

Credibility For Sale

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General questions regarding sovereign borrowing

- ▶ Why do sovereigns favor borrowing from private creditors during normal times and from official ones in periods of debt distress?
- ▶ Why are official loans so cheap?
- ▶ Do official loans crowd out private loans?
- ▶ How does access to official lending affect default decisions against outstanding loans from private creditors?
- ▶ How does it affect future default?

More specific (harder ? to answer) questions regarding patterns of default and borrowing during Eurozone's sovereign debt crisis

The patterns

- ▶ GREECE defaulted on outstanding (privately held) debt, received inexpensive fresh funds from official sources
- ▶ IRELAND, PORTUGAL, SPAIN did not default, received inexpensive fresh funds (or commitments) from official sources
- ▶ ITALY did not default, did not receive any official funds

- ▶ These questions have not been addressed in the literature
- ▶ The present paper attempts to fill this gap

Framework

- ▶ **DEFAULT:** Use the standard sovereign debt model with imperfect commitment and sanctions in case of default
 - ▶ Sanctions: output loss; NO exclusion from credit markets
- ▶ **DEBT COMPOSITION:** Two groups of creditors, private and official
- ▶ They differ in terms of ”**enforcement power**”
 - ▶ Official creditors can impose more severe sanctions in case of default than private creditors
- ▶ They are treated similarly in the case of default: No discrimination against private lenders (**pari passu**)
- ▶ **MATURITY:** Allow for short and long term debt overhang

Model implications

Regarding debt composition and pricing

- ▶ Sovereign **prefers** private loans when financing needs are low, and official ones when needs are high
- ▶ In spite of pari passu provisions, official credit often crowds out private credit
- ▶ High debt overhang discourages refinancing from official sources (Italy vs. Ireland, Portugal, Spain) . . .
- ▶ . . . *unless* default wipes out overhang (Greece)
- ▶ Official loans are “cheap” even when they are large

Regarding default decision

- ▶ Under *pari passu*, official funding typically makes *future* default (on total, private and official debt) less likely (unless official loans are "subsidized")
- ▶ But access to official credit makes the sovereign more likely to default on existing, privately held sovereign debt if there is long term debt overhang
- ▶ Official creditors may prefer to see the sovereign wipe out privately held, sovereign, long term debt before they make loans

Main features of the model

Assumptions

- ▶ Standard:
 - ▶ Sovereign lacks commitment. When he defaults he suffers a cost in terms of output but **no** credit market exclusion
- ▶ New
 - ▶ Default against official lenders is (perceived to be) costlier than against private lenders
This may be due to joint club membership. See current discussions in Germany, Greece
 - ▶ Pari passu. Official lenders are anxious not to crowd out fresh private funds

Greek debt exchange, Spring 2012, put private lenders, EFSF on equal footing (Zettelmeyer et al., 2012).

Merkel's agreement "to make ESM loans to Spain equal to Spanish bonds in creditors' pecking order" recognized necessity "to protect Spain's ability to sell bonds" (WSJ, June 29, 2012)

Literature

- ▶ Large literature on sovereign debt, starting with (Eaton and Gersovitz, 1981)
- ▶ Scant literature on composition of debt (Boz, 2011)

The Model

Two periods, $t = 1, 2$

Three agents

- ▶ Domestic taxpayers
- ▶ Government
- ▶ Foreign investors of two types

Domestic taxpayers

- ▶ Risk averse, hand-to-mouth, discount factor δ

Government

- ▶ Benevolent, but cannot commit
- ▶ Chooses repayment rate on debt, r_t , issues zero-coupon debt, b_{t+1} , (residually) levies taxes

Foreign investors: Risk neutral, discount factor $\beta \gg \delta$

- ▶ Official lenders (“enforcer”), debt position b_{t+1}^e
- ▶ Competitive private lenders, debt position $b_{t+1} - b_{t+1}^e$

Default decision, $r_t \in [0, 1]$ (pari passu)

Default: $r_t < 1$ triggers income loss for taxpayers

- ▶ Income loss $L_t \geq 0$, realization of i.i.d. random variable with c.d.f. $F_t(\cdot)$
- ▶ With official debt, additional income loss $\mathcal{L}(b_2^e) \geq 0$

Long-term debt overhang, b_{02}

- ▶ Outstanding in first period, maturing in second
- ▶ Debt in the second period: $\tilde{b}_2 \equiv b_2 + b_{02}r_1$

Sovereign's objective

$$G_1(s_1) = \max_{r_1, b_2, b_2^e} u(y_1 - b_1 r_1 - \mathbb{1}_{r_1 < 1} L_1 + d_1(s_1, \pi_1)) \\ + \delta E_1 [G_2(s_2)]$$

$$\text{s.t. } p_1(s_1, \cdot), q_1(s_1, \cdot)$$

$$G_2(s_2) = \max_{r_2} u(y_2 - \tilde{b}_2 r_2 - \mathbb{1}_{r_2 < 1} (L_2 + \mathcal{L}(b_2^e)))$$

$$q_1(s_1, \pi_1) = \beta E_1 [r_2(s_2)]$$

q = price of debt issued to private creditors

Different official debt pricing $p_1(\cdot)$ schemes

Choice of Repayment Rate in Second Period

Discrete repayment rate

$$r_2(s_2) = \begin{cases} 1 & \text{if } L_2 \geq \tilde{b}_2 - \mathcal{L}(b_2^e) \\ 0 & \text{if } L_2 < \tilde{b}_2 - \mathcal{L}(b_2^e) \end{cases}$$

Implied pricing function

$$q_1(s_1, \pi_1) = \beta(1 - F_2(\tilde{b}_2 - \mathcal{L}(b_2^e)))$$

Choice of Debt Issued to Private Lenders

Marginal effect of b_2 , given b_2^e

$$(1 - F_2(\tilde{b}_2 - \mathcal{L}(b_2^e)))(\beta u'(c_1) - \delta E_1[u'(y_2 - \tilde{b}_2)]) \\ - u'(c_1) \left(b_2 \beta f_2(\tilde{b}_2 - \mathcal{L}(b_2^e)) + b_2^e \frac{\partial \Delta_1}{\partial b_2} \right) + \mu$$

Trade off

- ▶ An extra unit of debt brings consumption smoothing benefit
- ▶ But it increases the Prob(default) and this makes inframarginal debt units more costly (debt-Laffer curve)

Choice of Debt Issued to Official Lenders

Marginal effect of b_2^e , given b_2

$$\mathcal{L}'(b_2^e) \left(u'(c_1) \beta f_2(\tilde{b}_2 - \mathcal{L}(b_2^e)) b_2 - \delta E_1 \left[\int_0^{\tilde{b}_2 - \mathcal{L}(b_2^e)} u'(c_2^d) dF_2(L_2) \right] \right) \\ - u'(c_1) \left(\Delta_1 + b_2^e \frac{\partial \Delta_1}{\partial b_2^e} \right) + \lambda - \mu$$

Trade off

- ▶ An extra unit increases credibility and allows more funds to be borrowed in the present
- ▶ But this carries costs in the future
 1. It reduces future flexibility (default occurs less often than under private funding)
 2. If nevertheless default occurs, higher losses are suffered

Choice of Repayment Rate in First Period

Discrete repayment rate

”Dynamic” default decision

- ▶ Default wipes out b_1 and b_{02}
- ▶ The latter implies increase in q_1 and G_2

Properties of Equilibrium

The quantity of debt issued, the ownership structure, and the default choices depend on

- ▶ The intensity of the borrowing needs (β/δ)
- ▶ The steepness of the output profile
- ▶ The distribution function of output losses, $F_2(\cdot)$
- ▶ Preferences
- ▶ The enforcement technology, $\mathcal{L}(\cdot)$
- ▶ The price discount, $\Delta_1(\cdot)$.

The optimality conditions suggest two general properties of equilibrium regarding:

- ▶ The equilibrium debt ownership structure
- ▶ The interaction between this structure and the default decision in the first period

Properties of Equilibrium I

Non pari passu makes private and official loans substitutes.
Corner solution

Pari passu implies "complementarity" between private and official loans. Possibility of an interior solution.

BUT

- ▶ Interior debt composition requires sufficient non-linearity in $u(\cdot)$, $F(\cdot)$ or $\mathcal{L}(\cdot)$
- ▶ In the linear examples we use, debt composition is always in a corner

High borrowing needs (low δ) favor official sources.
Low borrowing needs (high δ) favor official sources.

Properties of Equilibrium II

Effect of long-term debt overhang on default choice

- ▶ Overhang affects price elasticity of *both* private and official debt
- ▶ It has a disproportionate effect on *official* funds because their higher costs in case of default are now more likely to materialize (due to debt overhang)
- ▶ Overhang thus reduces relative attractiveness of official funds
- ▶ When official refinancing is available and credibility very valuable (high borrowing needs), overhang may increase incentive to default

Analytical Examples

Linearity

$$u'(c) = 1, \mathcal{L}'(b_2^e) = \mathcal{L}', F_2'(L_2) = f_2$$

Value function

$$G_1(s_1) = \max_{r_1, b_2, b_2^e} -b_1 r_1 - \mathbb{1}_{r_1 < 1} L_1 + \beta(1 - f_2 \cdot (\tilde{b}_2 - \mathcal{L}' b_2^e)) b_2 - \Delta_1 b_2^e \\ - \delta \left\{ \int_0^{\tilde{b}_2 - \mathcal{L}' b_2^e} (L_2 + \mathcal{L}' b_2^e) f_2 dL_2 + (1 - f_2 \cdot (\tilde{b}_2 - \mathcal{L}' b_2^e)) \tilde{b}_2 \right\}$$

Ownership structure always in a corner

Exogenous Price Discount, No Long-Term Debt Overhang

$$p_1(s_1, \pi_1) = \kappa q_1(s_1, \pi_1), \quad \kappa \leq 1$$

Official funding preferred iff

- ▶ For $\delta = 0$: $1 - \kappa < \mathcal{L}'$
- ▶ For general δ : sufficiently large κ, \mathcal{L}'

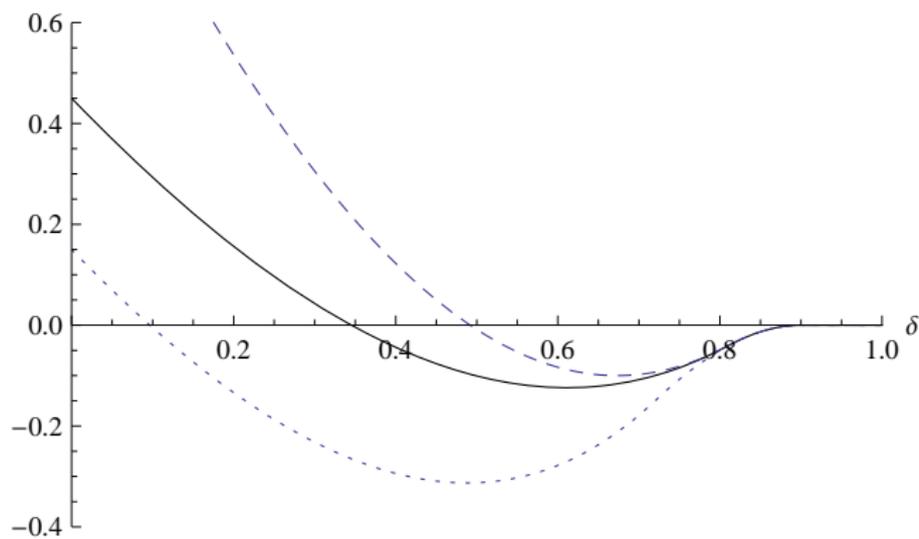


FIGURE : $G_1^{\text{OF}} - G_1^{\text{PR}}$ as function of δ . Higher \mathcal{L}' shifts the curve up (dashed line), lower κ shifts the curve down (dotted line).

Endogenous Price Discount, No Long-Term Debt Overhang

Default cost to enforcer (in addition to capital loss), $\mathcal{C}(b_2^e)$

- ▶ Disruptions to fiscal policy, financial sector; costly expulsion of borrower from club

Participation constraint of enforcer without bargaining power

$$b_2^e p_1(s_1, \pi_1) = b_2^e \beta (1 - F_2) - \beta F_2 \mathcal{C}(b_2^e)$$

Proportional cost, $\mathcal{C}(b_2^e) = \mathcal{C}' b_2^e$

- ▶ Increase of \mathcal{C}' affects δ^* similarly to a decrease in κ

Fixed cost, $\mathcal{C}(b_2^e) = c$

- ▶ Increase of c again decreases δ^*

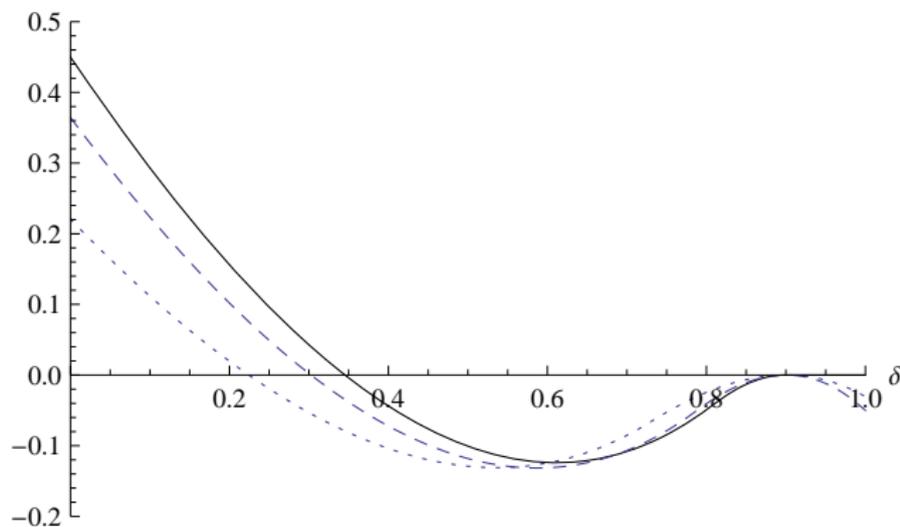


FIGURE : Exogenous Price, Long-Term Debt Overhang.
 $G_1^{\text{OF}} - G_1^{\text{PR}}$ as function of δ . Higher $b_{02}r_1$ reduces δ^* . Overhang increases marginal expected cost due to higher probability of default, $\delta F_2 \mathcal{L}'$, reducing relative attractiveness of official funding

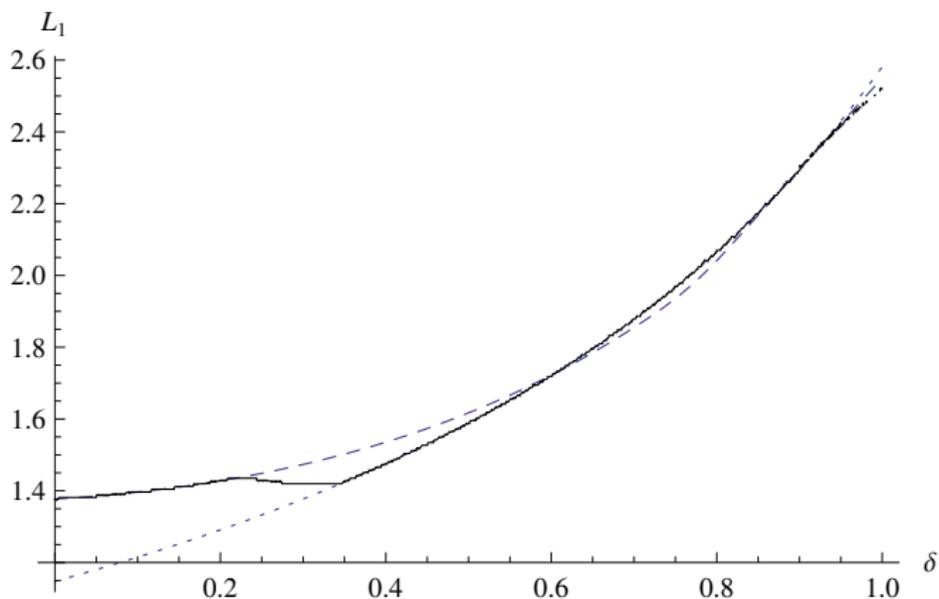


FIGURE : \hat{L}_1^{PR} (dotted), \hat{L}_1^{OF} (dashed), \hat{L}_1 (solid) as functions of δ . When official loans are available and credibility very valuable (low δ) overhang increases incentive to default.

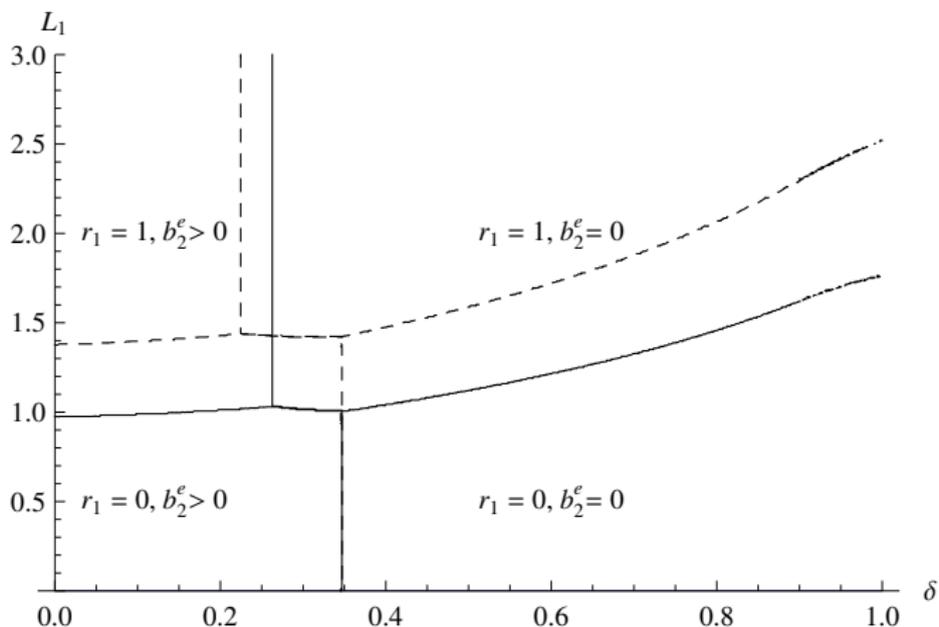


FIGURE : Interaction between debt overhang, refinancing source, default decision. Italy vs Portugal

CONCLUSION

Differential enforcement power

- ▶ Makes the structure of debt ownership endogenous as a function of funding needs, etc..
- ▶ Makes this structure matter for default decisions
- ▶ With long term debt overhang, it also affects initial default decision

It allows the standard sovereign model to make sense of the patterns observed during the Eurozone debt crisis