

The Perils of Bilateral Sovereign Debt

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Official Sovereign Debt

- A large share of sovereign borrowing takes the form of **official** debt
... Multilaterals, development banks, other governments
- Emergence of new bilateral creditors **outside** the Paris Club
... with claims to **seniority** and sometimes **opaque** terms

► IDS data

Questions

- How does the presence of a large official lender affect sovereign debt markets?
- What are its welfare implications for borrowing governments?

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Evaluating Large Official Creditors

Quantitative sovereign debt model with

- Competitive creditors in private **markets** (bondholders)
- Large **bilateral** lender
 1. Superior enforcement technology
 2. Bargained borrowing terms (price and quantity)
 3. Short-maturity loans
- Prime example: Central Bank swap lines (Horn et al., 2021), also deposits, IMF programs...
- Focus on the **interaction** between both funding sources
 - ... presence of bilateral lender affects government behavior in debt markets
 - ... outcomes in debt markets affect threat points in bargaining

Main findings

- Bilateral loans **small** relative to debt but significant effects
 - ... provide funding when other sources dry up (e.g. because of default risk)
 - ... can also incentivize more **risk-taking**
- Bilateral loans induce **relational overborrowing**
 - Surplus requires spreads – spreads require risk
- **Welfare losses** from presence of bilateral creditor (for realistic bargaining weights)
- Relational overborrowing due to **elasticity** of bilateral terms to market debt
 - ... remains present in a model **without** bargaining
 - ... model with exogenous bilateral terms useful for **optimal design**

Main findings

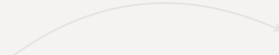
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- Sovereign debt/default with interactions from ‘official’ debt
 - ... senior debt (Hatchondo, Martinez & Önder 2017), senior debt with conditionality (Boz 2011, Fink & Scholl 2016), bailout agencies (Corsetti, Guimarães & Roubini 2006, Kirsch & Rühmkorf 2017, Roch & Uhlig 2018), official debt (Arellano & Barreto 2024, Liu, Liu & Yue 2025)
- Data on new official creditors
 - ... Horn, Reinhart & Trebesch 2021a, 2021b, Gelpern et al. 2021, Horn, Parks, Reinhart & Trebesch 2023
- Central Bank swap lines
 - ... among advanced economies (Bahaj & Reis 2021, Cesa-Bianchi, Eguren-Martin & Ferrero 2022), data for emerging-market borrowers (Perks, Rao, Shin & Tokuoka 2021)

Model


The government of a small open economy borrows from a monopolist and from markets

- Income $y(z_t)$ follows an AR(1) process in logs
 - ... Only one good, representative risk-averse household, expected utility
- **Renegotiate** the loan m each period
 - ... Involves a current transfer x and a new size m'
 - ... Loan is non-defaultable \implies Repaying m is the natural threat point
- Should expect
 - ... Implicit interest rate r to vary over time
 - ... Interest rate to reflect **market power**
 - ... Interest rate to reflect **outside options**

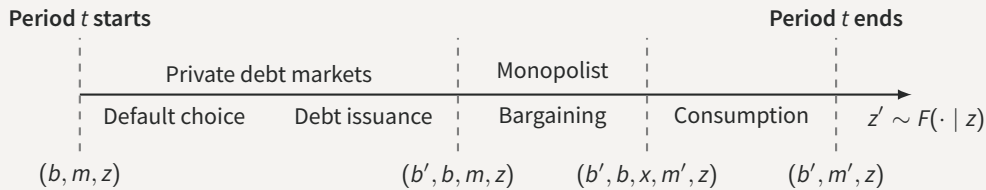

$$x = \frac{1}{1+r} m' - m$$

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Timeline of Events



Borrowing from Markets

- Debt is a geometrically-decaying coupon
... for each unit, get q , pay $\kappa, (1 - \delta)\kappa, \dots (1 - \delta)^{s-1}\kappa$
- Government enters first stage owing b in debt, m in swaps, income state z

$$v(b, m, z) = \max \{ v_R(b, m, z) + \epsilon_R, v_D(m, z) + \epsilon_D \}$$
$$v_R(b, m, z) = \max_{b'} w_R(b', b, m, z)$$

- Lenders in competitive markets need to anticipate interactions with the monopolist

$$q(b', b, m, z) = \beta_L \mathbb{E} [(1 - 1_D(b', m', z')) (\kappa + (1 - \delta)q(b'', b', m', z')) \mid z]$$
$$m' = m'(b', b, m, z)$$
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same sdf as monopolist

Bargaining Stage with Monopolist

- At state z , owing debt b bonds and m on the swap and having issued b'

$$\max_{x,m} \mathcal{L}_R(b', x, m, m', z)^\theta \times \mathcal{B}_R(b', b, x, m, m', z)^{1-\theta}$$

Government surplus

Lender surplus

- Lender's surplus

$$\mathcal{L}_R(b', x, m, m', z) = \underbrace{(a - x + \beta_L \mathbb{E}[h(b', m', z') | z])}_{\text{agreement}} - \underbrace{(a + m + \beta_L \mathbb{E}[h(b', 0, z') | z])}_{\text{threat point}}$$

- Government's surplus

$$\begin{aligned} \mathcal{B}_R(b', b, x, m, m', z) = & \underbrace{u(y(z) + B(b', b, m, z) + x) + \beta \mathbb{E}[v(b', m', z') | z]}_{\text{agreement}} \\ & - \underbrace{(u(y(z) + B(b', b, m, z) - m) + \beta \mathbb{E}[v(b', 0, z') | z])}_{\text{threat point}} \end{aligned}$$

with $B(b', b, m, z) = q(b', b, m, z)(b' - (1 - \delta)b) - \kappa b$

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Quantitative Effects of Bilateral Loans

- Calibrate to Argentina with only market (as in Roch & Roldán, 2023)

| | Parameter | Value |
|------------------------------------|------------|--------|
| Sovereign's discount factor | β | 0.9504 |
| Sovereign's risk aversion | γ | 2 |
| Preference shock scale parameter | χ | 0.02 |
| Lender's bargaining power | θ | 0.5 |
| Risk-free interest rate | r | 0.01 |
| Duration of debt | δ | 0.05 |
| Income autocorrelation coefficient | ρ_z | 0.9484 |
| Standard deviation of y_t | σ_z | 0.02 |
| Reentry probability | ψ | 0.0385 |
| Default cost: linear | d_0 | -0.24 |
| Default cost: quadratic | d_1 | 0.3 |

Calibration

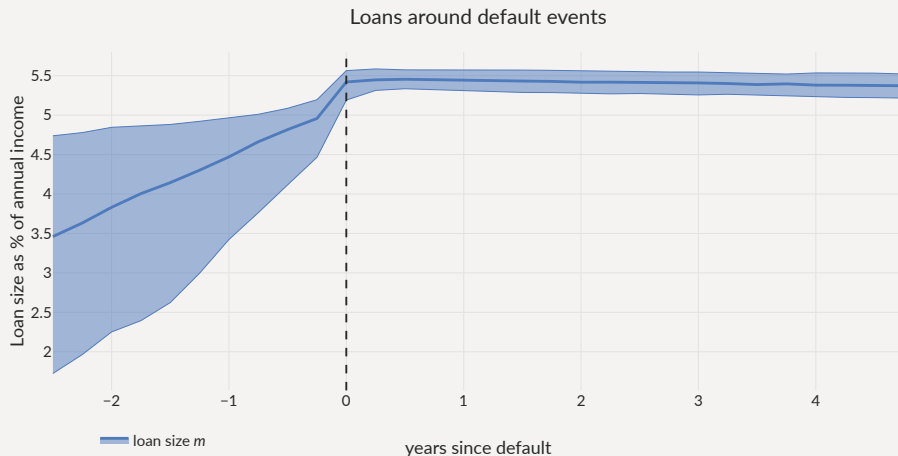
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How Do Bilateral Loans Affect Equilibrium?

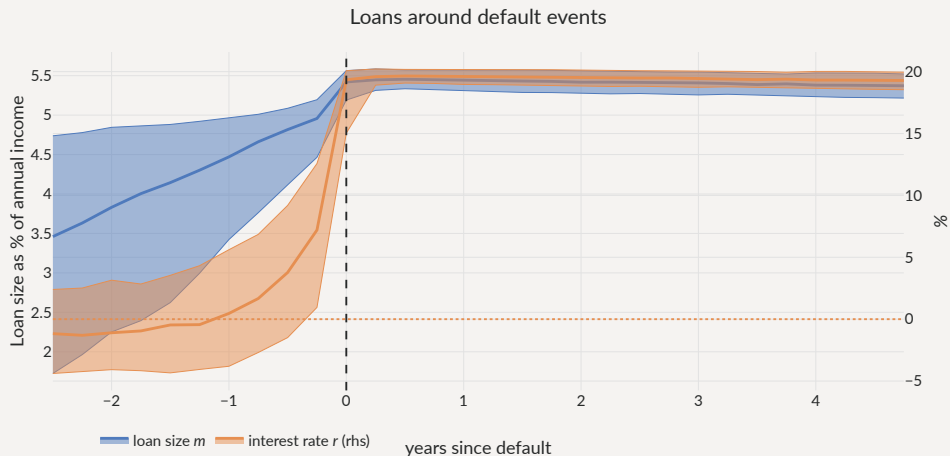
| | Only market | Unrestricted, $\theta = 0.25$ | Unrestricted, $\theta = 0.5$ |
|---------------------------|-------------|----------------------------------|---------------------------------|
| Avg spread (bps) | 714 | 1,613 | 2,105 |
| Std spread (bps) | 399 | 927 | 1,331 |
| $\sigma(c)/\sigma(y)$ (%) | 113 | 109 | 109 |
| Debt to GDP (%) | 22.5 | 21.7 | 21.2 |
| Loan to GDP (%) | 0 | 3.4 | 3.02 |
| Loan spread (bps) | – | -52.5 | -429 |
| Corr. loan & spreads (%) | – | 61.7 | 67.5 |
| Default frequency (%) | 5.72 | 11 | 13 |
| Welfare gains (rep) | – | -0.15% | -0.43% |

- Loans shoot up before *and during* defaults



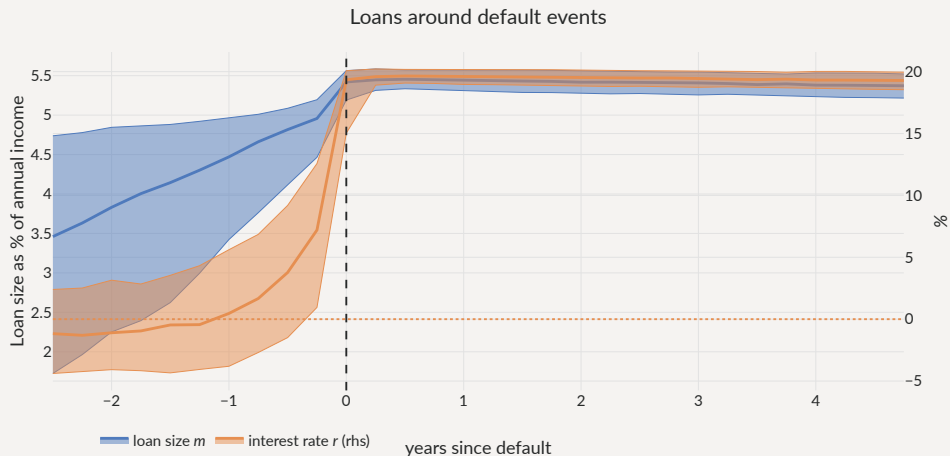
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Limiting Loans in Default

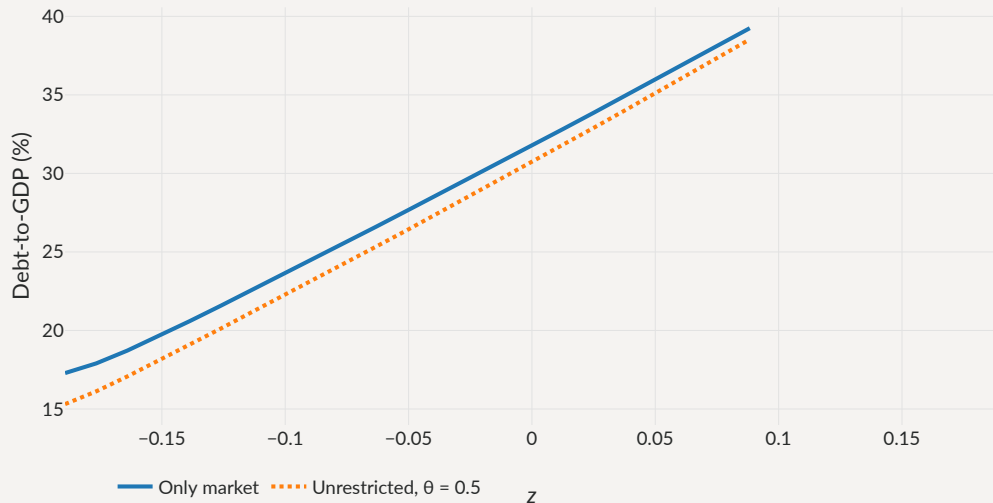
- **Limited:** entire loan must be repaid while in default $\Gamma(m) = 0$

| | Only market | Unrestricted, $\theta = 0.5$ | Limited, $\theta = 0.5$ |
|---------------------------|----------------|---------------------------------|----------------------------|
| Avg spread (bps) | 714 | 2,105 | 1,038 |
| Std spread (bps) | 399 | 1,331 | 612 |
| $\sigma(c)/\sigma(y)$ (%) | 113 | 109 | 113 |
| Debt to GDP (%) | 22.5 | 21.2 | 22.5 |
| Loan to GDP (%) | 0 | 3.02 | 1.06 |
| Loan spread (bps) | – | -429 | 536 |
| Corr. loan & spreads (%) | – | 67.5 | 71.1 |
| Default frequency (%) | 5.72 | 13 | 7.72 |
| Welfare gains (rep) | – | -0.43% | -0.2% |

Default Barriers with Loans

- **Unrestricted:** default barrier moves inward, **Limited:** marginal impact

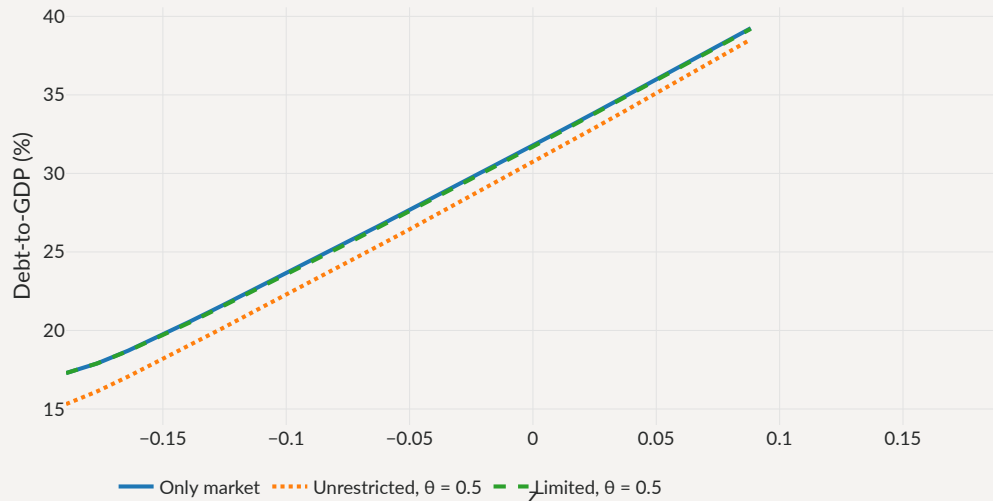
Debt levels at which $\mathcal{A}(b,m,z)$ crosses 50%



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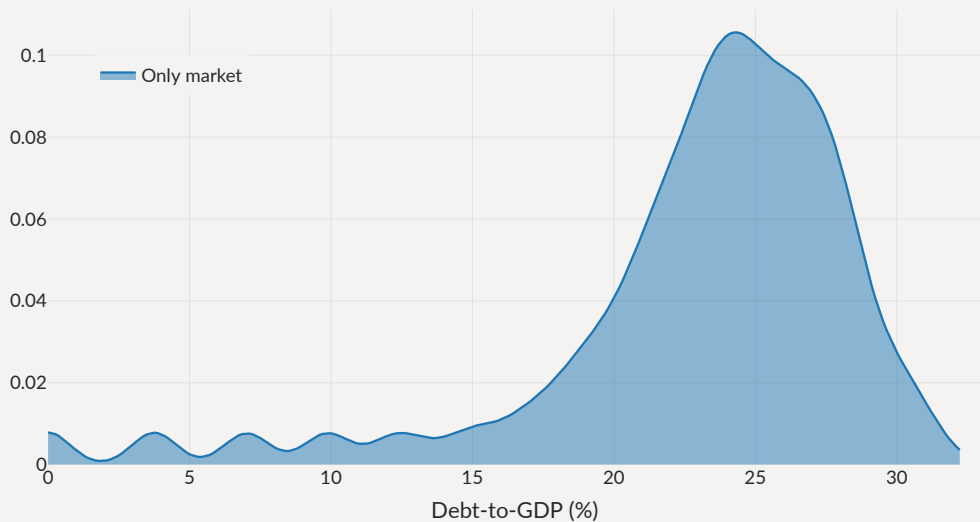


If **Limited** loans help repay the debt,

Why are there **more** defaults with loans?

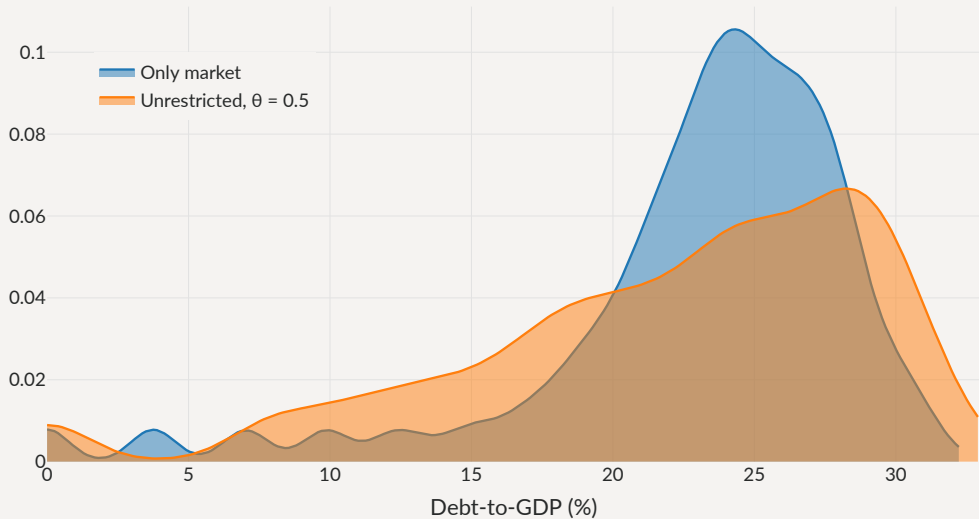
Debt Levels with Loans

Distribution of debt levels



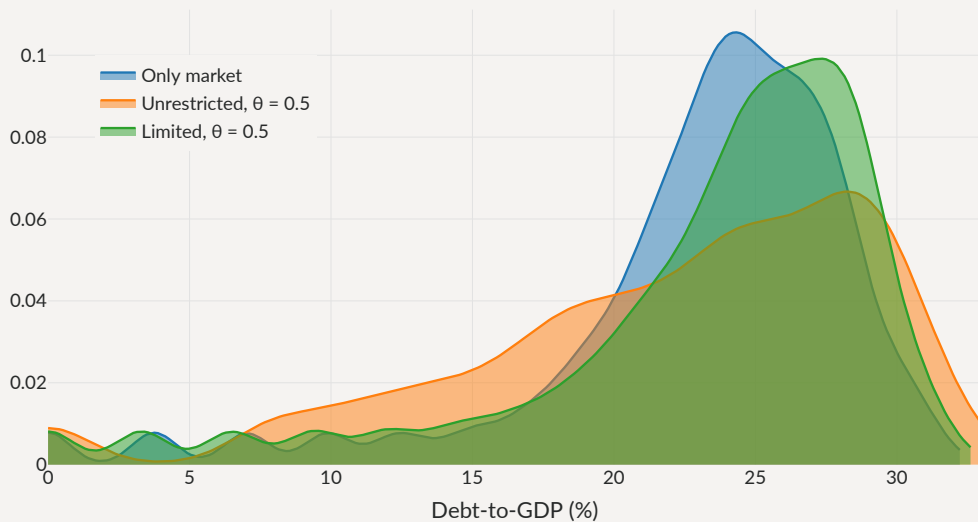
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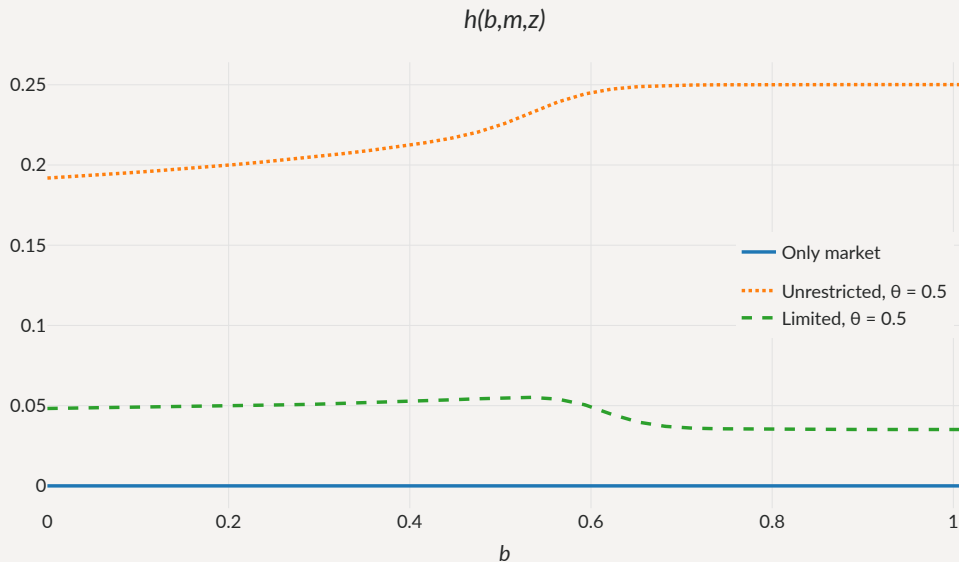
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Monopolist's Profits

Monopolist's profits **increasing** in debt (cond. on repayment) – surplus requires spreads > 0



Government's surplus

$$\mathcal{B}_R(b', b, x, m, m', z) = u(y(z) + B(b', b, m, z) + x) + \beta \mathbb{E} [v(b', m', z') | z] \\ - (u(y(z) + B(b', b, m, z) - m) + \beta \mathbb{E} [v(b', 0, z') | z])$$

- Revenues from debt issuance $B(b', b, m, z)$ modulate the value of the threat point
 - After large revenues (high q , high b'), gov't flush with cash, strong in bargaining
 - After bad issuance (low q or low b'), gov't **weak** in bargaining
- Strongly negative cross-elasticity of bilateral terms to market debt
→ goes against market discipline of spreads

$$u'(c) \left(q + \frac{\partial q}{\partial b'} i + \frac{1}{1+r_b} \frac{\partial m'}{\partial b'} + \frac{\partial \frac{1}{1+r_b}}{\partial b'} m' \right) = \beta \mathbb{E} [u'(c)(1 - \mathbb{1}_D) (\kappa + (1 - \delta)q' + \dots)]$$

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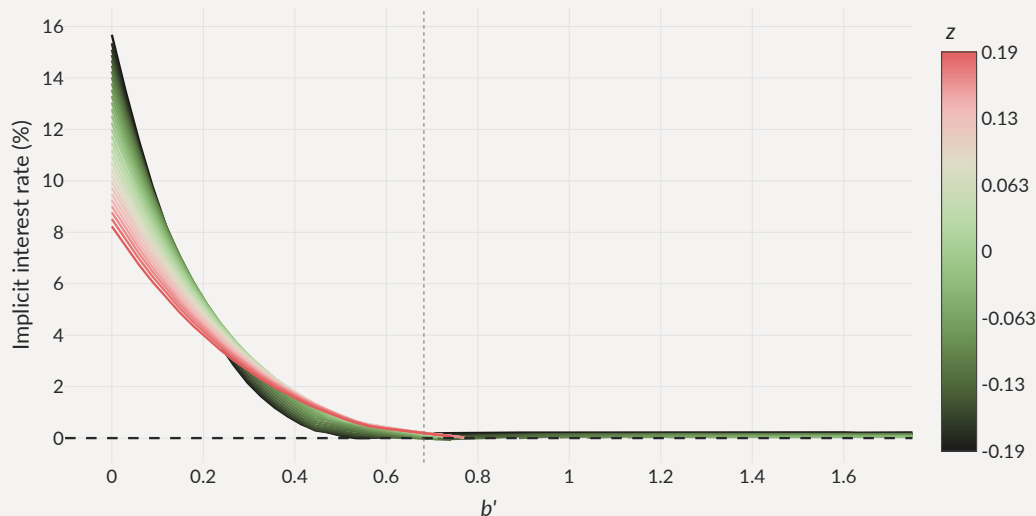
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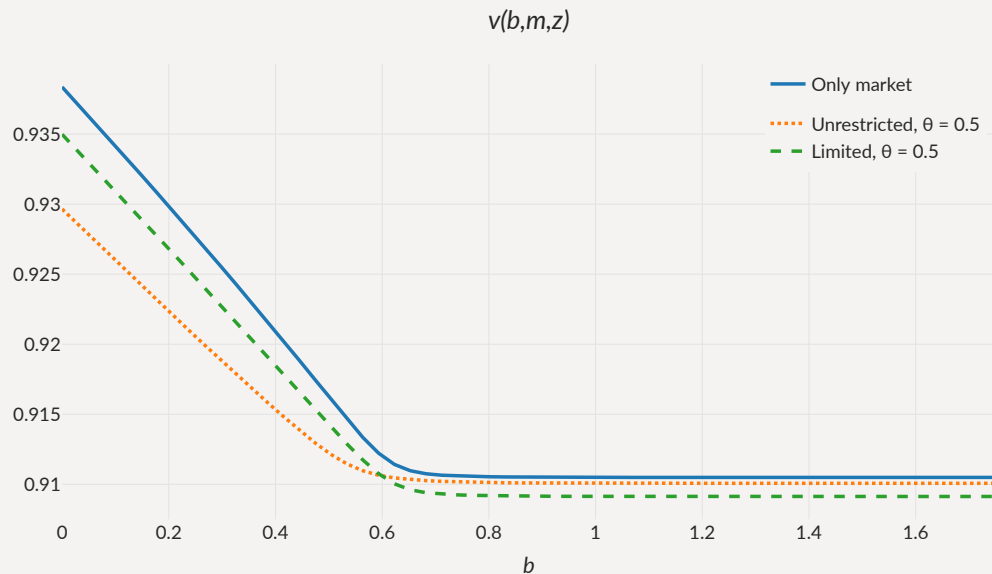
Surplus on loan requires spreads > 0 : monopolist provides **incentives** for risk taking

Loan interest rate (Limited)



Welfare Effects of Bilateral Loans

Limited \succcurlyeq Unrestricted, but...



Programming the Large Lender

- Bargaining over bilateral terms endogenously leads to punishment for deleveraging
- Explore interest rate rules of the form

$$r(b', m') = \max\{r, \alpha_0 + \alpha_b b' + \alpha_m m'\}$$

- Two versions
 - Risk-inducing rule: $\alpha_0 > 0, \alpha_b < 0, \alpha_m = 0$
 - Size-dependent (similar to surcharges): $\alpha_0 > 0, \alpha_b = 0, \alpha_m > 0$

Equilibrium with Exogenous Rules

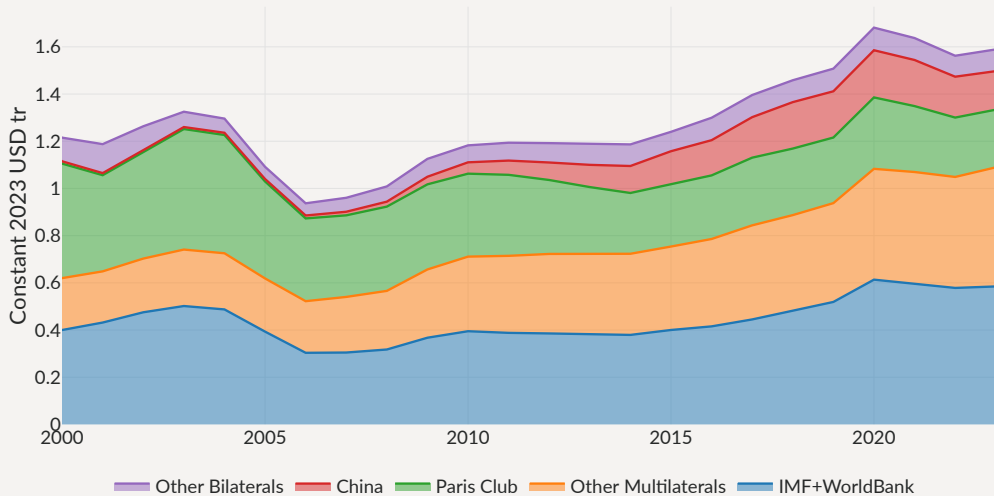
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|---------------------------|-------------|-----------------------|----------------------|----------------------------|
| Avg spread (bps) | 714 | 623 | 921 | 1,038 |
| Std spread (bps) | 399 | 315 | 552 | 612 |
| $\sigma(c)/\sigma(y)$ (%) | 113 | 115 | 115 | 113 |
| Debt to GDP (%) | 22.5 | 23.5 | 22.8 | 22.5 |
| Loan to GDP (%) | 0 | 0.71 | 0.972 | 1.06 |
| Loan spread (bps) | – | 682 | 1,264 | 536 |
| Corr. loan & spreads (%) | – | 62.5 | 48.1 | 71.1 |
| Default frequency (%) | 5.72 | 5.13 | 6.92 | 7.72 |
| Welfare gains (rep) | – | 0.21% | -0.079% | -0.2% |

Concluding remarks

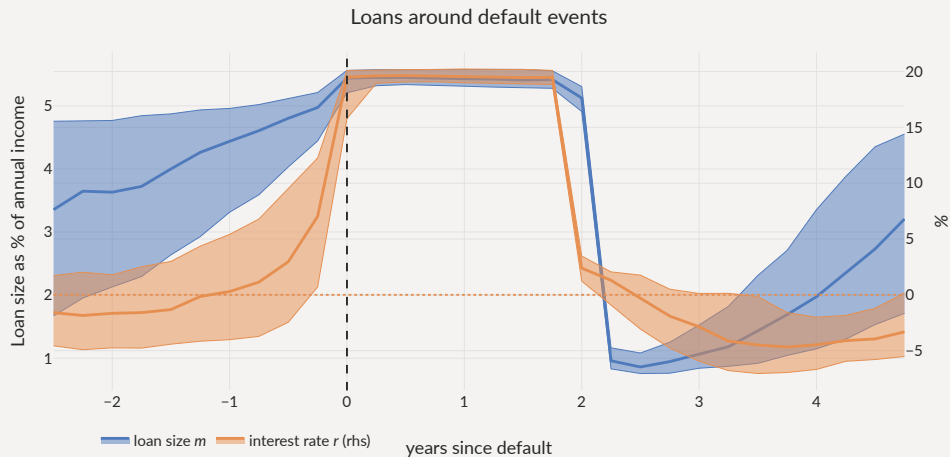
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- Simple model with monopolist/fringe structure
 - ... example of situation where cross-elasticity emerges
- Strong interaction between two markets for sovereign debt
 - ... cross-elasticity induces risk-taking, more defaults, welfare losses
 - ... even if bilateral loans are not used intensely on the equilibrium path
- Cross-elasticity constitutes a simple test to assess welfare gains of new instruments
 - ... or a boost to the gains of fiscal rules, state-contingent debt...

Total Official Debt

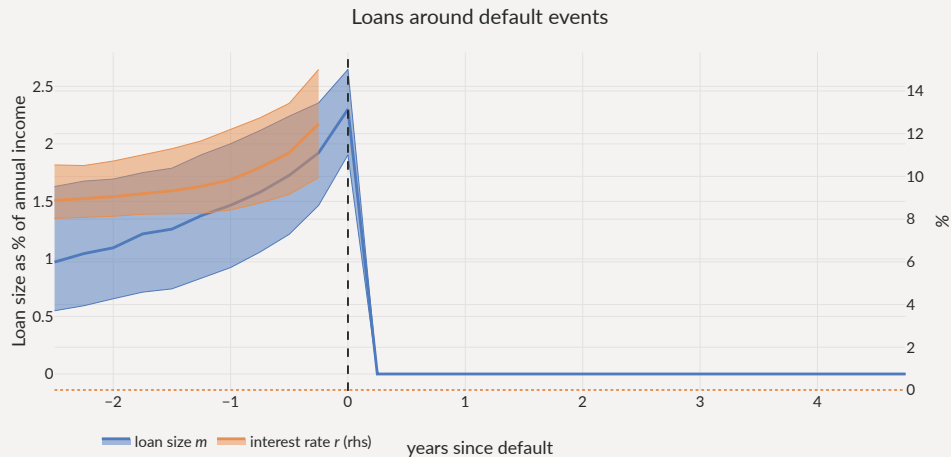


- Further conditioning on default events lasting exactly two years



When is the Loan Used?

- With Limited: $\Gamma(m) = m$



Loan drawings m' (Limited)

