Understanding Sovereign Debt Crises

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Monetary union and fiscal coordination

- As we discussed earlier, one benefit of a monetary union (common currency area) is that it eliminates “speculative” exchange rate movements that may arise from the “nominal exchange rate indeterminancy” phenomenon.

- The main goal of every central bank is to provide a credible “nominal anchor” (e.g., low and stable inflation rate).

- The question is whether a monetary union makes achieving this goal more difficult (or even impossible).

- To explore this issue, let’s look at government finance in a little more detail.
A simple OLG model

- Constant population $N$ of young, who are endowed with $y$ units of non-storable output

- Young at date $t$ only value consumption at date $t+1$ according to utility function $E_t c_{t+1}^o$

- There is a government that demands $Ng$ units of output in every period, where $y > g \geq 0$

- Let’s consider three different ways of financing $g$
[1] Tax finance

- Government keeps money supply constant at $M$ and there is no debt

- Assume that $g$ is financed by way of a tax $\tau$ on the young, so that GBC is $g = \tau$

- Individual budget constraints are $c^y + q = y - g$ and $c^o = \Pi^{-1}q$, or combining (and setting $c^y = 0$)... $c^o = \Pi^{-1}[y - g]$

- Market-clearing has $v_tM = Nq$, which implies $\Pi = 1$; so $c^o = y - g$

- No taxes and no debt

- Money is used to finance $g$, so GBC is $Ng = [1 - 1/\mu] v_t M_t$

- Market-clearing is $v_t M_t = Nq$, so

$$g = \left[ 1 - \frac{1}{\mu} \right] q$$

- Individual budget constraints are $c^y + q = y$ and $c^o = \Pi^{-1} q$, or combining (and setting $c^y = 0$)... 

$$c^o = \Pi^{-1} y$$
• Since \( q = y \), we can use GBC to solve for necessary money growth rate

\[
\mu = \left[ \frac{y}{y - g} \right] > 1
\]

• Moreover, market-clearing implies \( \Pi = \mu \), so

\[
c^o = \left( \frac{1}{\mu} \right) y
\]

• Combining the previous two equations...

\[
c^o = \left[ \frac{y - g}{y} \right] y = y - g
\]

• Note: the inflation tax is not distortionary here because of limited substitution possibilities (not a general result)
[3] Bond finance

- Government keeps money supply constant

- Assume that $g$ is financed at each date with debt that matures in one period
  - and that principal and interest is paid by tax $\tau$ on the old
  - this differs from case [1] only in the timing of taxes
  - in [1], the young pay upfront; in [3], the young pay later (when they are old)
• Let $R_t$ denote the (gross) nominal interest rate on government debt and let $B_t$ denote the principal amount of maturing debt; then GBC is...

$$G_t + R_t B_{t-1} = B_t + T_t$$

or, in real per capita terms...

$$\frac{v_t G_t}{N} + R_t \left[ \frac{v_t}{v_{t-1}} \right] \frac{v_{t-1} B_{t-1}}{N} = \frac{v_t B_t}{N} + \frac{v_t T_t}{N}$$

$$g + \frac{R_t}{\Pi_t} b_{t-1} = b_t + \tau_t$$

• In steady-state,

$$\tau = \left[ \frac{R}{\Pi} - 1 \right] b + g$$
• Individual budget constraints

\[
(c^y = 0) + q + b = y \\
c^o = \frac{R}{\Pi}b + \frac{1}{\Pi}q - \tau
\]

• If bonds are risk-free, then they will drive money out of circulation if \( R > 1 \); so assume \( R = 1 \)

  – in this case, individuals view money and bonds as perfect substitutes

• Market-clearing requires \( v_t B = Nb \) and \( v_t M = Nq \); so \( \Pi = 1 \)

• Combining all restrictions, we have \( c^o = y - g \)
The timing of taxes

• Under program [1], the government takes output $g$ from the young (or, they take the monetary equivalent, and then use the money to buy $g$)

• Under program [3], the government asks for output $g$ from the young (by borrowing it) and later takes the same amount of output way to pay off its debt (interest and principal)

• The young are indifferent across program [1] and [3] (Ricardian equivalence theorem)

• Indeed, in the setup here, they are indifferent between these options and [2] as well (but again, this is not a general result)
Default risk

- Since debt is a promise of repayment, there is a possibility of broken promises—default
  - default is usually “partial” in the sense that creditors typically receive some, but not all, of what they were promised

- The motivation for default is usually to alleviate the debt burden on taxpayers (typically, during times of economic stress)
  - more cynically, the calculation seems often to be between which voters count more
• Most debt is *nominal* in the sense that it is not indexed to the price-level or inflation

  – however, inflation-indexed bonds do exist (e.g., TIPS in the U.S.)

• In the case of nominal debt, it is possible to default without breaking any explicit promise

  – at time of contract, debtor promises $R$ and savers expect real return $R/\Pi$

  – it is possible to reduce the real cost of debt repayment via a surprise inflation

• Suppose that the market perceives the probability of default to be $\alpha$ (assume zero pay off event)
- A key issue is whether this market perception is correct or not (very difficult to judge)

- In any case, if $\alpha > 0$, then investors will demand a risk-premium

- In our model, agents are risk-neutral, so no-arbitrage-condition requires equation of expected returns

\[(1 - \alpha)R + \alpha(0) = 1\]

- Implies risk-adjusted interest rate on bonds equal to

\[R = \left[ \frac{1}{1 - \alpha} \right] > 1\]
• From the GBC

\[ \tau = \left( \frac{R}{\Pi} - 1 \right) b + g \]

• Higher \( R \) because of risk premium now implies a greater tax burden
  
  – *conditional on making good on the promise*
Short-run gain...

- In the short-run, there may be a strong incentive to default, esp. in recession
  - cuts in $g$ are painful and may depress economic activity
  - increase in $\tau$ is painful and may depress economic activity

- So, either outright default or—*if possible*—implicit default via surprise increase in $\Pi$ becomes increasingly attractive
  - especially if bond holders are a minority of wealthy individuals (preferably foreign—i.e., non-voting)
...but long-run pain

- Defaulting will almost surely lead to increased future borrowing costs (higher risk-premia)
  - financing may not even be forthcoming at any price for a period of time

- This is true even if the default occurs via an unexpected inflation (and typically, currency depreciation)
  - nominal rate on new bond issue will reflect all associated risk, including inflation risk
Central bank interventions

- Central banks are primarily designed to be “lenders of last resort”

- The LOLR function means to lend money to worthy borrowers at an “appropriate” interest rate

- The LOLR function virtually assumes (possibly correctly) that market interest rates do not always reflect true underlying economic fundamentals
  - e.g., during a financial crisis, the financial market might perceive a very high $\alpha$ when, in fact, the sovereign in question has every intention of making good on its promises
• Suppose that the market overestimates sovereign debt risk

• Then, a case could be made for the monetary authority to purchase new sovereign debt at a lower discount (higher price)

• If the debt is repaid (money flows back to the central bank), then the monetary injection is temporary, and there are no long-lasting effects on the price-level or inflation

• If the debt is not repaid, new money remains in the economy, leading ultimately to higher prices (effectively, an inflation tax to pay for the bad debt)

• Either way, if market overestimates risk, then LOLR can be justified
Moral hazard

- Attaching a high probability of default on a sovereign bond (for whatever reason) may become a self-fulfilling prophesy (higher debt-servicing cost may actually promote a default)

- But this is an argument that can be expected to be made by *all* debtors in troubled circumstances

- Economically unjustified but politically expedient interventions can lead to high inflation, currency devaluation, and high risk premia

- So it is important to have a strong and politically independent central bank to mitigate against these forces
The European Monetary Union (EMU)

- One motivation for the EMU was to establish a more politically-independent central bank
  
  - ECB is located in Frankfurt, with representatives from EMU member states

- So in addition to benefits of eliminating “speculative” ER fluctuations, perhaps lower $\alpha \rightarrow$ lower risk-premia $\rightarrow$ lower finance costs for sovereign debt

- This, together with “fiscal coordination” as stipulated in Maastricht treaty
Italian currency devaluation prior to Euro

[Graph showing the Italian lira to US dollar exchange rate from 1970 to 2005 with shaded areas indicating US recessions. Source: Federal Reserve Bank of St. Louis.]

Shaded areas indicate US recessions.
2012 research.stlouisfed.org
European bond yields
PIIGS

- Portugal, Ireland, Italy, Greece and Spain

- Fiscal strains, triggered by the financial crisis $\rightarrow$ increase in $\alpha$

- Ownership of this debt is spread out, financing costs an increasing burden

- ECB under political pressure to purchase distressed debt

- What is going to happen?

- Stay tuned