

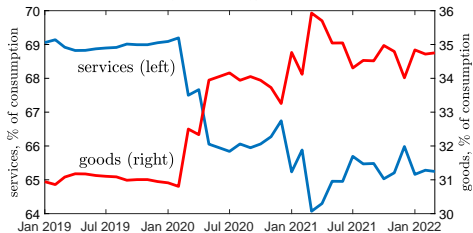
Global Stagflation and Reverse Currency Wars

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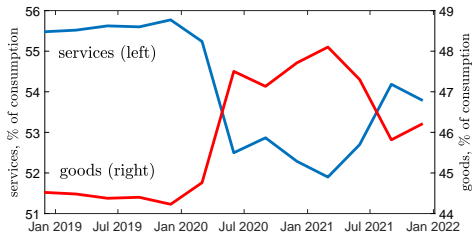
Motivation and research questions

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

United States



Other G7 countries



Motivation and research questions

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

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

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

- $\chi(P_{i,t}/P_{i,t-1})$ is a convex function capturing disutility from deviations of CPI inflation from target (normalized to zero)
- No disutility from working, labor endowment \bar{L}

$$\begin{aligned} P_{i,t}^T C_{i,t}^T + P_{i,t}^N C_{i,t}^N + P_{i,t}^T B_{i,t+1} + B_{i,t+1}^n &= \\ &= W_{i,t} L_{i,t} + \Pi_{i,t} + P_{i,t}^T R_{i,t-1} B_{i,t} + R_{i,t-1}^n B_{i,t}^n \end{aligned}$$

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

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

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

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

- 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 $B_{i,t}^n = 0$, tradable good market clearing

$$Y_{i,t}^T - C_{i,t}^T = B_{i,t+1} - R_{i,t-1}B_{i,t}$$

- NT good market clearing

$$C_{i,t}^N = Y_{i,t}^N$$

- Labor market

$$L_{i,t} = L_{i,t}^T + L_{i,t}^N \leq \bar{L}$$

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

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

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

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

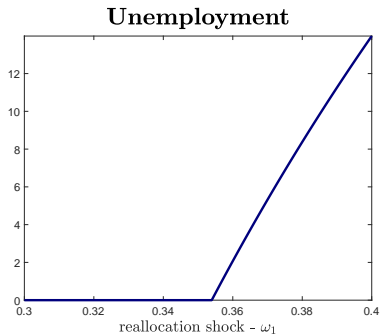
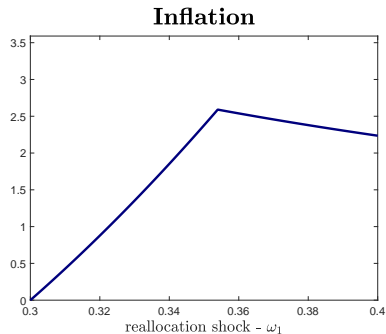
Optimal monetary policy response to reallocation shock

- Private sector behavior gives rise to a Phillips curve

$$P_{i,1}^T = \frac{1}{\alpha} \left(\frac{\omega_1 \alpha L_{i,t}}{1 - \omega_1 (1 - \alpha)} \right)^{1-\alpha}$$

- Rise in $P_{i,1}^T$ sustains demand and employment in both sectors
 - ▶ Labor reallocation: $\uparrow Y_{i,1}^T, \uparrow L_{i,1}^T$
 - ▶ Expenditure switching: $\uparrow \frac{P_{i,1}^T}{P_{i,1}^N} \uparrow C_{i,1}^N, \uparrow L_{i,1}^N$
 - ▶ Income effect: $\uparrow Y_{i,1}^T, \uparrow C_{i,1}^T, \uparrow C_{i,1}^N, \uparrow L_{i,1}^N$
- Reallocation shock lowers demand for NT goods and shifts the Phillips curve (cost-push shock)
- Optimal monetary 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**

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

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

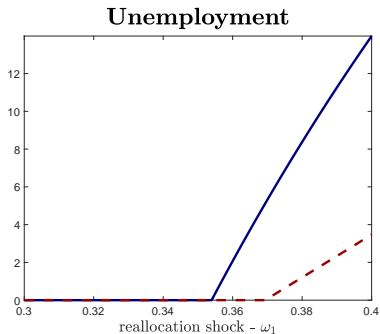
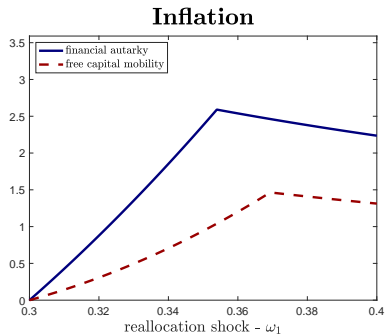
An idiosyncratic reallocation shock

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

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

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

An idiosyncratic reallocation shock

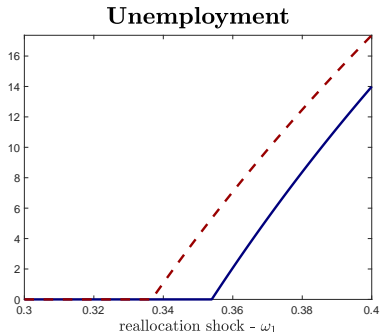
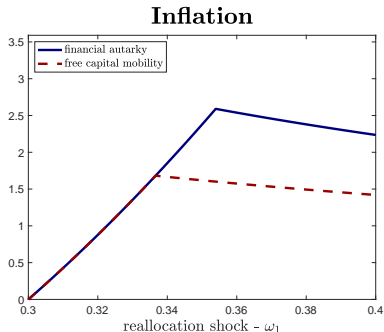


- Trade deficits contain domestic inflation and unemployment

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



- Tighter monetary policy under free capital mobility, compared to financial autarky

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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)