

# The Perils of Bilateral Sovereign Debt

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# Official Sovereign Debt

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- 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

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- 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

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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 explained by **elasticity** of bilateral terms to market spreads
  - ... remains present in a model **without** bargaining
  - ... model with exogenous bilateral terms useful for **optimal design**

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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)

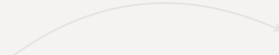
## Model

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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**

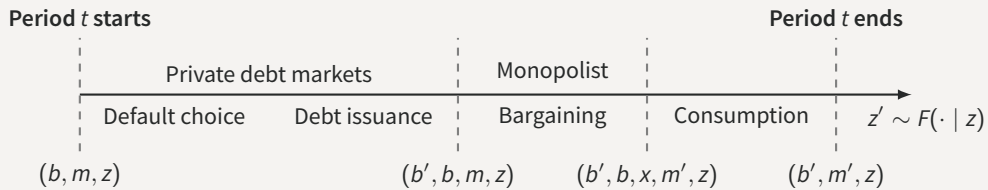

$$x = \frac{1}{1+r} m' - m$$

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# Timeline of Events



## Borrowing from Markets

- Debt is a geometrically-decaying coupon  
... for each unit, get  $q$ , pay  $\kappa, (1 - \rho)\kappa, \dots (1 - \rho)^{s-1}\kappa$
- 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

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

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

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## Quantitative Effects of Bilateral Loans

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

	Parameter	Value
Sovereign's discount factor	$\beta$	0.9504
Sovereign's risk aversion	$\gamma$	2
Preference shock scale parameter	$\chi$	0.02
Lender's bargaining power	$\theta$	0.5
Risk-free interest rate	$r$	0.01
Duration of debt	$\rho$	0.05
Income autocorrelation coefficient	$\rho_z$	0.9484
Standard deviation of $y_t$	$\sigma_z$	0.02
Reentry probability	$\psi$	0.0385
Default cost: linear	$d_0$	-0.24
Default cost: quadratic	$d_1$	0.3

# Calibration

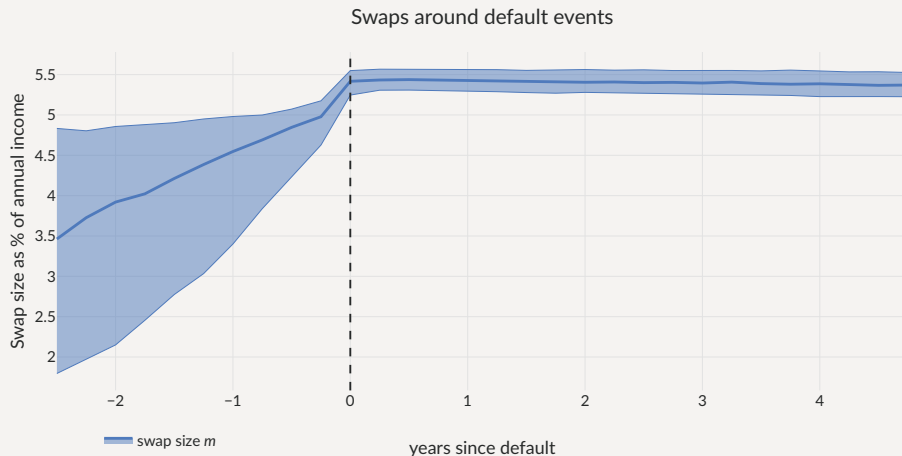
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## How Do Bilateral Loans Affect Equilibrium?

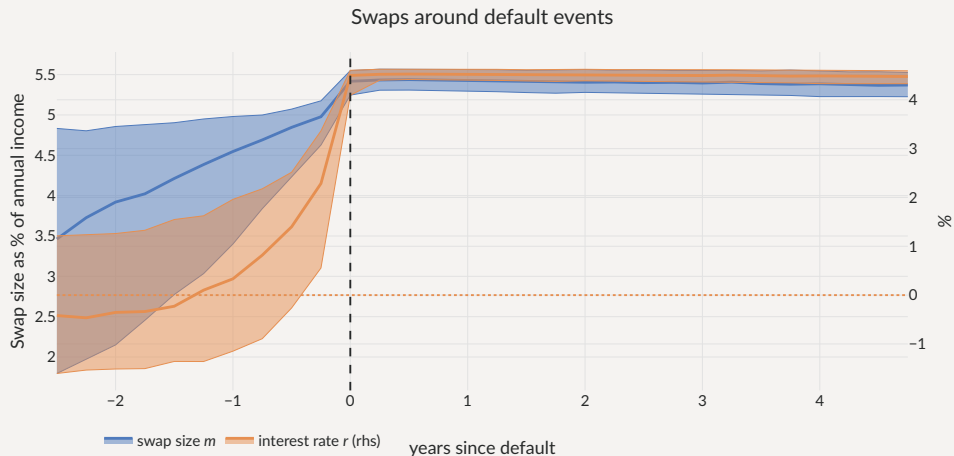
	Only market	Both, $\theta = 0.25$	Both, $\theta = 0.5$
Avg spread (bps)	804	1,841	2,396
Std spread (bps)	470	1,099	1,541
$\sigma(c)/\sigma(y)$ (%)	111	111	110
Debt to GDP (%)	21.4	20.8	20.2
Loan to GDP (%)	0	3.74	3.32
Corr. loan & spreads (%)	–	53.8	62.2
Default frequency (%)	6.53	13.0	14.7
Welfare gains (rep)	–	-0.082%	-0.41%

- Loans shoot up before *and during* defaults



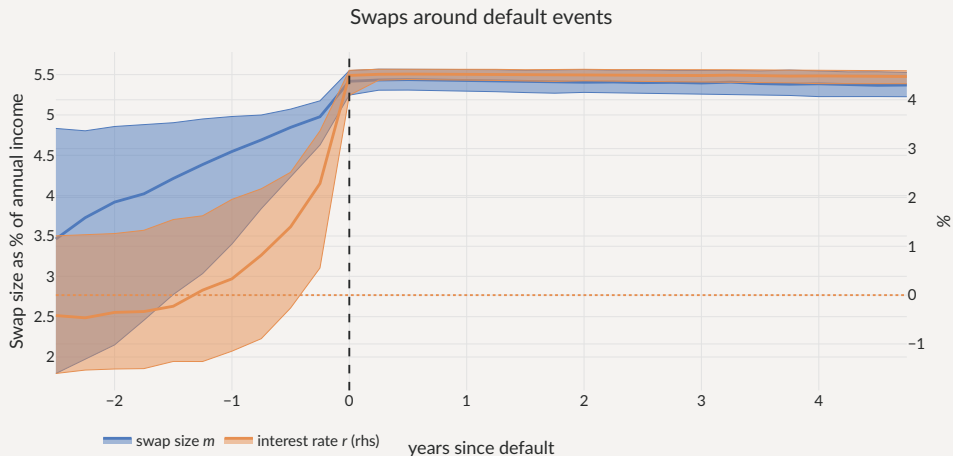
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## Limiting Loans in Default

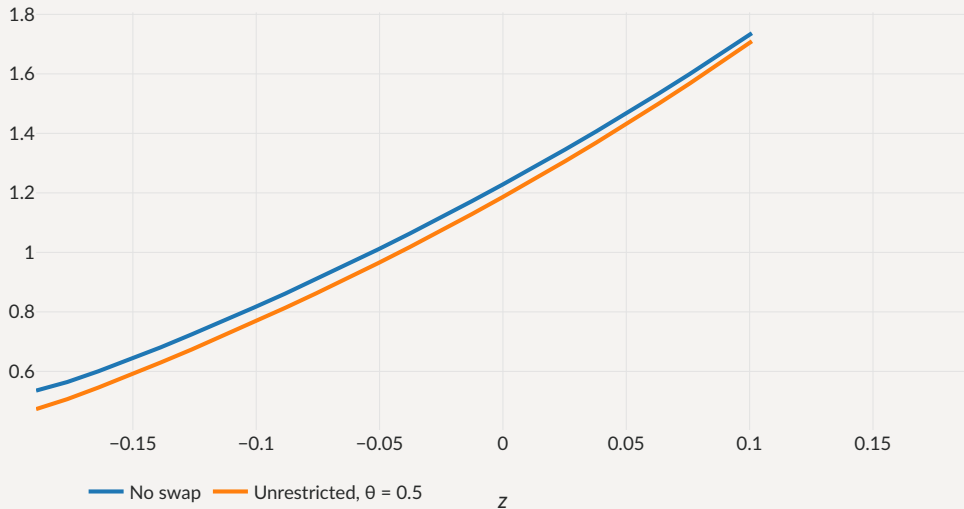
- **Limited:** entire loan must be repaid while in default  $\Gamma(m) = 0$

	Only market	Unrestricted, $\theta = 0.5$	Limited, $\theta = 0.5$
Avg spread (bps)	804	2,396	1,216
Std spread (bps)	470	1,541	779
$\sigma(c)/\sigma(y)$ (%)	111	110	113
Debt to GDP (%)	21.4	20.2	21.7
Loan to GDP (%)	0	3.32	1.05
Corr. loan & spreads (%)	–	62.2	69.4
Default frequency (%)	6.53	14.7	9.34
Welfare gains (rep)	–	-0.41%	-0.084%

## Default Barriers with Loans

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

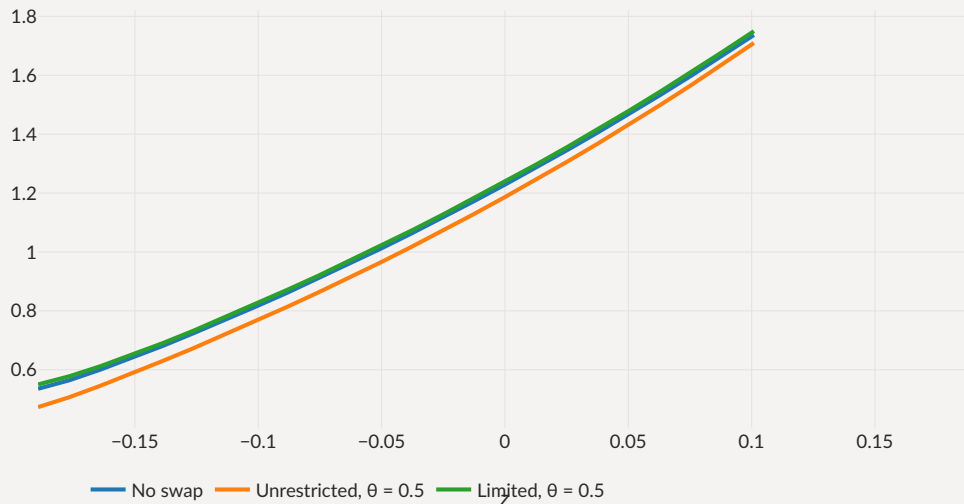
Debt levels at which  $\mathcal{P}(b,m,z)$  crosses 50%



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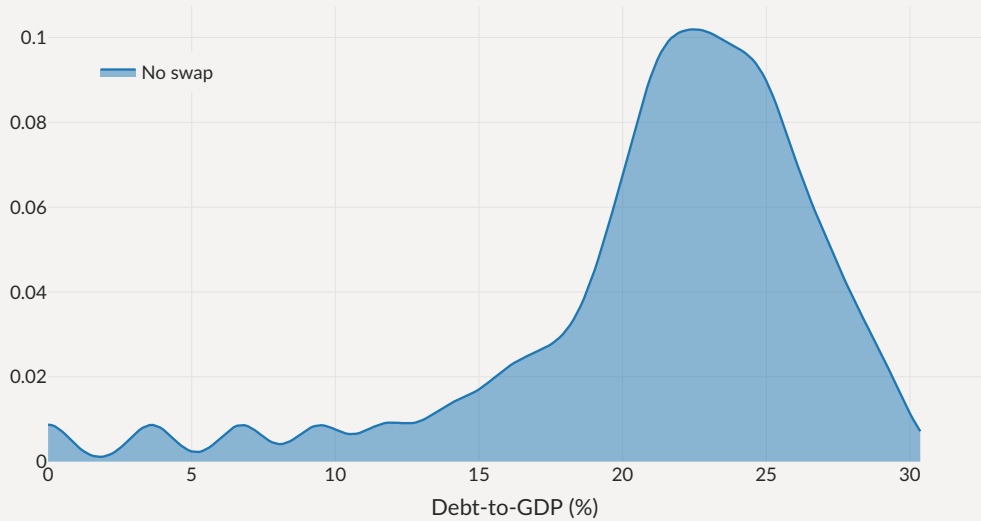
If **Limited** loans help repay the debt,

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

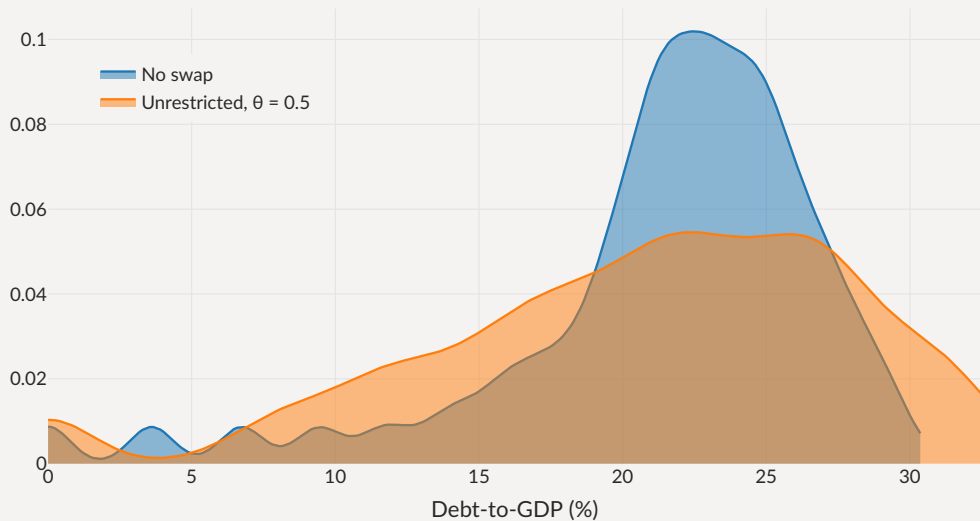
# Debt Levels with Loans

Distribution of debt levels



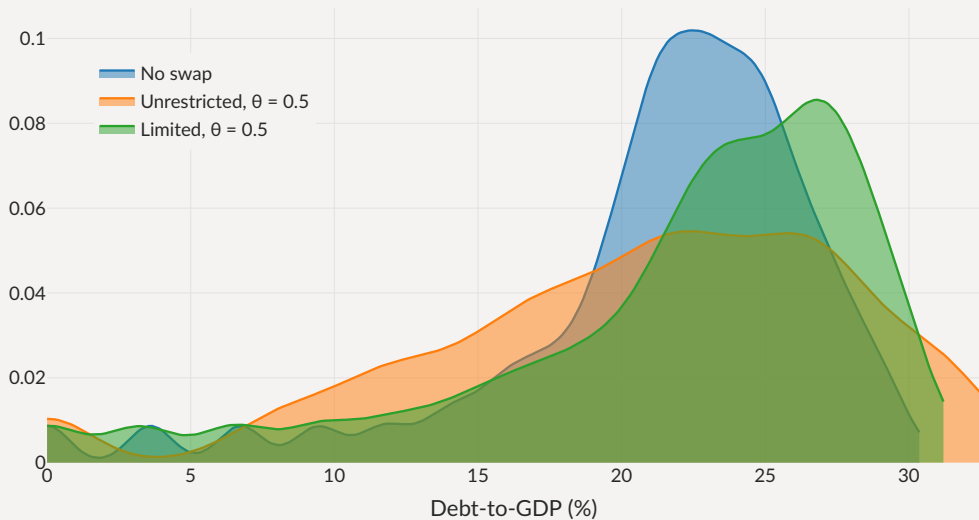
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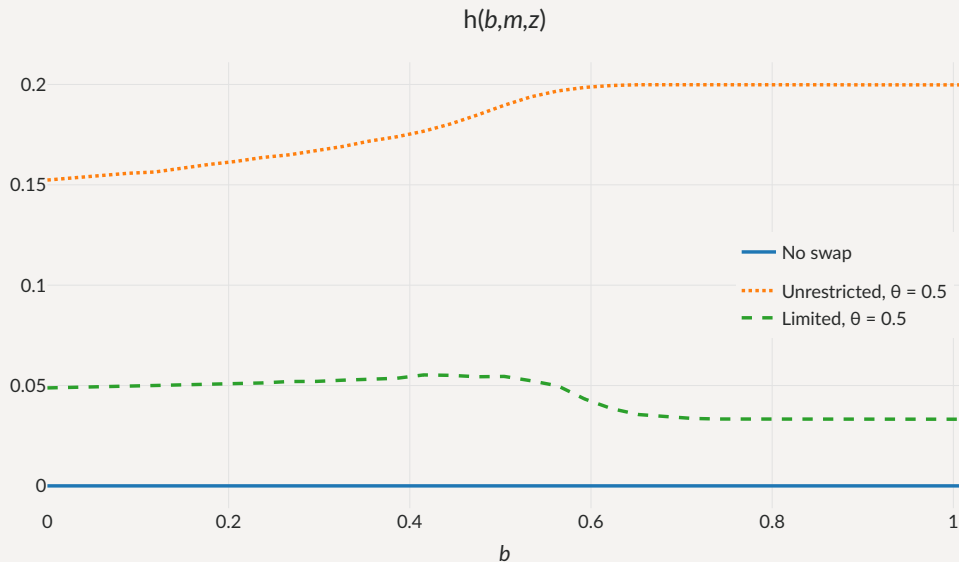
## Debt Levels with Loans

Distribution of debt levels



# Monopolist's Profits

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

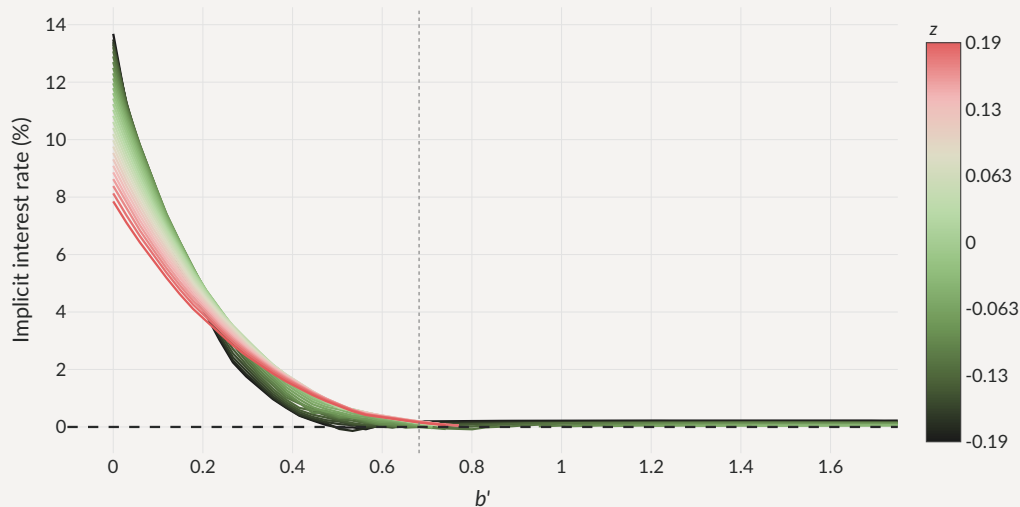




## Risk-taking Incentives

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

Interest rate on the swap (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

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

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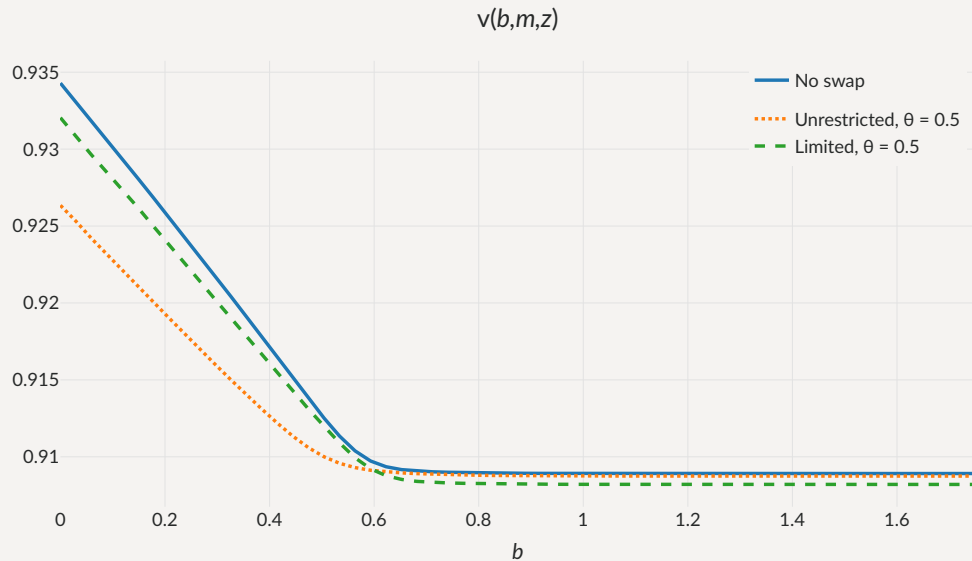
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# Welfare Effects of Bilateral Loans

Limited  $\succcurlyeq$  Unrestricted, but...



# Programming the Large Lender

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- 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)	802	635	1,118	1,211
Std spread (bps)	454	241	1,051	753
$\sigma(c)/\sigma(y)$ (%)	112	120	118	113
Debt to GDP (%)	21.5	25.8	21.9	21.8
Loan to GDP (%)	0	2.32	1.37	1.05
Loan spread (bps)	–	836	2,267	408
Corr. loan & spreads (%)	–	50.2	43.6	70.1
Default frequency (%)	6.27	5.13	7.56	9.17
Welfare gains (rep)	–	0.61%	-0.094%	-0.084%



## Concluding remarks

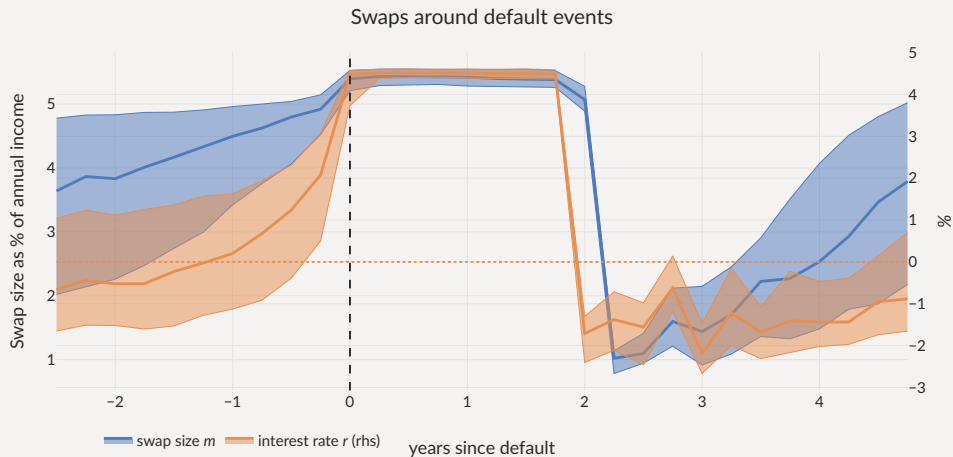
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# The Perils of Bilateral Sovereign Debt

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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
- Large welfare effects, policy challenges
  - How to limit their use during defaults?
  - Relational overborrowing – more gains from fiscal rules, state-contingent debt?
- Simple test to determine welfare gains of a new instrument

- Further conditioning on default events lasting exactly two years



# When is the Swap Used?

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

