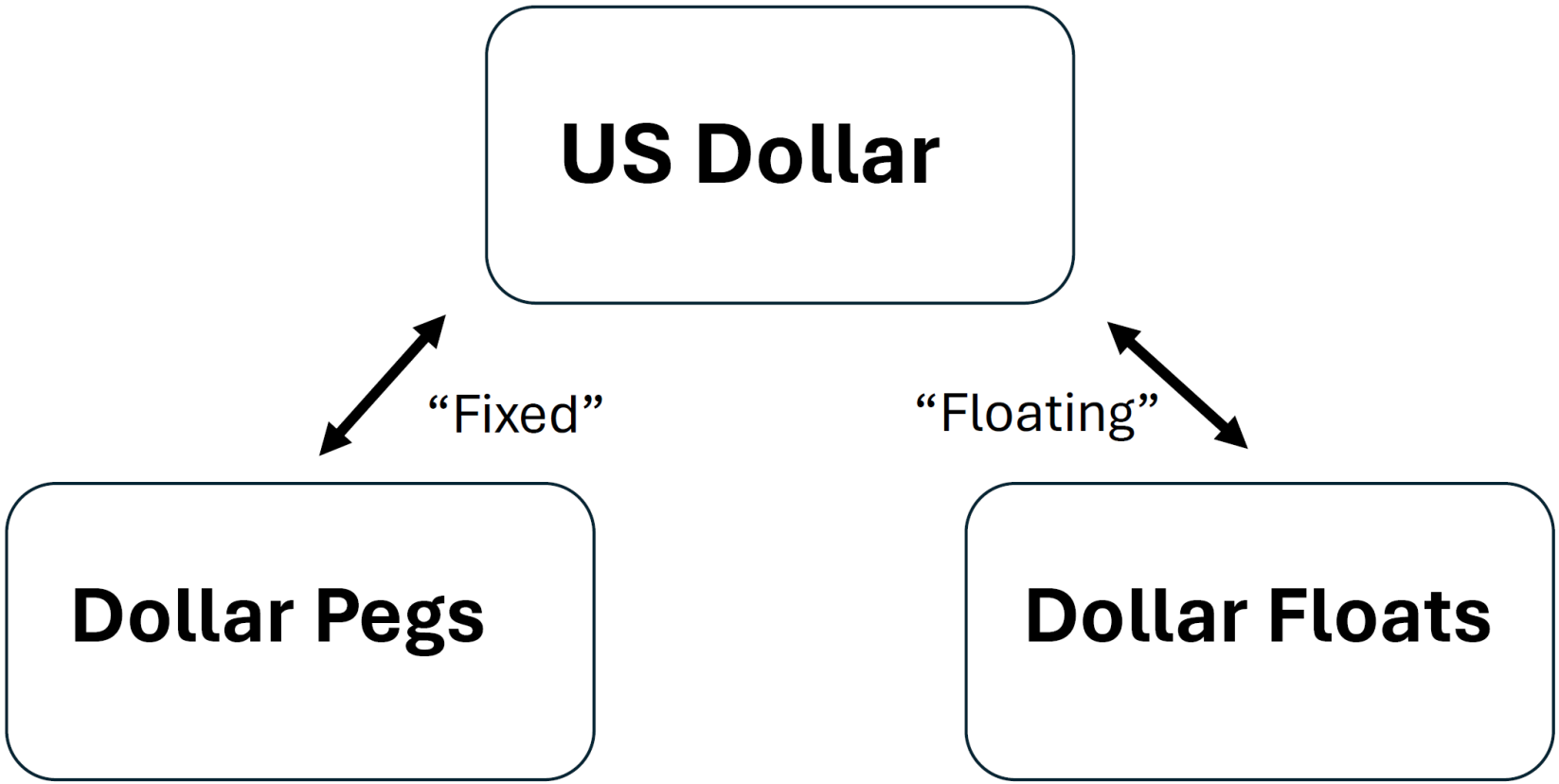
- **Mussa Puzzle**:Nominal and real exchange rate volatility intimately related (abandonement of Bretton-Woods increased real exchange rate volatility significantly).
- **Backus-Smith Puzzle**:

$$\frac{u_c\left(c_{it}\right)}{u_c\left(c_{it-1}\right)} \neq \frac{u_c\left(c_{jt}\right)}{u_c\left(c_{jt-1}\right)} \frac{q_{ijt}}{q_{ijt-1}} + \varepsilon_{ijt}$$

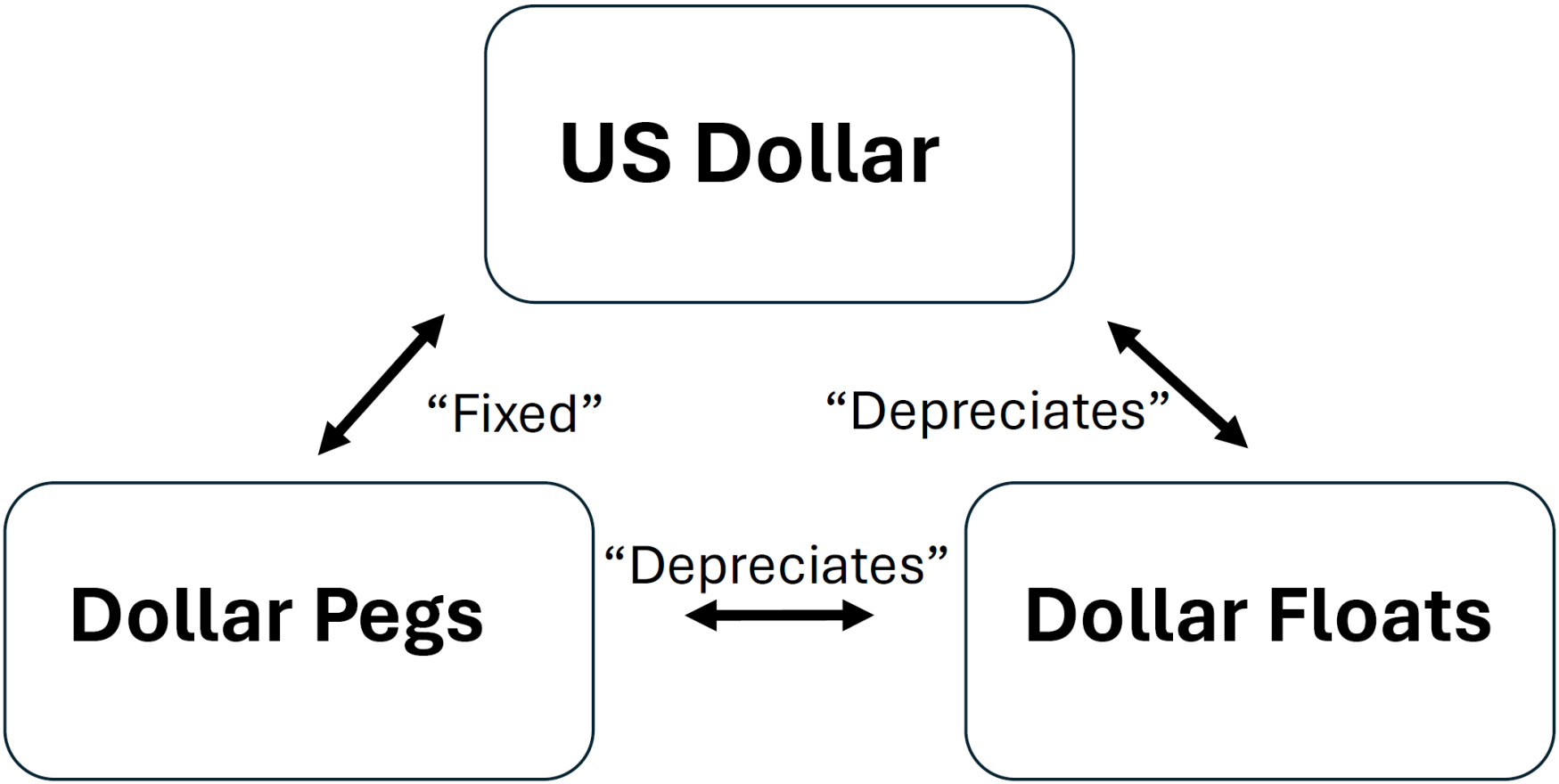
- **Exchange Rate Disconnect**:

$$\zeta_{ijt} \perp \left[Z_{it}, Z_{jt}\right]$$

Empirics



Empirics


US Dollar
"Fixed"
"Depreciates"
Dollar Pegs
"Depreciates"
Dollar Floats

Empirics

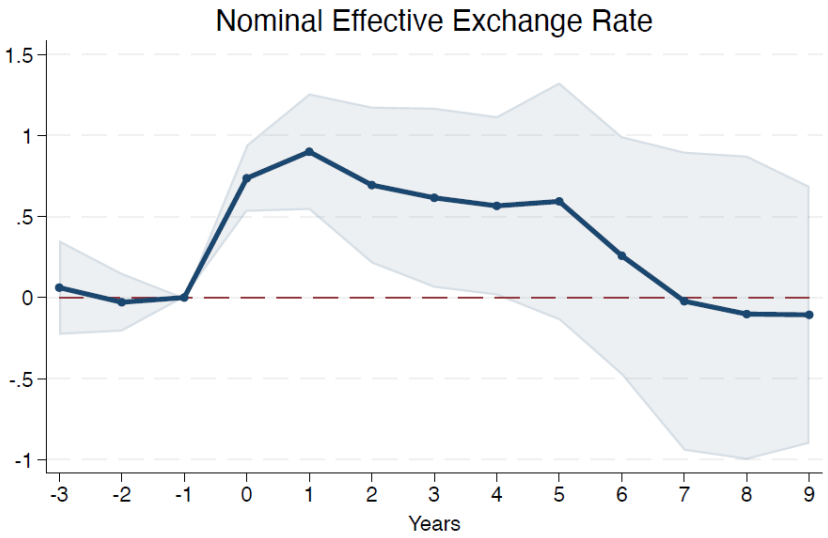
Paper exploits such **regime-induced exchange rate changes** to estimate impact of US$ changes:

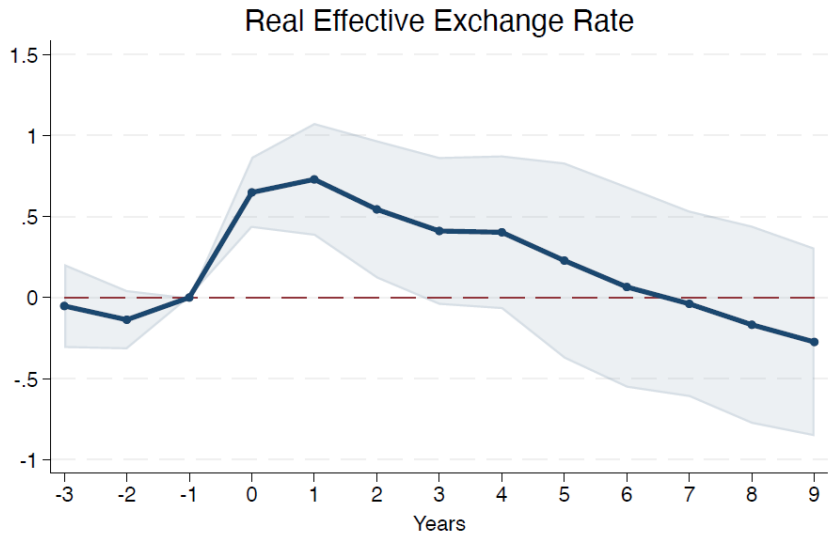
$$\begin{aligned} y_{i,t+h} - y_{i,t-1} &= \alpha_{i,h} + \alpha_{r(i),t,h} + \beta_h Peg_{i,t} \times \triangle \overbrace{e_{US,t}}^{\text{nom. effective dollar}} \\ &\quad + \Gamma'_h X_{i,t-1} + \gamma_h Peg_{i,t} + \varepsilon_{i,t,h} \end{aligned} \tag{1}$$

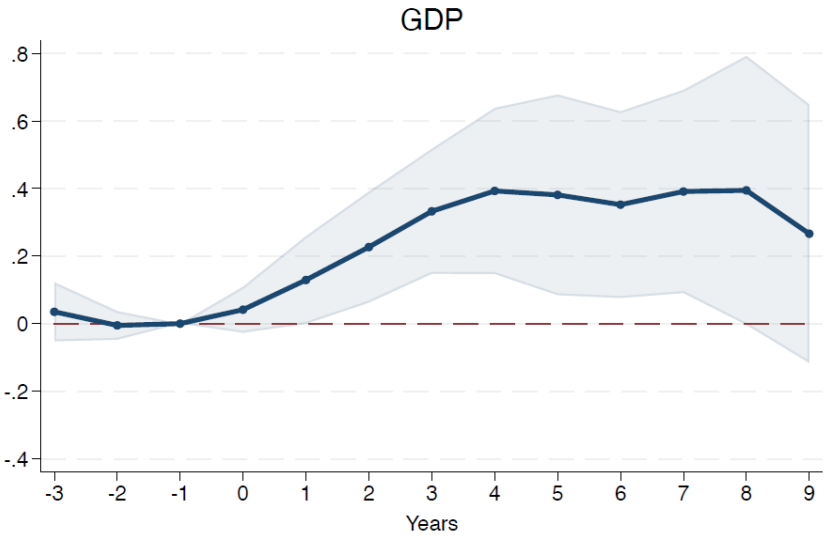
$Peg_{i,t}$:

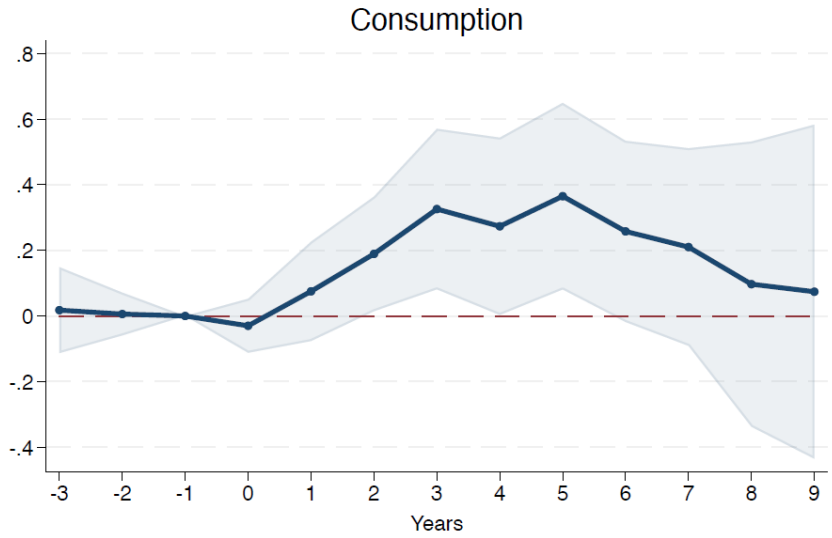
- Indicator of whether the country is in an exchange rate peg vs US$.
- Produces estimates of relative effects of US$ changes.
- Annual data 1973-2019.
- Drop extreme values of the outcome variable, years of changes in exchange rate regimes.

Empirics

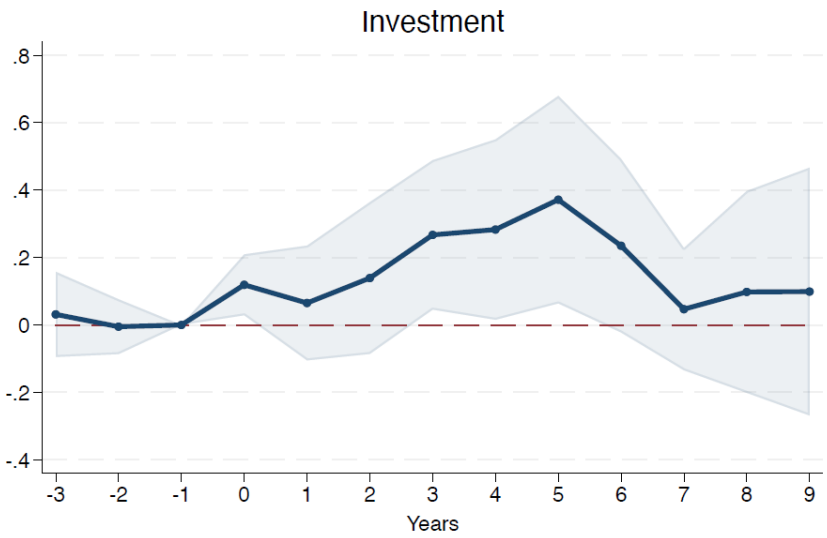

Nominal Effective Exchange Rate
1.5
1
.5
0
-.5
-1
-3 -2 -1 0 1 2 3 4 5 6 7 8 9
Years

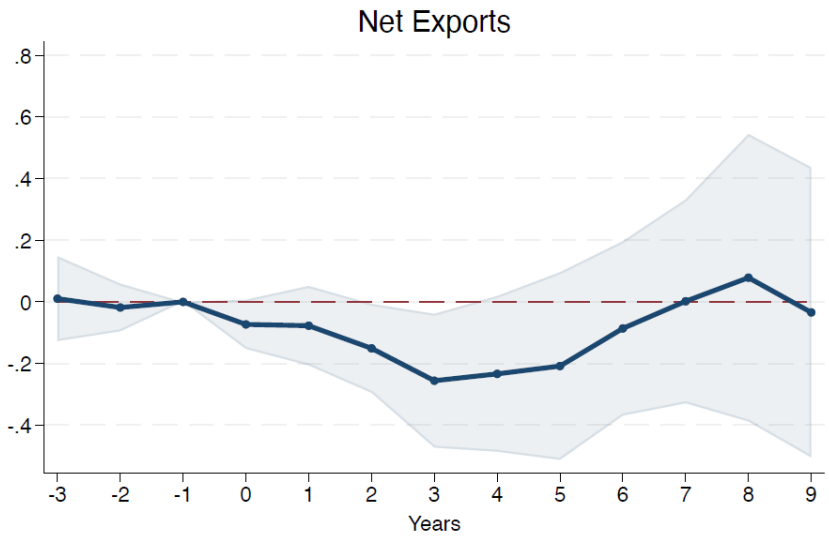

Real Effective Exchange Rate
1.5
1
.5
0
-.5
-1
-3 -2 -1 0 1 2 3 4 5 6 7 8 9
Years

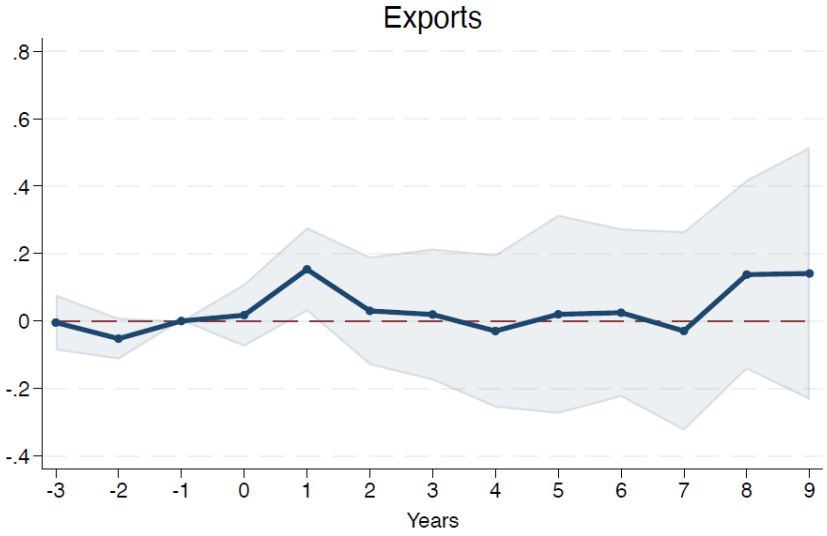

GDP
.8
.6
.4
.2
0
-.2
-.4
-3 -2 -1 0 1 2 3 4 5 6 7 8 9
Years


Consumption
.8
.6
.4
.2
0
-.2
-.4
-3 -2 -1 0 1 2 3 4 5 6 7 8 9
Years

Empirics


Investment
.8
.6
.4
.2
0
-.2
-.4
-3 -2 -1 0 1 2 3 4 5 6 7 8 9
Years


Net Exports
.8
.6
.4
.2
0
-.2
-.4
-3 -2 -1 0 1 2 3 4 5 6 7 8 9
Years


Exports
.8
.6
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0
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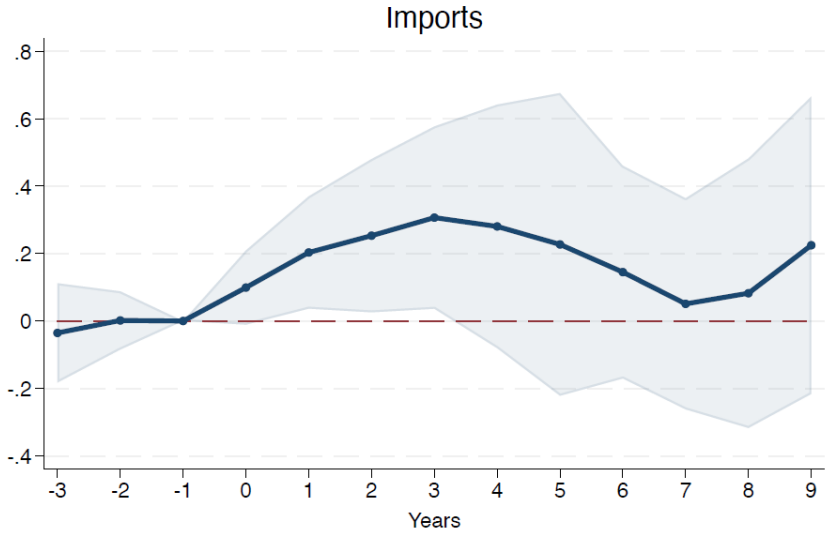
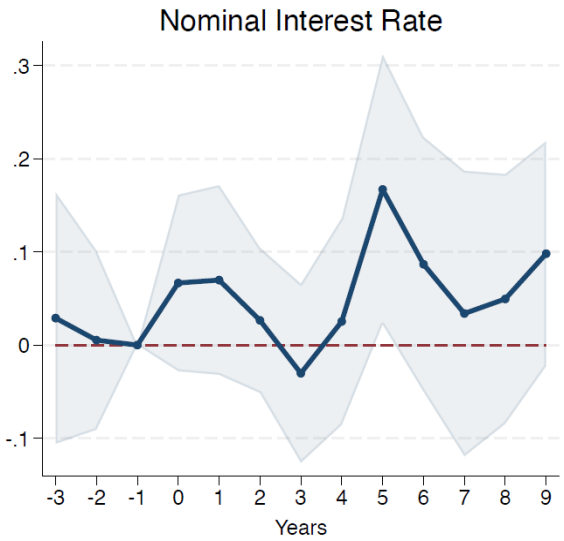
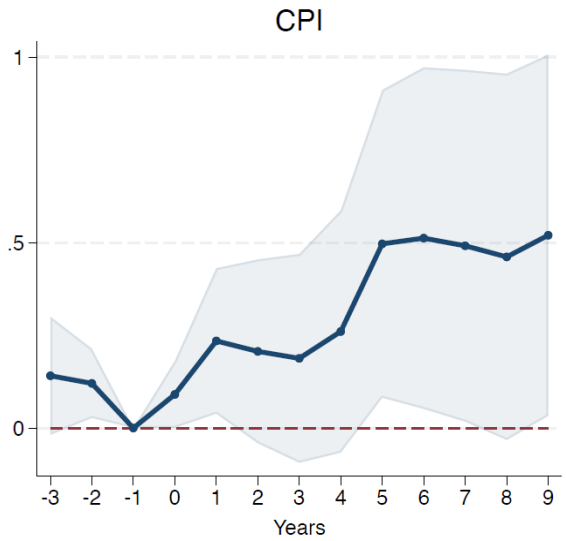
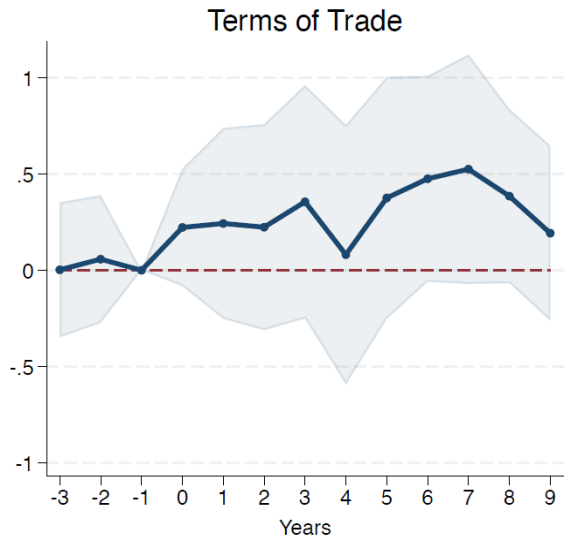
-3 -2 -1 0 1 2 3 4 5 6 7 8 9
Years


Imports
.8
.6
.4
.2
0
-.2
-.4
-3 -2 -1 0 1 2 3 4 5 6 7 8 9
Years

Empirics







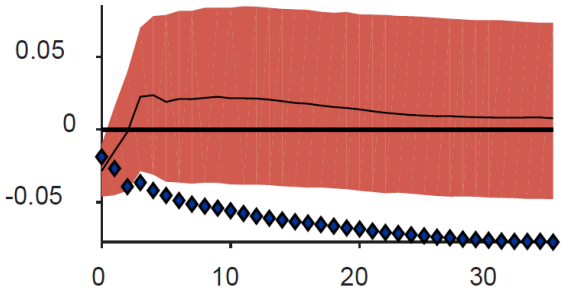
- Large and very persistent effects.
- Seem contrary to standard expenditure switching logic.
- Important to remember that these are **relative effects**

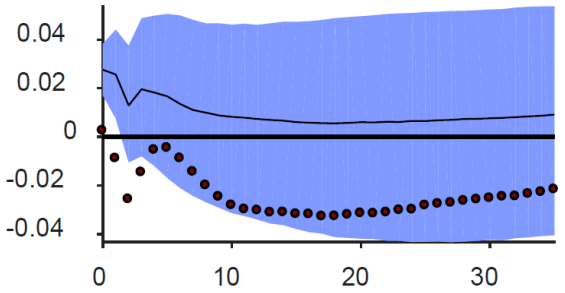
Comments – US Dollar Special (Ca' Zorzi et al)

ECB tightening

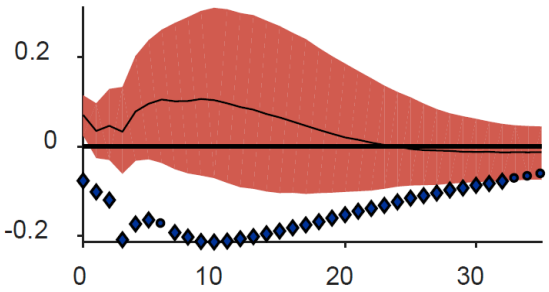
Federal Reserve tightening

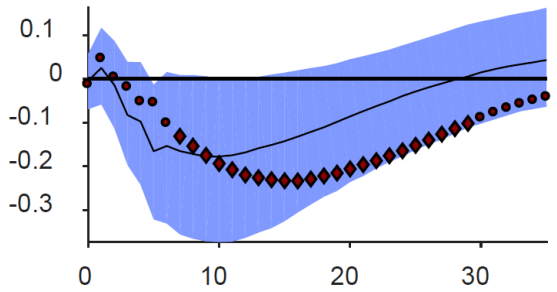
HICP/CPI
(100 x log)



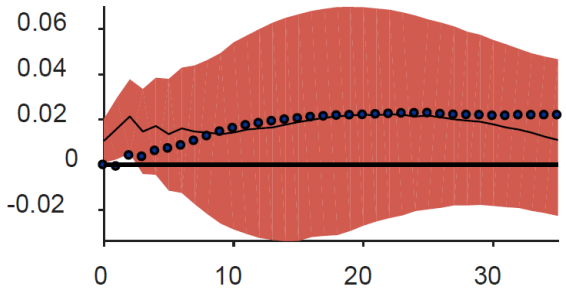


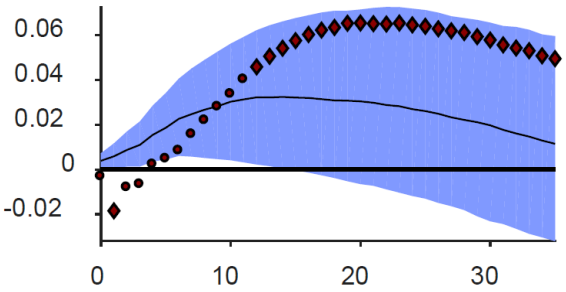
Industrial production
(100 x log)





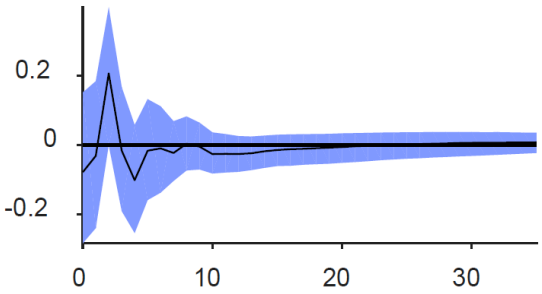
Unemployment rate
(percentage points)

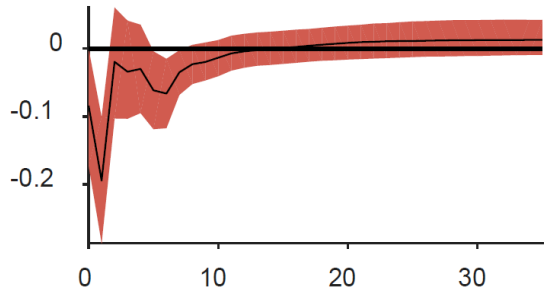




Comments – US Dollar Special (Ca' Zorzi et al)

Portfolio investment
(net acquisition of financial assets, percentages of GDP)

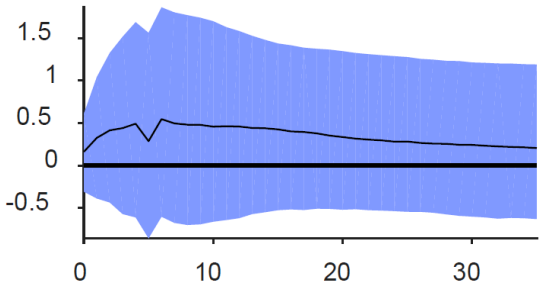


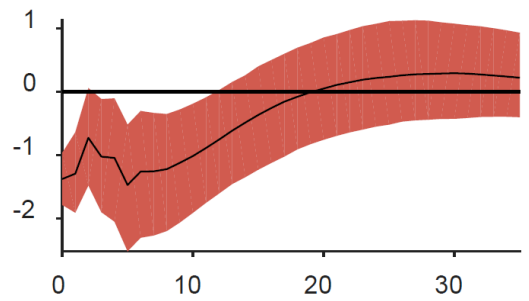


ECB tightening

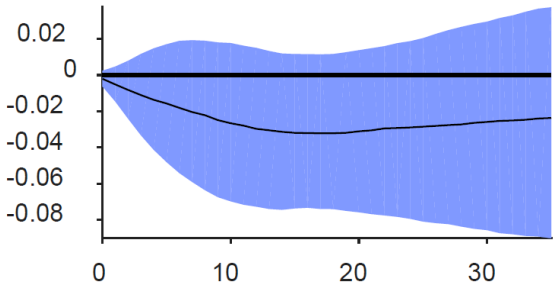
Federal Reserve tightening

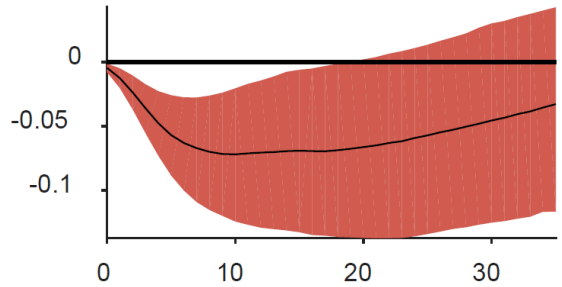
Stock prices in emerging economies
(MSCI emerging markets index, 100 x log)





Real GDP of emerging economies
(USD, 100 x log)

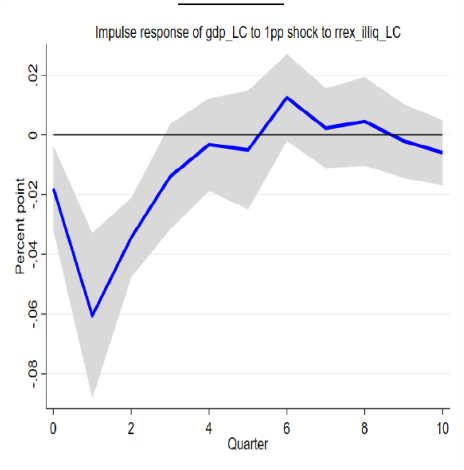




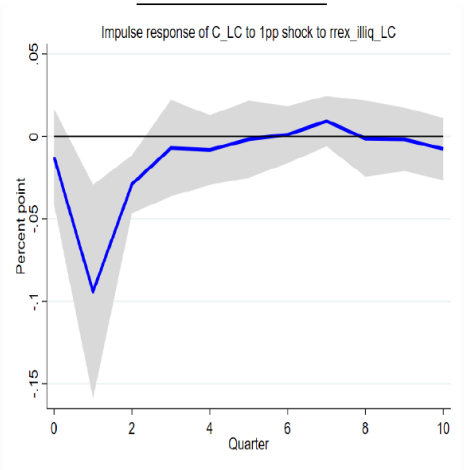
Transmission Through Risky or Safe Assets?

Impact of US Risky Returns on S Korea

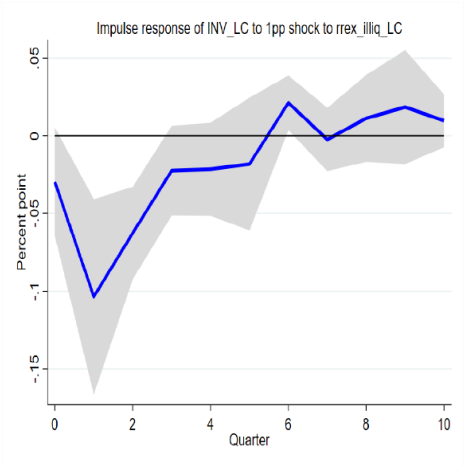
Output



Consumption

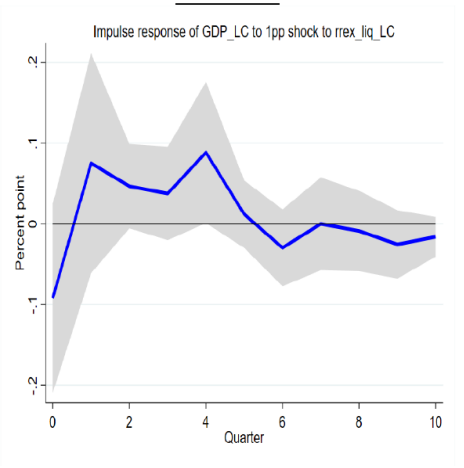


Investment

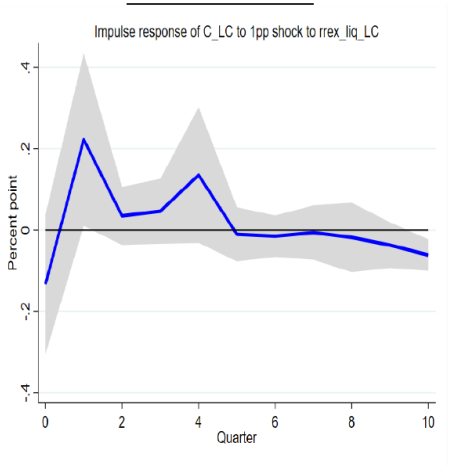


Impact of US Safe Returns on S Korea

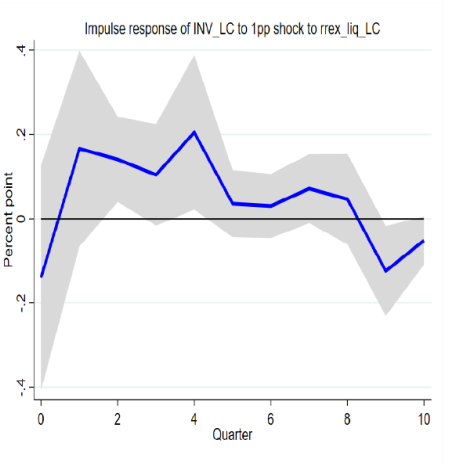
Output



Consumption



Investment



Empirics

Other comments:

- What are the drivers of regime-induced ER changes?
- Common shocks?
- Temporal aggregation?
- Exclude currencies in other pegs?

Yes:

- Evidence appears very convincing.

Theory

FDX driven (cont. of) SMOE NK model a'la Itskhoki and Mukhin:

- Countries either US, Pegs or Floaters
- **Portfolio adjustment costs** prevent full arbitrage:

$$1 + r_{ijt+1} = (1 + r_{jt+1}) \frac{q_{jit+1}}{q_{jit}} \neq 1 + r_{it+1}$$

$$\underbrace{s^Z_{ijt}}_{\text{portfolio share}} = F\left(\underbrace{\Gamma^z}_{\text{arbitr. costs}}, \mathbb{E}_t \left(\underbrace{r_{ijt+1} - r_{it+1}}_{\text{return difference}} \right) \right)$$

- **Noise traders**: Take US$ bond short position, buy bonds of $j \notin U$

$$\psi_{jt} = \rho^{\psi} \psi_{jt-1} + \epsilon^{\psi}_t$$

Theory

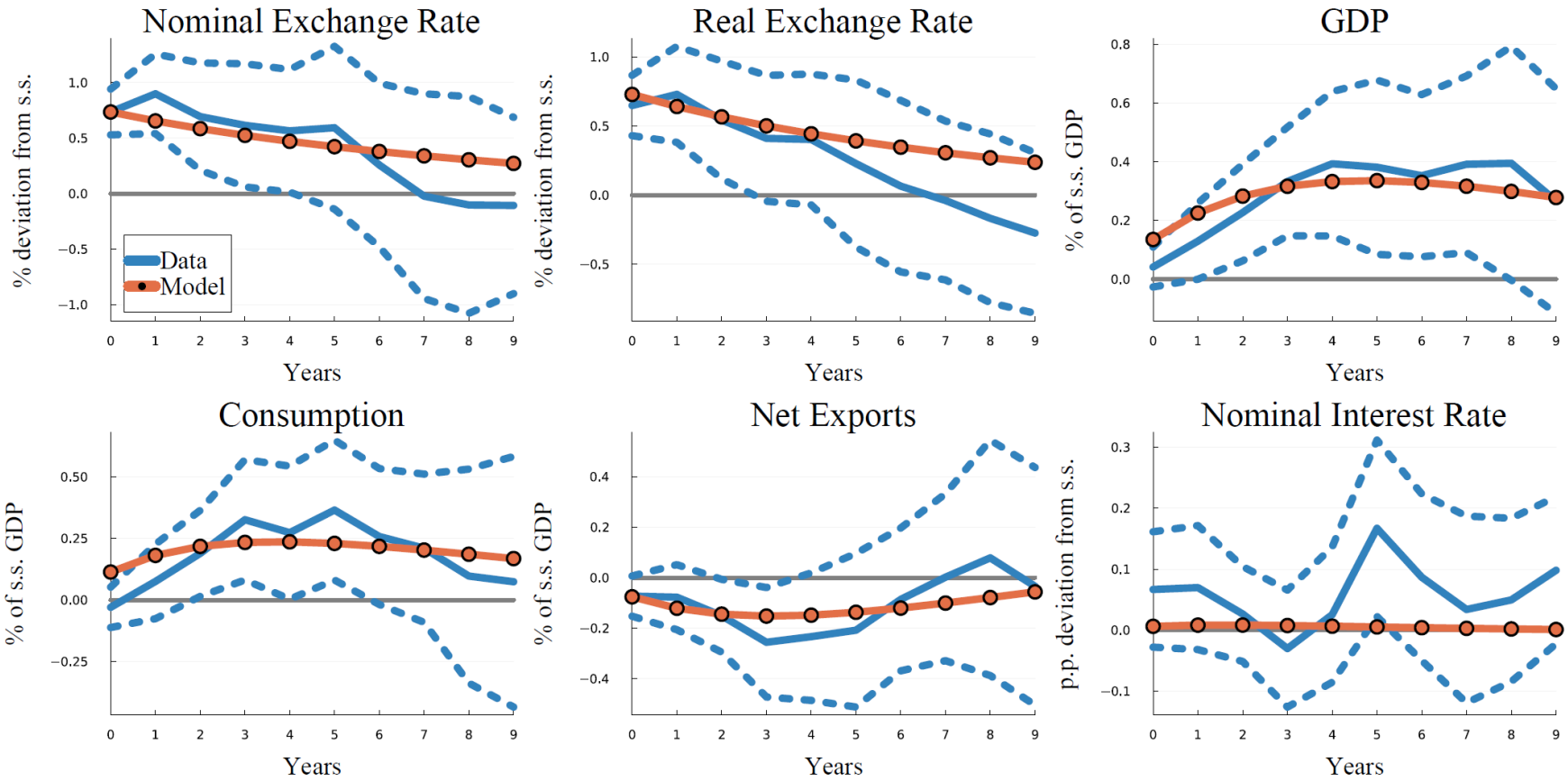
- Bond arbitrageurs that engage in carry trade:

$$\underbrace{B^{I}_{Ujt}}_{\text{US investor's position in j}} = \frac{1}{\underbrace{\Gamma^{B}}_{\gamma var\left(\triangle \xi_{jU}\right)}} \left[\underbrace{i_{jt} - i_{U,t} - \mathbb{E}_t \triangle \xi_{jUt+1}}_{\text{UIP deviation}} \right]$$

- Then in equilibrium:

$$\begin{aligned}
1 + i_{Ut} &= \mathbb{E}_t \left(1 + i_{jt}\right) \frac{\xi_{jUt+1}}{\xi_{jUt}} \Phi_{jt},\ j \in P \\
\Phi_{jt} &= \exp\left(\Gamma \left[\left(1 - \int \bar{s}_{ji}\, di\right) NFA_{jt} + \int \bar{s}_{ij} NFA_{it}\, di\right] + \psi_{jt}\right) \\
1 + i_{Ut} &= \mathbb{E}_t \left(1 + i_{jt}\right) \frac{\xi_{jUt+1}}{\xi_{jUt}},\ j \in F
\end{aligned}$$

Theory


Nominal Exchange Rate
% deviation from s.s.
Data
Model
Years
Real Exchange Rate
% deviation from s.s.
Years
GDP
% of s.s. GDP
Years
Consumption
% of s.s. GDP
Years
Net Exports
% of s.s. GDP
Years
Nominal Interest Rate
p.p. deviation from s.s.
Years

Theory

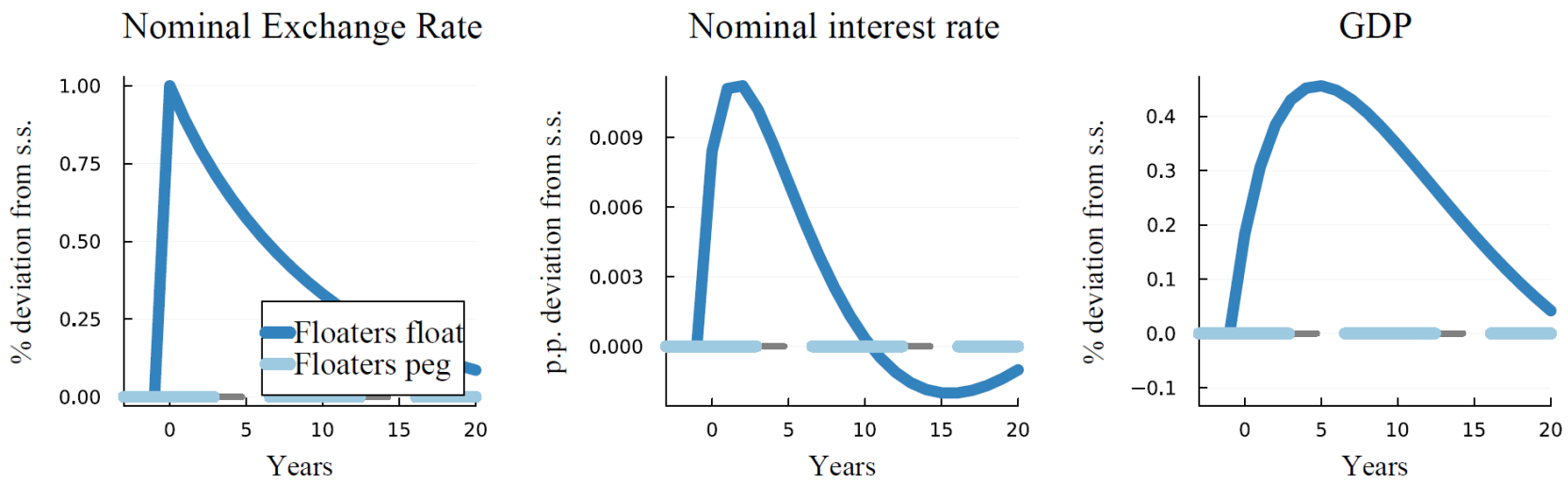
Model above would be inconsistent with

- Exchange rate disconnect - strong connection to output, consumption, etc.
- Backus-Smith puzzle - strong correlation between RER and relative consumption.

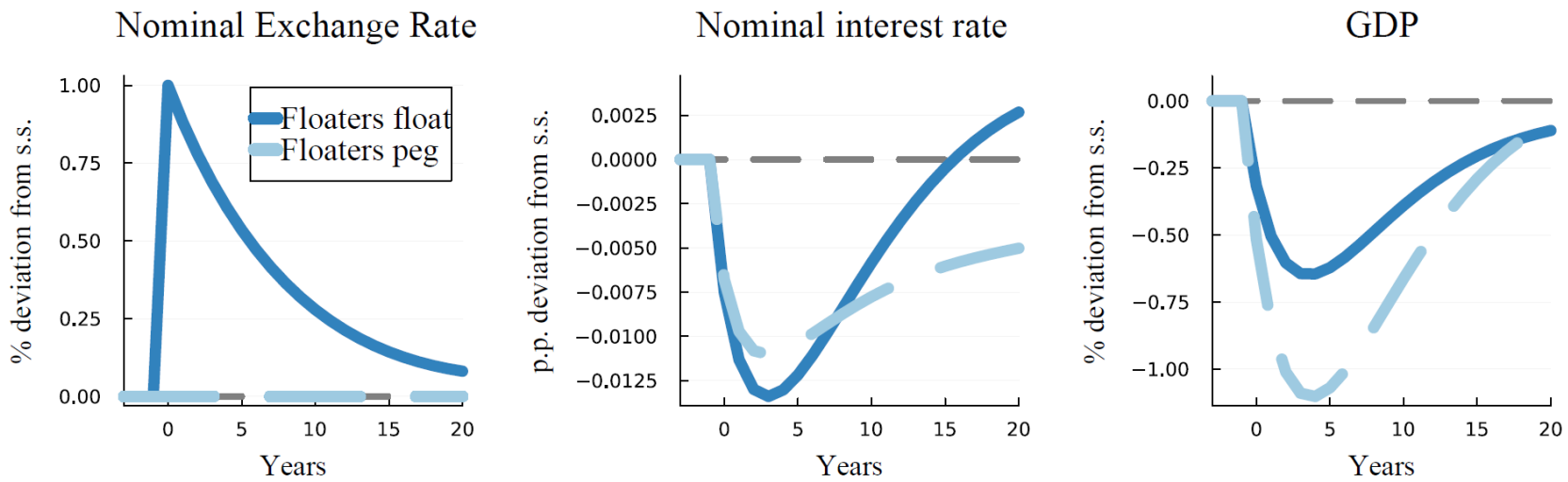
To address this, they introduce financial intermediation and a capital flight shock

$$\begin{aligned} 1 + r_{ijt+1} &= (1 + r_{jt+1}) \frac{q_{jit+1}}{q_{jit}} \exp(\xi_{it}) \\ \xi_{it} &= \rho^{\xi} \xi_{it-1} + \epsilon^{\xi}_{it} \end{aligned}$$

Theory



(a) Impulse Response to a UIP Shock



Comments - Theory

1. **Costs of arbitrage**: Necessary component of the FDX model.
   - Large institutional investors and investment funds unlikely to face significant transactions costs.
   - May be a stand-in for other phenomena:
     - Currency matching regulation.
     - Passive investment strategies.
2. **Risk premia**: Might risk premia be important?
   - Currency speculation is risky and needs to be compensated.
   - FNS do introduce such risk aversion but only at the level of bond arbitrageurs.

Comments - Theory

May empirical evidence support this risk compensation story?

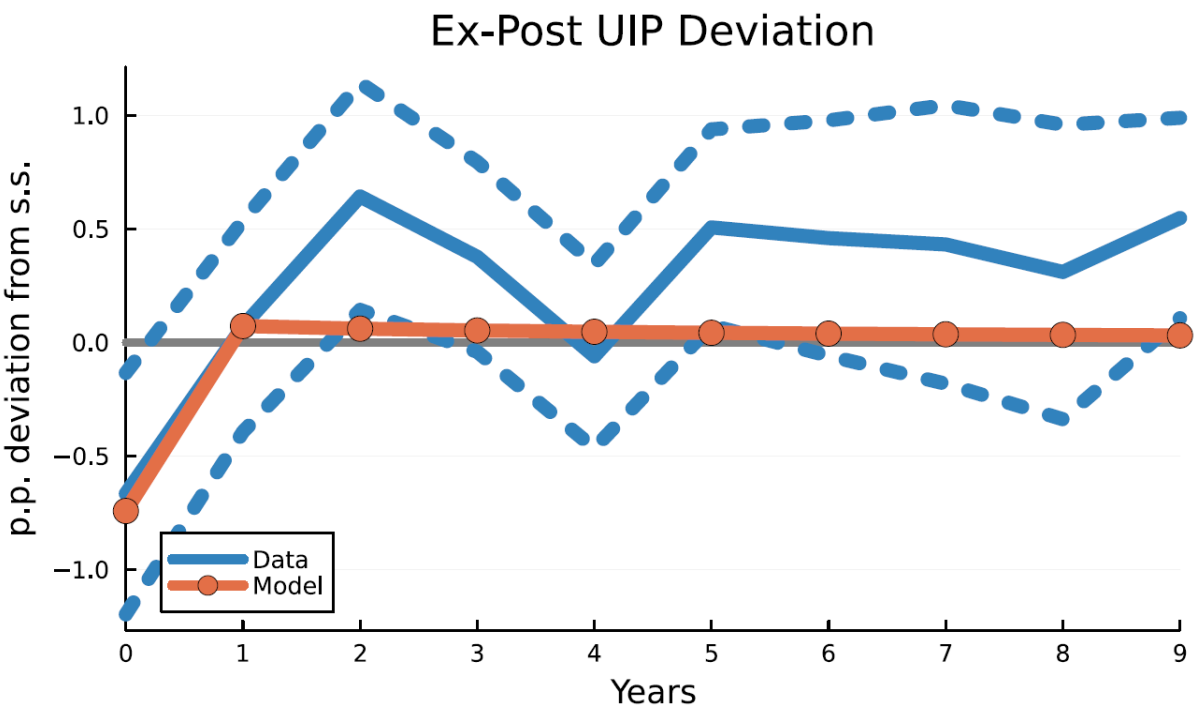


Figure C.3: Ex-Post UIP Deviations

Comments - Theory

3. **Structure of information**: Shocks perfectly observable.
   - In practise, investors may be confused about source of shocks in the short run.
   - This might help account for lack of strong SR arbitrage.
4. **Fiscal origins**: US debt special.
   - Investors willing to hold US debt and cash even if return dominated.
   - Presents the US with the privilege of access to monetary finance of deficits.
5. **Policy response**: How should monetary policy makers respond?

Conclusion

Great paper!

- Convincing empirical evidence on the impact of US$ movements.
- Does evidence extend to other pegs?
- What are the sources of impact of US$?
- Model that can account for not only empirical evidence but also major puzzles surrounding real and nominal exchange rates.
- Perhaps worth to think more about underlying deeper determinants of UIP violations.
- Top paper, one of those that address important question and make you think.