International Coordination of Monetary and Macro-Prudential policies[1]

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[1] Views expressed here are not necessarily the views of the BIS.

Introduction

When is international policy coordination desirable?

- Literature starting from Obsfeld and Rogoff (1992) finds little gains to international coordination on monetary policy (MP).
- But what about macro-prudential policy (MaP) ?
  - Does a similar kind of result hold ?
  - How do gains to international cooperation, if any, depend on economies' fundamentals ?
  - Do these gains depend on how MP is conducted (cooperative vs. non-cooperative) ?

Introduction

Main results

- For given MaP policies, there are gains to MP cooperation at the global level, but they are **asymmetric**
  - Region loosing to MP cooperation has no interest in coordination
- Under non-cooperative MP, all regions experience positive **gains to cooperating on MaP policies**.
  - Cooperative MaP policies easier to implement than cooperative MP
- Gains from cooperative MaP policies **disappear** under cooperative MP.
  - Cooperating on MP would help, but given the difficulty, cooperating on MaP remains the best option.

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The intuitions for the results in one slide.

- **Gains to MP cooperation are asymmetric:**
  - Under Nash MP, domestic interest rate maximizes domestic welfare.
  - With a global market, world equilibrium interest rate (FC) is the *max*
  - FC are hence optimal for one region, but too tight for the other.

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- **Under Nash MP, all regions are better-off under cooperative MaP:**
  - FC under Nash MP are too tight for the global economy.
  - Coop. MaP aims at easing "too tight FC". How? by allowing for more cross-border capital flows $\Rightarrow$ higher welfare in both regions.

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  - FC under Nash MP are too tight for the global economy.
  - Coop. MaP aims at easing "too tight FC". How? by allowing for more cross-border capital flows $\Rightarrow$ higher welfare in both regions.
- **Gains to MaP cooperation go away under coop. MP:**
  - With cooperative MP, FC are suboptimal for each individual region, but ability to steer FC through domestic MaP is more limited.
  - Both Nash and coop. optimal MaP focus on capital flows and risk sharing.

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Some papers in the literature.

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- **MP and MaP in open economy:**
  - Objectives: Benigno (2009), Corsetti et. al. (2011), Faia and Monacelli (2008), Senay and Sutherland (2018).
  - Effectiveness: Rey (dilemma vs. trilemma), Mendoza (2016) and Aizenmann et al. (2018).
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  - Leakages: Aiyar (2012) for the UK, Barroso et al. (2016) for Brazil
- **Liquidity managment/provision**
  - Under-insurance and pecuniary externalities (Gromb and Vayanos 2002, Lorenzoni 2008 or Stein 2012), particularly in open economy context (Caballero and Krishnamurthy 2003 or Jeanne and Korinek 2010, Brunnermeier and Sannikov (2014)).

The model

Framework and technologies.

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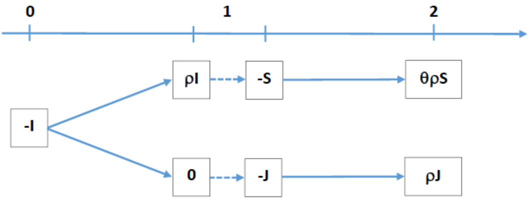
- At date 0, banks with a unit endowment, can invest I in a risky asset.
  - Risky assets yield ρI or 0 at date 1; yields negatively correlated across regions.



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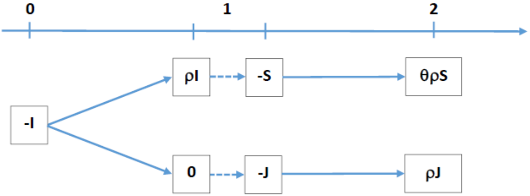
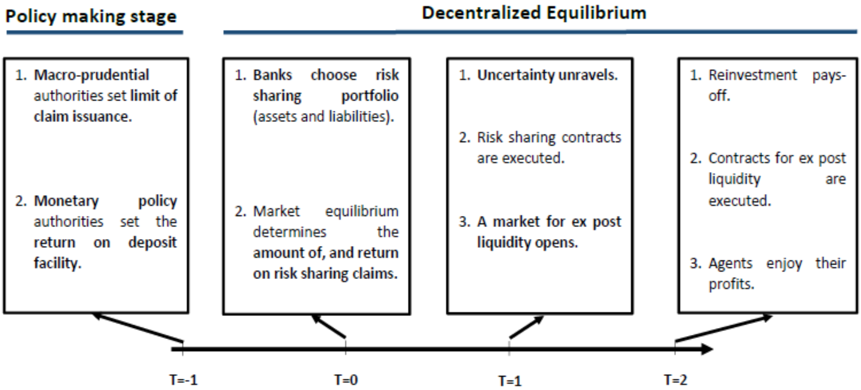


- At date 1, uncertainty unravels:
  - Banks can save for a return $\theta\rho$.
  - Banks whose risky assets do not pay-off can reinvest for a return ρ

The model

- Markets
  - **Ex ante risk sharing**: At date 0, banks can issue claims on their risky assets.
  - **Ex post market for liquidity**: At date 1, once uncertainty is resolved, banks can exchange liquidity.
- Policies
  - **Monetary policy**: Setting the return to savings between date 1 and date 2 (*deposit facility*).
  - **Macro-prudential policy**: Choosing how many claims banks can at most issue at date 0 (*leverage ratio or CFM*).

The model
Timing



The decentralized equilibrium

- The portfolio problem for region i banks:

$$\max_{L_i; L_{-i}} \qquad \tfrac{1}{2}\pi_{i,1} r_{-i,2} + \tfrac{1}{2}\pi_{i,2}$$

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- Equilibrium amount and return on ex ante capital flows:

$$L_j=\varphi_j\frac{1-\varphi_{-j}}{1-\varphi_j\varphi_{-j}} \text{ and } \beta r_{j,1}=r_{j,2} \text{ for } j=\{i;-i\}$$

  - Capital inflows and outflows are *negatively* correlated. Return to buying insurance *equal* to return on ex post liquidity.

The decentralized equilibrium

- Notations: $R_{j,t} = r_{j,t}/\rho$ and $1 - \nu_i = (1-q)\,\overline{j_i}$. When region i banks need to reinvest, market for ex post funding equilibrium:

$$\underbrace{1 + L_{-i} - L_i}_{\text{Funding Supply}} = \underbrace{\beta R_{-i,1} L_{-i} + (1 - \nu_i)}_{\text{Funding Demand}}$$

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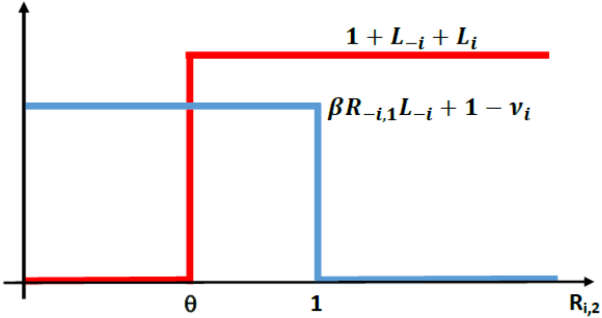
- Supply and demand for funding are inelastic $\Rightarrow$ corner solutions



The decentralized equilibrium

- Inelastic funding supply and demand with $\beta < 1 \Rightarrow$ unique equilibrium with excess funding supply:

$$(R_{i,2}; R_{-i,2}) = \theta = \max(\theta_i; \theta_{-i}) \text{ and } \left\{ \begin{array}{c} L_i \leq \nu_i + (1-\theta) L_{-i} \\ L_{-i} \leq \nu_{-i} + (1-\theta) L_i \end{array} \right.$$

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- Higher degree of risk sharing (higher $(L_i; L_{-i})$) can be sustained with easier funding conditions (lower θ)
  - With lower θ, funding demand -say from banks of region i- goes down. Excess funding supply compatible with region $-i$ banks holding more claims L_i from region i banks.
  - Variant of the risk taking channel of monetary policy: lower interest rates allow larger cross-border risk-sharing instead of more risk taking.

Optimal monetary policy

The non-cooperative equilibrium

- MP makers in region i choose the domestic interest rate θ_i:
  - to maximize *domestic* banks' expected profits
  - subject to banks arbitraging between deposit facilities

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- The problem for MP maker in region i:

$$\max_{\theta_i} \quad \pi_i = \left[1 + \left(1 - \frac{1}{\beta} R_{i,2}\right) L_i\right] R_{-i,2} + (1 - R_{i,2})(1 - \nu_i)$$
$$\text{s.t. } R_{i,2} = R_{-i,2} = \max(\theta_i; \theta_{-i})$$

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- Optimal interest rates under Nash MP satisfy

$$\theta_i = \theta_{-i} = \theta_n \equiv \frac{\beta}{2} \max\left[1 + \frac{\nu_i}{L_i}\right]$$

  - CBs set lower interest rates when domestic banks are more leveraged, i.e. hold more risk sharing liabilities.
  - Eq. interest rate θ_n is optimal for one region, too high for the other.

Optimal macro-prudential policy

The non-cooperative equilibrium

- MaP policy makers choose φ to maximize banks' profits, subject to
  - bank individual decisions to issue claims for risk sharing
  - which region is setting the global interest rate θ_n
  - the constraints on the decentralized equilibrium

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- Optimal MaP policy in the "interest rate setting" region :

$$\max_{\varphi_i} \quad \pi_i = \left[\nu_i + \left(1 - \tfrac{1}{\beta}\theta_n\right) L_i\right] \theta_n$$

$$\text{s.t.} \quad \begin{cases} L_i = \frac{\varphi_i\left(1-\varphi_{-i}\right)}{1-\varphi_{-i}\varphi_i} \text{ and } \theta_n = \frac{\beta}{2}\left[1 + \frac{\nu_i}{L_i}\right] \text{ and } L_i \leq \frac{\nu_i}{\nu_{-i}} L_{-i} \\ L_i \leq \nu_i + \left(1 - \theta_n\right) L_{-i} \text{ and } L_{-i} \leq \nu_{-i} + \left(1 - \theta_n\right) L_i \end{cases}$$

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- Capital inflows L_i unambiguously raise profits π_i :

$$L_i = \min\left\{\nu_i + (1-\theta_n) L_{-i}; \frac{\nu_i}{\nu_{-i}} L_{-i}\right\}$$

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The non-cooperative equilibrium

- Optimal MaP policy in the "non-interest rate setting" region:

$$\max_{\varphi_{-i}} \quad \pi_{-i} = \left[\nu_{-i} + \left(1 - \frac{1}{\beta}\theta_n\right) L_{-i}\right] \theta_n$$

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- Trade-off btw risk sharing and funding conditions; with higher φ_{-i}
  - larger capital inflows $L_{-i} \Rightarrow$ **larger** expected profits π_{-i}
  - lower capital outflows $L_i \Rightarrow$ tighter FC $\Rightarrow$ **lower** expected profits π_{-i}

$$L_{-i} = \min\left\{L_n\left(L_i\right); \nu_{-i} + \left(1-\theta_n\right) L_i\right\}$$

Optimal macro-prudential policy

The cooperative equilibrium

$$\max_{\varphi_i;\varphi_{-i}} \quad \pi_i + \pi_{-i} = \left[\nu_i + \nu_{-i} + \left(1 - \tfrac{1}{\beta}\theta_n\right)(L_i + L_{-i})\right]\theta_n$$

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- No trade-off for MaP in "interest rate setting" region: higher φ_i
  - larger global capital flows $(L_i + L_{-i}) \Rightarrow$ **larger** global profits
  - lower interest rate $\theta_n \Rightarrow$ **larger** global profits

$$L_i = \min\left\{\nu_i + (1-\theta_n) L_{-i}; \frac{\nu_i}{\nu_{-i}} L_{-i}\right\}$$

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- Trade-off for MaP in "non-interest rate setting" region: higher φ_{-i}
  - larger global capital flows $(L_i + L_{-i}) \Rightarrow$ **larger** global profits
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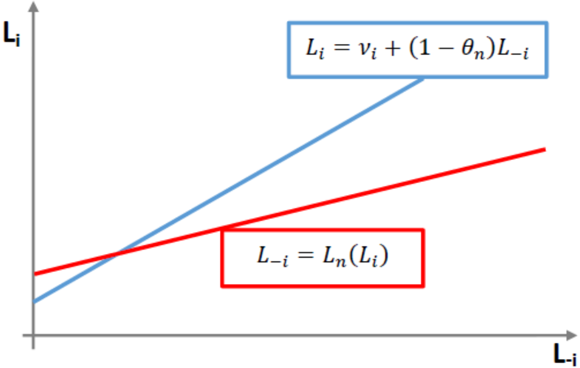
- Higher φ_{-i} raises global capital flows $L_{-i} + L_i$ but less than it raises capital inflows $L_{-i} \Rightarrow L_c\left(L_i\right) \leq L_n\left(L_i\right)$.

Optimal macro-prudential policy

Comparing Nash and cooperation



Optimal MaP policy under Nash MP

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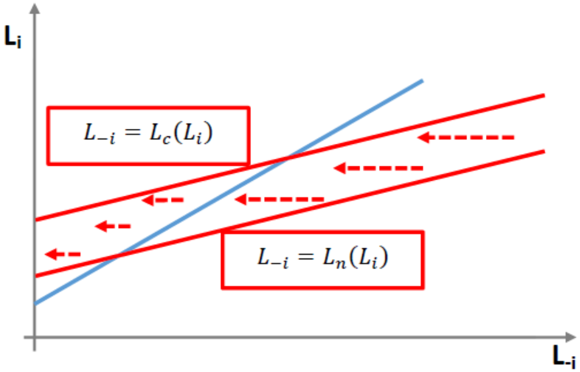

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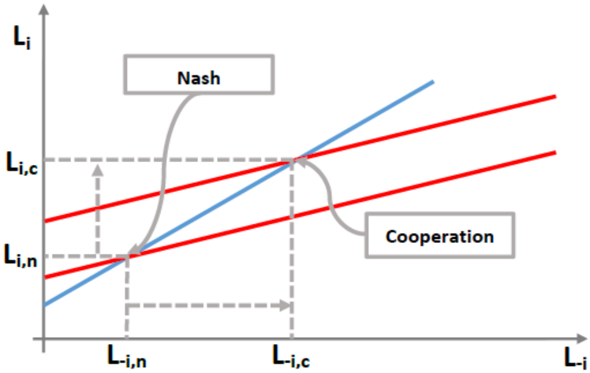

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Both regions are better-off cooperating on MaP

Conclusions

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- Analysis suggests so far that coordinating MaP can help to reduce MP Nash-induced inefficiency.

APPENDIX SLIDE

State-contingent interest rates

- Idea: banks running fixed-scale reinvestment can shirk and claim to run variable-scale reinvestment. They then reap a marginal return ρ_s only with some probability p_s.
- Incentive constraint which precludes shirking writes as:

$$\left(\beta r_{-i,1} L_{-i} + D_j\right) \rho - D_j r_{i,2} \geq \left[\left(\beta r_{-i,1} L_{-i} + D\right) \rho_s - D r_{i,2}\right] p_s$$

with $\beta r_{-i,1} L_{-i} + D_j = \bar{j}_i \rho$ and $D = \frac{\phi}{1-\phi} \beta r_{-i,1} L_{-i}$

$$R_{i,2} = \theta_{-i} \leq \frac{1 - \alpha_i \theta_i L_{-i}}{1 - \beta_i \theta_i L_{-i}}$$

- Trade-off for MaP unchanged:
  - Larger ex ante capital inflows L_{-i} vs. lower return on ex post lending θ_{-i} and higher cost of ex post borrowing θ_i.