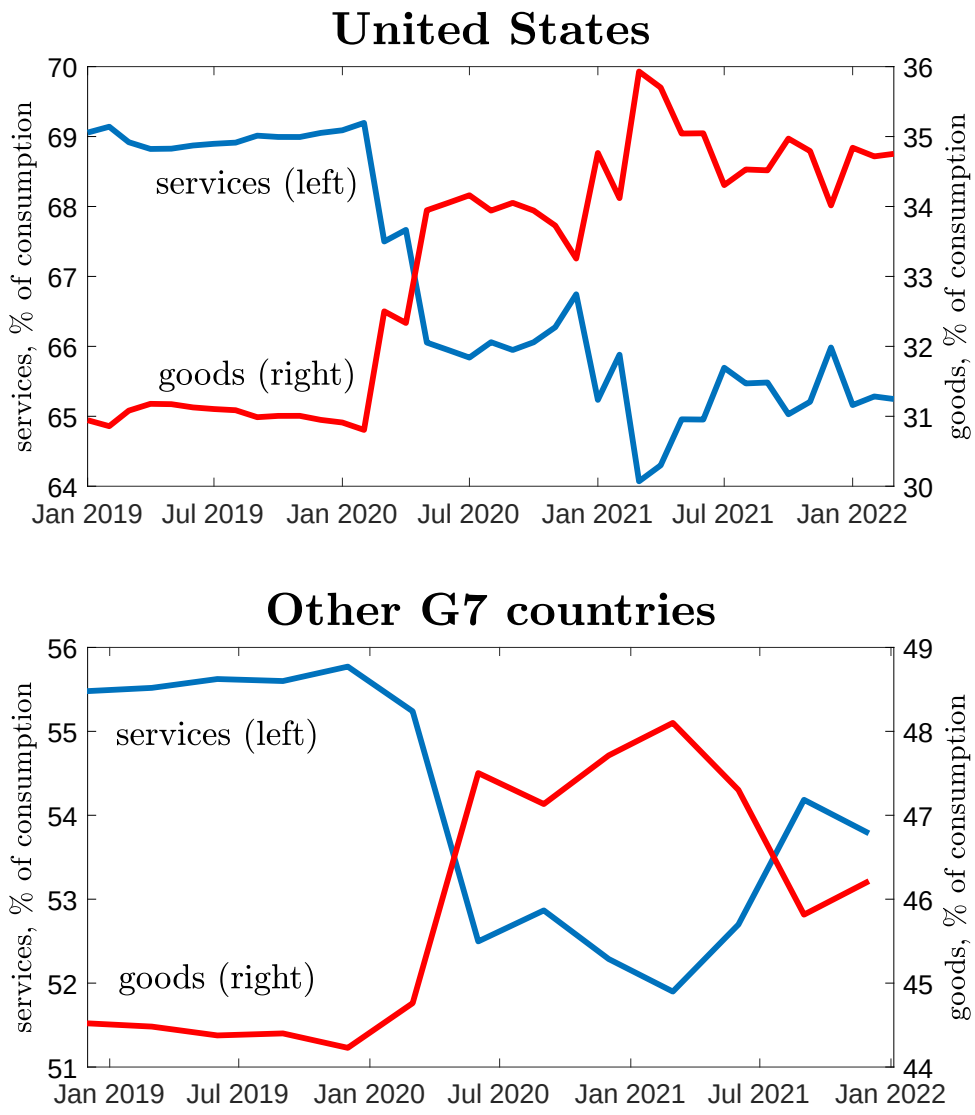
Global Stagflation and Reverse Currency Wars

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Motivation and research questions

- Recovery from Covid recession is unbalanced
  - Demand for goods is buoyant
  - Demand for services is subdued


United States
services, % of consumption
goods, % of consumption
services (left)
goods (right)
70
69
68
67
66
65
64
36
35
34
33
32
31
30
Jan 2019
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Other G7 countries
services, % of consumption
goods, % of consumption
services (left)
goods (right)
56
55
54
53
52
51
49
48
47
46
45
44
Jan 2019
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022

Motivation and research questions

- Recovery from Covid recession is unbalanced
  - Demand for goods is buoyant
  - Demand for services is subdued
- Reallocation of global demand from non-tradable services to tradable goods
  - What is the optimal monetary policy response?
  - What is the role played by capital flows?
  - Are there gains from international cooperation?

This paper

- Multi-country Keynesian model with multiple sectors
  - Continuum of small open economies
  - Each country produces a tradable good and a non-tradable one
  - Nominal wages are rigid
- Optimal monetary response to global reallocation shock
  - Temporary rise in consumers' demand for the tradable good, relative to the non-tradable one

Preview of results

- Reallocation shock triggers a rise in (tradable good) inflation (Olivera, 1964; Tobin, 1972; Guerrieri et al., 2021)
  - Trade off between inflation and unemployment (global stagflation)
- Capital flows transmit inflation internationally
  - Trade deficits contain domestic inflation and unemployment
  - But trade deficits export inflation and unemployment abroad
- Reverse currency wars (parallel with the 1980s; Frankel, 2022)
  - Countries try to appreciate exchange rate and run trade deficits
  - As a result interest rates and unemployment end up being too high

Outline of the talk

1. Model
2. Optimal monetary policy during a reallocation shock
   - Financial autarky
   - Free capital mobility
3. International spillovers and gains from cooperation

Households

- Lifetime utility of the representative household in country i

$$\sum_{t=1}^{\infty} \beta^{t-1} \left(\log\left(C_{i,t}\right) - \chi\left(\frac{P_{i,t}}{P_{i,t-1}}\right)\right)$$

$$C_{i,t} = \left(\frac{C_{i,t}^{T}}{\omega_{i,t}}\right)^{\omega_{i,t}} \left(\frac{C_{i,t}^{N}}{1-\omega_{i,t}}\right)^{1-\omega_{i,t}}$$

- $\chi\left(P_{i,t}/P_{i,t-1}\right)$ is a convex function capturing disutility from deviations of CPI inflation from target (normalized to zero)

- No disutility from working, labor endowment $\bar{L}$

$$P_{i,t}^{T} C_{i,t}^{T} + P_{i,t}^{N} C_{i,t}^{N} + P_{i,t}^{T} B_{i,t+1} + B_{i,t+1}^{n} =$$

$$= \mathrm{W}_{i,t} L_{i,t} + \Pi_{i,t} + P_{i,t}^{T} R_{i,t-1} B_{i,t} + R_{i,t-1}^{n} B_{i,t}^{n}$$

Optimality conditions

- Euler equation for T good

$$C_{i,t}^{T} = \frac{C_{i,t+1}^{T}}{\beta R_{i,t}} \frac{\omega_{i,t}}{\omega_{i,t+1}}$$

- No arbitrage between the two bonds

$$R_{i,t} = \frac{R_{i,t}^{n} P_{i,t}^{T}}{P_{i,t+1}^{T}}$$

- Demand for NT goods

$$C_{i,t}^{N} = \frac{1-\omega_{i,t}}{\omega_{i,t}} \frac{P_{i,t}^{T}}{P_{i,t}^{N}} C_{i,t}^{T}$$

- Consumer price index given by

$$P_{i,t} = \left(P_{i,t}^{T}\right)^{\omega_{i,t}} \left(P_{i,t}^{N}\right)^{1-\omega_{i,t}}$$

Nominal wage rigidities

- Nominal wage is fixed in the short run ($t = 1$)

$$W_{i,1} = 1$$

- Involuntary unemployment may arise in the short run
  - $L_{i,1} = \bar{L}$: full employment
  - $L_{i,1} < \bar{L}$: involuntary unemployment
- Wages are fully flexible in the long run ($t \geq 2$)

Firms and production

- Short run ($t = 1$): competitive firms, perfect sectoral labor mobility
- Non-tradable sector

$$Y_{i,1}^N = L_{i,1}^N \rightarrow P_{i,1}^N = W_{i,1}$$

- Tradable sector

$$Y_{i,t}^T = \left(L_{i,t}^T\right)^{\alpha} \rightarrow P_{i,t}^T = \frac{W_{i,t}}{\alpha} \left(Y_{i,t}^T\right)^{\frac{1-\alpha}{\alpha}}$$

- Law of one price

$$P_{i,t}^T = \mathcal{E}_{i,t}^j P_{j,t}^T$$

- Long run ($t \geq 2$): constant endowments Y^T and Y^N

Market clearing

- Normalize $B^n_{i,t} = 0$, tradable good market clearing

$$Y^T_{i,t} - C^T_{i,t} = B_{i,t+1} - R_{i,t-1} B_{i,t}$$

- NT good market clearing

$$C^N_{i,t} = Y^N_{i,t}$$

- Labor market

$$L_{i,t} = L^T_{i,t} + L^N_{i,t} \leq \bar{L}$$

Optimal monetary policy during a reallocation shock

- Long run ($t \geq 2$): optimal monetary policy targets zero inflation
- Short run ($t = 1$): central bank sets $P_{i,1}^T$ to maximize domestic utility
- Temporary reallocation shock
  - Initial steady state $\omega_{i,0} = \omega$
  - Short run: $\omega_{i,1} > \omega$ for at least some i
  - Long run: $\omega_{i,t} = \omega$ for $t \geq 2$
- Symmetric initial steady state $B_{i,1} = 0$, $W_{i,1} = 1$ and $P_{i,0}^T = P_0^T$
- P_0^T such that if $P_1^T > P_0^T$ then $Y_1^T > Y_0^T$

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Optimal policy problem

- Central bank sets $P_{i,1}^T$ to maximize

$$\omega_1 \log Y_{i,1}^T + (1-\omega_1) \log Y_{i,1}^N - \chi \left(\frac{P_{i,1}}{P_{i,0}} \right)$$

- Subject to

$$Y_{i,1}^T = \left(\alpha P_{i,1}^T \right)^{\frac{\alpha}{1-\alpha}}$$

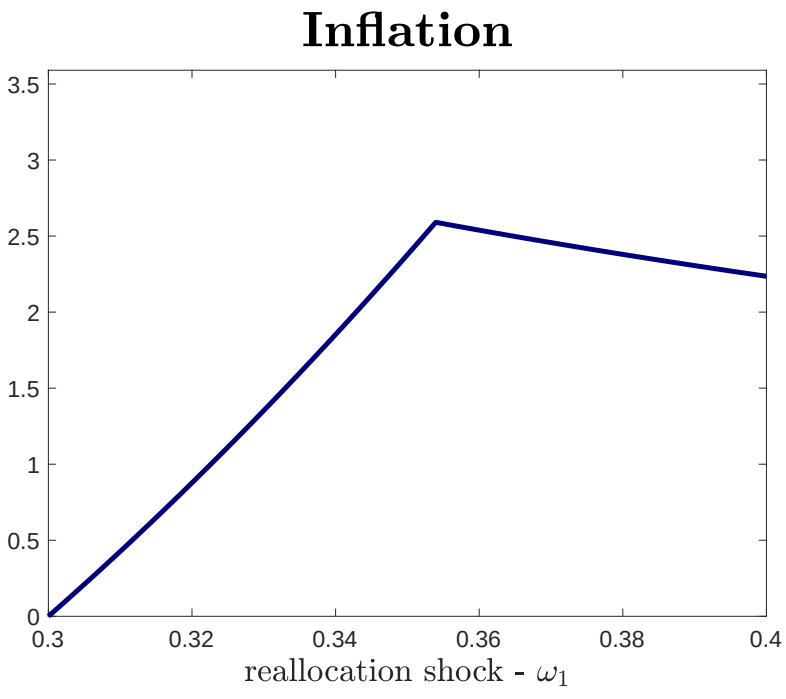
$$Y_{i,1}^N = \frac{1-\omega_1}{\omega_1} Y_{i,1}^T P_{i,1}^T$$

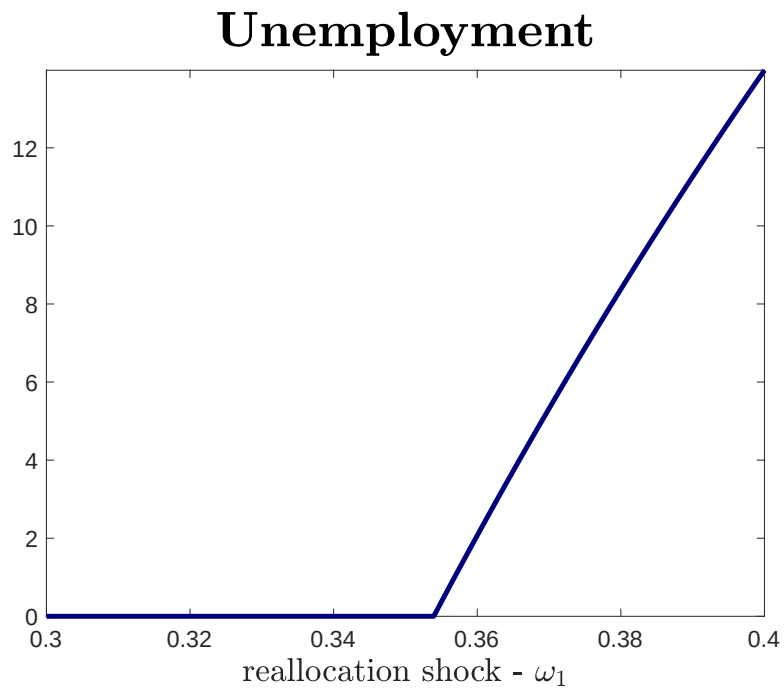
$$\left(Y_{i,1}^T \right)^{\frac{1}{\alpha}} + Y_{i,1}^N \leq \bar{L}$$

Optimal monetary policy response to reallocation shock

- Reallocation shock lowers demand for NT goods and employment
- Rise in $P^T_{i,1}$ sustains demand and employment in both sectors
  - Labor reallocation: $\uparrow Y^T_{i,1}, \uparrow L^T_{i,1}$
  - Expenditure switching: $\uparrow \frac{P^T_{i,1}}{P^N_{i,1}} \uparrow C^N_{i,1}, \uparrow L^N_{i,1}$
  - Income effect: $\uparrow Y^T_{i,1}, \uparrow C^T_{i,1}, \uparrow C^N_{i,1}, \uparrow L^N_{i,1}$
- Optimal policy trades off the inflation cost against the employment benefits

Optimal monetary policy response to reallocation shock





- Sufficiently large reallocation shock leads to stagflation

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Optimal policy problem under free capital mobility

- Countries may use the international credit markets to smooth the impact of the reallocation shock on consumption

$$C_{i,1}^T = \frac{\omega_{i,1}(1-\beta)}{\omega_{i,1}(1-\beta)+\omega\beta}\left(Y_{i,1}^T + \frac{R}{R-1}\frac{Y^T}{R_1}\right)$$

- Capital flows affect demand for non-tradables

$$Y_{i,1}^N = \frac{1-\omega_{i,1}}{\omega_{i,1}} C_{i,1}^T P_{i,1}^T$$

- Now a monetary expansion ($\uparrow P_{i,1}^T$) has a smaller impact on domestic demand for NT goods because income effect is weaker

$$\frac{\partial C_{i,1}^T}{\partial Y_{i,1}^T} << 1$$

- The reason is that part of the increase in $Y_{i,1}^T$ due to a monetary expansion is sold to foreign consumers

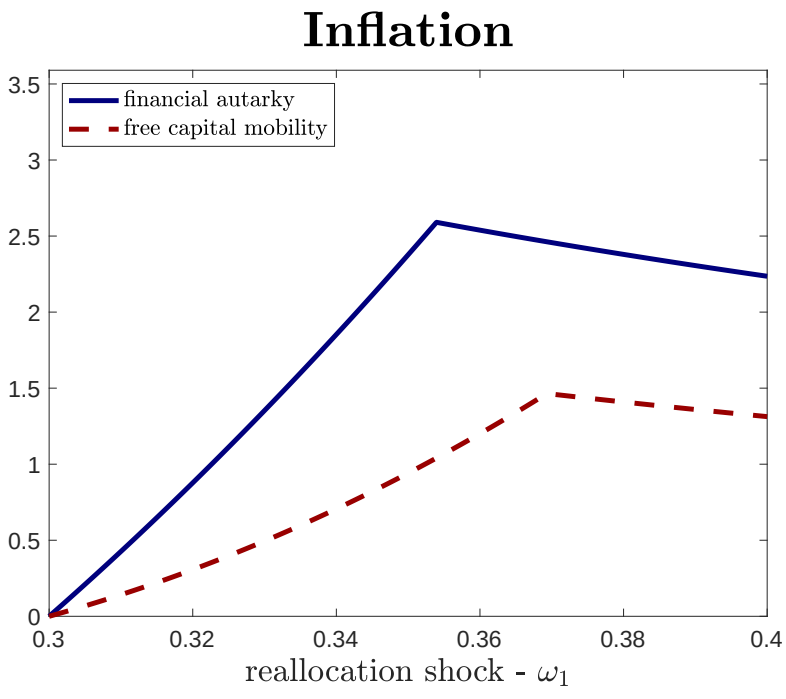
An idiosyncratic reallocation shock

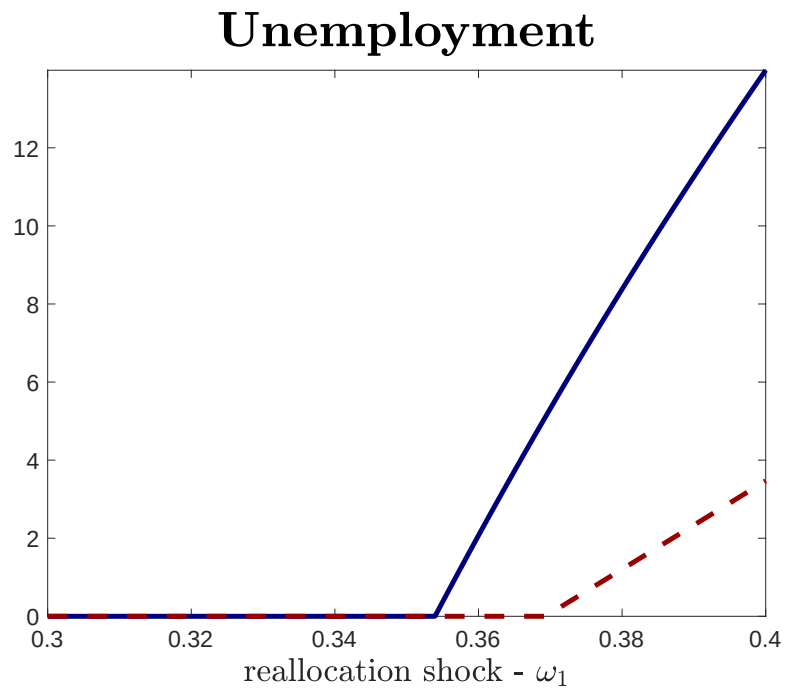
- Start by considering a rise in $\omega_{i,1}$ occurring in a single country i
- Country i reacts by running a trade deficit ($C^T_{i,1}/Y^T_{i,1}$ rises)
- Trade deficit sustains demand for NT goods and improves the trade off between inflation and unemployment

$$Y^N_{i,1} = \frac{1-\omega_1}{\omega_1} P^T_{i,1} C^T_{i,1}$$

- Access to international credit markets facilitates the adjustment to idiosyncratic reallocation shocks

An idiosyncratic reallocation shock



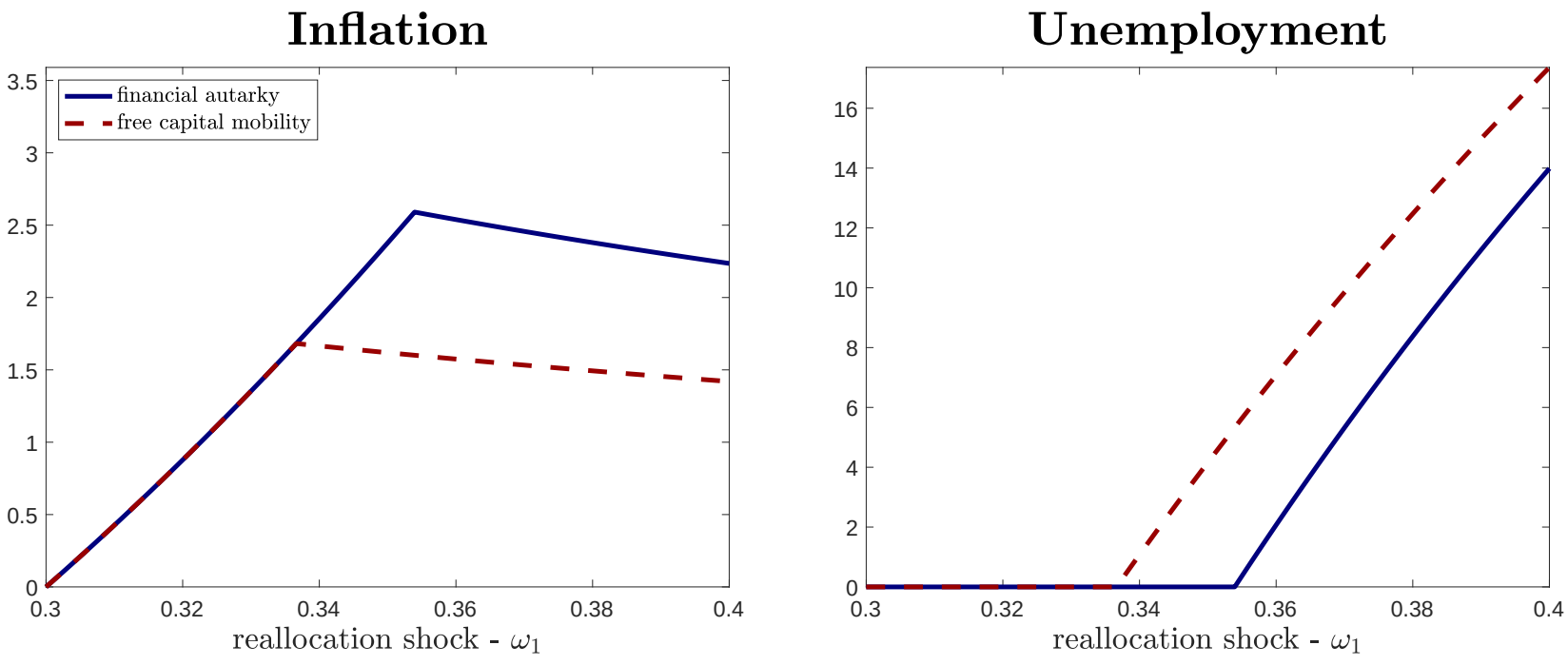


- Trade deficitd contain domestic inflation and unemployment

A global reallocation shock

- Now consider a rise in ω_1 occurring in every country
- Everyone tries to borrow on the international credit markets $\rightarrow R_1$ rises until trade balance is restored ($Y_{i,1}^T = C_{i,1}^T$)
- Still, due to free capital mobility, unilateral monetary expansions have a smaller impact on domestic NT demand and employment
- Compared to financial autarky, national monetary authorities tolerate less inflation and more unemployment

A global reallocation shock



- Capital mobility worsens trade off between inflation and unemployment

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Gains from cooperation

- With symmetric shock, problem of the global planner is isomorphic to the one of national central banks under financial autarky
- Under free capital mobility, tighter monetary policy and excessive unemployment compared to global optimum
- Suppose a single country increases $P_{i,1}^T$ (and depreciates ER)
  - $Y_{i,1}^T$ rises, increase in net exports toward rest of the world
  - Higher demand for NT goods and employment in r.o.w.
  - But inflation cost is fully bore by domestic households
- National central banks do not internalize the positive demand externalities generated by monetary expansions

Reverse currency wars

- Suppose that we start from the global optimum
  - Each country has an incentive to increase its policy rate, appreciate its exchange rate and run a trade deficit
  - But this policy exacerbates the global scarcity of traded goods, and leads to higher inflation and unemployment in the r.o.w.
  - If every country sets policy unilaterally, interest rates and unemployment will be too high from a global perspective
- Competitive appreciations pose a challenge to international cooperation
  - Contrast with the notion of competitive depreciations during periods of weak global demand (1930s, 2010s)
  - But now the issue is scarce global supply of traded goods: echoes of the 1980s and of the Plaza Accord (Sachs, 1985; Frankel, 2022)