On official lending

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1 Question and literature

2 Three period model of fundamental default
   - Short-term market debt only
   - Long-term loans at market rate
   - Long-term loans at market rate

3 Logic of official lending
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   - Official rates

4 To conclude: Open issues
Euro area countries in crisis have received funding from the IMF, European institutions ESM/EFSF, bilateral loans, plus direct and indirect effects of ECB policies.

Type and terms of official lending differ significantly in nature (transfers versus monetary backstop), maturity (ESM loans longer) and spread (ESM spreads lower than IMF).

Gourinchas Martin Messer (GMM’s)—The Economics of Sovereign Debt, Bailouts and the Eurozone Crisis—estimate a lower bound for transfers to crisis countries:
- Greece 40% vs Portugal and Cyprus 3% Spain less than 1%
- Spain Ireland less than 1% or negative?
## Official Lending Terms in the euro area

Maturities and marginal lending rate from Corsetti Erce Uy 2017, 2018

<table>
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<th>Dec-10</th>
<th>Dec-11</th>
<th>Dec-12</th>
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<td>Interest rate</td>
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<tr>
<td>IMF</td>
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<td></td>
<td>Interest rate</td>
<td>337 bps</td>
<td>321 bps</td>
<td>307 bps</td>
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<td><strong>Portugal</strong></td>
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<tr>
<td>EFSF/ESM</td>
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<td>15 years</td>
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<td>277 bps</td>
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<td>321 bps</td>
<td>307 bps</td>
<td>309 bps</td>
</tr>
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Sources: International Monetary Fund, European Commission, European Financial Stability Facility, European Stability Mechanism and Bloomberg.
Debt Composition and Market Spreads
ESM debt includes EFSM loans (for Ireland, also bilateral loans from DK and UK) from Corsetti Erce and Uy 2017, 2018
How does official lending work?

- Official loans and transfers affect a government's incentives to issue, repay, or default on debt:
  hence they matter for how much debt a country can sustain, just like tax capacity, spending and inflation.

In what follows we abstract from multiple equilibria and belief-driven crises. For a comprehensive analysis and a review of the policy debate, see:

- Giancarlo Corsetti, Aitor Erce, Tim Uy (CEU) “Debt sustainability and the terms of official support”, ADEMU WP: 2018/116
Selected literature

Bailout

- GMM

Liquidity vs fundamentals

Three period model of fundamental default


- In period 1 and 2, output in either boom $y_H$ or recession $y_L$ with prob. $p$ and $(1 - p)$ in period 2 and with prob. $\alpha$ and $(1 - \alpha)$ in period 1
- Borrowers: linear utility, value current consumption $\beta \leq 1$
- Lenders: risk-neutral, do not discount future
- Default cost: if the country repudiate debt, it is excluded from financial markets and consumption falls by a fraction $\delta$ of current income: $(1 - \delta)y_j, j = H, L.$
  Given these default costs, repayment credible only as long as consumption remain above $\delta y_H$ in booms or $\delta y_L$ in downturn.
- The country issues discount bonds (priced under risk neutrality).
General Three-period Model

\[ c_0 = \begin{cases} y_0 + Q_1^1 B_1^1 + Q_0^2 B_0^2 - B_0^0 \\ (1 - \delta) y_0 \end{cases} \]

\[ c_1^H = \begin{cases} y_H + Q_1^2 B_1^2 - B_0^1 \\ (1 - \delta) y_H \end{cases} \]

\[ c_2^H = \begin{cases} y_H - B_1^2 - B_0^2 \\ (1 - \delta) y_H \end{cases} \]

\[ c_1^L = \begin{cases} y_L + Q_1^2 B_1^2 - B_0^1 \\ (1 - \delta) y_L \end{cases} \]

\[ c_2^L = \begin{cases} y_L - B_1^2 - B_0^2 \\ (1 - \delta) y_L \end{cases} \]

Key

\[ c_t = \begin{cases} \text{Welfare if default} \\ \text{Welfare if no default} \end{cases} \]
Initial equilibrium with prospective default and no bailout

To start with, consider an equilibrium such that, in the absence of official support, the initial (legacy) debt is sufficiently large to induce default during period 2 contractions, i.e., in histories HL and LL (with short-term debt, see AR for details).

In equilibrium:

- In period 2, the country will default in recessions, paying the default costs hence consuming \((1 - \delta)y_L\). It will repay during expansion debt issued in period 1, \(B^2_1\).
- This means that, in period 1, provided the country does not default, lenders will finance new debt issuance only up to the default costs in period 2 expansions, which is \(B^2_1 = \delta y_H\), at the risk-neutral price \(p\). If it issued more debt, in period 2 the country would have a welfare incentive to default also in expansions.
- In period 1, parameters are such that the country will always repay the debt issued in period 0, \(B^1_0\).
In period 0, the level of safe one-period debt lenders can finance is $B^1_0 = \delta y_L + p\delta y_H$. To see why, recall that in a recession the country will repay only as long as consumption remains above $(1 - \delta)y_L$. In period 1 recessions, consumption must satisfy

$$C_1 = y_L + pB^2_1 - B^1_0 = y_L + p\delta y_H - B^1_0 \geq (1 - \delta)y_L$$

The inequality is solved by $B^1_0 \leq p\delta y_H + \delta y_L$, implying that $B^1_0 < p\delta y_H$.

Consumption in period 0 is then

$$C_0 = y - B^0_0 + B^1_0 = y - B^0_0 + p\delta y_H + \delta y_L \geq (1 - \delta)y$$

Again, keep in mind that the country would default if debt service brings consumption below $(1 - \delta)y$. Hence for $B^0_0$ to be sustainable, it must be the case that

$$B^0_0 \leq \delta y + p\delta y_H + \delta y_L$$
Initial equilibrium: default in “bad state” in period 2
Structure of the equilibrium

Short-term debt equilibrium without official loans, assuming \( p \geq \frac{y_L}{y_H} \)
Default is optimal in a recession in period 2

\[
\begin{align*}
    c_0 &= y_0 + B_0^1 - B_0^0 \\
    c_1^H &= y_H + pB_1^2 - B_0^1 \\
    c_1^L &= y_L + pB_1^2 - B_0^1 \\
    c_2^H &= y_H - B_1^2 \\
    c_2^L &= (1 - \delta)y_L
\end{align*}
\]

Key
Default
No default
Initial equilibrium: default in bad state in period 2
Solved for bond prices and quantities

Short-term debt equilibrium without official loans, assuming $p \geq \frac{y_L}{y_H}$
Default is optimal in a recession in period 2

\[
\begin{align*}
    c_0 &= y_0 + ((\delta y_L) + p(\delta y_H)) - B_0^0 \\
    c_L^1 &= y_L + p(\delta y_H) - ((\delta y_L) + p(\delta y_H)) \\
    c_L^2 &= (1 - \delta)y_L \\
    c_H^1 &= y_H + p(\delta y_H) - ((\delta y_L) + p(\delta y_H)) \\
    c_H^2 &= y_H - (\delta y_H) \\
    c_2^H &= y_H - (\delta y_H)
\end{align*}
\]

Key
Default
No default
Long-term debt at market prices does not affect the allocation

We now prove an important “irrelevance result”. Let the country borrow by issuing Long-Term bonds at the market rate $p$ (explain why this is the market rate): Long-term borrowing per se does NOT alter sustainability.

- To show this, we can use a “replication argument”
  - Everything else equal, relative to the equilibrium with short-term debt only, issuing one LT bond that pays in period 2 reduces consumption in period 2 $c_2^H$ by 1 unit in both HH and HL.
  - To maintain $c_2^H$ at the initial level, $B_1^2$ need to fall by 1 unit. Given that $B_1^2$ is priced $p$ in period 1, less borrowing from period 2 causes both $c_1^H$ and $c_1^L$ to fall by $p$.
  - To restore $c_1^H$ and $c_1^L$ back to their short-debt equilibrium level, need to reduce $B_0^1$ by $p$ units. But this in turn would reduce $c_0$ by $p$.
  - The reduction in $c_0$ by $p$ is however offset exactly by the issuance of 1 unit of $B_0^2$ at the price $p$.

- Lesson: official lending at market rate would not be effective in addressing default in period 2.
Equilibrium with short- and long-term debt at market rate, \( p \geq \frac{y_L}{y_H} \). Long term bond issuance is above \( \delta y_L \), so that the country defaults in the “bad state” in 2, but below \( \delta y_L \), so that it is repaid in the “good state”, and its traded at the price \( p \).
Equilibrium with official debt at market rate and long term market debt, \( p \geq \frac{y_L}{y_H} \)

Below is possible allocation with long-term debt equal to \( \delta y_L \)

By the replication argument, the allocation is the same as with short-term debt

\[
\begin{align*}
    c_0 &= Y_0 + (\delta y_L) + p(\delta y_H) - B_0^0 \\
    c_L^2 &= (1 - \delta)Y_L \\
    c_H^2 &= Y_H - 0 - (\delta y_H) \\
    c_L^1 &= Y_L + p \cdot 0 - (\delta y_L) \\
    c_H^1 &= Y_H + p \cdot 0 - (\delta y_H) \\
\end{align*}
\]

Key
- Default
- No default
Now introduce official loans at below-market rates

- Motivated by the empirical facts presented at the beginning of this notes, consider a bailout in the form of official long term bonds $B_{0,IF}^2$ at some official price $Q_{IF}$ above market price (that is, below-market rates), designed to prevent default.

- The prices $Q_{IF}$ and issuance $B_{0,IF}^2$ must be set such that:
  1. default in period 2 is no longer (never) optimal. Main idea: make the government just indifferent between suffering default cost $\delta y_L$ or repaying debt;
  2. debtor welfare is at least as high as in the initial equilibrium—we can proceed with a stronger than needed assumption, that consumption is at least as high in each period/economic condition as in the default-equilibrium.

- Interpretation: official lending turns default costs in a recession into ‘collateral’ against which debt can be issued.
The logic of bailout

Key: in a recession, the country will choose to service debt over default only if the debt bill is below default cost $\delta y_L$.

For the country not to default in period 2, it can only be allowed to borrow up to this default costs: $B^{2,IF}_0 \leq \delta y_L$.

The official lender sets $B^{2,IF}_0 = \delta y_L$ and stipulates a rule (stability pact) preventing the country from diluting official loans.

In the example, this means that the country cannot borrow from markets in period 1.

As one-period debt issuance in the intermediate period 1 is zero, $B^{2}_1$ falls by $\delta y_H$, implying a drop in $c_1$ of the same size. To offset this drop, debt due in period 1 and issued in period 0 must also be lowered: $B^{1}_0$ must fall by by $p\delta y_H$.

A lower $B^{1}_0$, by $p\delta y_H$, per se implies a lower $c_0$. For $c_0$ not to fall, the official price, $Q^{IF}$ must be set high enough, such that $Q^{IF} B^{2,IF}_0 = Q^{IF} \delta y_L \geq p\delta y_H$.

Rearranging, the price of official debt must satisfy

$$Q^{IF} \geq py_H/y_L.$$ (1)
Equilibrium with official debt where $Q^\text{IF} \geq \frac{Y_H}{Y_L}, p \geq \frac{Y_L}{Y_H}$ and $B_0^2,\text{IF} \leq \delta Y_L$

$c_0 = Y_0 + B_1^0 + Q^\text{IF} B_0^2,\text{IF} - B_0^0$

$c_1^H = Y_H + pB_1^2 - B_0^1$

$c_1^L = Y_L + pB_1^2 - B_0^1$

$c_2^H = Y_H - B_1^2 - B_0^2,\text{IF}$

$c_2^L = Y_L - B_0^2,\text{IF}$
Equilibrium with official debt where $Q_{IF}^{1} \geq \frac{pY_{H}}{Y_{L}}, p \geq \frac{Y_{L}}{Y_{H}}$ and $B_{0,IF}^{2} \leq \delta Y_{L}$

\[
\begin{align*}
c_{2}^{H} &= Y_{H} - \delta Y_{L} \\
c_{1}^{H} &= Y_{H} + p \cdot (0 - B_{0}^{1}) \\
c_{0} &= Y_{0} + B_{0}^{1} + (p\frac{Y_{H}}{Y_{L}})(\delta Y_{L}) - B_{0}^{0} \\
c_{1}^{L} &= Y_{L} + p \cdot (0 - B_{0}^{1}) \\
c_{2}^{L} &= Y_{L} - (\delta Y_{L})
\end{align*}
\]
The official rate of interest is below market: instead of $p$, the official lender buy bonds at $Q^{IF} > p$ because $y_H > y_L$

- In our example, the transfer implicit in this rate is $y_H/y_L$—this follows from our assumption that default costs are state-contingent and proportional to output. Hence the more severe the possible recession in the future, the more generous concessions have to be to restore sustainability.

The official rate required to restore sustainability may/may not be above the funding cost of the agency providing the bailout—in our example, actually, $py_H/y_L > 1$, the implied interest rate is negative!

- Recall: for official lending to be successful, the country cannot be allowed to dilute the official lender by expanding debt and re-introduce default.

  - Seniority of official debt not enough here: debt issuance must be capped otherwise country will rationally issue risky debt for $y_H/2 - y_L/2$ in period 1 at the price $p$, implying that the country will still default if a recession occurs in period 2.
Insight on current debates

- We have seen that, ex post, a bailout can prevent default by transferring “just enough” to make the debtor indifferent between repudiating and servicing the debt.
  - “Southern view” emphasized by GMM: “all the surplus from a bailout goes to creditors”.
  - But a low concessional rate (higher $q \geq py_H/y_L$) also creates ex post benefits for debtors: if the country recovers, the interest bill remains low.

- Ex ante, bailouts enhance a country’s borrowing capacity against prospective future transfer used as effective “collateral”—hence debtors can enjoy higher consumption.
  - Northern view in GMM: borrowing against bailout is excessive and distortionary.
  - But note: once debt is already close to unsustainable, official lending no longer finances extra consumption—it only becomes key to sustainability.
  - Barring transfers is tantamount to forcing immediate default, which may not be efficient even from the vantage point of the creditors.
Key open issues

Highly debated

- Credibility of international institution and rules—debt cap
- Incentive for opportunistic behavior (moral hazard)
- Liquidity crisis

Less debated, arguably core issues:

- Objective function of the official lender
  - externalities, solidarity
- Budget constraint of the official lender
  - Value at risk model?