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 ▸ IDS data
  ... with claims to seniority and sometimes **opaque** terms

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

Relational Overborrowing

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**

Relational Overborrowing

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Literature

- 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

Environment

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

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

- Should expect
  - … Implicit interest rate r to vary over time
  - … Interest rate to reflect market power
  - … Interest rate to reflect outside options

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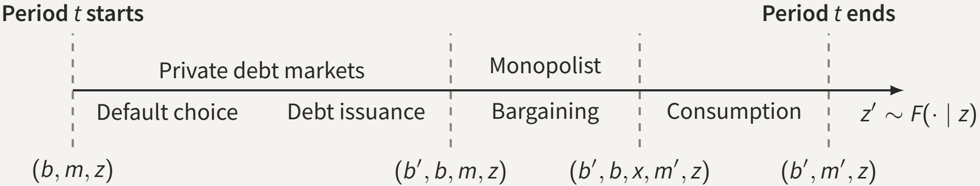
Timeline of Events



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

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

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

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

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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'

Government surplus

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

Lender surplus

- Lender's surplus

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

- Government's surplus

$$\mathcal{B}_R(b', b, x, m, m', z) = \underbrace{u\left(y(z) + B(b', b, m, z) + x\right) + \beta \mathbb{E}\left[v(b', m', z') \mid z\right]}_{\text{agreement}}$$

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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

Calibration

- 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

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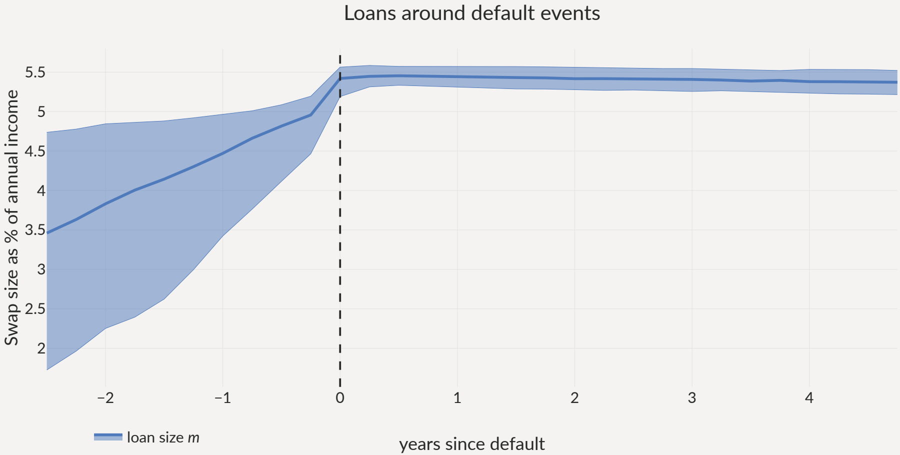
How Do Bilateral Loans Affect Equilibrium?

	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%

When Is the Loan Used?

- Loans shoot up before *and during* defaults



- Also consider Limited versions: $m' \leq \Gamma(m)$ while in default

When Is the Loan Used?

Limited More

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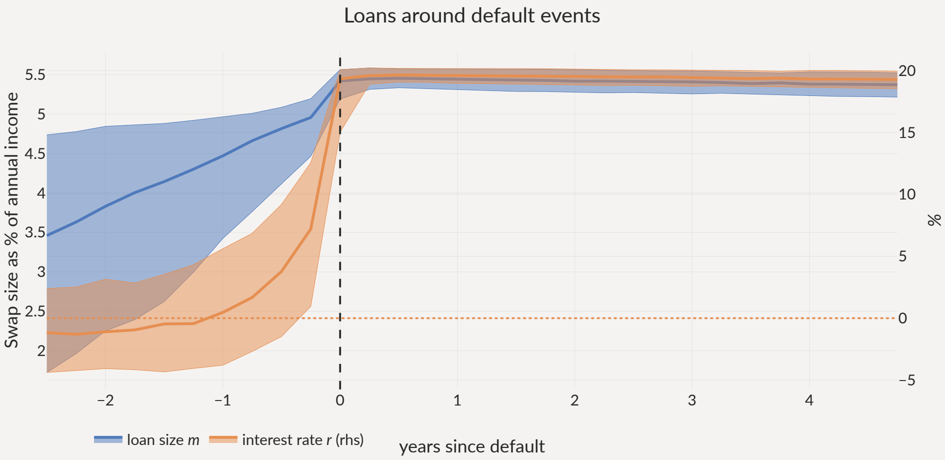

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When Is the Loan Used?

▸ Limited ▸ More

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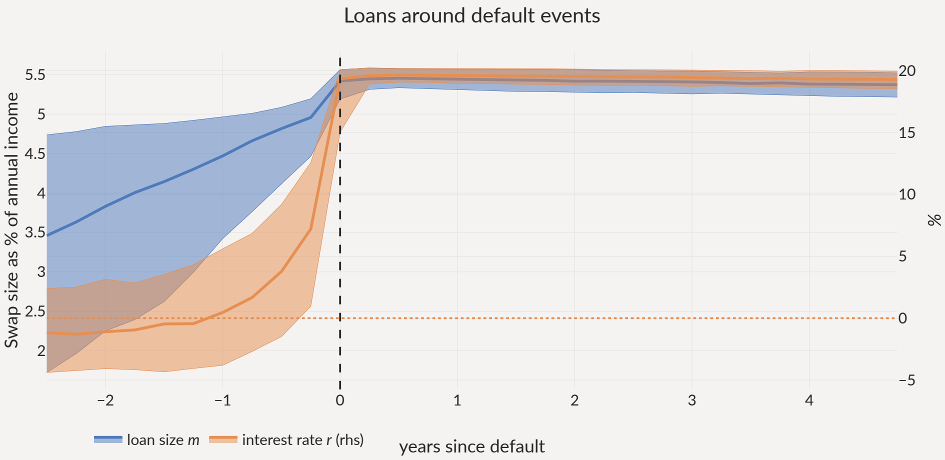

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Limiting Loans in Default

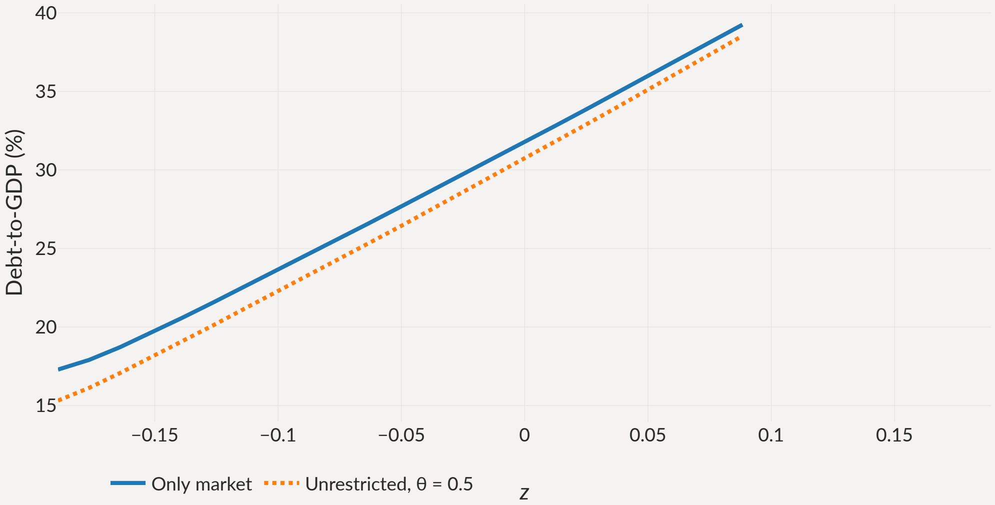
- **Limited**: entire loan must be repaid while in default $\Gamma(m) = 0$

	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 $\mathscr{P}(b,m,z)$ crosses 50%



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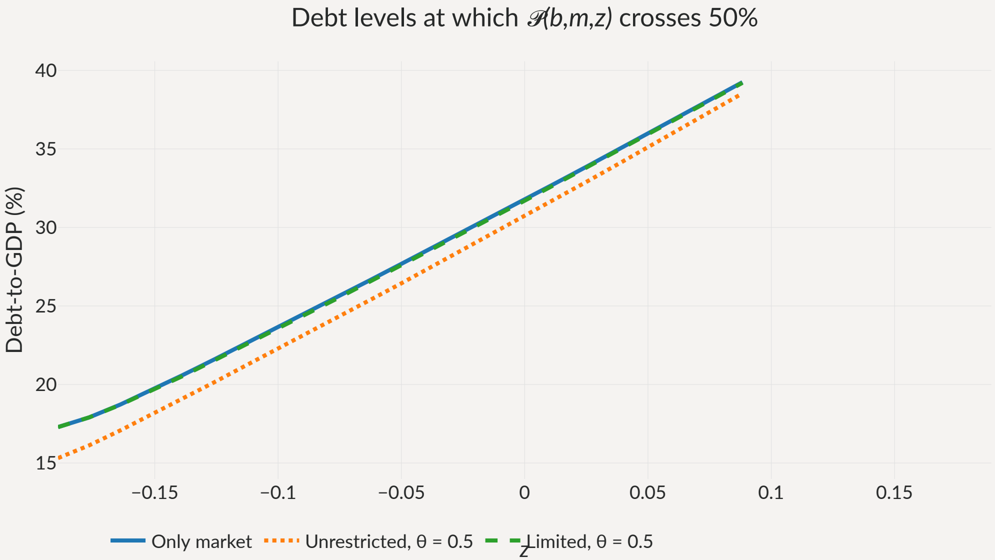
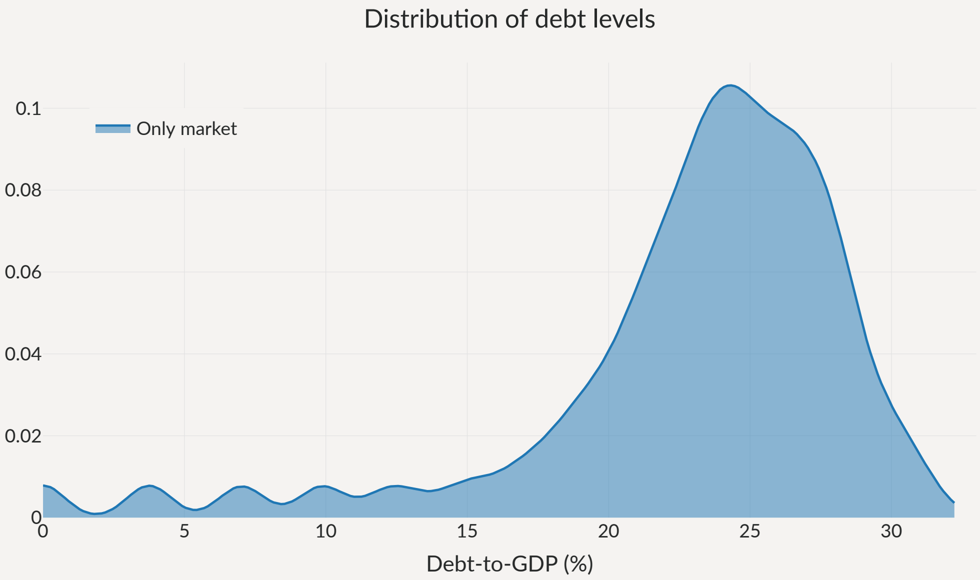


If **Limited** loans help repay the debt,

Why are there more defaults with loans?

Debt Levels with Loans



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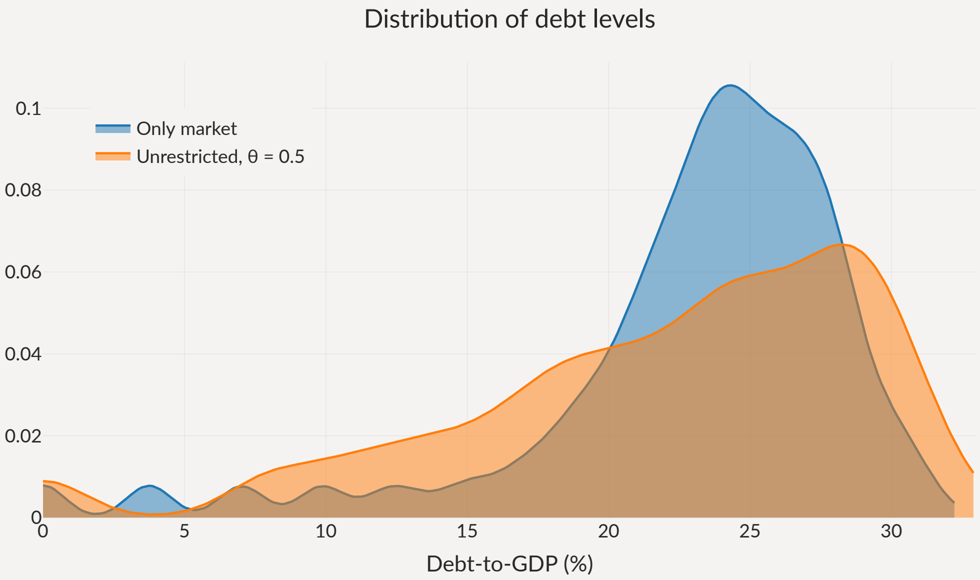

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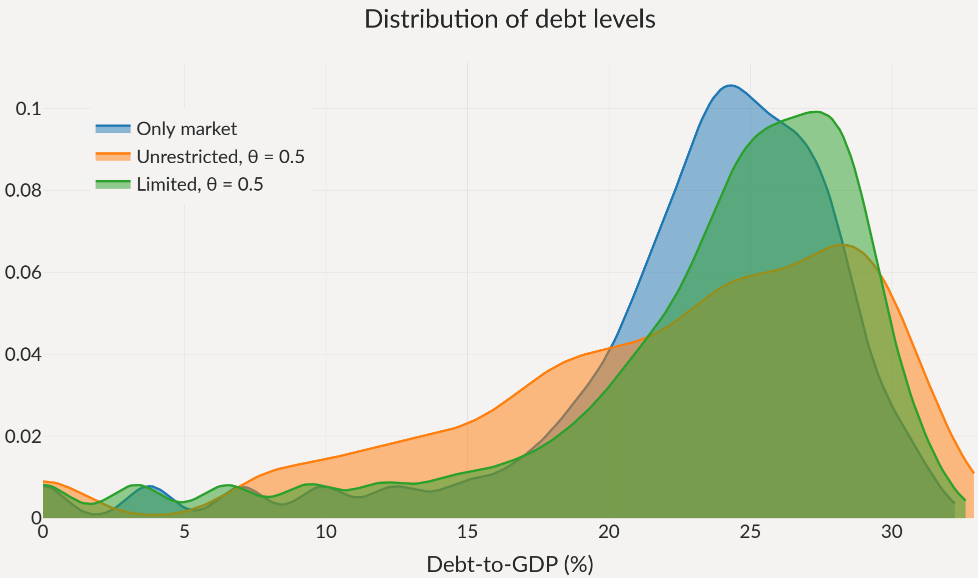
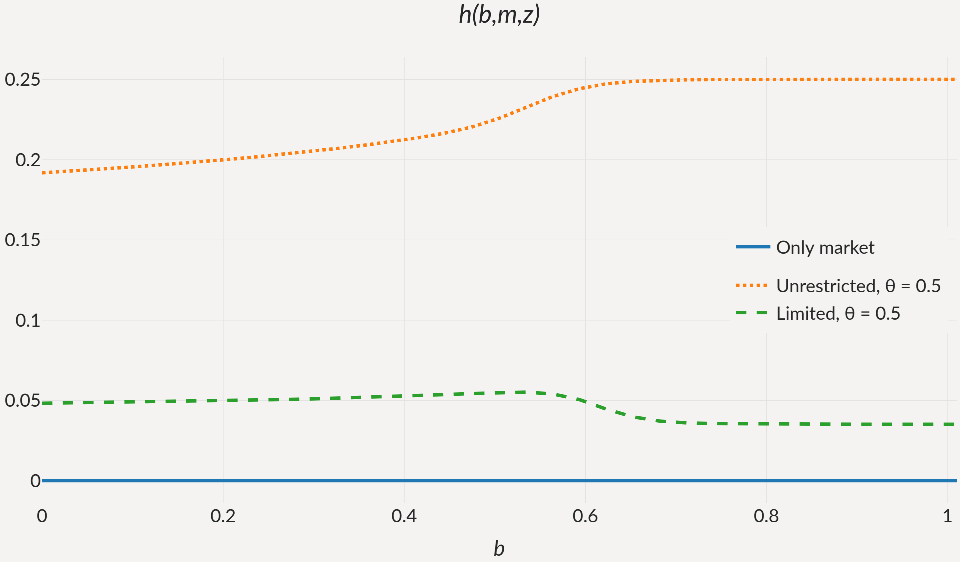


Monopolist's Profits

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



Government's surplus

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

- 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

$\longrightarrow$ goes against market discipline of spreads

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

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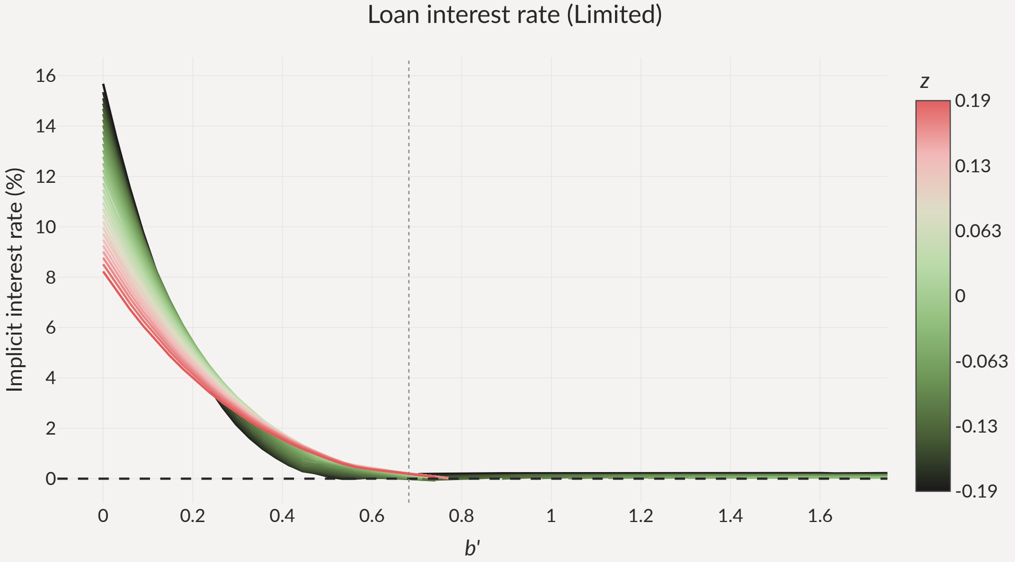
Risk-taking Incentives

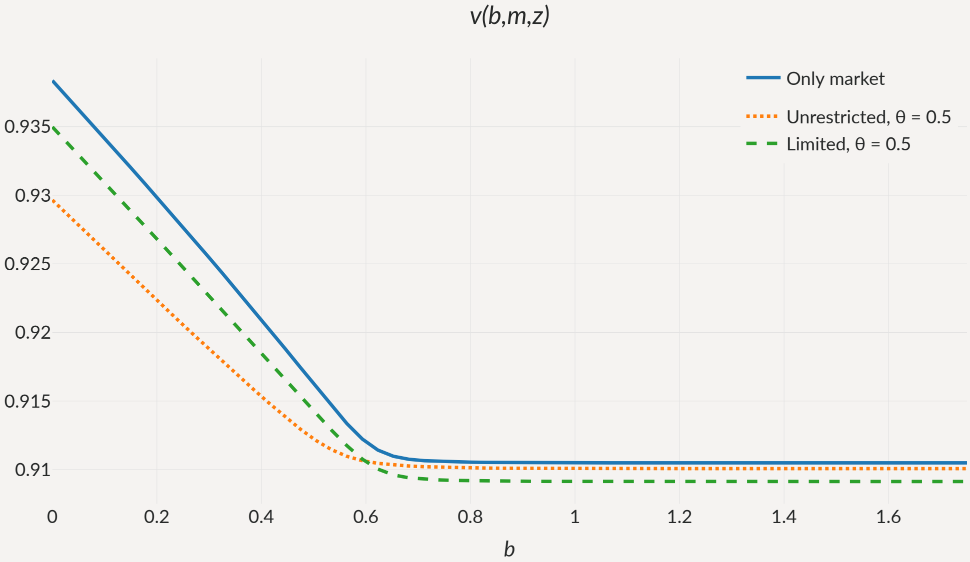
▸ Drawings

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



Welfare Effects of Bilateral Loans

Limited $\succcurlyeq$ Unrestricted, but…



Programming the Large Lender

Possible rules

- 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

	Only market	Size dependent r	Risk inducing r	Limited, $\theta = 0.5$
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

The Perils of Bilateral Sovereign Debt

- 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

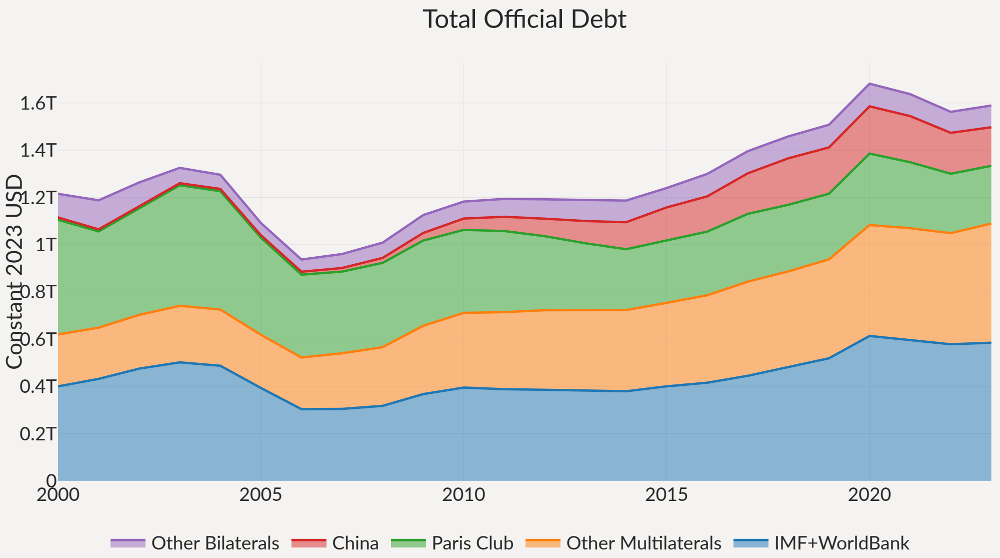
  … even if bilateral loans are not used intensely on the equilibrium path

- 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…

A New Landscape for Official Sovereign Debt

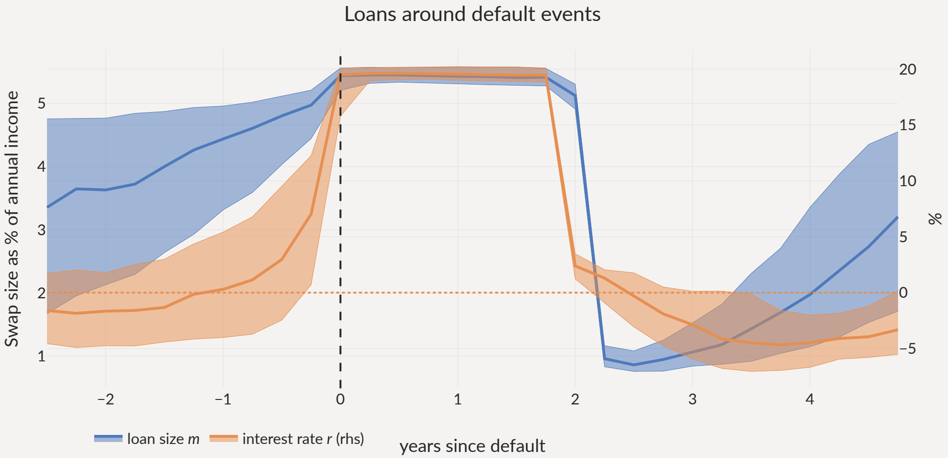
Back



When is the Loan Used?

◂ Back

- Further conditioning on default events lasting exactly two years



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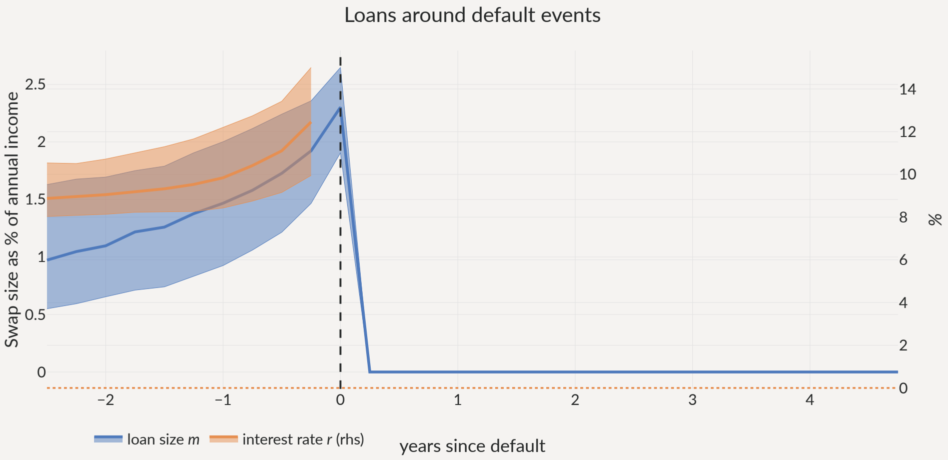
- With Limited: $\Gamma(m) = m$



Risk-taking Incentives

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