The Eurozone Crisis and Target2

Aaron Tornell
UCLA

December 2012
Eurozone Crisis combines elements of ‘old’ crises:

- The Tragedy-of-the-Commons
- Multiple Equilibria
- Nominal Rigidities
- Systemic Bailout Guarantees

Policies that only address multiple equilibria and nominal rigidities:

- Exacerbate the Tragedy-of-the-Commons
- Make the eventual crisis more severe
Sudden-Stop and Current Account Adjustment

Current Account = National Income - Expenditure
Insufficient Adjustment in GIPS
Mexico in the Run-up to the Tequila crisis

Graph showing international reserves and domestic credit from 1993 Q2 to 1994 Q4.
The exponential path of the red line is not the design of a central planner.
The exponential path of the red line is not the design of a central planner.

It results from decisions by national authorities.
• The exponential path of the red line is not the design of a central planner
• It results from decisions by national authorities
• National Central Banks, not the ECB in Frankfurt, have the power over credit to domestic banks
Full allotment tenders. Any bank can borrow from its NCB as much as it can at a given i.

To borrow from a NCB, a bank must be:
- Solvent
- Have eligible collateral

Countries, not the ECB, have supervisory power to:
- Decide whether a bank is solvent
- Determine quality of collateral

Collateral Rules have been relaxed significantly since 2008.
• Full allotment tenders. Any bank can borrow from its NCB as much as it can at a given i.
• To borrow from a NCB, a bank must be:

  Solvent
  Have eligible collateral

Countries, not the ECB, have supervisory power to:
  Decide whether a bank is solvent
  Determine quality of collateral

Collateral Rules have been relaxed significantly since 2008.
- Full allotment tenders. Any bank can borrow from its NCB as much as it can at a given i.
- To borrow from a NCB, a bank must be:
  - Solvent
• Full allotment tenders. Any bank can borrow from its NCB as much as it can at a given i.

• To borrow from a NCB, a bank must be:
  • Solvent
  • Have eligible collateral
Full allotment tenders. Any bank can borrow from its NCB as much as it can at a given i.

To borrow from a NCB, a bank must be:
- Solvent
- Have eligible collateral

Countries, not the ECB, have supervisory power to:
• Full allotment tenders. Any bank can borrow from its NCB as much as it can at a given i.

• To borrow from a NCB, a bank must be:
  • Solvent
  • Have eligible collateral

• Countries, not the ECB, have supervisory power to:
  • Decide whether a bank is solvent
Full allotment tenders. Any bank can borrow from its NCB as much as it can at a given i.

To borrow from a NCB, a bank must be:

- Solvent
- Have eligible collateral

Countries, not the ECB, have supervisory power to:

- Decide whether a bank is solvent
- Determine quality of collateral
• Full allotment tenders. Any bank can borrow from its NCB as much as it can at a given i.

• To borrow from a NCB, a bank must be:
  • Solvent
  • Have eligible collateral

• Countries, not the ECB, have supervisory power to:
  • Decide whether a bank is solvent
  • Determine quality of collateral

• Collateral Rules have been relaxed significantly since 2008.
Double Common-Pool Problem in EZ

- **Within-country**
  - Several interest groups with power to extract resources from the fisc.
    - Sub-national Governments, Unions, Industrial Groups
    - Banks & “connected-lending”

- **Across-countries**
  - Occurs mainly at the Eurosystem of Central Banks
  - Supported by Target2
N Powerful Groups

- Borrow from banks $g_{it}$, consume $c_{it}$ and invest abroad
- Group $i$ gross debt to domestic banks
  \[ d_{i,t} = [1 + \rho_{t-1}] d_{i,t-1} + g_{i,t-1} \]
- Group $i$ "safe assets abroad"
  \[ b_{i,t+1} = [1 + \beta] b_{i,t} + g_{i,t} - c_{i,t} \]
- Objective function
  \[ U_i(s) = \sum_{t=s}^{\infty} \frac{1}{\delta^{t-s}} \log(c_{i,t}), \quad \delta \equiv 1 + r \]
- **Domestic Banks.** Controlled by the groups;
  - Make loans to the groups.
  - Fund loans by selling one-period bonds (that promise $1 + \rho_t$) to foreign investors or by borrowing from the NCB.

- **Foreign Investors.** Competitive risk-neutral agents with an opportunity cost $r$.

- **National Central Bank (NCB).** Provides systemic bailout guarantees to foreign bond-holders and to domestic banks.
**Systemic bailout guarantees.** If a majority of domestic banks is at risk of bankruptcy, the NCB extends credit to them so that: (i) they honor the promised repayment on all their outstanding bonds and (ii) they fund new loans to the groups. If a majority of domestic banks is *not* at risk of bankruptcy, the NCB does not make any loans to any bank.
Systemic bailout guarantees. If a majority of domestic banks is at risk of bankruptcy, the NCB extends credit to them so that: (i) they honor the promised repayment on all their outstanding bonds and (ii) they fund new loans to the groups. If a majority of domestic banks is not at risk of bankruptcy, the NCB does not make any loans to any bank.

Two states of the world:
Good state. Investors roll over bonds
Bad state. Investors do not roll over bonds
The bad state is absorbing.
The NCB’s Budget Constraint

\[ \Delta D_t^a = \Delta Tg2_t - \Delta IR_t \]
The NCB’s Budget Constraint

\[ \Delta D_t^a = \Delta Tg2_t - \Delta IR_t \]

"NCB’s shadow domestic credit" is the contingent bailout obligation of the NCB: \( D_t = \sum_{i=1}^{n} d_{i,t} \)
The NCB’s Budget Constraint

\[ \Delta D^a_t = \Delta Tg2_t - \Delta IR_t \]

"NCB’s shadow domestic credit" is the contingent bailout obligation of the NCB: 

\[ D_t = \sum_{i=1}^{n} d_{i,t} \]

There is an upper bound \( \overline{D}_t \) on \( D_t \).
The NCB’s Budget Constraint

\[ \Delta D_t^a = \Delta Tg2_t - \Delta IR_t \]

"NCB’s shadow domestic credit" is the contingent bailout obligation of the NCB: \[ D_t = \sum_{i=1}^{n} d_{i,t} \]

There is an upper bound \( \overline{D}_t \) on \( D_t \).

\( \overline{D}_t \) evolves over time

\[ \overline{D}_{t+1} - \overline{D}_t = \lambda \left[ \overline{D}_t - D_t \right] + rD_t, \quad \lambda \geq 0 \]
Dynamic game across groups.

Groups share a common-pool resource: "available NCB domestic credit"

\[ L_t \equiv \bar{D}_t - D_t \geq 0 \]

The NCB’s dynamic constraint

\[ L_t = [1 + \lambda]L_{t-1} - \sum_{i=1}^{n} g_{i,t-1} \]

Group i. Given the strategies of the other \( n - 1 \) groups, select \( \{g_{i,t}, c_{i,t}\}_{t=s}^{\infty} \) to maximize \( U^i_t \) subject to

- NCB’s dynamic constraint (1)
- Private assets eqn \( b_{i,t+1} = [1 + \beta] b_{i,t} + g_{i,t} - c_{i,t} \)
- Upper bound \( g_{i,t} \in [0, \bar{g}L_t] \)
\[ L_t = [1 + \lambda]L_{t-1} - \sum_{i=1}^{n} g_{i,t-1}, \quad L_t \geq 0 \]

\[ b_{i,t+1} = [1 + \beta] b_{i,t} + g_{i,t} - c_{i,t} \]
- There is a MPE if and only if $\beta < \lambda < \beta + (1 + \beta)(n - 1)$
- The MPE is unique

$$\hat{g}_i = \frac{\lambda - \beta}{n - 1} \cdot L_t$$

$$c_i = r \left[ \frac{1 + \beta}{1 + r} \right] \cdot [L_t + b_{i,t}]$$
Intuition: Suppose for a moment that $\hat{g}_j(L_{t}, b_{j,t})$ is linear in $L_{t}$:

$$\hat{g}_j(L_{t}, b_{j,t}) = \gamma_j \cdot L_{t}$$

From group $i$’s ‘private’ perspective:

- RoR on the common-pool asset:

$$\lambda - \sum_{j \neq i} \hat{\gamma}_{j},$$

- RoR on the private-asset abroad: $\beta$.

*group i* compares the return on both assets $\rightarrow$

$$\beta = \lambda - \sum_{j \neq i} \hat{\gamma}_{j}$$

This condition must hold for all $i = 1, \ldots, n$ $\rightarrow$ the equilibrium is unique & must be symmetric

$$\hat{g}_{i,t} = \frac{\lambda - \beta}{n - 1} \cdot L_{t}$$
Stylized fact

Before the Sudden-stop

- GIPS interest rates were almost as low as German interest rates.
- Gross private capital inflows into GIPS were booming

Following the Sudden-stop

- GIPS NCB’s credit to domestic banks grow exponentially
- GIPS Target2 liabilities mirror NCB’s credit to domestic banks
- Bailout guarantee ⇒
  - Investors set interest rate $\rho_t = r$
  - Buy banks’ bonds up to PV of maximum bailout
    \[ F_t \leq \bar{F}_t \equiv \frac{D_{t+1} - \sum_{i=1}^{n} g_{i,t-1}}{1+r} \]

- Domestic banks’ debt to foreign investors
  \[ F_t = \begin{cases} 
  [1 + r] F_{t-1} + \sum_{i=1}^{n} g_{i,t-1} & \text{if } S_t = \text{good} \\
  0 & \text{if } S_t = \text{bad} 
  \end{cases} \]

- NCB credit to domestic banks
  \[ D^a_t = \begin{cases} 
  0 & \text{if } S_t = \text{good} \\
  [1 + r] F_{t-1} + \sum_{i=1}^{n} g_{i,t-1} & \text{if } S_t = \text{bad} \text{ & } S_{t-1} = \text{good} \\
  [1 + r] D^a_{t-1} + \sum_{i=1}^{n} g_{i,t-1} & \text{if } S_t = \text{bad} \text{ & } S_{t-1} = \text{bad} 
  \end{cases} \]
In equilibrium

- Groups save abroad even if $\beta < r$.
- $\uparrow$ National gross debt coexist with $\uparrow$ private assets abroad.

The Current Account

$$CA_t = \beta \sum_{i=1}^{n} b_{i,t} - rD_{t-1} - \sum_{i=1}^{n} c_{i,t}$$

Private assets abroad of each group

$$\hat{b}_{i,t} = \left[\frac{1 + \beta}{\delta}\right]^t [b_{i,0} + L_0] - \left[1 + \frac{n\beta - \lambda}{n - 1}\right]^t L_0$$

National debt

$$\hat{D}_t = \delta^{t-1} \Gamma \left[\frac{1 - (Y/\delta)^t}{1 - Y/\delta}\right] L_0, \quad Y \equiv 1 + \frac{n\beta - \lambda}{n - 1}, \quad \Gamma \equiv \frac{n[\lambda - \beta]}{n - 1}$$
The ECB can indirectly relax the constraints on periphery NCBs:

- Authorizing the purchase of bonds in the secondary market (SMP).
- Further relax the criteria for "acceptable collateral" and in this way allow an NCB to grant more credit to banks.
- Emergency loans agreements (ELAs) can be authorized when there is no more eligible collateral
- Outright monetary transactions (OMT)
Effects of Greater ECB Generosity

- In an interior equilibrium, without conditionality
- The benefits from an ECB policy shift that increase $\lambda$ are squandered
- $\uparrow \lambda \rightarrow \uparrow$ groups’ borrowing–fiscal appropriations–and results in lower growth of $L_t$
- Neither groups’ consumption possibilities nor welfare increase

“What leaves one aghast is the irresponsibility of those who think of…xing themselves when the house is still burning”
M. Monti, FT Dec 11, 2012
In an interior equilibrium, without conditionality

The benefits from an ECB policy shift that increase $\lambda$ are squandered

$\uparrow \lambda \rightarrow \uparrow$ groups’ borrowing–fiscal appropriations–and results in lower growth of $L_t$

Neither groups’ consumption possibilities nor welfare increase

"What leaves one aghast is the irresponsibility of those who think of fixing themselves when the house is still burning" M. Monti, FT Dec11, 2012
Direct effect: \( \uparrow \lambda \rightarrow \uparrow \) growth of \( L \), NCB available credit to banks

Indirect effect: \( \uparrow \lambda \rightarrow \uparrow \) groups’ loan demand

\[
\frac{\partial \hat{g}_{i,t}}{\partial \lambda} = \frac{1}{n-1} L_t > 0
\]

Net effect: \( \downarrow \) growth of \( L \)

\[
\frac{\partial \left( \hat{L}_{t+1}/\hat{L}_t \right)}{\partial \lambda} = 1 - \frac{n}{n-1} = \frac{-1}{n-1} < 0
\]

Neither groups’ consumption nor utility increase

\[
V_i = \frac{\delta}{\delta - 1} \left[ \log(L_0 + b_{i,0}) + \frac{1}{\delta - 1} \log \left( \frac{1 + \beta}{\delta} \right) \right]
\]
OMT:

- Promise open-ended intervention to cap interest rates
  - Provided the country accepts "conditionality"

Right on Target! OMT avoids a crisis & tries to block indiscipline

BUT it eliminates Central Bank independence as we know it.

What if "i and country ' cannot' accept conditionality? Will ECB blink or ...?

Mr. Rajoy
- "We will only use the mechanism if it's needed to defend the interests of Spaniards and if it isn't, then we won't use it"
  - Dec 2012.

Mr. Hollande
- "France's rating, the one we can check every day on the markets, is the yield on its debt, which has been falling since I have been in charge,"
  - Dec 2012.
OMT:

- Promise open-ended intervention to cap interest rates

What if "i" and country 'cannot' accept conditionality?

Mr. Rajoy: "We will only use the mechanism if it's needed to defend the interests of Spaniards and if it isn't, then we won't use it" (Dec 2012)

Mr. Hollande: "France's rating, the one we can check every day on the markets, is the yield on its debt, which has been falling since I have been in charge," (Dec 2012)
OMT:

- Promise open-ended intervention to cap interest rates
- Provided the country accepts "conditionality"
OMT:

- Promise open-ended intervention to cap interest rates
- Provided the country accepts "conditionality"

Right on Target! OMT avoids a crisis & tries to block fiscal indiscipline
OMT:
- Promise open-ended intervention to cap interest rates
- Provided the country accepts "conditionality"

Right on Target! OMT avoids a crisis & tries to block fiscal indiscipline

BUT it eliminates Central Bank independence as we know it.
OMT:
- Promise open-ended intervention to cap interest rates
- Provided the country accepts "conditionality"

Right on Target! OMT avoids a crisis & tries to block fiscal indiscipline

BUT it eliminates Central Bank independence as we know it.
- What if $i$ and country ‘cannot’ accept conditionality?
**Policy**

- **OMT:**
  - Promise open-ended intervention to cap interest rates
  - Provided the country accepts "conditionality"

- Right on Target! OMT avoids a crisis & tries to block fiscal indiscipline

- **BUT** it eliminates Central Bank independence as we know it.
  - What if $i$ and country ‘cannot’ accept conditionality?
  - Will ECB blink or ...?

---

Mr. Rajoy

"We will only use the mechanism if it’s needed to defend the interests of Spaniards and if it isn’t, then we won’t use it"

Dec 2012.

Mr. Hollande

"France’s rating, the one we can check every day on the markets, is the yield on its debt, which has been falling since I have been in charge,"

Dec 2012.
Policy

- **OMT:**
  - Promise open-ended intervention to cap interest rates
  - Provided the country accepts "conditionality"

- Right on Target! OMT avoids a crisis & tries to block fiscal indiscipline

- BUT it eliminates Central Bank independence as we know it.
  - What if $i$ and country ‘cannot’ accept conditionality?
  - Will ECB blink or ...?

- Mr. Rajoy "We will only use the mechanism if it’s needed to defend the interests of Spaniards and if it isn’t, then we won’t use it" Dec 2012.
**Policy**

- **OMT:**
  - Promise open-ended intervention to cap interest rates
  - Provided the country accepts "conditionality"

- Right on Target! OMT avoids a crisis & tries to block fiscal indiscipline

- BUT it eliminates Central Bank independence as we know it.
  - What if $i$ and country ‘cannot’ accept conditionality?
  - Will ECB blink or ...?

- Mr. Rajoy  "*We will only use the mechanism if it’s needed to defend the interests of Spaniards and if it isn’t, then we won’t use it*" Dec 2012.

- Mr. Hollande  "*France’s rating, the one we can check every day on the markets, is the yield on its debt, which has been falling since I have been in charge,*"  Dec 2012
Centralized supervision of largest Banks by ECB.
Centralized supervision of largest Banks by ECB.
Right on target: it helps eliminate the common-pool problem in the Eurosystem
Centralized supervision of largest Banks by ECB.
Right on target: it helps eliminate the common-pool problem in the Eurosystem
It tries to eliminate a pillar of the "red line"
Centralized supervision of largest Banks by ECB.
Right on target: it helps eliminate the common-pool problem in the Eurosystem
It tries to eliminate a pillar of the "red line"
BUT it exposes the ECB governing board to direct political pressure from powerful groups
It is necessary for smooth functioning of the monetary union.
- It is necessary for smooth functioning of the monetary union
- Also,
- It is necessary for smooth functioning of the monetary union
- Also,
  - It supports ↑ NCB domestic credit
It is necessary for smooth functioning of the monetary union

Also,

- It supports NCB domestic credit
- It provides a mechanism for systemic bailout guarantees
- It is necessary for smooth functioning of the monetary union

- Also,
  - It supports ↑ NCB domestic credit
  - It provides a mechanism for *systemic bailout guarantees*
  - Reduces pressures for capital flight
It is necessary for smooth functioning of the monetary union

Also,

- It supports ↑ NCB domestic credit
- It provides a mechanism for *systemic bailout guarantees*
- Reduces pressures for capital flight

Target2 is NOT the source of the EZ problem, just a symptom.
It is necessary for smooth functioning of the monetary union

Also,

- It supports ↑ NCB domestic credit
- It provides a mechanism for systemic bailout guarantees
- Reduces pressures for capital flight

Target2 is NOT the source of the EZ problem, just a symptom.

Can eliminate Target2 imbalances, and still have an EZ problem
It is necessary for smooth functioning of the monetary union

Also,

- It supports ↑ NCB domestic credit
- It provides a mechanism for systemic bailout guarantees
- Reduces pressures for capital flight

Target2 is NOT the source of the EZ problem, just a symptom.

Can eliminate Target2 imbalances, and still have an EZ problem

BUT, political limits will be hit. Target2 cannot grow forever.
What share of Target2 is a bailout?

Back-of-the-envelope calculation

Between 2009:I and 2012:I

\[ \text{Target2 GIPS liabilities} \]
\[ \sum \text{CA deficit} \]
\[ \text{gross PAA}_{\text{gips}} \]

\[ \approx \text{Bailout} \]
\[ \approx \text{Excess Spending-Income} \]
\[ \approx \text{Private Repay} \]
ECB policies open a window of opportunity for reform
Do reforms—that affect powerful groups—happen in good times or during severe crises?
Ranciere & Tornell (forthcoming)
A teacher of many of us said:

"Very rich countries can do very bad things for a very, very long time."

Rudi Dornbusch
A teacher of many of us said:

"Very rich countries can do very bad things for a very, very long time"
A teacher of many of us said:
"Very rich countries can do very bad things for a very, very long time"

Rudi Dornbusch