

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

Questions

- How does the presence of a large official lender affect sovereign debt markets?
- What are the 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 increase **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 spreads
 - ... remains present in a model **without** bargaining
 - ... model with exogenous bilateral terms useful for **optimal design**

Main findings

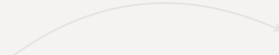
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- Sovereign debt/default with interactions from ‘official’ debt
 - ... senior debt (Hatchondo, Martinez & Onder 2017), senior debt with conditionality (Boz 2011, Fink & Scholl 2016), bailout agencies (Corsetti, Guimarães & Roubini 2006, Kirsch & Rühmkorf 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**

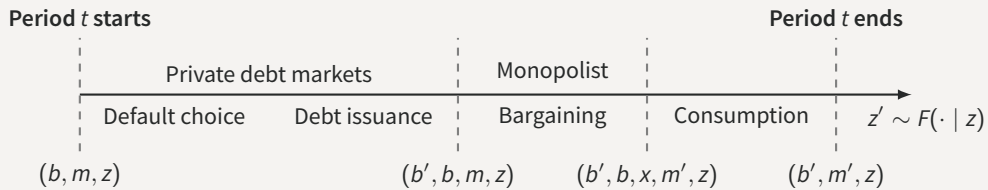

$$x = \frac{1}{1+r} m' - m$$

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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

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

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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

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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

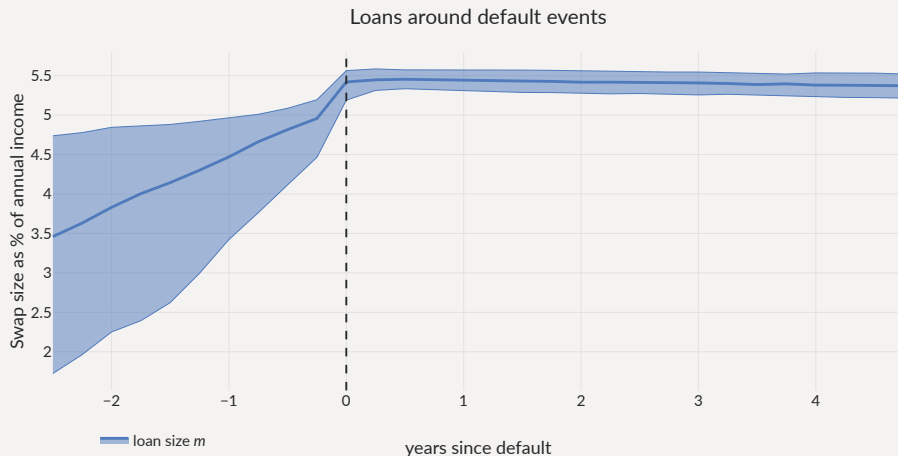
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How Do Bilateral Loans Affect Equilibrium?

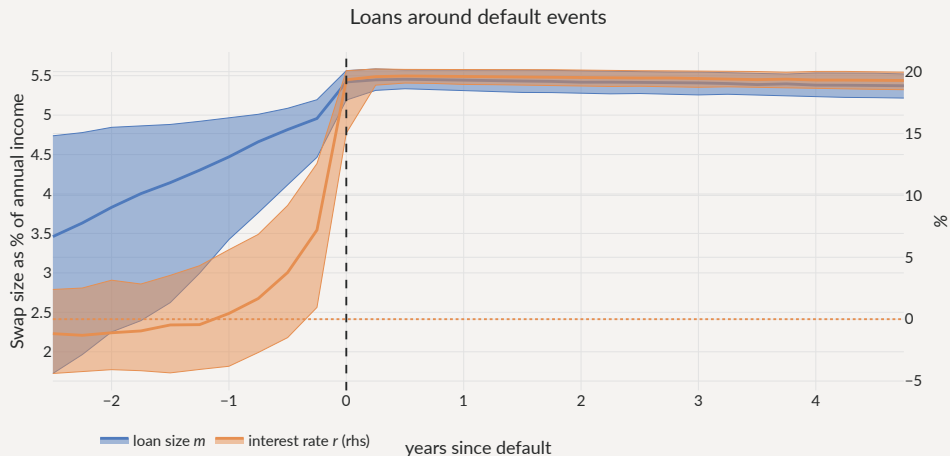
	Only market	Unrestricted, $\theta = 0.25$	Unrestricted, $\theta = 0.5$
Avg spread (bps)	714	1,613	2,105
Std spread (bps)	399	927	1,331
$\sigma(c)/\sigma(y)$ (%)	113	109	109
Debt to GDP (%)	22.5	21.7	21.2
Loan to GDP (%)	0	3.4	3.02
Loan spread (bps)	–	-52.5	-429
Corr. loan & spreads (%)	–	61.7	67.5
Default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

- Loans shoot up before *and during* defaults



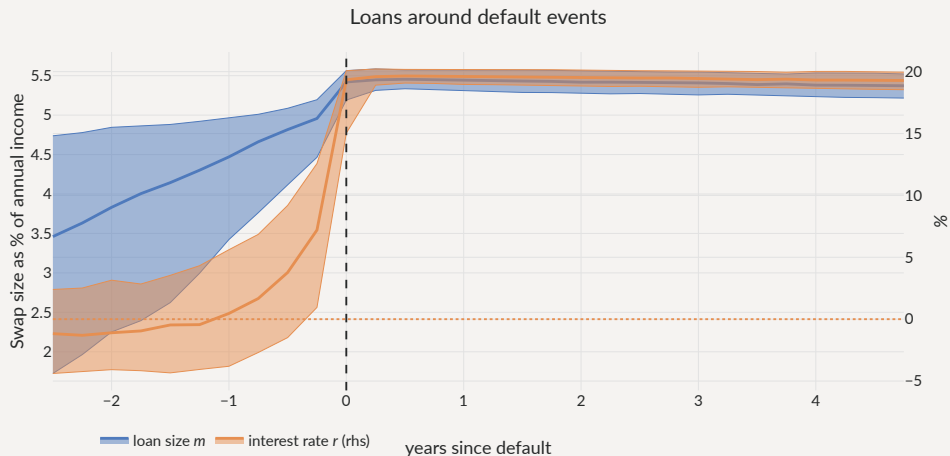
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Limiting Loans in Default

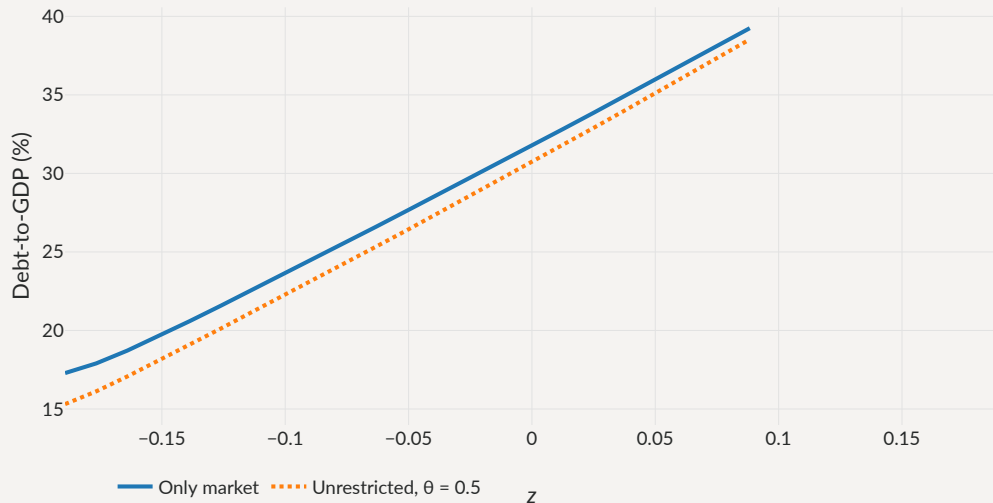
- **Limited:** entire loan must be repaid while in default $\Gamma(m) = 0$

	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

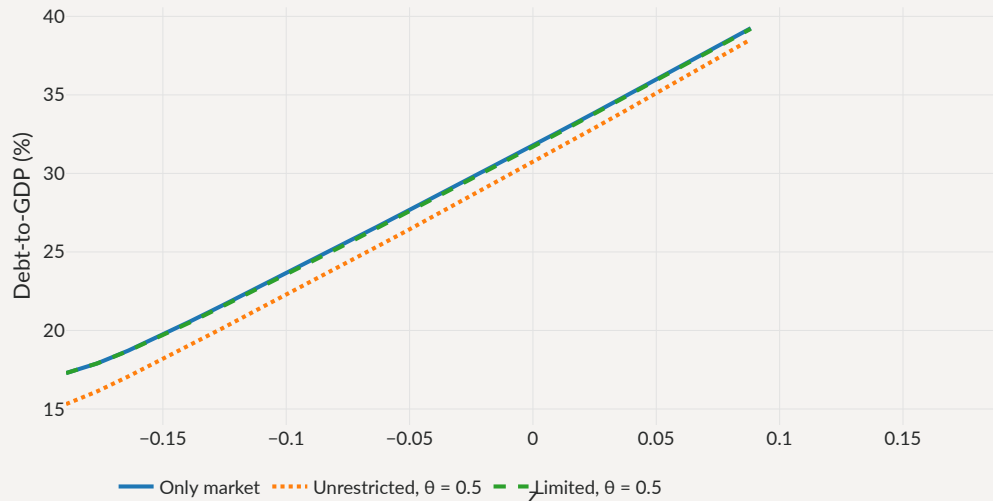
Debt levels at which $\mathcal{A}(b,m,z)$ crosses 50%



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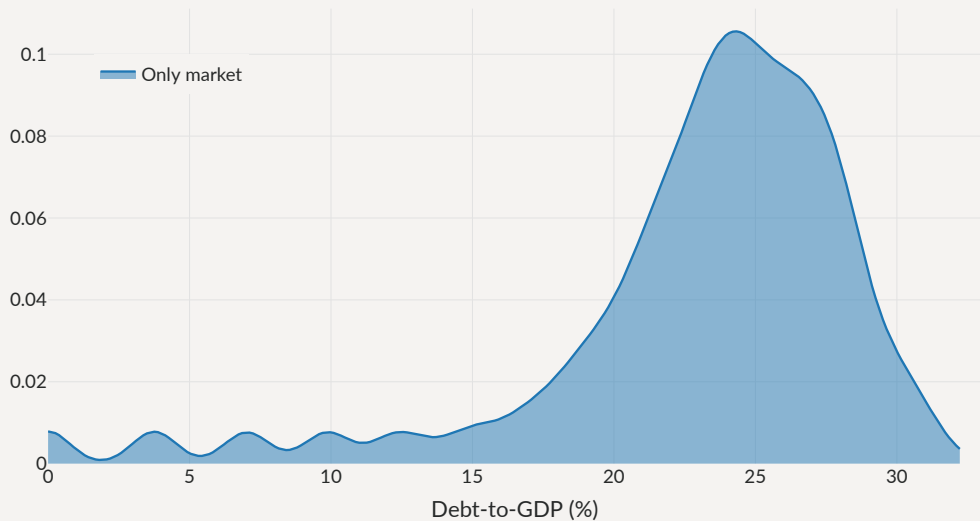


If **Limited** loans help repay the debt,

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

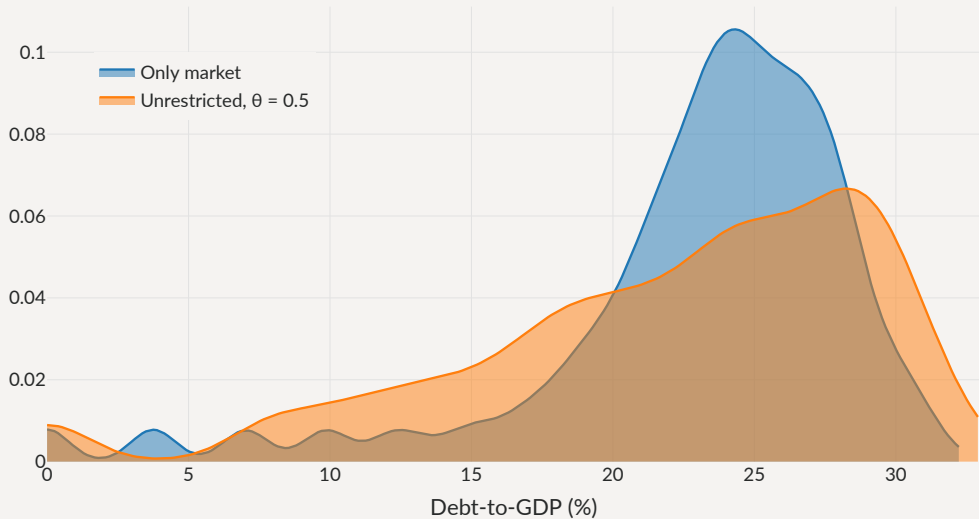
Debt Levels with Loans

Distribution of debt levels



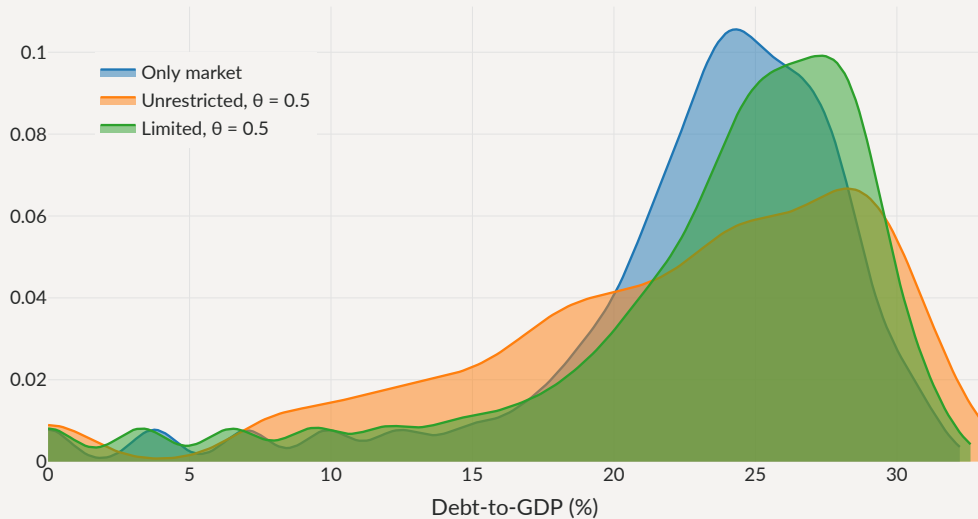
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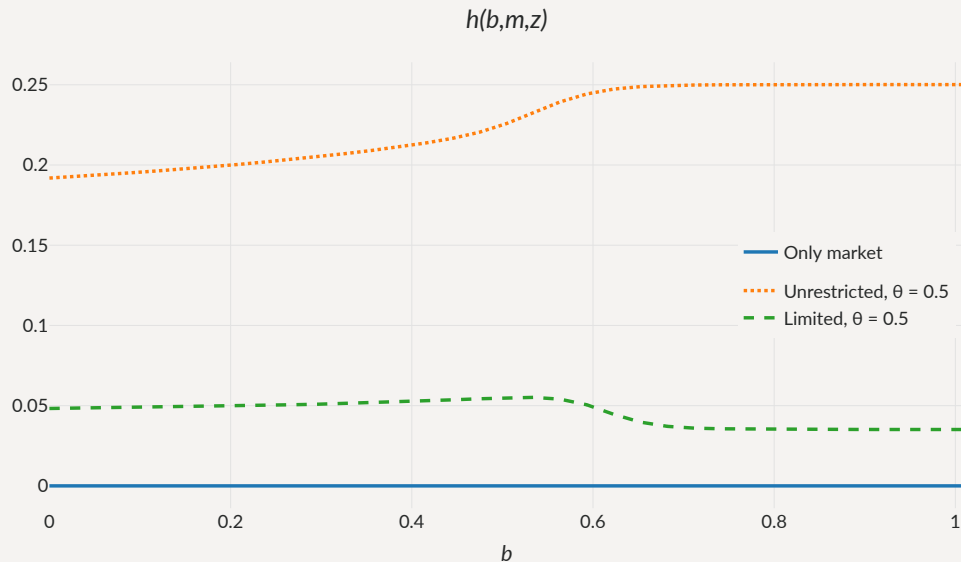
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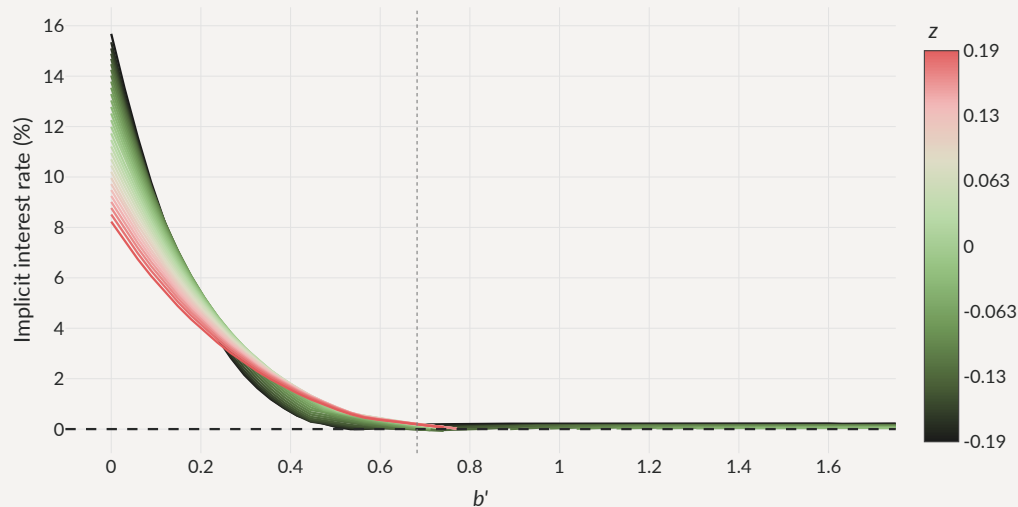
Monopolist's Profits

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



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

Loan interest rate (Limited)



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

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

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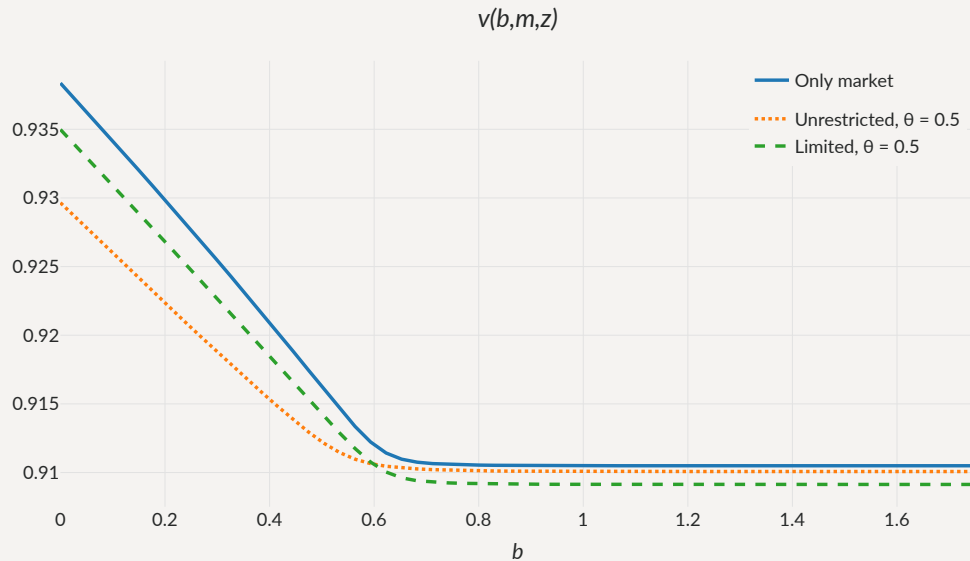
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Welfare Effects of Bilateral Loans

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

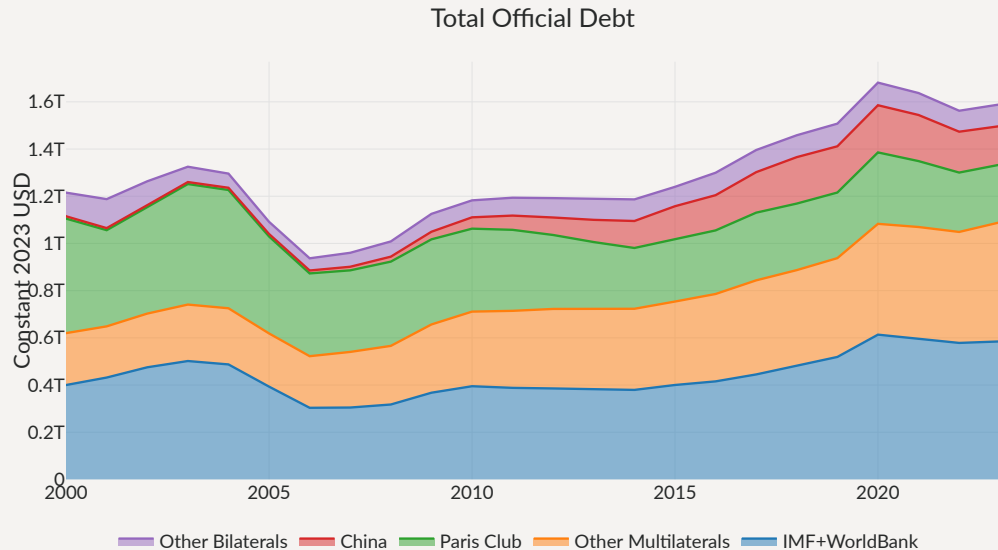
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Std spread (bps)	399	315	552	612
$\sigma(c)/\sigma(y)$ (%)	113	115	115	113
Debt to GDP (%)	22.5	23.5	22.8	22.5
Loan to GDP (%)	0	0.71	0.972	1.06
Loan spread (bps)	–	682	1,264	536
Corr. loan & spreads (%)	–	62.5	48.1	71.1
Default frequency (%)	5.72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

Concluding remarks

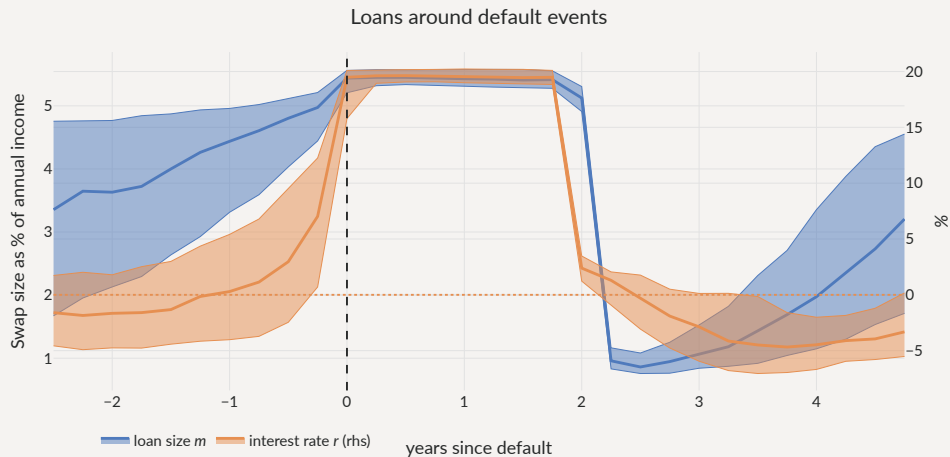
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- Simple model with monopolist/fringe structure
 - ... example of situation where cross-elasticity emerges
 - ... market power is crucial in model
- Strong interaction between two markets for sovereign debt
 - ... cross-elasticity induces risk-taking, 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

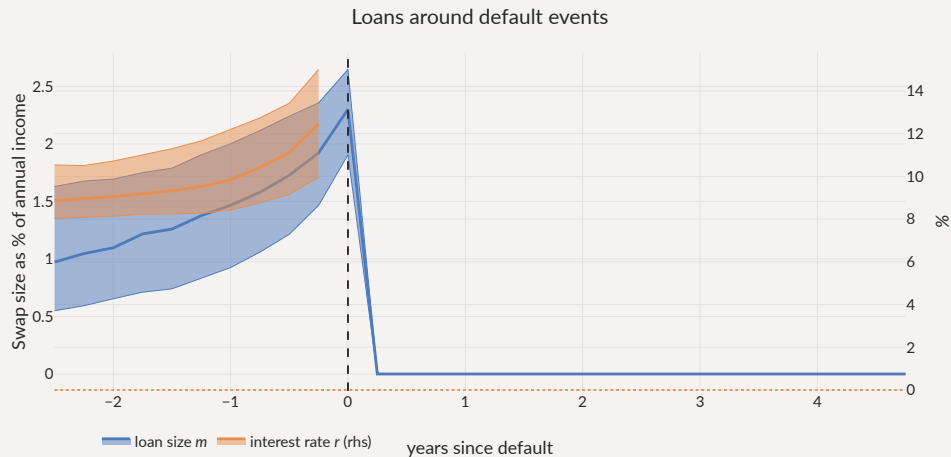
A New Landscape for Official Sovereign Debt



- Further conditioning on default events lasting exactly two years



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



Swap drawings m' (Limited)

