

Financial Integration and Monetary Policy Coordination

Javier Bianchi¹ Louphou Coulibaly²

Bank of Canada, Annual Conference 2023

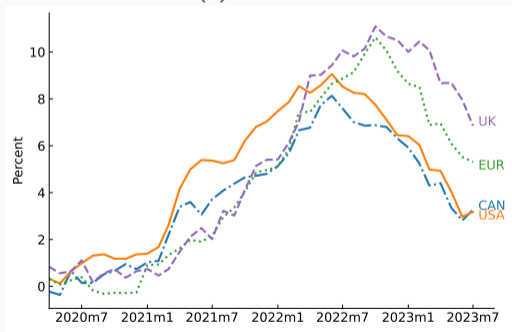
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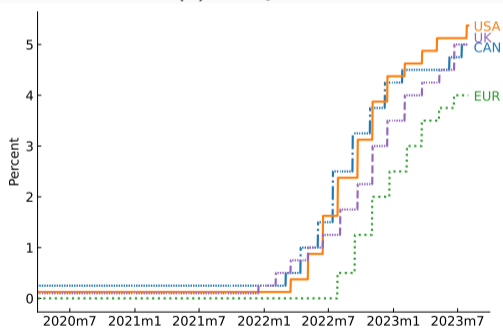
Motivation

- Surge in inflation followed by synchronized tightening of monetary policy

(a) Inflation



(b) Policy rates



Motivation (ctd)

Concerns about synchronized tightening leading to global recession

Central banks nearly everywhere feel accused of being on the back foot. The present danger, however, is [...] they collectively go too far and drive the world economy into an unnecessarily harsh contraction... **By simultaneously all going in the same direction, they risk reinforcing each other's policy impacts without taking that feedback loop into account.**

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Questions:

- What are the benefits from monetary policy cooperation?
- Does cooperation necessarily call for less tightening?

Monetary Policy Coordination

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 - Countries use monetary policy to \uparrow NFA and prevent ZLB
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- Fornaro and Romei (2022):
 - Cooperative monetary policy under inflation-output tradeoff
 - Under-tightening in response to reallocation shock

Preview of Results

- **Cooperation may call for lower or higher nominal rates**
- **Three sufficient statistics:** (i) output gap; (ii) sectoral differences in labor intensity for tradables (T) and non-tradables (N); (iii) the trade balance response to changes in nominal rates

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 - Central bank wants to shift employment towards high-labor intensive sector (N)
 - $\downarrow R^*$ leads to more inflows and more demand (and more employment) for N

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Signs revert when $dTB/dR > 0$ (or T are more labor intensive) \Rightarrow under-tightening

Main Elements of the Model

- Deterministic, infinite horizon
- Continuum of identical small open economies
 - Each country populated by continuum of households
- Two goods: tradable (T) and non-tradable (N)
 - Law of one price for tradables
- Sticky wages in period 0
 - Flexible wages for $t > 0$
- Perfect capital mobility
 - Global asset pays R^* in units of T

$$\sum_{t=0}^{\infty} \beta^t \left[U(c_t) - \kappa_t h_t - \frac{\chi}{2} (\hat{\pi}_t)^2 \right]$$

$$c_t = \left[\phi^T (c_t^T)^{\frac{\gamma-1}{\gamma}} + \phi^N (c_t^N)^{\frac{\gamma-1}{\gamma}} \right]^{\frac{\gamma}{\gamma-1}}, \quad h_t = h_t^T + h_t^N, \quad \hat{\pi}_t \text{ deviation from CPI target}$$

- Budget constraint:

$$P_t^T c_t^T + P_t^N c_t^N + \frac{b_{t+1}}{R_t} + P_t^T \frac{b_{t+1}^*}{R_t^*} = W_t (h_t^T + h_t^N) + \Psi_t + b_t + P_t^T b_t$$

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- Off labor supply at $t = 0$
- For baseline, assume $\gamma = 1$. General IES $1/\sigma$

- Production for tradables (T) and non-tradables (N)

$$F^T(h_t^T, A_t^T) = A_t^T (h_t^T)^{\alpha^T}, \quad F^N(h_t^N, A_t^N) = A_t^N (h_t^N)^{\alpha^N}$$

- Optimality

$$P_t^T \alpha^T A_t^T (h_t^T)^{\alpha^T - 1} = P_t^N \alpha^N A_t^N (h_t^N)^{\alpha^N - 1} = W_t.$$

- For $t > 0$, assume central bank stabilizes price level
- For $t = 0$, optimal choice of $\{R_0\}$

Competitive Equilibrium in the Global Economy

Given b_0^* , a sticky wage W , and a sequence of policies $\{R_t\}$ in each country k , an equilibrium is a sequence of world real rates $\{R_t^*\}$, prices $\{P_t^T, P_t^N, W_t, e_{k,t}^j\}$ and allocations $\{c_t^T, c_t^N, h_t^T, h_t^N, b_{t+1}, b_{t+1}^*\}$ in each country k such that:

- In each country:
 - (i) Households and firms optimize
 - (ii) Market clears for tradables $P_t^T c_t^T = e_{kt}^j P_{jt}^T$ for any country-pair k, j
 - (iii) Market clears for non-tradables $F^N(h_t^N, A_t^N) = c_t^N$, local currency bonds $b_{t+1} = 0$.
and labor for $t \geq 1$
- Law of one price holds for tradables: $P_{kt}^T = e_{kt}^j P_{jt}^T$ for any country-pair k, j
- Market for real assets clear globally: $\int b_{kt+1}^* dk = 0$ for $t \geq 0$.

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In a symmetric equilibrium: $b_{t+1}^* = 0$ for all k, t and $e_{kt}^j = 1$

Individual central bank problem

$$\max_{h_0^T, h_0^N, b_1^*} u \left(F^T(h_0^T, A_0^T) - \frac{b_1^*}{R_0^*}, F^N(h_0^N, A_0^N) \right) - \kappa_0(h_0^T + h_0^N) - \frac{\chi}{2}(\hat{\pi}_0)^2 + \beta V_1(b_1^*)$$

$$\text{s.t.} \quad \frac{\hat{\pi}_0}{1 + \bar{\pi}} = \frac{W}{W_0^n} \left(\frac{h_0^T}{\bar{h}_0^T} \right)^{(1-\alpha^T)\phi^T} \left(\frac{h_0^N}{\bar{h}_0^N} \right)^{(1-\alpha^N)\phi^N} - 1$$

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- Absent inflation costs, first-best \bar{h}^T, \bar{h}^N can be implemented for any natural wage W_0^n
 - Align real wage consistent that implements \bar{h}^T, \bar{h}^N

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Suppose $\hat{\pi}_0 > 0$ and $\hat{h}_0 < 0$:

- By $\downarrow b_1^*$, country can raise demand for T and N goods

\Rightarrow Higher borrowing reallocate employment toward N

- If $\alpha^N > \alpha^T$, this helps $\downarrow \hat{\pi}_0$

- Higher intensity means that to achieve $\uparrow h$, less increase in prices needed

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Does cooperative monetary policy call for higher or lower nominal rates?

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All spillovers through R_0^* :

- No terms of trade (single tradable good)
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All spillovers through R_0^* :

- No terms of trade (single tradable good)
- Inflationary pressures through exchange rates can be offset by monetary policy
- With capital controls, no spillovers (Bianchi and Coulibaly, 2021)

Optimal Monetary Policy under Cooperation

Denote \mathcal{R}^* the real rate as a function of nominal rates R_0

$$\max_{R_0} \mathcal{U}_0(R_0, \mathcal{R}^*(R_0)) \Rightarrow \frac{\partial \mathcal{U}_0(R, R^*)}{\partial R} + \frac{d\mathcal{R}^*}{dR} \frac{\partial \mathcal{U}}{\partial R^*} = 0$$

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Suppose $\alpha^N > \alpha^T$ and $\hat{h}_0^N < 0$: a country benefits from low R^*

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$$\frac{d\mathcal{R}^*}{d\mathbf{R}} > 0 \iff \sigma > \bar{\sigma} \equiv 1 - \frac{\alpha^T}{\alpha^T \phi^T + \alpha^N \phi^N}$$

\Rightarrow Generalized Marshall Lerner: $dTB/dR < 0$ for relatively low IES $1/\sigma$ or high α^T :

Proposition. Denote h_0^N the output gap in the Nash equilibrium. Then, the Nash equilibrium displays under-tightening $R_0^{NE} < R_0^{GP}$ if and only if $(\alpha^N - \alpha^T)(\sigma - \bar{\sigma})\hat{h}_0^N > 0$.

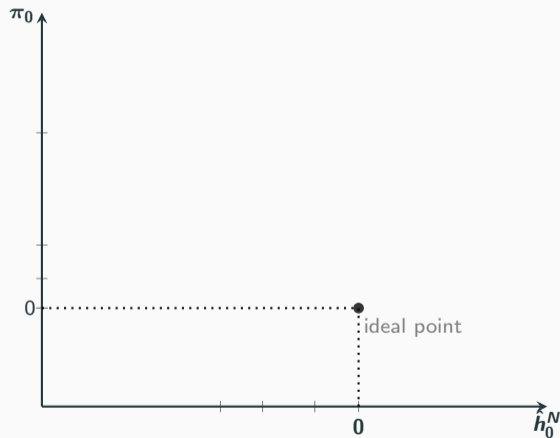
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 - Overheating, N are more labor intensive & $dTB/dR < 0$
 - Recession, N are more labor intensive & $dTB/dR > 0$
- Examples w/ **over-tightening** in Nash-eqm:
 - Overheating, N are more labor intensive & $dTB/dR > 0$
 - Recession, N are more labor intensive & $dTB/dR < 0$

Fornaro and Romei (2022): $\alpha^N = 1, \sigma = 1, \kappa = 0, \Rightarrow b_1/dR < 0, \hat{h} < 0$

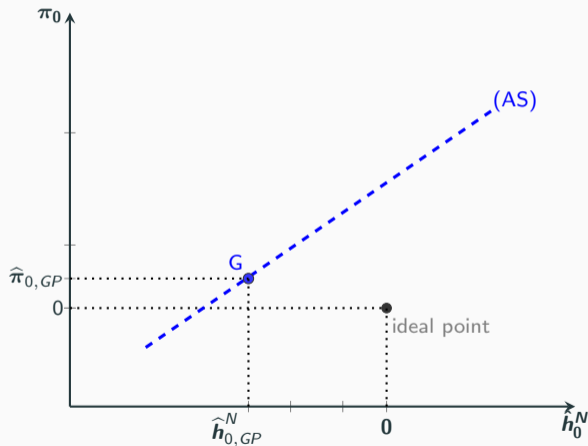
Inflation-Output Tradeoff

Under-tightening for $\sigma < \bar{\sigma}$ and $\alpha^N > \alpha^T$



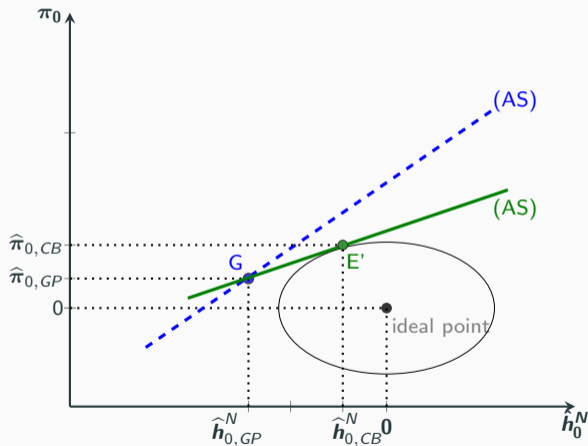
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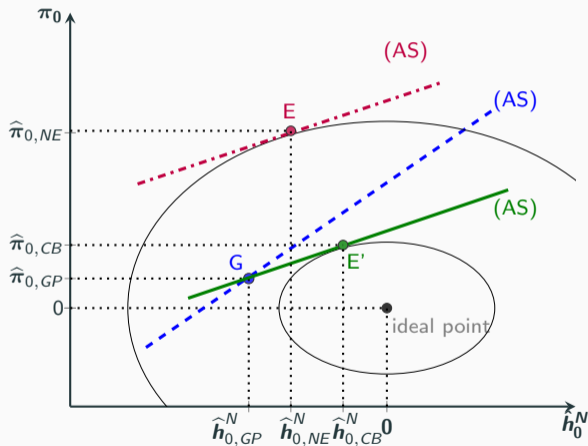
Under-tightening for $\sigma < \bar{\sigma}$ and $\alpha^N > \alpha^T$



Lower nominal interest rates for a SOE expand output and lower inflation

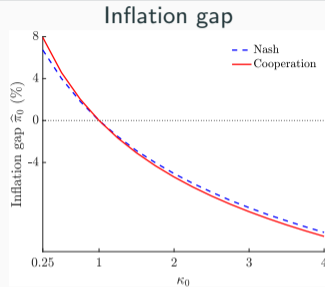
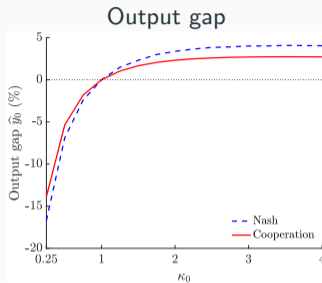
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Under-tightening for $\sigma < \bar{\sigma}$ and $\alpha^N > \alpha^T$

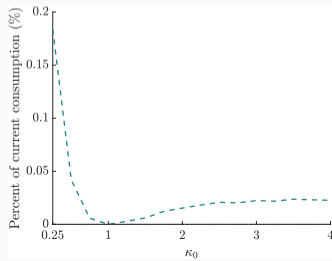


Low nominal rates raise R^* and generate even higher inflation

Quantitative Gains from Coordination



Welfare



Extensions/Other considerations

- Anticipated shocks can generate inflation and overheating
 - Under cooperation, $\hat{\pi} = \hat{h} = 0$ (Bianchi and Coulibaly, 2021)
- Sufficient statistics generalize with CES aggregator and imperfect labor mobility
- Other factors of production (e.g. oil)
 - Intensity of other factors of production irrelevant as long as their price is flexible

Extensions/Other considerations

- Anticipated shocks can generate inflation and overheating
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 - Role of labor intensity for inflation

- Theory of monetary policy coordination under financial integration
- Nash equilibrium features over- or under-tightening depending on
 - the sign of output gap
 - differences in labor intensity
 - response of trade balance to exchange rate depreciations
- Quantitative gains can be significant for large shocks