

The Perils of Bilateral Sovereign Debt

Francisco Roldán
IMF

César Sosa-Padilla
Notre Dame & NBER

RIDGE Forum
Montevideo, November 2025

The views expressed herein are those of the authors and should not be attributed to the IMF, its Executive Board, or its management.

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 senior lender affect sovereign debt markets?
- What are its welfare implications for borrowing governments?

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

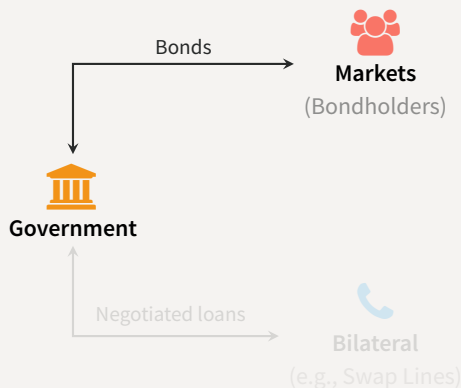
Questions

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

Evaluating Senior Official Creditors

Quantitative sovereign debt model with

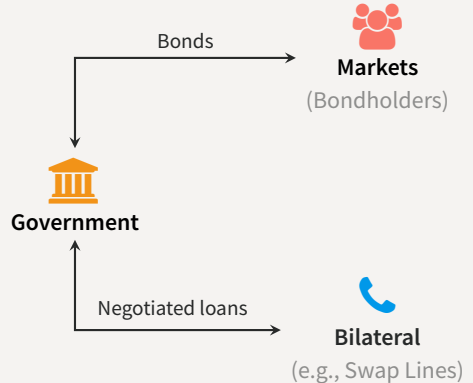
- Competitive creditors in private **markets**
- Large **bilateral** lender
 1. Superior enforcement
[de-facto seniority]
 2. Bargained terms
[price and quantity]
 3. Short-maturity loans
- Prime example: Central Bank **swap** lines
(Horn et al., 2021)
- Focus on the **interaction** between both funding sources



Evaluating Senior Official Creditors

Quantitative sovereign debt model with

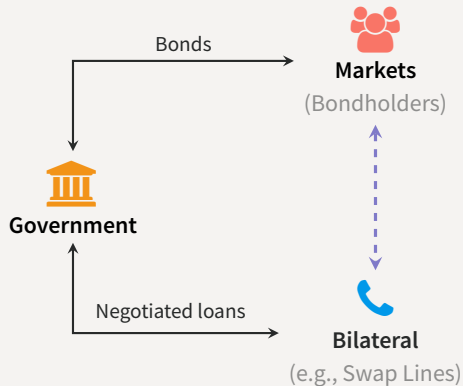
- Competitive creditors in private **markets**
- Large **bilateral** lender
 1. Superior enforcement
[de-facto seniority]
 2. Bargained terms
[price and quantity]
 3. Short-maturity loans
- Prime example: Central Bank **swap** lines
(Horn et al., 2021)
- Focus on the **interaction** between both funding sources



Evaluating Senior Official Creditors

Quantitative sovereign debt model with

- Competitive creditors in private **markets**
- Large **bilateral** lender
 1. Superior enforcement
[de-facto seniority]
 2. Bargained terms
[price and quantity]
 3. Short-maturity loans
- Prime example: Central Bank **swap** lines
(Horn et al., 2021)
- Focus on the **interaction** between both funding sources



Main findings

- Bilateral loans have significant effects on equilibrium outcomes
 - ... provide funding when other sources dry up (e.g. because of default risk) ▲
 - ... can also incentivize more **risk-taking** ▼
- If the rate on bilateral loans is decreasing in *market* debt [cross-elasticity]
 - ... government issues market debt more quickly, delevers more slowly
 - ... spends longer in the risky region
 - ... defaults more frequently
- Cross-elasticity can emerge endogenously from **bargaining** ☞
 - ... at plausible values for bargaining weights
 - ... increased frequency of defaults dominates extra liquidity
 - ... **welfare losses** for the government

Relational Overborrowing

Main findings

- Bilateral loans have significant effects on equilibrium outcomes
 - ... provide funding when other sources dry up (e.g. because of default risk) ▲
 - ... can also incentivize more **risk-taking** ▼
- If the rate on bilateral loans is decreasing in *market* debt [cross-elasticity]
 - ... government issues market debt more quickly, delevers more slowly
 - ... spends longer in the risky region
 - ... defaults more frequently
- Cross-elasticity can emerge endogenously from **bargaining** ☞
 - ... at plausible values for bargaining weights
 - ... increased frequency of defaults dominates extra liquidity
 - ... **welfare losses** for the government

Main findings

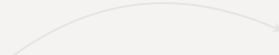
- Bilateral loans have significant effects on equilibrium outcomes
 - ... provide funding when other sources dry up (e.g. because of default risk) ▲
 - ... can also incentivize more **risk-taking** ▼
- If the rate on bilateral loans is decreasing in *market* debt [cross-elasticity]
 - ... government issues market debt more quickly, delevers more slowly
 - ... spends longer in the risky region
 - ... defaults more frequently
- Cross-elasticity can emerge endogenously from **bargaining** ☞
 - ... at plausible values for bargaining weights
 - ... increased frequency of defaults dominates extra liquidity
 - ... **welfare losses** for the government

- 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**

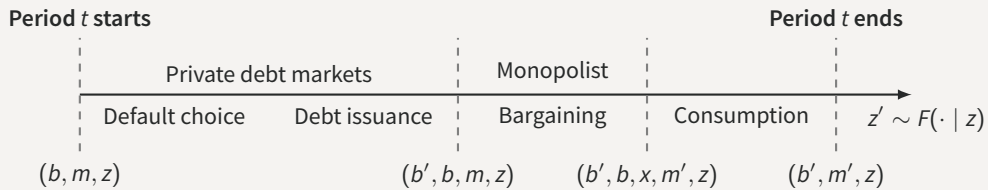

$$x = \frac{1}{1+r} m' - m$$

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**


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

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 loans, 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

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

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 loans, 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

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

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 loans, 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

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

$$m' = m'(b', b, m, z)$$

$$b'' = b'(b', m', z')$$

same sdf as monopolist

Bargaining Stage with Monopolist

- At state z , owing debt b bonds and m on the loan 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 $B(b', b, m, z) = q(b', b, m, z)(b' - (1 - \delta)b) - \kappa b$

Bargaining Stage with Monopolist

- At state z , owing debt b bonds and m on the loan 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

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

same sdf as markets

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

Bargaining Stage with Monopolist

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

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

- 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

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

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

Lender's surplus

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

- Low rates when value of relationship $\mathbb{E} [h(b', m', z') - h(b', 0, z')]$ is high

Government's surplus

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

- If default risk is low, not much role for monopolist
- Revenues from debt issuance $B(b', b, m, z)$ modulate the value of the threat point
... When $m - B(b', b, m, z)$ is large: government willing to borrow at high rates

Lender's surplus

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

- Low rates when value of relationship $\mathbb{E} [h(b', m', z') - h(b', 0, z')]$ is high

Government's surplus

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

- If default risk is low, not much role for monopolist
- Revenues from debt issuance $B(b', b, m, z)$ modulate the value of the threat point
... When $m - B(b', b, m, z)$ is large: government willing to borrow at high rates

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

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

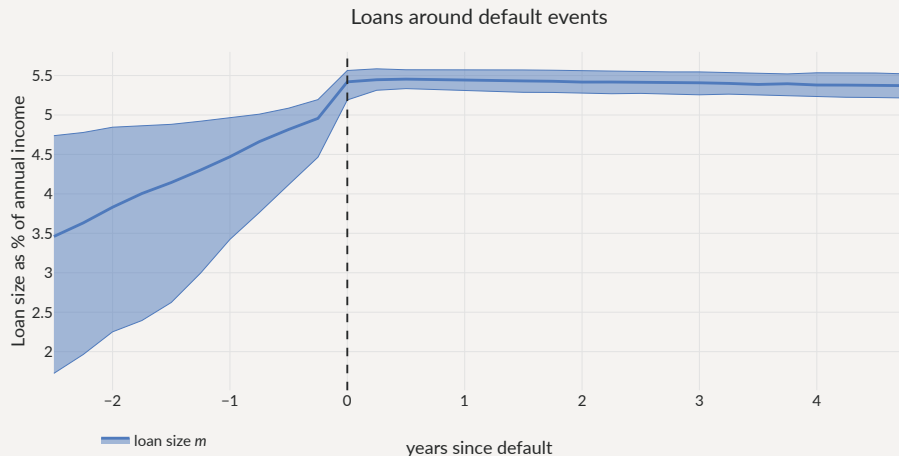
	Parameter	Value
Sovereign's discount factor	β	0.9504
Sovereign's risk aversion	γ	2
Preference shock scale parameter	χ	0.02
Lender's bargaining power	θ	0.5
Risk-free interest rate	r	0.01
Duration of debt	δ	0.05
Income autocorrelation coefficient	ρ_z	0.9484
Standard deviation of y_t	σ_z	0.02
Reentry probability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

Limiting Loans in Default

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

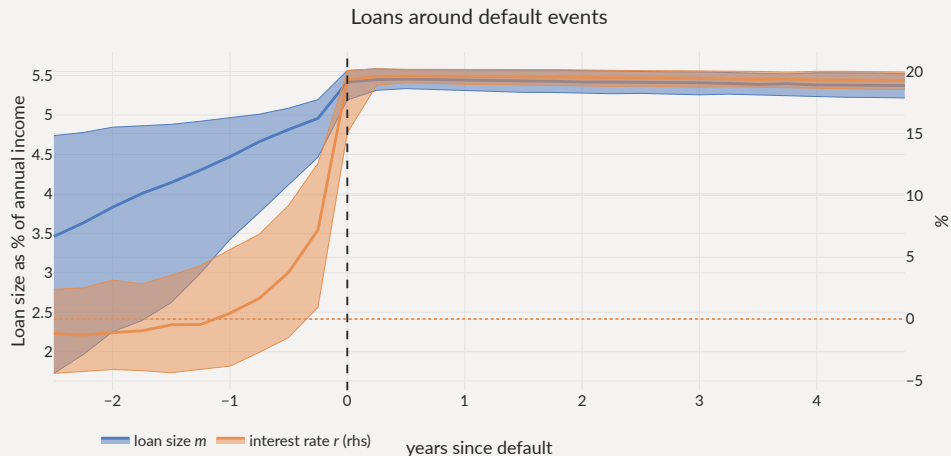
	Only market	Unrestricted, $\theta = 0.5$	Limited, $\theta = 0.5$
Avg spread (bps)	714	2,105	1,038
Std spread (bps)	399	1,331	612
$\sigma(c)/\sigma(y)$ (%)	113	109	113
Debt to GDP (%)	22.5	21.2	22.5
Loan to GDP (%)	0	3.02	1.06
Loan spread (bps)	–	-429	536
Corr. loan & spreads (%)	–	67.5	71.1
Default frequency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

- Loans shoot up before *and during* defaults



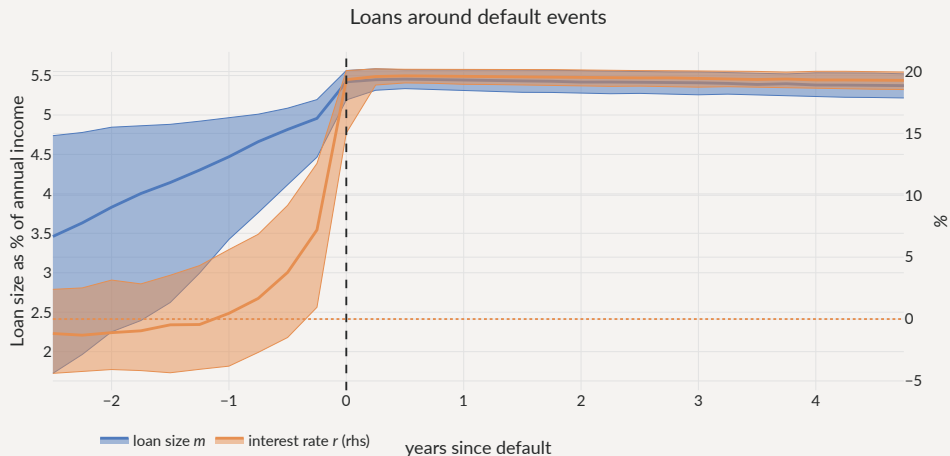
- Also consider **Limited** versions: $m' \leq \Gamma(m)$ while in default

- Loans shoot up before *and during* defaults



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

- Loans shoot up before *and during* defaults

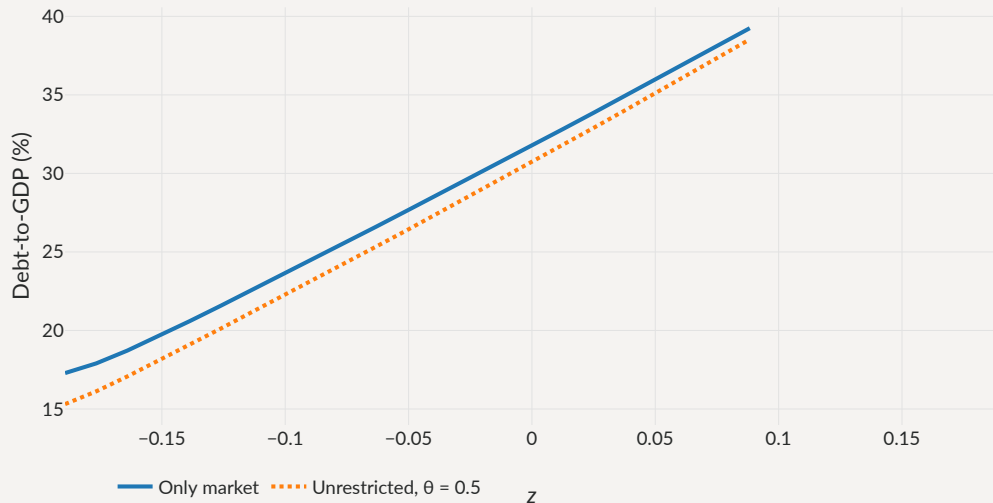


- Also consider **Limited** versions: $m' \leq \Gamma(m)$ while in default

Default Barriers with Loans

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

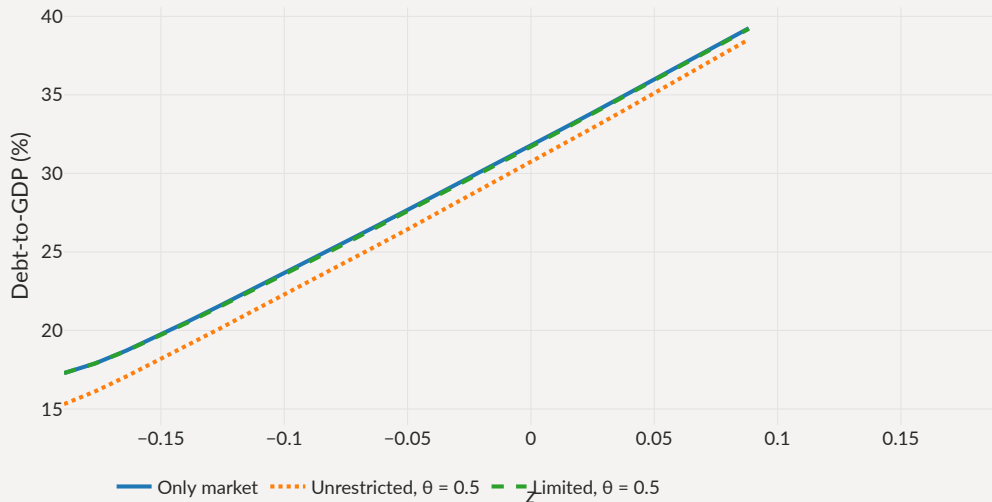
Debt levels at which $\mathcal{A}(b,m,z)$ crosses 50%



Default Barriers with Loans

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

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

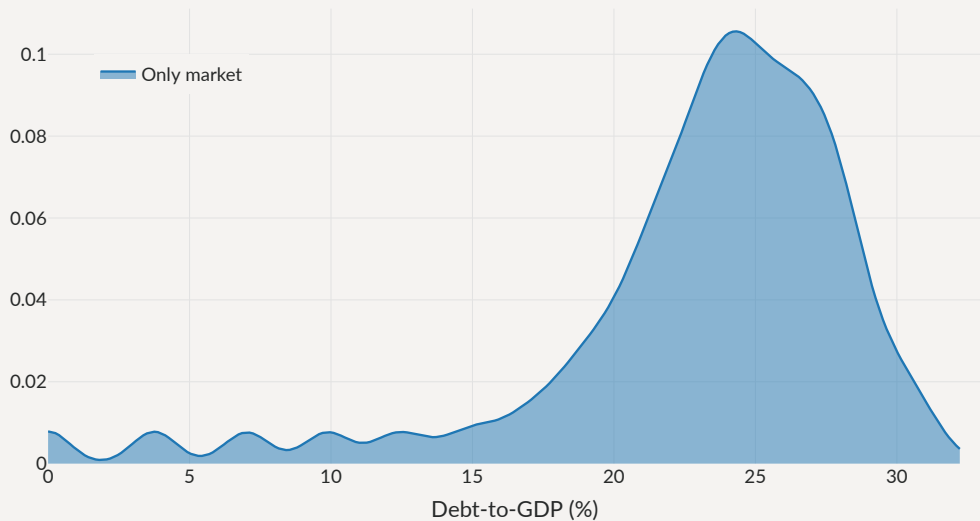


If Limited loans help repay the debt,

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

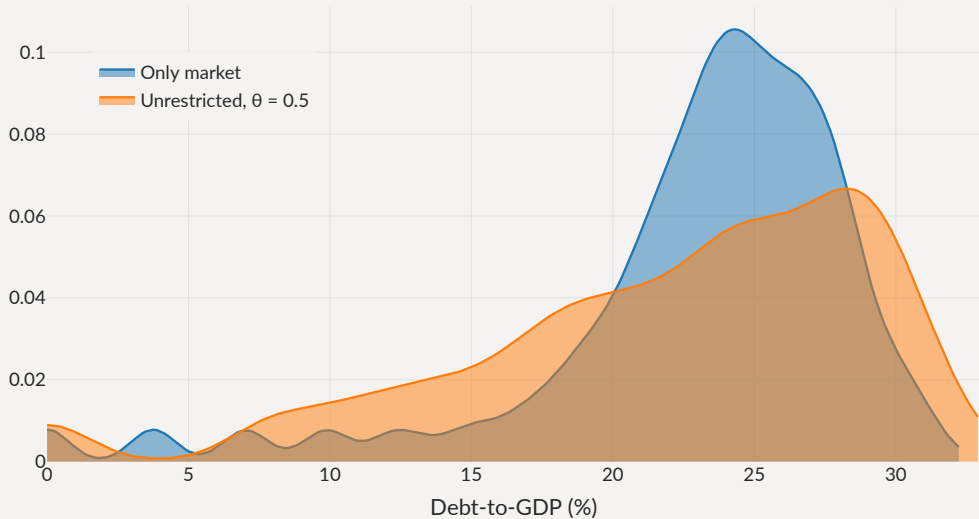
Debt Levels with Loans

Distribution of debt levels



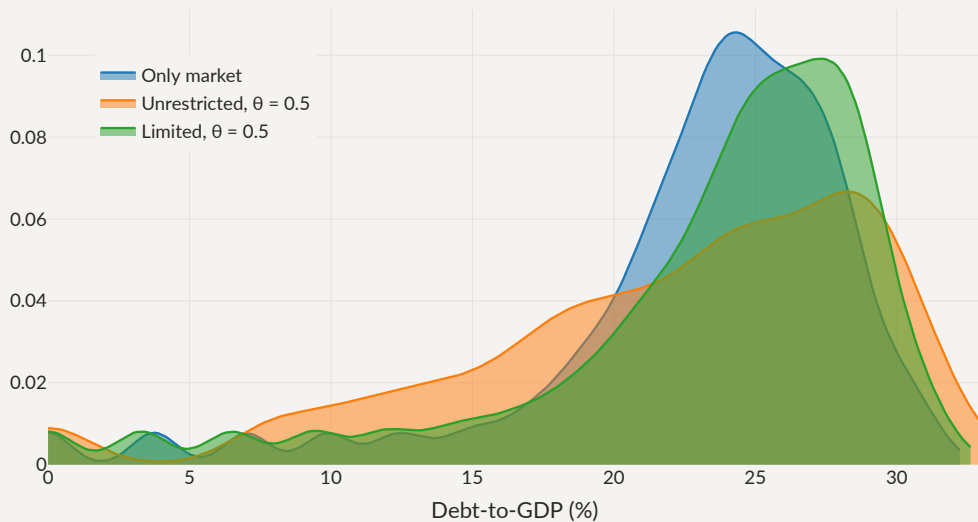
Debt Levels with Loans

Distribution of debt levels



Debt Levels with Loans

Distribution of debt levels



Government's surplus

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

- 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

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

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

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

Government's surplus

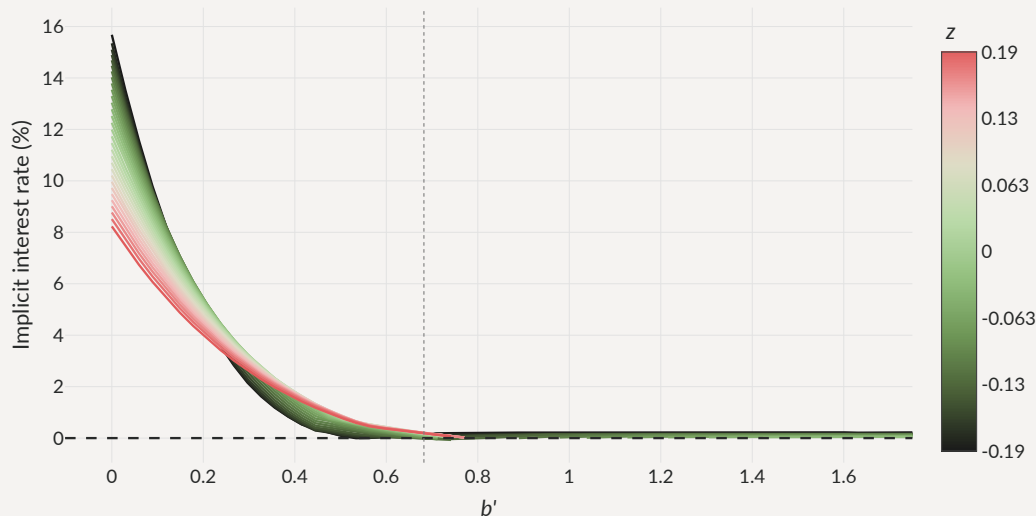
$$\mathcal{B}_R(b', b, x, m, m', z) = u(y(z) + B(b', b, m, z) + x) + \beta \mathbb{E} [v(b', m', z') \mid z] \\ - (u(y(z) + B(b', b, m, z) - m) + \beta \mathbb{E} [v(b', 0, z') \mid z])$$

- 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

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

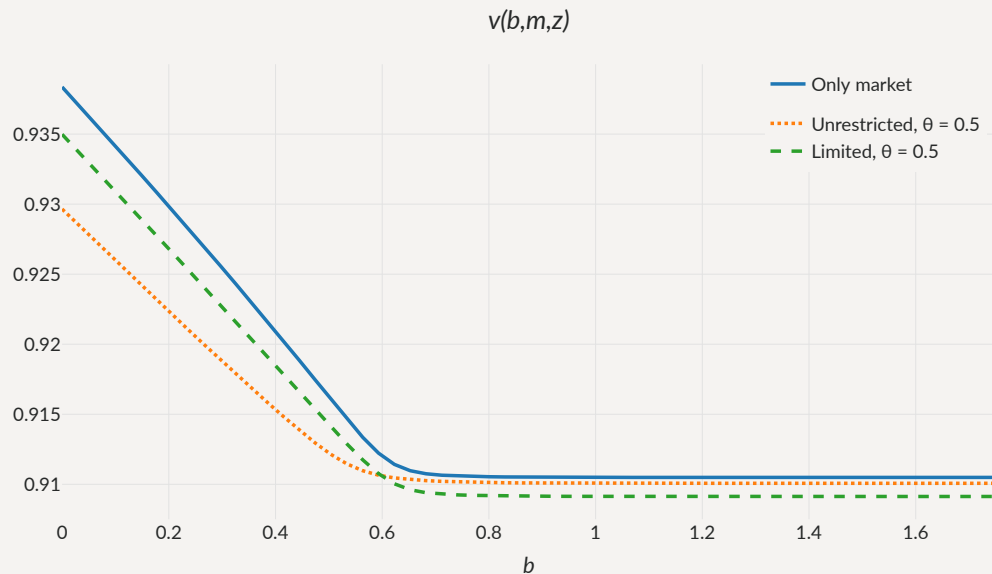
Surplus on loan requires spreads > 0 : monopolist provides **incentives** for risk taking

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

	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

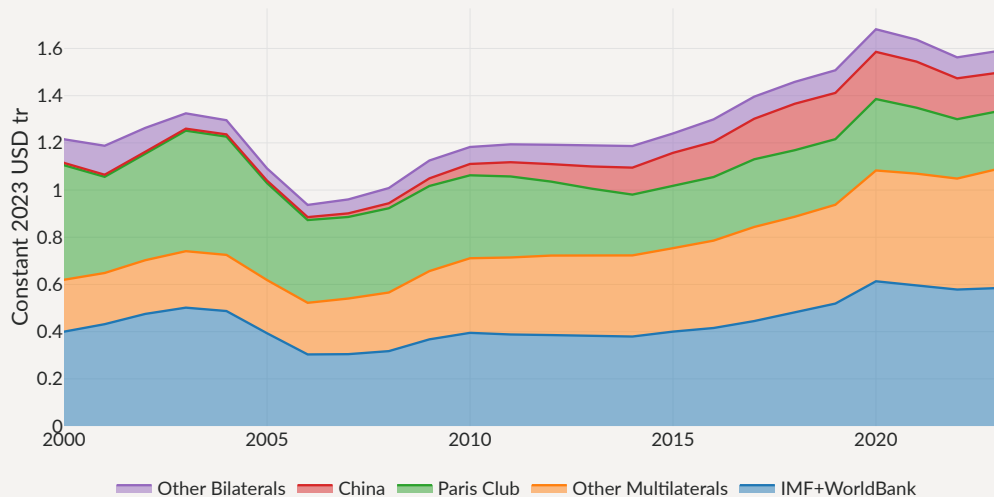
The Perils of Bilateral Sovereign Debt

- Simple model of borrowing from **markets** and a **senior bilateral lender**
 - ... **Dangerous** when bilateral interest rate responds negatively to *market* debt
 - ... Bargaining as an 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...



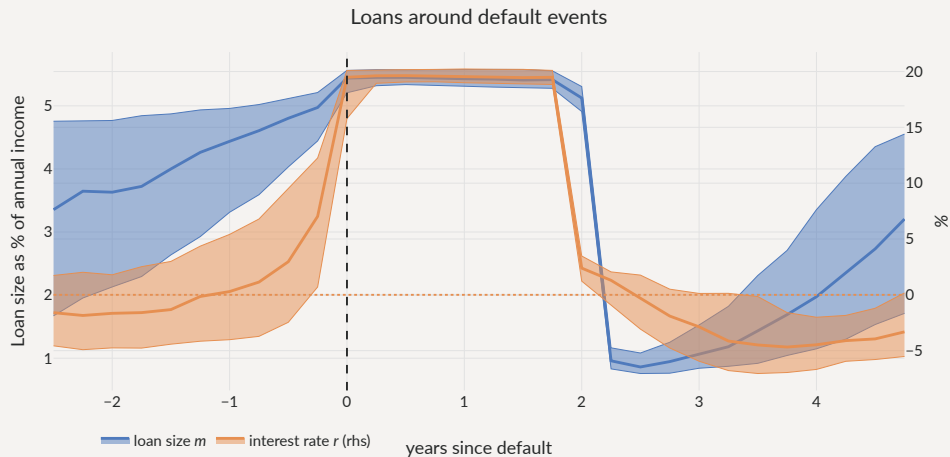
Scan to find the paper

Total Official Debt



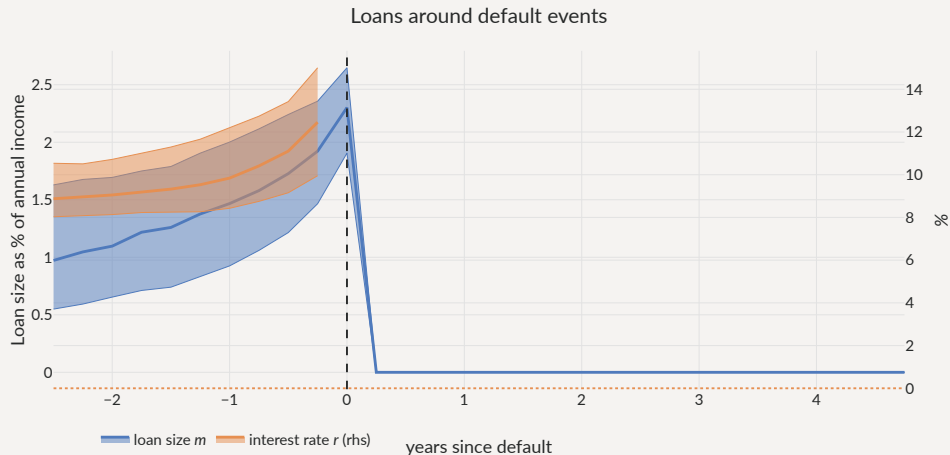
When is the Loan Used?

- Further conditioning on default events lasting exactly two years



When is the Loan Used?

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



Loan drawings m' (Limited)

