What Drives the Exchange Rate?

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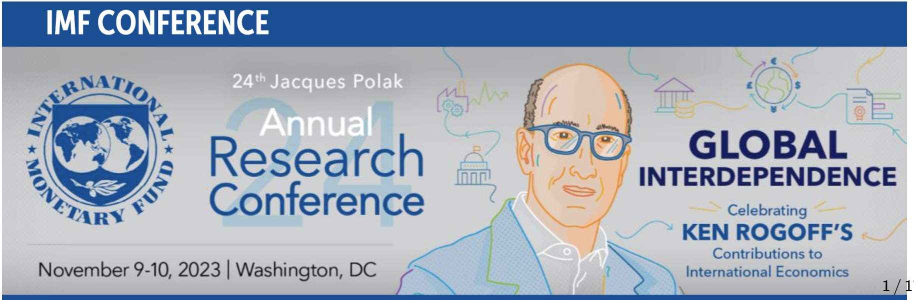

Introduction

- Prequel to: “Exchange Rate Disconnect in General Equilibrium”
- Inspired by:
  1. Meese and Rogoff (1983)
  2. Rogoff (1996)
  3. Obstfeld and Rogoff (2001)
  4. Ken’s doctoral course in International Macro

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- Exchange rates offer some of the most pervasive and challenging puzzles in macroeconomics and macro-finance
  - exchange rates feature in all international macro and finance models
  - exchange rates are key to macroeconomic policy in open economies
  - yet, almost any moment with exchange rate is a named puzzle!

Exchange Rate Facts: Puzzles

1. Exchange Rate Disconnect (Messe & Rogoff 1983, Engel & West 2005)

$$\mathbb{E}\{\Delta e_{t+1} | y_{t+1}, y_t, \ldots\} \approx 0 \quad \text{and} \quad \mathrm{var}_t(\Delta e_{t+1}) \gg \mathrm{var}_t(\Delta y_{t+1})$$

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$$\Delta e_{t+1} = \alpha_F + \beta_F(i_t - i_t^*) + \varepsilon_t \quad \Rightarrow \quad \beta_F < 0, \; R_F^2 \approx 0$$

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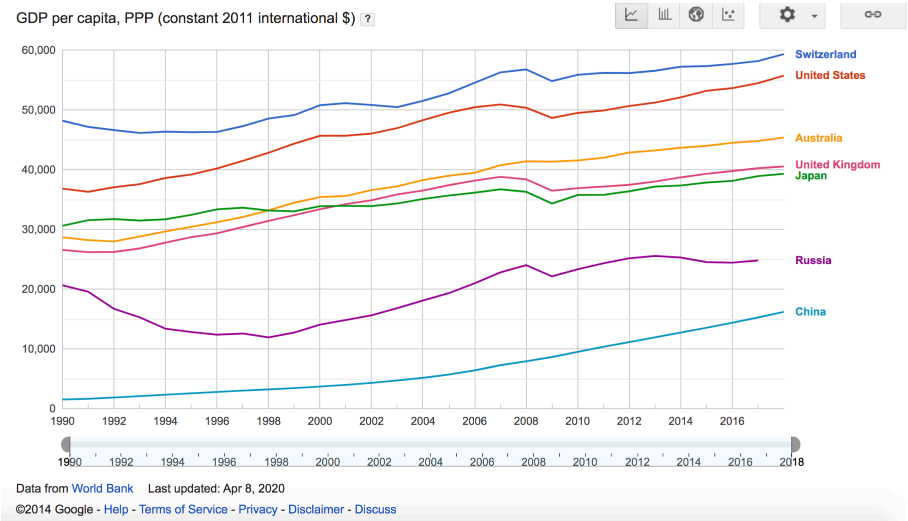
5. Mussa Puzzle (Mussa 1986, Baxter & Stockmann 1989)

Exchange Rate Disconnect in Pictures

1. Growth and Development



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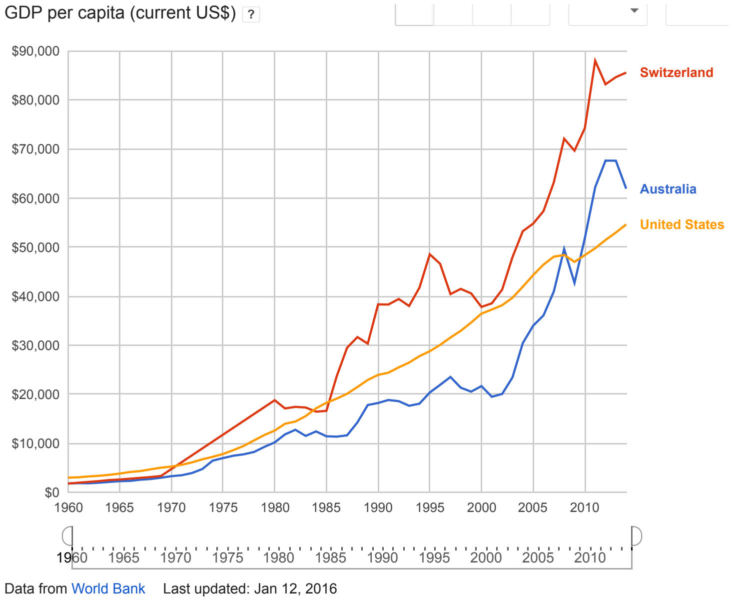


GBP/USD (GBPUSD=X) 1.3304 -0.0047 (-0.3499%) As of 10:16 AM EDT. CCY Delayed Price. Market open.
Add Indicator
Compare
5y
Area
Settings
Reset
GBPUSD=X 1.3297
Open 1.3352
Close 1.3297
Low 1.3289
High 1.3371
Vol 0.00
% Chg -18.06%
1.7500
1.7000
1.6500
1.6000
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1.5000
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1.3500
1.3297
1.3000
1.2500
Jan 2 '12
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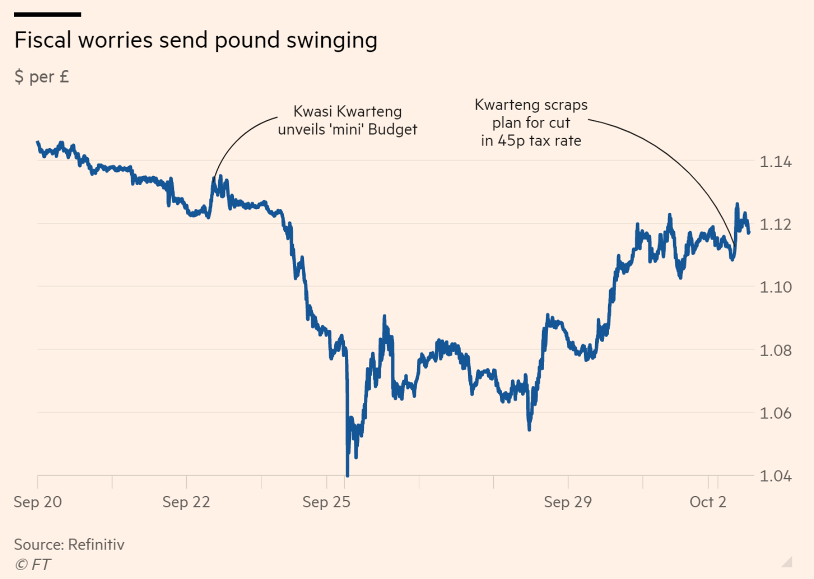
Jan 5 '15
Jan 4 '16

Exchange Rate Disconnect in Pictures

2. The British Pound II: 2022 Fiscal Panic



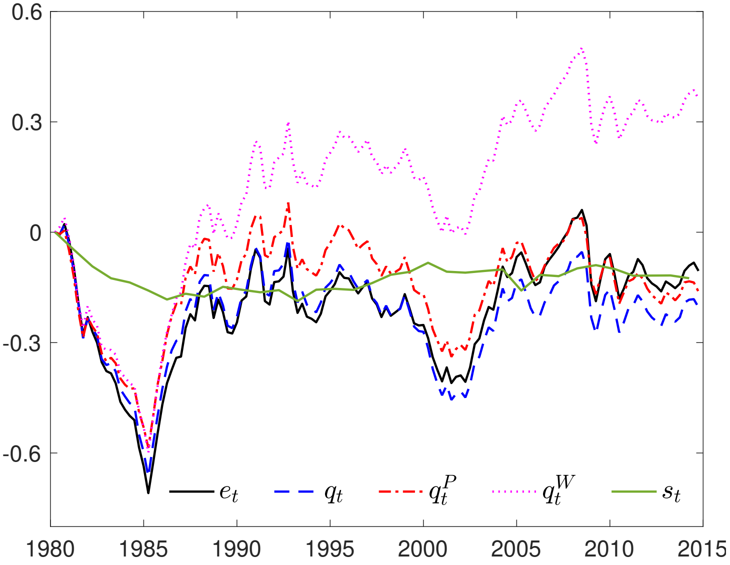
Exchange Rate Disconnect in Pictures

3. Abenomics and the Japanese yen

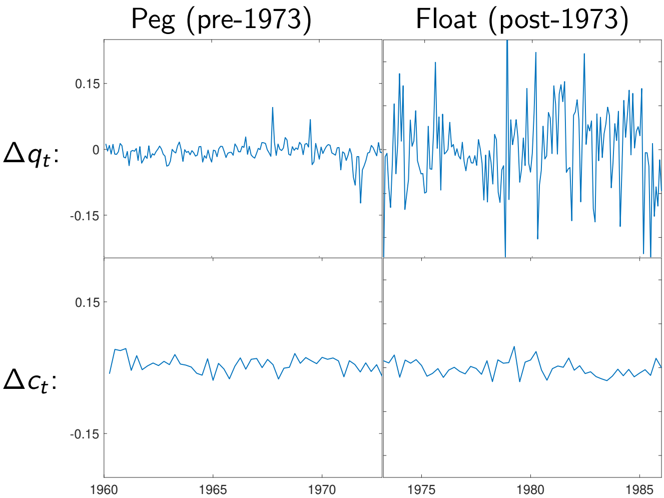
Exchange Rate Disconnect in Pictures

4. Sanctions and the ruble

Real Exchange Rate and PPP



ER Disconnect and Mussa Puzzle



$\Rightarrow$ ✗ IRBC

$\Rightarrow$ ✗ NKOE

$\Downarrow$ ✓ Mussa Puzzle

$\Downarrow$ ✓ ER Disconnect

Disconnect in the Limit

- Trade autarky: a model of complete exchange rate disconnect
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  - can ER be an order of magnitude more volatile than macro variables?
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- Further away from trade autarky, less disconnect

- Study the behavior of economies around the autarky limit as the diagnostic tool for modeling disconnect
  - using CKM-style business cycle "wedge" accounting

MODELING SETUP

Model Setup

- Home households solve:

$$\mathbb{E}_0 \sum_{t=0}^{\infty} \beta^t e^{\chi_t} \left(\frac{1}{1-\sigma} C_t^{1-\sigma} - \frac{e^{\kappa_t}}{1+1/\varphi} L_t^{1+1/\varphi} \right)$$

$$P_t C_t + \sum_{j \in J_t} \Theta_t^j B_{t+1}^j \leq \sum_{j \in J_{t-1}} e^{-\psi_t^j} (\Theta_t^j + \mathcal{D}_t^j) B_t^j + W_t L_t + \Pi_t + T_t$$

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- with expenditure $P_t C_t = P_{Ht} C_{Ht} + P_{Ft} C_{Ft}$ and import demand:

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- Government:

$$T_t = \sum_{j \in J_{t-1}} (1 - e^{-\psi_t^j})(\Theta_t^j + \mathcal{D}_t^j) B_t^j - P_t G_t, \quad G_t \equiv e^{g_t}$$

Equilibrium Conditions

- Asset market clearing:

$$B_t^j + B_t^{*j} = 0 \qquad \text{for} \quad j \in J_{t-1} \cap J_{t-1}^*$$

- Goods market clearing: $Y_t = Y_{Ht} + Y_{Ht}^*$ and e.g.

$$Y_{Ht}^* = C_{Ht}^* + G_{Ht}^* = \gamma e^{(1-\gamma)\xi_t^*} \left(\frac{P_{Ht}^*}{P_t^*} \right)^{-\theta} [C_t^* + G_t^*]$$

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- Generalized Backus-Smith condition:

$$\mathcal{Q}_t = \Lambda e^{\zeta_t} \left(\frac{C_t}{C_t^*} \right)^{\sigma},$$

where $\Delta\zeta_t = \tilde{\psi}_t \equiv \psi_t^j - \psi_t^{*j}$ for all j with $\zeta_{-1} = 0$

Shocks / Wedges Ω_t

	Macro and international shocks
p_t	inflation shock (monetary policy)
a_t	productivity shock
g_t	government spending shock
μ_t	markup shock (sticky prices)
κ_t	labor wedge (sticky wages)
ξ_t	international good demand shock
η_t	law-of-one-price shock (LCP/DCP, trade costs)
ψ_t^j	financial (asset demand) shocks

+ their foreign counterparts

MACRO DISCONNECT

Definition (1. Macro disconnect in the autarky limit)

Denote with $Z_t \equiv (W_t, P_t, C_t, L_t, Y_t)$ a vector of all domestic macro variables (wage rate, price level, consumption, employment, output) and with $\varepsilon_t \equiv V'\Omega_t + V^{*\prime}\Omega_t^*$ an arbitrary combination of shocks. We say that an open economy $\gamma > 0$) exhibits macro disconnect in the autarky limit if

$$\lim_{\gamma \to 0} \frac{\mathrm{d}Z_t}{\mathrm{d}\varepsilon_t} = 0 \qquad \text{and} \qquad \lim_{\gamma \to 0} \frac{\mathrm{d}\mathcal{E}_t}{\mathrm{d}\varepsilon_t} \neq 0. \tag{1}$$

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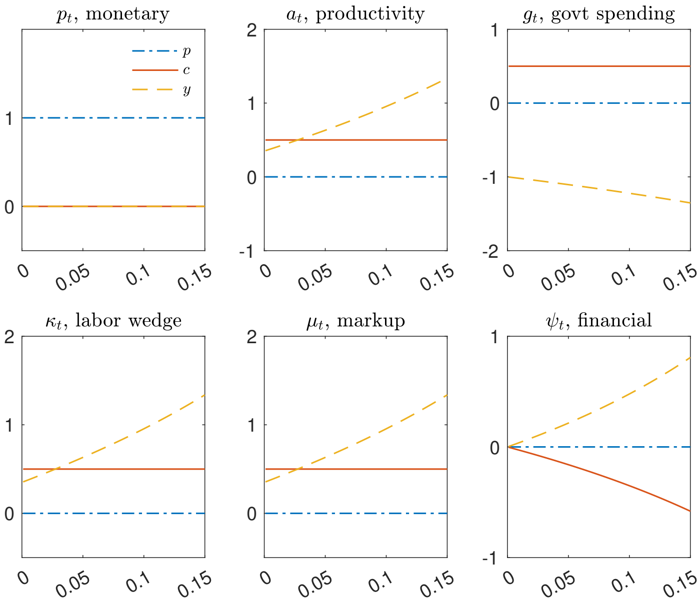
- Macro shocks $\Omega_t^{\varnothing} \equiv \{p_t, a_t, g_t, \kappa_t, \mu_t\}$ do not result in disconnect
  - — bad news for conventional IRBC and NOEM models of ER

Illustration: $\frac{dz_t}{de_t} \equiv \frac{\partial z_t/\partial \varepsilon_t}{\partial e_t/\partial \varepsilon_t}$ as a function of γ



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Proposition (2)

Near the autarky limit ($\gamma \to 0$), the international asset demand shock ψ_t is the only shock in $\{\eta_t, \xi_t, \psi_t\}$ that simultaneously and robustly produces:

(i) *a positive correlation between the terms of trade and the real exchange rate (Terms of Trade puzzle);*

(ii) *a negative correlation between relative consumption growth and the real exchange rate depreciation (Backus-Smith puzzle);*

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  3. Macro news are "financial" shocks from perspective of Props. 1&2

FINANCIAL DISCONNECT

Asset Prices and Returns

- Asset returns: $\mathcal{R}^j_{t+1} = \frac{\Theta^j_{t+1} + \mathcal{D}^j_{t+1}}{\Theta^j_t}$
- Asset prices $j \in J_t$:

$$\Theta^j_t = \mathbb{E}_t \left\{ e^{-\psi^j_{t+1}} \mathcal{M}_{t+1} \left(\Theta^j_{t+1} + \mathcal{D}^j_{t+1} \right) \right\},$$

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- Asset prices from the perspective of foreigners, $j \in J^*_t$:

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- Sets of "local currency" assets $\mathcal{A}_t, \mathcal{A}^*_t \in J_t \cap J^*_t$ with dividends, $\mathcal{D}^i_{t+1}$ for $i \in \mathcal{A}_t$ and $\mathcal{D}^{*j}_{t+1} = \mathcal{D}^j_{t+1} / \mathcal{E}_{t+1}$ for $j \in \mathcal{A}^*_t$, independent of $\mathcal{E}_{t+1}$
  - all local equities and full terms structure of bonds

Financial Disconnect

Definition (2. Financial disconnect in the autarky limit)

Denote with $\mathsf{F}_t \equiv \{\Theta^i_t, \Theta^{*j}_t\}$, where $i \in \mathcal{A}_t$ and $j \in \mathcal{A}^*_t$, a vector of asset prices that are not mechanically correlated with the exchange rate. We say that an open economy ($\gamma > 0$) exhibits financial disconnect in the limit if

$$\lim_{\gamma \to 0} \frac{\mathrm{d}\mathsf{F}_t}{\mathrm{d}\varepsilon_t} = 0 \qquad \text{and} \qquad \lim_{\gamma \to 0} \frac{\mathrm{d}\mathcal{E}_t}{\mathrm{d}\varepsilon_t} \neq 0. \tag{2}$$

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Suppose that the sets $\mathcal{A}_t$ and $\mathcal{A}^*_t$ are sufficiently rich. Then the model cannot exhibit financial disconnect in the autarky limit if the combined shock ε_t has a weight of zero on the subset of shocks $\{\eta_t, \xi_t, \psi^j_t\}$.

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- Macro news shocks are consistent with "Macro disconnect", but not "Financial disconnect" in the autarky limit

Admissible Financial Shocks

Proposition (4)

Shocks ψ_t^{*j}, $j \in \mathcal{A}_t$ *and* ψ_t^i, $i \in \mathcal{A}_t^*$ *are consistent with financial disconnect in the autarky limit.*

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- Foreign demand for "domestic currency" assets lead to exchange rate volatility without asset price volatility
  - may additionally move asset positions, B_t^j and B_t^{*j}, hence requires limited asset supply elasticity
  - limiting case of fully inelastic supply (segmented market models) results disconnect with asset positions as well
- In contrast, domestic demand for domestic assets moves asset prices

Conclusion

1. Financial shocks are necessary for a model of Macro disconnect
   — trade cost and LOP deviation shocks can also be useful as addition

2. Adding macro shocks helps match macro business cycle dynamics without compromising disconnect
   — Backus-Smith moment provides identification for the right mix of financial and macro shocks: supply of goods vs demand for assets

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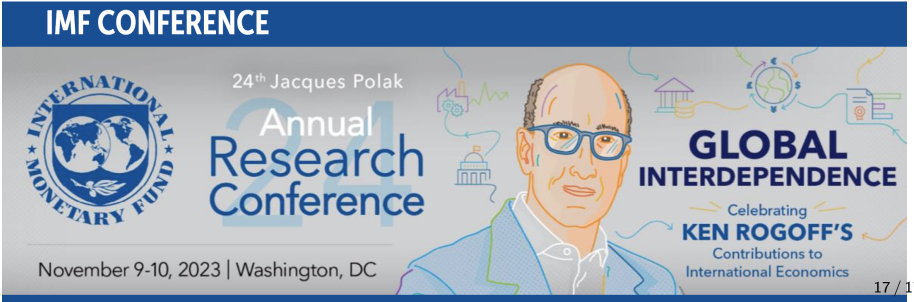
5. Recent segmented market models are not only sufficient, but likely also necessary to explain exchange rate disconnect

THANK YOU!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