Gains from Monetary Policy Cooperation under Dollar Pricing

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Definitions

- Producer currency pricing (PCP): Firms set all prices in their own currency
- Local currency pricing (LCP): Home (Foreign) firms set export prices in Foreign (Home) currency and domestic prices in their own currency
- Dollar pricing (DP): Home firms set all prices in their own currency (PCP), while Foreign firms set export prices in Home currency and domestic prices in their own currency (LCP)
    - Under DP, every international trade transaction is priced in U.S. dollars (Home currency)

Motivation

- Almost every international trade transaction is priced in U.S. dollars
    - Gopinath and Rigobon 2008: 90% of U.S. imports and 97% of U.S. exports are priced in U.S. dollars for the period 1994-2005
- This suggests that open economy models with symmetric export pricing, i.e. PCP models or LCP models, do not seem to be plausible
    - In symmetric export pricing models, more than one currency are used in international trade transactions

Motivation

- Dominant role of the U.S. dollar in international trade can have significant influences on the transmission of shocks across countries, and hence welfare
- Nevertheless, most studies have not considered the dominant role of the U.S. dollar in international trade
  - Almost all researchers still use two-country models with symmetric export pricing (either PCP or LCP) to study optimal monetary policy in open economies

Aim

- Construct a two-country model with asymmetric export pricing (i.e. DP model)
- Derive quadratic loss functions of cooperative and noncooperative policymakers
- Compute welfare gains from monetary policy cooperation in the DP model, and examine
  - whether welfare gains from cooperation exist
  - whether the gains are larger than those in the LCP and PCP models
  - whether Home (U.S.) gains are greater than Foreign (rest of the world) gains

Literature

- Related to the literature on optimal monetary policy in open economies and export price setting
  - PCP: Clarida, Galí and Gertler (2002), Benigno and Benigno (2006), etc.
  - LCP: Engel (2011), Fujiwara and Wang (2017), etc.

Literature

- Few studies assume DP
  - Corsetti and Pesenti (2007), Devereux, Shi and Xu (2007), Goldberg and Tille (2009): consider one-period stochastic models with one-period ahead price setting (and thus fully sticky prices)
  - Mukhin (2018): Do not utilize the linear-quadratic framework, do not explicitly calculate the welfare gains, and focuse only on cooperation
  - Egorov and Mukhin (2020): Do not utilize the linear-quadratic framework, do not explicitly calculate the welfare gains and assume the U.S. as a small open economy

$\Rightarrow$ This paper is complementary to Mukhin (2018) and Egorov and Mukhin (2020)

Illustration

- PCP model
  - Exist the inefficiency arising from the internal relative price (P_F/P_H) misalignments
    - National CB can manipulate the internal relative price to improve its welfare through nominal exchange rate adjustment
    - Note that the internal relative price and the terms of trade are equalized under PCP since LOOP holds

$\Rightarrow$ Small gains from monetary policy cooperation

Illustration

- LCP model
  - Does not exist the inefficiency arising from the internal relative price misalignments
    - Import prices are set in local currencies → CB cannot control the price to improve welfare through nominal exchange rate adjustment
  - Do exist the inefficiency arising from currency misalignments (deviations from the LOOP)
    - LOOP does not hold → CB can engineer the currency misalignments to improve welfare through nominal exchange rate adjustment

⇒ Small gains from cooperation but larger than PCP model

Illustration

- DP model
  - Exist the inefficiencies arising from both the internal relative price and currency misalignments
    - LOOP partially holds. LOOP for Home goods holds but that for Foreign goods does not hold
    - Home cannot control the internal relative price, since its import prices are set in Home currency by Foreign firms
    - But Foreign can control the internal relative price through nominal exchange rate adjustment, because its import prices are set in Home currency

Illustration

- DP model
  - Since LOOP for Foreign goods does not hold, Foreign can control currency misalignments by adjusting the nominal exchange rate
  - But Home cannot, because LOOP for Home products holds

Illustration

- In the DP model, there is one more inefficiency compared to the PCP and LCP models

$\Rightarrow$ Gains from cooperation are greater than those in the PCP and LCP models

- Only Foreign can control both the internal relative price and currency misalignments through nominal exchange rate adjustment

$\Rightarrow$ Rationalize the fact that the U.S. designates currency manipulators to protect its welfare

$\Rightarrow$ Home gains are larger

Illustration

- Under log utility, unitary elasticity of substitution between Home and Foreign goods and no home bias, there are no gains from cooperation in the PCP and LCP models
  - In the PCP model with log utility and unitary elasticity of substitution, the internal relative price interdependence is absent → no gains from cooperation
  - In symmetric models such as the LCP and PCP models, the Home internal relative price and the inverse of the Foreign internal relative price are equal → combining this and no home bias generates constant real exchange rate → there are no deviations from the LOOP in the LCP model → no gains from cooperation

Illustration

- In the DP model, the internal relative price interdependence disappears under the conditions
- However, there are still currency misalignments
  - Thanks to the asymmetry of the DP model, the LOOP still does not hold for Foreign products

$\Rightarrow$ There are gains from monetary policy cooperation even under the conditions

The model

Overview

- The world economy consists of two countries: Home (U.S.) and Foreign (rest of the world)
- Home and Foreign are symmetric with exception of export pricing
    - Firms in Home set all prices in their own currency, while those in Foreign set export prices in Home currency and domestic prices in their own currency
    - Hence, only Home currency (U.S. dollar) is used in international trade
- The population size in each country is normalized to one and asset markets are complete

Households

- Utility:

$$W_H = \mathbb{E}_{t_0} \sum_{t=t_0}^{\infty} \beta^{t-t_0} \left[\frac{C_t^{1-\sigma}}{1-\sigma} - \chi \frac{h_t^{1+\omega}}{1+\omega} \right] \tag{1}$$

- Aggregate consumption:

$$C_t = \left\{ (1-\gamma)^{\frac{1}{\eta}} C_{H,t}^{\frac{\eta-1}{\eta}} + \gamma^{\frac{1}{\eta}} C_{F,t}^{\frac{\eta-1}{\eta}} \right\}^{\frac{\eta}{\eta-1}} \tag{2}$$

- LOOP partially holds

$$P_{H,t} = E_t P_{H,t}^*, \quad P_{F,t} \neq E_t P_{F,t}^* \tag{3}$$

Relative prices

- Home and Foreign currency misalignment (deviations from the LOOP):

$$m_t = \frac{E_t P^*_{H,t}}{P_{H,t}} = 1, \qquad m^*_t = \frac{E_t P^*_{F,t}}{P_{F,t}} \tag{4}$$

- Home and Foreign internal relative prices, s_t and s^*_t:

$$s_t = \frac{P_{F,t}}{P_{H,t}}, \qquad s^*_t = \frac{P^*_{H,t}}{P^*_{F,t}} \tag{5}$$

- Home and Foreign terms of trade, τ_t and τ^*_t, are

$$\tau_t = \frac{P_{F,t}}{E_t P^*_{H,t}}, \qquad \tau^*_t = \frac{E_t P^*_{H,t}}{P_{F,t}} \tag{6}$$

Note that $\tau_t = s_t$ but $\tau^*_t \neq s^*_t$

Firms

- Production:

$$Y_t(j) = \exp(z_t)\, h_t(j) \tag{7}$$

- Firms' resource constraints:

$$Y_t(j) = C_{H,t}(j) + C^*_{H,t}(j) \tag{8}$$

Price setting and aggregate resource constraints

- Home firm j maximizes

$$\mathbb{E}_{t_0} \sum_{t=t_0}^{\infty} \theta^{t-t_0} Q_{t_0,t} \left[(1+\mu) P_{H,t_0}(j) \left\{ C_{H,t}(j) + C^*_{H,t}(j) \right\} - MC_t Y_t(j) \right] \tag{9}$$

- Foreign firm j^* maximizes

$$\mathbb{E}_{t_0} \sum_{t=t_0}^{\infty} \theta^{t-t_0} Q^*_{t_0,t} \left[(1+\mu) \left\{ P^*_{F,t_0}(j^*) C^*_{F,t}(j^*) + \frac{P_{F,t_0}(j^*)}{E_t} C_{F,t}(j^*) \right\} - MC^*_t Y^*_t(j^*) \right] \tag{10}$$

- Aggregate resource constraints:

$$Y_t = \Delta_t C_{H,t} + \Delta_t C^*_{H,t}, \quad Y^*_t = \Delta_{F,t} C_{F,t} + \Delta^*_{F,t} C^*_{F,t} \tag{11}$$

Linear-quadratic framework

Linear constraints

- NKPCs:

$$\hat{\pi}_{H,t} = \beta \mathbb{E}_t \left[\hat{\pi}_{H,t+1} \right] + \delta \left\{ (\sigma + \omega) \hat{Y}_t - (1+\omega) z_t - \gamma(1-\eta\sigma) \left(\hat{s}_t^* - \hat{e}_t \right) - \gamma(1-\eta\sigma) \hat{m}_t^* \right\} \tag{12}$$

$$\hat{\pi}_{F,t}^* = \beta \mathbb{E}_t \left[\hat{\pi}_{F,t+1}^* \right] + \delta \left\{ (\sigma + \omega) \hat{Y}_t^* - (1+\omega) z_t^* + \gamma(1-\eta\sigma) \left(\hat{s}_t^* - \hat{e}_t \right) - \gamma\eta\sigma \hat{m}_t^* \right\} \tag{13}$$

$$\hat{\pi}_{F,t} = \beta \mathbb{E}_t \left[\hat{\pi}_{F,t+1} \right] + \delta \left\{ (\sigma + \omega) \hat{Y}_t^* - (1+\omega) z_t^* + \gamma(1-\eta\sigma) \left(\hat{s}_t^* - \hat{e}_t \right) + (1-\gamma\eta\sigma) \hat{m}_t^* \right\} \tag{14}$$

Linear constraints

$$\hat{Y}_t - \hat{Y}_t^* + \eta(1-\gamma)\hat{p}_{H,t} + \eta\gamma\hat{p}_{H,t}^* - \frac{1-2\gamma}{\sigma}\hat{e}_t - \eta(1-\gamma)\hat{p}_{F,t}^* - \eta\gamma\hat{p}_{F,t} = 0 \quad (15)$$

$$\hat{\pi}_{H,t} = \hat{\pi}_t + \hat{p}_{H,t} - \hat{p}_{H,t-1} \quad (16)$$

$$\hat{\pi}_{H,t}^* = \hat{\pi}_t^* + \hat{p}_{H,t}^* - \hat{p}_{H,t-1}^* \quad (17)$$

$$\hat{\pi}_{F,t}^* = \hat{\pi}_t^* + \hat{p}_{F,t}^* - \hat{p}_{F,t-1}^* \quad (18)$$

$$\hat{\pi}_{F,t} = \hat{\pi}_t + \hat{p}_{F,t} - \hat{p}_{F,t-1} \quad (19)$$

$$(1-\gamma)\hat{p}_{H,t} + \gamma\hat{p}_{F,t} = 0 \quad (20)$$

$$(1-\gamma)\hat{p}_{F,t}^* + \gamma\hat{p}_{H,t}^* = 0 \quad (21)$$

$$\hat{p}_{H,t} = \hat{p}_{H,t}^* + \hat{e}_t \quad (22)$$

$$\hat{m}_t^* = \hat{p}_{F,t}^* + \hat{e}_t - \hat{p}_{F,t} \quad (23)$$

$$\hat{s}_t^* = \hat{p}_{H,t}^* - \hat{p}_{F,t}^* \quad (24)$$

Quadratic loss functions

- Under cooperation:

$$L^W = \frac{1}{2}\mathbb{E}_{t_0}\sum_{t=t_0}^{\infty}\beta^{t-t_0}\left[\begin{array}{c} (1+\omega)\left(\hat{Y}_t - z_t\right)^2 + (1+\omega)\left(\hat{Y}_t^* - z_t^*\right)^2 + \Gamma\Sigma^2\hat{e}_t^2 \\ +\frac{\varepsilon}{\delta}\left\{\hat{\pi}_{H,t}^2 + (1-\gamma)\hat{\pi}_{F,t}^{*2} + \gamma\hat{\pi}_{F,t}^2\right\} + \Gamma\left(\eta\hat{p}_{F,t} - \frac{\hat{e}_t}{\sigma} - \eta\hat{p}_{F,t}^*\right)^2 \\ +(\sigma-1)\left\{\left(\hat{Y}_t + \gamma\Sigma\hat{e}_t + \eta\hat{p}_{H,t}\right)^2 + \left(\hat{Y}_t^* - \gamma\Sigma\hat{e}_t + \eta\gamma\hat{\tau}_t\right)^2\right\} \\ +\eta(1-\eta)\left\{(1-\gamma)\hat{p}_{H,t}^2 + \gamma\hat{p}_{F,t}^2 + (1-\gamma)\hat{p}_{F,t}^{*2} + \gamma\hat{p}_{H,t}^{*2}\right\} \end{array}\right]$$

$$+\text{t.i.p} + \mathcal{O}\left(\|\xi_t\|^3\right), \quad (25)$$

Quadratic loss functions

- Home loss function under noncooperation:

$$L = \frac{1}{2}\mathbb{E}_{t_0}\sum_{t=t_0}^{\infty}\beta^{t-t_0}\left[\begin{array}{c} \{1-\Omega_1(1+\omega)\}(1+\omega)\left(\hat{Y}_t - z_t\right)^2 + (1-\omega\Omega_1)\Gamma\Sigma^2\hat{e}_t^2 \\ +\frac{\varepsilon}{\delta}\left(1-(1+\omega)\Omega_1\right)\hat{\pi}_{H,t}^2 + \frac{\varepsilon}{\delta}\left((1-\gamma)\omega\Omega_1 - \Omega_3\right)\hat{\pi}_{F,t}^{*2} \\ +\gamma\frac{\varepsilon}{\delta}\left(\omega\Omega_1+\Omega_2\right)\hat{\pi}_{F,t}^2 + \Gamma\omega\Omega_1\left(\eta\hat{p}_{F,t} - \frac{\hat{e}_t}{\sigma} - \eta\hat{p}_{F,t}^*\right)^2 \\ +(\sigma-1)\left\{\hat{Y}_t + \gamma\Sigma\hat{e}_t + \eta\hat{p}_{H,t}\right\}^2 \\ +(1-\eta)\left(\eta\left(1-\omega\Omega_1\right) - \Omega_2\right)\left\{(1-\gamma)\hat{p}_{F,t}^{*2} + \gamma\hat{p}_{H,t}^{*2}\right\} \\ +(1-\eta)\left(\eta\omega\Omega_1 + \frac{1}{\gamma}\gamma\Omega_2\right)\left\{(1-\gamma)\hat{p}_{H,t}^2 + \gamma\hat{p}_{F,t}^2\right\} \\ +\Omega_1\left\{(1-\sigma)\hat{Y}_t - \sigma\gamma\Sigma\hat{e}_t + (1-\sigma\eta)\hat{p}_{H,t}\right\}^2 \\ -\Omega_3\left\{(\omega+1)(\hat{Y}_t^* - z_t^*) + \gamma\left(\eta\hat{p}_{F,t} - \frac{\hat{e}_t}{\sigma} - \eta\hat{p}_{F,t}^*\right)\right\}^2 \\ +\Omega_3\left\{(1-\sigma)\left(\hat{Y}_t^* - \gamma\Sigma\hat{e}_t + \eta\gamma\hat{\tau}_t\right) + (1-\eta)\hat{p}_{F,t}^*\right\}^2 \\ +\gamma\Omega_2\left\{(\omega+1)(\hat{Y}_t^* - z_t^*) - (1-\gamma)\left(\eta\hat{p}_{F,t} - \frac{\hat{e}_t}{\sigma} - \eta\hat{p}_{F,t}^*\right)\right\}^2 \\ -\gamma\Omega_2\left\{(1-\sigma)\left(\hat{Y}_t + \gamma\Sigma\hat{e}_t + \eta\hat{p}_{H,t}\right) + (1-\eta)\hat{p}_{F,t}\right\}^2 \end{array}\right] + \text{t.i.p} + \mathcal{O}\left(\|\xi_t\|^3\right), \tag{26}$$

Quadratic loss functions

- Foreign loss function under noncooperation:

$$L^* = \frac{1}{2}\mathbb{E}_{t_0}\sum_{t=t_0}^{\infty}\beta^{t-t_0}\left[\begin{array}{c} \Omega_1\left\{(\omega+1)(\hat{Y}_t - z_t)\right\}^2 + (1+\omega)\left(\hat{Y}_t^* - z_t^*\right)^2 + \omega\Omega_1\Gamma\Sigma^2\hat{e}_t^2 \\ +\frac{\varepsilon}{\delta}(1+\omega)\Omega_1\hat{\pi}_{H,t}^2 + \frac{\varepsilon}{\delta}\left(\Omega_3 + (1-\gamma)(1-\omega\Omega_1)\right)\hat{\pi}_{F,t}^{*2} \\ +\gamma\frac{\varepsilon}{\delta}\left((1-\omega\Omega_1)-\Omega_2\right)\hat{\pi}_{F,t}^2 \\ +\Gamma(1-\omega\Omega_1)\left(\eta\hat{p}_{F,t} - \frac{\hat{e}_t}{\sigma} - \eta\hat{p}_{F,t}^*\right)^2 \\ +(\sigma-1)\left\{\hat{Y}_t^* - \gamma\Sigma\hat{e}_t + \eta\gamma\hat{\tau}_t\right\}^2 \\ +(1-\eta)(\Omega_2+\eta\omega\Omega_1)\left\{(1-\gamma)\hat{p}_{F,t}^{*2} + \gamma\hat{p}_{H,t}^{*2}\right\} \\ +(1-\eta)\left(\eta(1-\omega\Omega_1)-\Omega_2\right)\left\{(1-\gamma)\hat{p}_{H,t}^2 + \gamma\hat{p}_{F,t}^2\right\} \\ -\Omega_1\left\{(1-\sigma)\hat{Y}_t - \sigma\gamma\Sigma\hat{e}_t + (1-\sigma\eta)\hat{p}_{H,t}\right\}^2 \\ +\Omega_3\left\{(\omega+1)(\hat{Y}_t^* - z_t^*) + \gamma\left(\eta\hat{p}_{F,t} - \frac{\hat{e}_t}{\sigma} - \eta\hat{p}_{F,t}^*\right)\right\}^2 \\ -\Omega_3\left\{(1-\sigma)\left(\hat{Y}_t^* - \gamma\Sigma\hat{e}_t + \eta\gamma\hat{\tau}_t\right) + (1-\eta)\hat{p}_{F,t}^*\right\}^2 \\ -\gamma\Omega_2\left\{(\omega+1)(\hat{Y}_t^* - z_t^*) - (1-\gamma)\left(\eta\hat{p}_{F,t} - \frac{\hat{e}_t}{\sigma} - \eta\hat{p}_{F,t}^*\right)\right\}^2 \\ +\gamma\Omega_2\left\{(1-\sigma)\left(\hat{Y}_t + \gamma\Sigma\hat{e}_t + \eta\hat{p}_{H,t}\right) + (1-\eta)\hat{p}_{F,t}\right\}^2 \end{array}\right] + \text{t.i.p} + \mathcal{O}\left(\|\xi_t\|^3\right), \quad (27)$$

Special case

Quadratic loss functions in a special case with log utility, unitary elasticity of substitution (Cobb-Douglas aggregate consumption) and no home bias ($\sigma = \eta = 1$ and $\gamma = 0.5$)

$$L = \frac{1}{2}\mathbb{E}_{t_0}\sum_{t=t_0}^{\infty}\beta^{t-t_0}\left[\begin{array}{c} \frac{1}{2}(1+\omega)\left(\hat{Y}_t - z_t\right)^2 + \frac{1}{2}(1+\omega)\left(\hat{Y}_t^* - z_t^*\right)^2 \\ -\frac{\omega+1}{2}(\hat{Y}_t^* - z_t^*)\left(\hat{p}_{F,t} - \hat{e}_t - \hat{p}_{F,t}^*\right) \\ +\frac{1}{8}\left(\hat{p}_{F,t} - \hat{e}_t - \hat{p}_{F,t}^*\right)^2 + \frac{\varepsilon}{2\delta}\hat{\pi}_{H,t}^2 + \frac{\varepsilon}{2\delta}\hat{\pi}_{F,t}^2 \end{array}\right] + \text{t.i.p} + \mathcal{O}\left(\|\xi_t\|^3\right),$$

$$L^* = \frac{1}{2}\mathbb{E}_{t_0}\sum_{t=t_0}^{\infty}\beta^{t-t_0}\left[\begin{array}{c} \frac{1}{2}(1+\omega)\left(\hat{Y}_t - z_t\right)^2 + \frac{1}{2}(1+\omega)\left(\hat{Y}_t^* - z_t^*\right)^2 \\ +\frac{\omega+1}{2}(\hat{Y}_t^* - z_t^*)\left(\hat{p}_{F,t} - \hat{e}_t - \hat{p}_{F,t}^*\right) \\ +\frac{1}{8}\left(\hat{p}_{F,t} - \hat{e}_t - \hat{p}_{F,t}^*\right)^2 + \frac{\varepsilon}{2\delta}\hat{\pi}_{H,t}^2 + \frac{\varepsilon}{2\delta}\hat{\pi}_{F,t}^{*2} \end{array}\right] + \text{t.i.p} + \mathcal{O}\left(\|\xi_t\|^3\right)$$

$$L^w = \frac{1}{2}\mathbb{E}_{t_0}\sum_{t=t_0}^{\infty}\beta^{t-t_0}\left[\begin{array}{c} (1+\omega)\left(\hat{Y}_t - z_t\right)^2 + (1+\omega)\left(\hat{Y}_t^* - z_t^*\right)^2 \\ +\frac{1}{4}\left(\hat{p}_{F,t} - \hat{e}_t - \hat{p}_{F,t}^*\right)^2 + \frac{\varepsilon}{\delta}\hat{\pi}_{H,t}^2 + \frac{\varepsilon}{2\delta}\hat{\pi}_{F,t}^{*2} + \frac{\varepsilon}{2\delta}\hat{\pi}_{F,t}^2 \end{array}\right] + \text{t.i.p} + \mathcal{O}(\|$$

Model analysis

Calibration

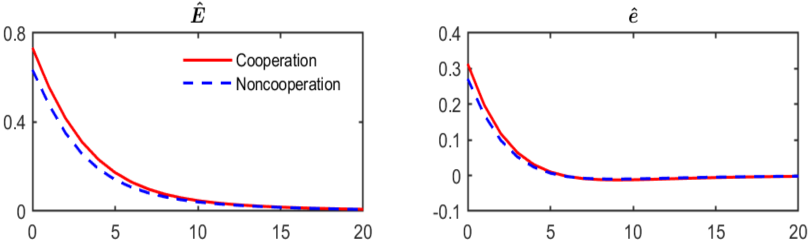
- Parameter values are standard
- Nonetheless, I also use various values of σ, γ and η in computing the gains from cooperation

Table: Parameter values

Parameter	Value	Definition
β	0.99	Discount factor
χ	1	Coefficient associated with labor disutility
ω	4.71	Inverse elasticity of labor supply
σ	3	Degree of risk aversion
θ	0.75	Probability that price cannot be adjusted
η	1.5	Elasticity of substitution between Home and Foreign goods
γ	0.5	Weight of imported goods in consumption basket

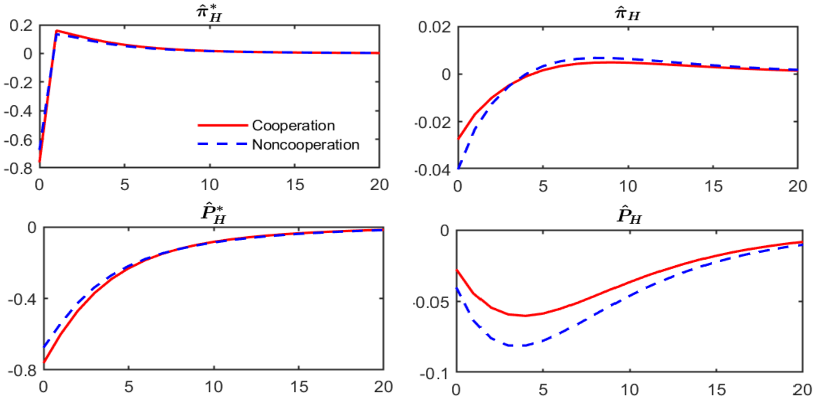
Impulse responses

- Responses of several variables in the DP model under cooperation and noncooperation to a positive one standard deviation productivity shock
- Under noncooperation, nominal exchange rate E depreciates by less than under cooperation, and thus real exchange rate e also depreciates by less



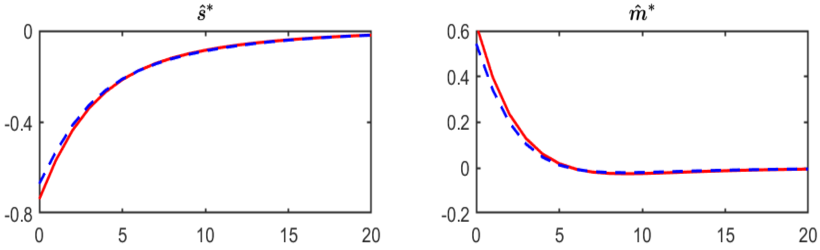
Impulse responses

- Hence, P_H^* falls by less and P_H falls by more $\rightarrow$ a smaller decline in π_H^* and a larger fall in π_H



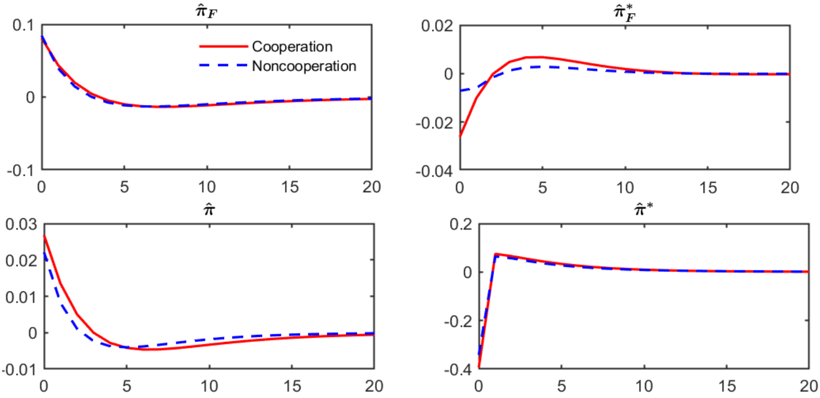
Impulse responses

- Accordingly, s^* decreases by less and m^* rise by less



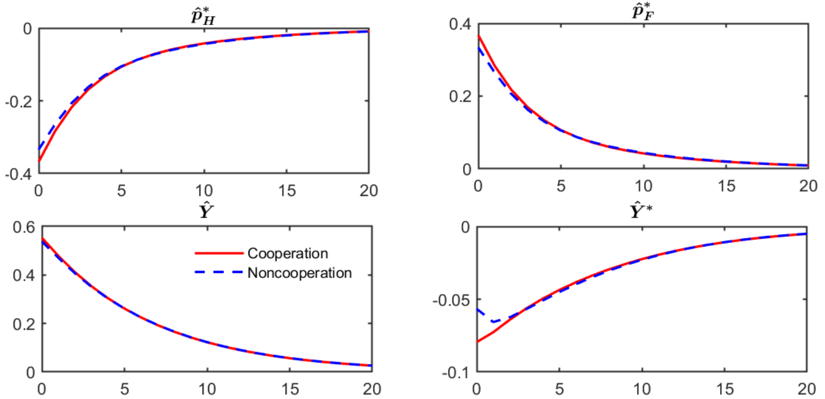
Impulse responses

- From NKPCs, a smaller decrease in π_F^* and a slightly greater rise in π_F
- As a result, π increases by less and π^* drops by less



Impulse responses

- Smaller increase in p_F^* $\rightarrow$ smaller fall in Y^*
- Smaller decrease in p_H^* $\rightarrow$ Y increases by less



Impulse responses

- Optimal monetary policy under noncooperation produces more stable Home CPI inflation π but more volatile Home PPI inflation π_H and import price inflation π_F
- On the other hand, in Foreign, more stable CPI inflation π^*, PPI inflation π_F^* and import price inflation π_H^* are generated by optimal monetary policy under noncooperation
- And, Home output Y increases by less and Foreign output Y^* falls by less compared to those under cooperation.

Difference between impulse responses

- In the DP model, there are inefficiencies arising from both internal relative price and currency misalignments

⇒ Responses of internal relative price and currency misalignments under cooperation and noncooperation are different

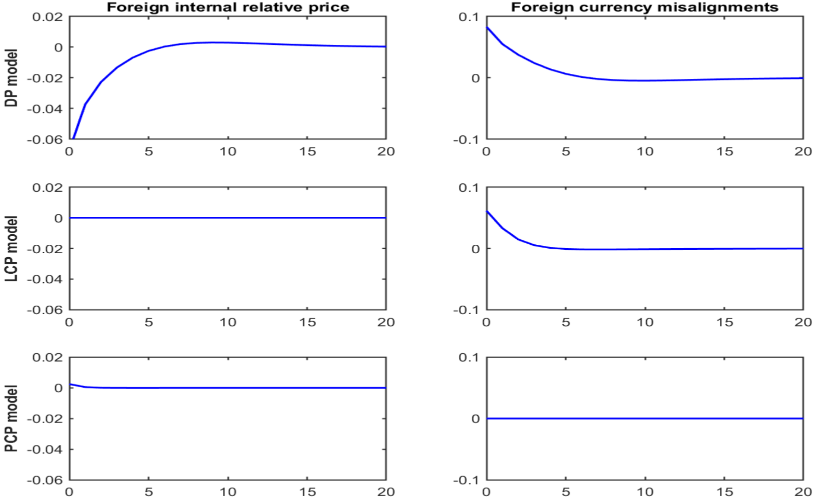
- In the LCP model, there is no inefficiency stemming from internal relative price

⇒ Responses of currency misalignments under cooperation and noncooperation are different

- In the PCP model, there is no inefficiency stemming from currency misalignments

⇒ Responses of internal relative price under cooperation and noncooperation are different

Difference between impulse responses

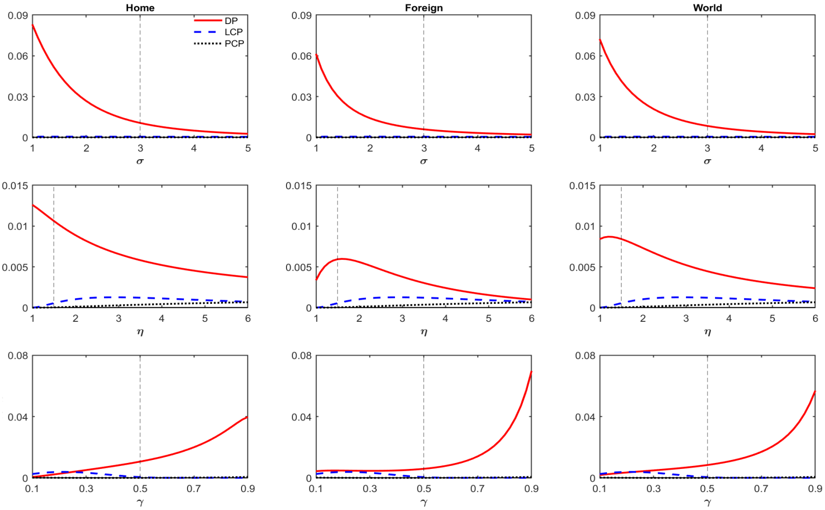


Welfare costs

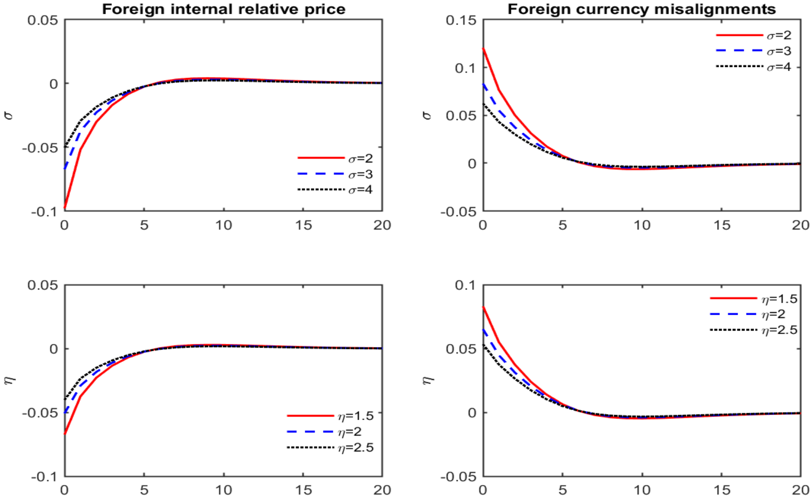
- Consumption units by Lucas (1992) are used in computing the welfare costs.
- Welfare costs are aggregate consumption that a representative household has to give up to be as well off under cooperation as under noncooperation
- Let λ^C be the welfare cost from noncooperation of the Home representative household

$$W_H^N = \mathbb{E}_{t_0} \sum_{t=t_0}^{\infty} \beta^{t-t_0} \left[\frac{\left\{ \left(1-\lambda^C\right) C_t^C \right\}^{1-\sigma}}{1-\sigma} - \chi \frac{h_t^{C^{1+\omega}}}{1+\omega} \right]$$

Welfare gains



Welfare costs



Conclusion

Conclusion

- This paper considers optimal monetary policy in a two-country model under DP

- In the DP model, there is one more inefficiency than in the LCP and PCP models

  - Internal relative price distortion compared to the LCP model, and distortion arising from deviations from the law of one price compared to the PCP model

- Accordingly, welfare gains from monetary policy cooperation in the DP model are substantially greater than in the LCP and PCP models

Conclusion

- Moreover, noncooperative Foreign policymaker in the DP model can manipulate not only internal relative price but also deviations from LOOP in favor of its own welfare through nominal exchange rate adjustment

- While noncooperative Home policymaker can control neither of the two

- Thus, gains from cooperation in Home are larger compared to Foreign

Conclusion

- This result also rationalizes the fact that the U.S. designates currency manipulators to protect its welfare

- Furthermore, I find that there are substantial gains from cooperation in the DP model even under the conditions that make gains from cooperation in the LCP and PCP models disappear

Thank you