Insulation Impossible: Fiscal Spillovers in a Monetary Union

Russell Cooper*  Hubert Kempf**  Dan Peled***

*European University Institute and University of Texas at Austin

**Banque de France and Paris School of Economics

***University of Haifa

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# Outline

1. Motivation
2. Model
   - Non-binding Reserve Requirement
   - Reserve Requirement Binds
3. Insulating Region 2 from Region 1 Fiscal Policy
   - Special Policies
   - Two General Results
4. Market Segmentation
5. Conclusion
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Figure: Our World View
World View

- federations of regions (countries, states)
- regional fiscal policy: financing of transfers to regional agents
- central tax authority (Treasury)
- central monetary authority (CB)

Effects of Interdependence

- gain: trade and factor reallocation enhanced
- loss: policy spillovers
  - policy coordination
  - policy segmentation: insulation
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Example: Who Pays Regional Debt Obligations?

- regional government want to spread obligations
- who will provide the bailout?
  - by Treasury (Cooper, Kempf and Peled, *IER*)
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Rationale for CB Bailout

- “Weak CB” prints money to finance debt obligations of regional government (Cooper and Kempf, *REStud*)
- tax and consumption smoothing motivates CB bail-out (multiplicity)
- CB rules may accommodate bail-out by linking policy to endogenous variables
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Two perspectives on CB policy rules

- **Policy response**: monetary policy may accommodate regional fiscal policy:
- **(fiscal spillovers)**: monetary policy acts to offset (eliminate) fiscal policy effects on wages and interest rates
- Both perspectives co-exist here
Figure: ECB

**ECB**
Monetary Policy Rules

**Regional Government**
- Spending/transfers
- Issues debt
- Regional taxes

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markets
Questions

- How effective is CB policy in insulating one country from another?
  - How does CB policy influence fiscal spillovers across regions?
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Find

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Study Using

- two-period, two-region Diamond OG model: money, capital and bonds
- interactions between regional government’s fiscal policy and (CB)
- reserve requirements generate money demand
- focus on steady state monetary equilibria; potentially interesting dynamics
- integrated capital markets
- no crises *per se* but mechanisms are relevant during these periods as well.
fiscal spillovers iff reserve requirements bind (non-Ricardian)

- regional debt \(\Rightarrow\) aggregate capital stock
- aggregate capital \(\Rightarrow\) real wages and interest rates
- CB may be induced to respond

CB rules

- abstract feedback rule
- fixed nominal money growth: no policy response
- interest peg: policy response through inflation tax, insulation from interest rate part of fiscal spillover
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Overview

- Agents
  - Households
  - Firms
  - Intermediaries
  - Governments

- friction through reserve requirements
  - difference between return on household saving and government debt
  - Ricardian equivalence is lost
  - fiscal spillovers emerge
  - choice of CB policy matters
Households

- HH in region \( i = 1, 2 \) solves

\[
\max_s u(c^i_y) + v(c^i_o) \tag{1}
\]

where \( c^i_y = \omega + g^i - \tau^i_y - s \) and \( c^i_o = sR - \tau^i_o \).

- tax is \( \tau^i_j, i = 1, 2 \) and \( j = y, o \).

- deposit \( s^i \) in intermediaries, return of \( R \)

- do not demand money

- \( u'(c^i_y) = Rv'(c^i_o) \)
Firms

- CRS, perfect competition
- $\omega = f(k) - kf'(k)$
- $r = f'(k)$
Intermediaries

- reserve requirement of $\lambda$ on deposits ($S$)
- $\frac{M}{p} = \lambda S$ and $b + k = (1 - \lambda)S$
- Return on deposits linked to asset portfolio by:

$$R = r(k)(1 - \lambda) + \frac{\lambda}{\pi} \tag{2}$$

- $r$ is return on capital and bonds
- construct equilibria with $r > R$ when constraint binds as $\lambda > 0$
Regional Governments

- only region 1 is fiscally active
- transfer $g^1 > 0$ to young agents (broadly defined)
- financed by taxes $\tau_y^1$ and $\tau_o^1$
- Budget Constraint (steady state)
  - $g^1 = \tau_y^1 + B^1$
  - $rB^1 = \tau_o^1 + T^1$: one-period debt
  - $0 = \tau_o^2 + T^2$ in region 2
  - $T^i = \frac{\phi^i \times T(k,b)}{\eta^i}$: real transfer from the CB to each agent in region $i$
- $B^1$ is per region 1 agent, $b$ is per capita
• monetary policy through transfers: \( (T(k, b), \phi^1, \phi^2) \)
• real transfers financed by printing money
• commit to \( T(k, b) \), prior to fiscal policy of regional government
• transfers to regional governments implement policies
• special rules
  • \( \sigma \text{ – rule: fix the money growth rate} \)
  • \( R \text{ – rule: peg an interest rate} \)
Steady State

- \((T(k, b), \phi^1, \phi^2)\) and \(b\) given
- \(k\) determined in steady state equilibrium satisfying:
  - Household Euler Equations: \(u'(c^i_y) = Rv'(c^i_o)\)
  - Intermediary Zero Profits
  - factor demand: \(r(k) = f'(k)\) and \(\omega(k) = f(k) - kf'(k)\)
  - Regional Government Budget Constraints
  - market clearing conditions
Benchmark: Non-binding Reserve Requirement

- all assets earn same return: \( r = \frac{1}{\pi} \) so \( R = r \)
- Ricardian outcome: fiscal policy of Region 1 is irrelevant

**Proposition** If \( T_b(k, b) \equiv 0 \), then the steady state equilibrium is independent of \( b \).

- but the CB can create spillovers directly:

**Proposition** If \( T_b(k, b) \neq 0 \), then the steady state equilibrium depends upon \( b \).
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Binding Reserve Requirement: General $T(k, b)$

- $r > R$
- **Proposition** [Non-neutrality] *For* $T(k, b) \equiv 0$, *the steady state equilibrium is dependent on* $b$.

- variations in $b$ influence $k$ and hence factor prices and thus welfare in other region
- Characterize the Spillovers with more structure
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Leading Case

Local Stability of the steady state and crowding out with $b^H > b^L$. 
Characterizing the Spillovers

- Capital dynamics are given by:

\[ k_{t+1} = (1 - \lambda) \sum_i \eta_i s_i^i(\omega(k_t), R(k_{t+1}, b), \tau_y^i, \tau_o^i(k_{t+1}, b)) - b. \]

- \( s_i^i(\omega, R, \tau_y^i, \tau_o^i) \) is the savings function for a region \( i \) agent given factor prices and taxes.
- \( \tau_o^1(k, b) = \frac{rb}{\eta_1^1} - T^1(k, b), \quad \tau_o^2(k, b) = -T^2(k, b). \)

- Local dynamics are governed by:

\[ \frac{dk_{t+1}}{dk_t} = \frac{(1 - \lambda) \sum_i \eta_i s_i^i \omega'(k_t)}{1 - (1 - \lambda)[\sum_i \eta_i (s_i^i R_k(k_{t+1}, b) + s_i^i \frac{\partial \tau_i^o(k_{t+1}, b)}{\partial k})]} . \]
Crowding Out

- response of $k$ to region 1 debt per capita, $b$

\[
\frac{dk}{db} = \frac{-[1 - (1 - \lambda) \sum_i \eta^i \left( s^i_{\tau_y} \frac{d\tau^i_y}{db} + s^i_{\tau_o} \frac{d\tau^i_o}{db} + s^i_R R_b(k, b) \right)]}{1 - (1 - \lambda) \left[ \sum_i \eta^i s^i_R R_k(k, b) + s^i_{\omega} \omega'(k) + s^i_{\tau_o} \frac{\partial \tau^i_o(k, b)}{\partial k} \right]}. 
\]

- **Proposition** [crowding out] If $\frac{dk_{t+1}}{dk_t} \in (0, 1)$ at the steady state and $T_b(k, b) \geq 0$, then $\frac{dk}{db} < 0$.

- Region 2 agents not insulated from region 1 fiscal policy
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CB Policy

- here we see spillovers and crowding out
- how does the choice of $T(k, b)$ influence these spillovers
- answer
  - through some illuminating special cases
  - in general
Fiscal Spillovers and a $\sigma - rule$

- Transfers proportional to money stock

$$T(k, b) = \lambda S \frac{(\sigma - 1)}{\sigma} = \frac{\lambda(k + b)}{(1 - \lambda)} \tilde{\sigma}$$

(3)

where $\tilde{\sigma} \equiv \frac{\sigma - 1}{\sigma}$

- **Corollary** Under a $\sigma - rule$ with $\tilde{\sigma} \geq 0$, an increase in $b$ leads to a reduction in the capital stock, an increase in the real interest rate and a reduction in the real wage.

- crowding out effect

- real transfers are influenced by $b$.

- region 2 agents affected by $b$. 
Fiscal Spillovers and a $R \rightarrow$ rule

- $\text{fix } R = r(k)(1 - \lambda) + \frac{\lambda}{\sigma}$

- **Corollary** Under a $R \rightarrow$ rule pegging $R$, if $\tilde{\sigma} \geq 0$, an increase in $b$ leads to a reduction in the capital stock and an increase in the rate of inflation.

- crowding out increases $R$

- CB inflates to peg it.

- Region 2 agents are insulated from both $R$ and inflation tax: $u'(\omega(k) - s^2) = Rv'(s^2R)$

- wages depend on $k$
Insulation Impossible

- Can the CB neutralize the effects of region 1 debt on region 2 agents?
  **Proposition:** There do not exist $T^i(k, b)$ transfer functions, for $i = 1, 2$, such that the steady state equilibrium levels of consumption of region 2 agents, $(c_2^y, c_2^o)$, are independent of $b$.

- Are the equilibrium levels of consumption and $k$ independent of $b$?
  **Proposition:** There do not exist $T^i(k, b)$ transfer functions, for $i = 1, 2$, such that the steady state equilibrium levels of consumption for agents in regions $i = 1, 2$ and the capital stock are independent of $b$. 
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Financial Market Segmentation

- understand robustness of insulation to portfolio
- Region 1 agents have access to intermediaries
- Region 2 agents only hold money: \( u'(\omega(k) - s^2) = \frac{1}{\pi} v'(\frac{s^2}{\pi}) \)
- Find:
  - \( \sigma - rule \): limits fiscal spillovers across regions to wages.
    Return for region 2 agents is fixed with money growth rate.
  - \( R - rule \): CB response leads to inflation tax on region 2 agents
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- can influence impact of spillovers from regional fiscal policy
- policy rules may partially insulate region 2 agents from inflation tax
- key is portfolio return relative to peg

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- other special CB rules
- are fiscal restrictions useful?
- OMOs vs money transfers
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