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
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
• 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 $\bar{L}$

\[
P_{i,t}^T C_{i,t}^T + P_{i,t}^N C_{i,t}^N + P_{i,t}^T B_{i,t+1} + B_{i,t+1}^n = W_{i,t} L_{i,t} + \Pi_{i,t} + P_{i,t}^T R_{i,t-1} B_{i,t} + R_{i,t-1}^n B_{i,t}^n
\]
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

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

• 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

\[
Y^{N}_{i,1} = L^{N}_{i,1} \rightarrow P^{N}_{i,1} = W_{i,1}
\]

• Tradable sector

\[
Y^{T}_{i,t} = (L^{T}_{i,t})^{\alpha} \rightarrow P^{T}_{i,t} = \frac{W_{i,t}}{\alpha} \left( Y^{T}_{i,t} \right)^{\frac{1-\alpha}{\alpha}}
\]

• Law of one price

\[
P^{T}_{i,t} = \mathcal{E}^{j}_{i,t} P^{T}_{j,t}
\]

• 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

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

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

  $$\left( Y_{i,1}^T \right)^{\frac{1}{\alpha}} + Y_{i,1}^N \leq \bar{L}$$
Optimal monetary policy response to reallocation shock

• 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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3 International spillovers and gains from cooperation
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 \( \omega_1 \) occurring in every country

• Everyone tries to borrow on the international credit markets → \( R_1 \) 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 $P^T_{i,1}$ (and depreciates ER).
  - $Y^T_{i,1}$ 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)