Sovereign Risk, Private Credit and Stabilization Policies

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Motivation

- Interconnection between government and private borrowing during crisis

![Graph showing sovereign spreads and private lending rates](image)

**Figure 1: Sovereign Spreads and Private Lending Rates**

<table>
<thead>
<tr>
<th>Country</th>
<th>Pre-Crisis</th>
<th>Crisis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greece</td>
<td>0.2</td>
<td>3.3</td>
</tr>
<tr>
<td>Ireland</td>
<td>0.1</td>
<td>2.4</td>
</tr>
<tr>
<td>Italy</td>
<td>0.2</td>
<td>2.2</td>
</tr>
<tr>
<td>Portugal</td>
<td>0.1</td>
<td>2.2</td>
</tr>
<tr>
<td>Spain</td>
<td>0.1</td>
<td>1.3</td>
</tr>
</tbody>
</table>

**Table 1: Sovereign Spreads and Private Lending Rates**
What are we going to see here?

- Sovereign spreads comove with private rates
  - Sovereign debt crisis worsens private credit conditions
  - This leads to an output losses and exacerbates macroeconomic instability

- Taking this into account, this paper examines the impact of spread stabilization policies
  - Particularly, the effect of the Outright Monetary Transaction in small open economy
  - Bailouts alleviate sovereign spreads and improve credit conditions
  - Reduce output losses by 0.06% and increases welfare by 1%

- The paper will be able to answer two questions:
  - To what extent are policy interventions aimed at reducing sovereign risk able to ameliorate private credit conditions?
  - How important are these effects quantitatively?
Model

Both spreads
- Government can: Repay, default, or ask for a bailout. Also, cost of adjusting debt position
- Representative firm face working capital constraints
- Both public and private spreads appear endogenously. And the link between those spread also appears endogenously and depends on macroeconomic conditions

The bailout (The OMT)
- This paper presents endogenous default model plus the possibility of bailout
- Accepting the bailout: Receive a transfer from a third-party fund, but also agree in constrain borrowing
- Three effects: 1) Drastically reduces exposure to default. 2) Successfully lower sovereign spreads. 3) Large effect on private credit condition
Households, firms and banks

- First we see a model abstracting from any bailout policy.

**Households**: Identical, risk averse, own firms and banks:

\[
\max \ E_0 \sum_{t=0}^{\infty} \beta^t \frac{\epsilon^{1-\sigma}}{1-\sigma} \ st: \\
\ c_t = h_t w_t + ku_t + \tau_t + \pi_t + \pi^b_t
\]

**Firms**: Large number of identical ones

\[
y_t = \varepsilon_t F(k, h_t) \\
\text{Working capital constraint: } \kappa_t \geq \eta w_t h_t \\
\text{Firm raise debt with } R_t^d \text{ to finance } \kappa_t
\]

**Financial intermediaries**: Large number of identical banks

- Bank i borrows funds from foreign investors at price \( q_t \) and lends to domestic agents offering an interest rate of \( R_t^d \)
Financial intermediaries

- Banks face a convex and increasing operational costs $\Psi(b_i)$
  - $\Psi(b' - b) = \frac{\psi}{2} (b' - b)^2$
  - Solving for the optimal problem of the banks:
    $$R^d_t [b_{t+1} - \psi(b_{t+1})] - \frac{b_{t+1}}{q_t} \text{ implies } R^d_t = \frac{1}{q_t} \frac{1}{1-\Psi'(b_{t+1})}$$

- **Relationship between $R^d_t$ and $q_t$:** Interest rate that the private sector faces is an increasing function of the sovereign rate
  - When sovereign debt is small, there is small effect of public spreads on private rates
  - When sovereign debt is big, changes in sovereign risk will have larger effect on private rates

- **International lenders:** Risk neutral
  - $\phi_t = q_t b_{t+1} - \frac{1-\delta_t}{1+r} b_{t+1}$ implies $q_t = \frac{1-\delta_t}{1+r}$
  - where $\phi$ are profits and $\delta$ is the probability of default of the government
Government (without possibility of bailout)

- The government is benevolent.
  - Social planner problem with adjustment cost when changing level of debt.
  - It observes $\varepsilon$ and foreign asset position, and decides if repay or default

- If government repay
  - $\max E_0 \sum_{t=0}^{\infty} \beta^t u(c_t)$
  - subject to $c_t = \varepsilon F(k, h_t) - \eta w_t h_t \left( \frac{R^d - 1}{R_t} \right) + b_t - q_t(b_{t+1}, \varepsilon)b_{t+1} - \Psi(b_{t+1})$

- If government defaults
  - Country is excluded from financial markets
  - $c_t = \varepsilon^{\text{def}} F(k, h_t)$, where $\varepsilon^{\text{def}} = \gamma(\varepsilon)$
  - With exogenous probability $\theta$ the government reenters the credit markets
Outright Monetary Transactions

- August 2012, creation of the OMT.
  - If a country enter the program, the ECB would buy its bond on the secondary market and would keep them until maturity.
  - At the same time, the country should start fiscal austerity measures or structural reforms.
  - Trade-offs. Conditional cause: Benefit (additional resources) vs Cost (borrowing constraints)

- The government can now:
  - Default on its debt.
  - Repay debt.
  - Repay debt while entering in a bailout program

- Remember the two questions:
  - To what extent are policy interventions aimed at reducing sovereign risk able to ameliorate private credit conditions?
  - How important are these effects quantitatively?
Setup 1

Once in the bailout program:

- Continuing the bailout program with an exogenous probability \( \mu \)
- Once in the program, the government financially constraint \( \bar{b} \),
- Consumption is equal to
  \[
  c = y - \eta wh \left( \frac{R^d - 1}{R^d} \right) + b' - q(b', \varepsilon)b' - \Psi(b') + G(b)
  \]

The complete problem of the government

- The government observes \( \varepsilon \) and the amount of foreign assets \( b \).
- Then its value is \( v^0(b, \varepsilon) = \max \{ v^c(b, \varepsilon), v^b(b, \varepsilon), v^d(\varepsilon) \} \)
- \( v^c(b, \varepsilon) \) is the value associated with not defaulting and not asking for a bailout
- \( v^b(b, \varepsilon) \) is is the value associated with no defaulting and asking for a bailout
- \( v^d(\varepsilon) \) is the value of defaulting
Setup 2

- **Value of repaying (continuing)**
  \[ v^c(b, \varepsilon) = \max_{b'} \left\{ u(y + b - q(b', \varepsilon)b') + \beta \int_{\varepsilon'} v^0(b', \varepsilon') f(\varepsilon', \varepsilon) \right\} \]

- **Value of entering bailout**
  \[ v^b(b, \varepsilon) = \max_{b' \geq b} \left\{ u(y + b - q(b', \varepsilon)b' + G) + \beta \int_{\varepsilon'} \left[ \mu v^{op}(b', \varepsilon') + (1 - \mu) v^0(b', \varepsilon') \right] f(\varepsilon', \varepsilon) d\varepsilon' \right\} \]

- **Value once in the bailout**
  \[ v^{op}(b, \varepsilon) = \max \left\{ v^p(b, \varepsilon), v^d(\varepsilon) \right\} \]

- **Value of continuing in the bailout**
  \[ v^p(b, \varepsilon) = \max_{b' \geq b} \left\{ u(y + b - q(b', \varepsilon)b') + \beta \int_{\varepsilon'} \left[ \mu v^{op}(b', \varepsilon') + (1 - \mu) v^0(b', \varepsilon') \right] f(\varepsilon', \varepsilon) d\varepsilon' \right\} \]

- **Value of defaulting**
  \[ v^d(\varepsilon) = u(\varepsilon^{def} y) + \beta \int_{\varepsilon'} \left[ \theta v^0(b', \varepsilon') + (1 - \theta) v^d(\varepsilon') \right] f(\varepsilon', \varepsilon) d\varepsilon' \]
Government policy

- The government policy is characterized by the repayment sets, bailout sets, and default sets.

  \[ R(b \mid \bar{P}) = \{ \varepsilon \in \epsilon : v_c(b', \varepsilon) \geq \max \{ v^b(b', \varepsilon), v^d(\varepsilon) \} \} \]

  \[ RP(b \mid \bar{P}) = \{ \varepsilon \in \epsilon : v^b(b', \varepsilon) \geq \max \{ v^c(b', \varepsilon), v^d(\varepsilon) \} \} \]

  \[ D(b \mid \bar{P}) = \{ \varepsilon \in \epsilon : v^d(\varepsilon) \geq \max \{ v^c(b', \varepsilon), v^b(b', \varepsilon) \} \} \]
OMT and sovereign risk

Let's analyze the default and interventions sets

- On the left, economy in normal times. On the right, already in the bailout program
- Presence of a bailout option significantly reduces the default set
Let's analyze price bond schedule

Note that the price bond schedule is always larger in an economy where bailouts are available.
OMT, sovereign spread and intervention sets

- The existence of the bailout program effectively reduces spread even for levels of debt for which bailout is not requested.
OMT, quantitative implications

- The presence of the OMT drastically reduces the exposure of an economy to default.
- The OMT successfully reduces the sovereign spreads.
- When considering a model with financial frictions, we can observe that reduction of government bond rates is associated with a reduction of the private loan rates.

<table>
<thead>
<tr>
<th></th>
<th>No Financial Friction</th>
<th>Financial Friction</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No OMT</td>
<td>strict</td>
</tr>
<tr>
<td>Sh. of periods in def.</td>
<td>19.1</td>
<td>3.5</td>
</tr>
<tr>
<td>Intervention freq.</td>
<td></td>
<td>75</td>
</tr>
<tr>
<td>Mean Sovereign Bond Return</td>
<td>5.7</td>
<td>2.9</td>
</tr>
<tr>
<td>Mean Private Rate</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Output loss</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Welfare</td>
<td>-</td>
<td>7.6</td>
</tr>
</tbody>
</table>
Conclusions

- This paper study the effect of bailout policies, OMT
- First, the paper show that unfavorable sovereign borrowing conditions prompted unfavorable conditions for private borrowing during crisis times
- Policies designed to reduce sovereign spreads will have a domino effect on the private borrowing rates
- Welfare benefits in terms of consumption of 7.6% to 9.4%