Discussion of:

Optimal Sovereign Debt Default

by K. Adam and M. Grill

Edouard Challe[1]

The Economics of Sovereign Debt and Default
Banque de France, 17-18 December 2012

[1] Ecole Polytechnique, CREST and Banque de France

Key Questions

- **What is a sovereign default?**
  Realisation of an explicitly ruled out, but implicitly commonly understood, state-contingent repayment

- **When is it optimal to default?**
  When a large shocks occurs and the country is close to its maximum borrowing capacity; then, no default would trigger too large a consumption fall

- **How often do defaults occur?**
  Not very often: a large shock is required for the benefits of default to overcome the default cost

Framework

- Small open economy
- Benevolent planner seeks to insulate domestic households' consumption from domestic (productivity) shocks; (that is, seeks to smooth consumption across time and states)
- Does so by accumulating riskless international reserves (self-insurance) and/or issuing government debt
- Default option makes government debt different from (minus) international reserves
- Full commitment: outright debt repudiation excluded

Framework

Key point: distinguishes **explicit** (in contract) vs **implicit** (commonly understood) state-contingent repayment schedule

A **noncontingent** gvt bonds pays 1 at maturity in all states

An **explicitly contingent** gvt bonds pays $I^n \leq 1$ in state n, at an ex ante cost per contingency

$$\lambda \left(1 - I^n\right)$$

An **implicitly contingent** gvt bond pays $I^n \left(1 - \delta^n\right)$ in state n, at an ex post cost per contingency

$$\lambda \delta^n I^n$$

where δ^n is the (%) size of default in state n

An implicity state-contingent repayment is commonly understood, hence commands the corresponding risk premum ex ante

A simple example

- 2 dates $t = 1, 2$, zero interest rate $(\beta = 1/(1+r) = 1)$
- 2 possible states at date 2: $n = l, h$, w.p. $1/2$ each
- Endowment economy: y_1, then y_2^n, with $y_2^h > y_2^l$
- Repayment on government debt contract at $t = 2$:

	noncontingent	explicitly contingent	implicitly contingent
$s = l$	1	$I^l \leq 1$	$1 - \delta^l \leq 1$
$s = h$	1	1	1

The joint use of **reserve accumulation** and **implicitly contingent government debt** allows the government to partially smooth domestic consumption across both time and states

A simple example

Suppose gvt wants to repay $p < 1$ if $s = l$. What is the legal cost of doing so?

In the **explicitly contingent** contract, it is

$$\lambda \left(1 - l^l\right) = \lambda \left(1 - p\right) \text{ ex ante}$$

In the **implicitly contingent** contract, it is

$$\lambda \delta^l = \lambda \left(1 - p\right) \text{ ex post}$$

The implicitly contingent contract is preferred ex ante since

$$\frac{1}{2}\lambda \left(1 - p\right) < \lambda \left(1 - p\right)$$

Hence, all government debt contract are explicitly noncontingent, while allowing for default (and court settlement) ex post

A simple example

Government maximises:

$$u\left(c_1\right)+\frac{1}{2}u\left(c_2^l\right)+\frac{1}{2}u\left(c_2^h\right)$$

s.t.

$$c_1 = y_1 - \underbrace{G^L}_{\text{Self-insurance}} + \underbrace{\frac{G^S}{1+R}}_{\text{Borrowing}} \quad \text{(BC1)}$$

$$c_2^h = y_2^h + G^L - G^S \quad \text{(BC2-h)}$$

$$c_2^l = y_2^l + G^L - \underbrace{G^S\left(1-\delta^l\right)}_{\text{default repayment}} - \underbrace{G^S\lambda\delta^l}_{\text{default costs}} \quad \text{(BC2-l)}$$

where

- G^L denote holding of international liquidity
- G^S the quantity of gvt debt issued
- R the face interest on gvt debt

A simple example

No arbitrage under risk neutrality implies

$$\frac{1}{2}[1+R] + \frac{1}{2}\left[(1+R)\left(1-\delta^l\right)\right] = 1$$
$$\Leftrightarrow \frac{1}{1+R} = 1 - \frac{\delta^l}{2}$$

which can be substituted into (BC1)

Then, define

$$b = G^L - G^S$$

the gvt **net foreign asset position** and a^l its **holdings of A-D securities that pay out 1 in state** l (when the gvt default). Since $r = 0$, the price of this security is

$$p^l = 1/2$$

A simple example

Then, rewrite BCs as:

$$c_1 = y_1 - \underbrace{\left(G^L - G^S\right)}_{b} - \underbrace{\frac{1}{2}}_{p^l} \underbrace{\delta^l G^S}_{a^l} \quad \text{(BC1)}$$

$$c_2^h = y_2^h + \underbrace{G^L - G^S}_{b} \quad \text{(BC2-h)}$$

$$c_2^l = y_2^l + \underbrace{G^L - G^S}_{b} + \underbrace{\delta^l G^S}_{a^l} - \underbrace{\lambda G^S \delta^l}_{\text{default costs: } \lambda a^l} \quad \text{(BC2-l)}$$

Hence, gvt solves

$$\max_{\{b,a^l\}} u(c_1) + \frac{1}{2} u\left(c_2^l\right) + \frac{1}{2} u\left(c_2^h\right)$$

s.t.

$$c_1 = y_1 - b - \frac{1}{2} a^l \quad \text{(BC1)}$$

$$c_2^h = y_2^h + b \quad \text{(BC2-h)}$$

$$c_2^l = y_2^l + b + (1-\lambda) a^l \quad \text{(BC2-l)}$$

A simple example

Substitute:

$$\max u\left(y_1 - b - \frac{1}{2}a^l\right) + \frac{1}{2}u\left(y_2^l + b + (1-\lambda)\, a^l\right) + \frac{1}{2}u\left(y_2^h + b\right)$$

FOCs:

$$\begin{aligned} b &: \quad u'(c_1) = \frac{1}{2}u'\left(c_2^l\right) + \frac{1}{2}u'\left(c_2^h\right) \\ a^l &: \quad u'(c_1) = (1-\lambda)\, u'\left(c_2^l\right) \end{aligned}$$

Combining the two gives

$$u'\left(c_2^h\right) = (1-2\lambda)\, u'\left(c_2^l\right)$$

A simple example

Special case 1: **costless sovereign default** ($\lambda = 0$)

Then there is **full risk-sharing**: $u'(c_1) = u'\left(c_2^l\right) = u'\left(c_2^h\right)$

The solution (a^l, b, c) is

$$\begin{aligned} a^l &= y_2^h - y_2^l > 0 \\ b &= \frac{y_1}{2} - \frac{3y_2^h}{4} + \frac{y_2^l}{4} \lesseqgtr 0 \\ c &= \frac{1}{2}\left(y_1 + \frac{y_2^h + y_2^l}{4}\right) > 0 \end{aligned}$$

Reverting back to $\left(G^L, G^S, \delta^l\right)$:

$$\begin{aligned} G^L - G^S &= b \\ \delta^l G^S &= a \end{aligned}$$

Hence, $\left(G^L, G^S, \delta^l\right)$ are not uniquely pinned down. For ex., size of default δ^l may be very small (and G^S, G^L adjusted accordingly)

A simple example

Special case 2: **prohibitively costly sovereign default**

In this case, one necessarily have

$$\delta^l = a = 0$$

One then has

$$\begin{aligned} c_1 &= y_1 - b \\ c_2^h &= y_2^h + b \\ c_2^l &= y_2^l + b \end{aligned}$$

where b solves:

$$u'(y_1 + b) = \frac{1}{2}u'\left(y_2^l + b\right) + \frac{1}{2}u'\left(y_2^h + b\right)$$

This implies that gvt debt ($b < 0$) **or** reserves accumulation ($b > 0$) is used to smooth consumption across dates, **not** states

Again, $\left(G^L, G^S\right)$ not pinned down (only net position is)

A simple example

Case of interest: **"small" default costs**

FOCs give:

$$
\begin{aligned}
u'(c_1) &= (1-\lambda)\, u'\left(c_2^l\right) \\
u'(c_1) &= \frac{1-\lambda}{1-2\lambda} u'\left(c_2^h\right)
\end{aligned}
$$

Interpretation: imperfect smoothing across states combined with smoothing across time implies

- Positive ex post consumption growth if $s = h$
- Negative ex post consumption growthif $s = l$

Main quantitative results

- For plausible default costs, moderate aggregate shocks, and a country not close to its borrowing limit, it is optimal to **avoid** default (i.e., imperfect smoothing is optimal)
- It will be optimal to (implicitly) design the contract so that default occurs following a large shock and/or a debt level close to the limit
- Allowing partial default in some extreme states significantly raises welfare

Comments

Idea that default/crisis **completes the market** –by introducing state-contingent payments that are not explicitly written in the contract

Is it specific to sovereign debt crisis?

Similar argument could apply to any debt contract (provided contractual environment is suitably specified)

Has been used to understand **efficient bank runs** (Allen and Gale, JoF)

There, the deposit contract is not explicitly contingent on the aggregate state; but bank runs make it so implicitly

This is useful in contexts where terminating a long asset might be desirable

Comments

Paper emphasises **common understanding** of implicit repayment schedules, in a context of **full commitment**

Is it a good model of the Euro area?

Apparently, implicit repayment schedules were **not** so commonly understood...

...and explicit clauses (no bail out) where subject to severe commitment problems

Comments

Emphasis on legal costs (i.e., lawers' time) in the theoretical part of the paper

Default cost estimated using excess returns on government bonds in the quantitative part of the paper

Since such costs are relatively small, the ex ante benefit of default (i.e., completing the market) is large and may outweight the cost

However, actual costs are likely to be many times larger than those considered. In particular, contagion (to banking sector, to other countries) make sovereign default costly in a way that is summarised neither in legal costs nor in risk premia

Incorporating large default costs will modify the tradeoff

Again, look at the Euro area

Comments

Share of loans + bond holdings issued by euro area governments and held by euro area financial sector:

	$\frac{\text{Credit to government}}{\text{Total assets}}$	$\frac{\text{Bank capital}}{\text{Total assets}}$
Euro area	17.5%	14.6%
Germany	20.0%	11.7%
Spain	14.8%	15.3%
France	15.6%	17.4%
Italy	24.0%	14.8%

Source: ECB

One option: squeeze the depositors (e.g., Germany, 1948)