Central Bank Swap Lines as Bilateral Sovereign Debt

Francisco Roldán
IMF

César Sosa-Padilla
Notre Dame & NBER

St. Louis Fed brown bag seminar
March 2025

Uses of Swap Lines

- Swap line: two lines of credit involving two central banks
  - … Each makes available some of its own currency to the other, for a fixed term
  - … Short-term arrangements (typically one year, typically renewed)

- Used to mainly involve AEs Fed–ECB–BoE–BoJ–SNB
  - … to support lender-of-last-resort functions with multinational firms

- Large increase in bilateral swaps and loans involving EMs since early 2000s
  - … for EM, swap resources are hard currency
  - … for EM, swap can be used for financing BoP (or as borrowed reserves)
  - … EMs borrowing from swap lines tend to use different counterparts

Question How do swap lines interact with sovereign debt?

Uses of Swap Lines

- Swap line: two lines of credit involving two central banks
  … Each makes available some of its own currency to the other, for a fixed term
  … Short-term arrangements (typically one year, typically renewed)

- Used to mainly involve AEs   Fed–ECB–BoE–BoJ–SNB
  … to support lender-of-last-resort functions with multinational firms

- Large increase in bilateral swaps and loans involving EMs since early 2000s
  … for EM, swap resources are hard currency
  … for EM, swap can be used for financing BoP (or as borrowed reserves)
  … EMs borrowing from swap lines tend to use different counterparts

Question   How do swap lines interact with sovereign debt?

Uses of Swap Lines

- Swap line: two lines of credit involving two central banks
  - … Each makes available some of its own currency to the other, for a fixed term
  - … Short-term arrangements (typically one year, typically renewed)

- Used to mainly involve AEs Fed–ECB–BoE–BoJ–SNB
  - … to support lender-of-last-resort functions with multinational firms

- Large increase in bilateral swaps and loans involving EMs since early 2000s
  - … for EM, swap resources are hard currency
  - … for EM, swap can be used for financing BoP (or as borrowed reserves)
  - … EMs borrowing from swap lines tend to use different counterparts

Question How do swap lines interact with sovereign debt?

Uses of Swap Lines

- Swap line: two lines of credit involving two central banks
  - … Each makes available some of its own currency to the other, for a fixed term
  - … Short-term arrangements (typically one year, typically renewed)
- Used to mainly involve AEs — Fed–ECB–BoE–BoJ–SNB
  - … to support lender-of-last-resort functions with multinational firms
- Large increase in bilateral swaps and loans involving EMs since early 2000s
  - … for EM, swap resources are hard currency
  - … for EM, swap can be used for financing BoP (or as borrowed reserves)
  - … EMs borrowing from swap lines tend to use different counterparts

Question How do swap lines interact with sovereign debt?

How do Central Bank Swap Lines Affect the Market Structure of Sovereign Debt?

We abstract from currencies, collateral, and focus on the borrowing

Tradeoff

- Borrowing with bonds
  … interest rate reflects default risk

- Borrowing from the swap line
  … interest rate and drawings negotiated

!! Defaulting on the debt does not mean defaulting on the swap

How do Central Bank Swap Lines Affect the Market Structure of Sovereign Debt?

We abstract from currencies, collateral, and focus on the borrowing

Tradeoff

- Borrowing with bonds

  … interest rate reflects default risk

- Borrowing from the swap line

  … interest rate and drawings negotiated

!! Defaulting on the debt does not mean defaulting on the swap

How do Central Bank Swap Lines Affect the Market Structure of Sovereign Debt?

We abstract from currencies, collateral, and focus on the borrowing

Tradeoff

- Borrowing with bonds
  … interest rate reflects default risk

- Borrowing from the swap line
  … interest rate and drawings negotiated

!! Defaulting on the debt does not mean defaulting on the swap

A New Landscape for Sovereign Borrowing

- Swap lines are an *example* of a new type of sovereign borrowing arrangement
  - Short maturity but rolled over, with renegotiation
  - Difficult to default on — Central bank $\neq$ Treasury
  - Cheaper than borrowing on the market
- Other examples: Central bank deposits, bilateral loans, IMF programs…

Risk-taking Incentives and Relational Overborrowing

Main findings

- Swap drawings small relative to debt, but
  - Presence of swaps affects sovereign debt markets

    … can provide financing when other sources dry up

    … can increase risk-taking

- Lending around or in default maximizes surplus in swap negotiations
  - Availability of swaps in default:

    … raises the value of default

    … which increases the default frequency

    … and worsens borrowing terms in bond markets
  - Without restricting swaps in default, welfare losses for the government

- Swap lines induce relational overborrowing similar to the debt dilution problem
  - Surplus requires spreads — spreads require risk

Risk-taking Incentives and Relational Overborrowing

Main findings

- Swap drawings small relative to debt, but
  - Presence of swaps affects sovereign debt markets

    … can provide financing when other sources dry up

    … can increase risk-taking

- Lending around or in default maximizes surplus in swap negotiations
  - Availability of swaps in default:

    … raises the value of default

    … which increases the default frequency

    … and worsens borrowing terms in bond markets
  - Without restricting swaps in default, welfare losses for the government

- Swap lines induce relational overborrowing similar to the debt dilution problem
  - Surplus requires spreads — spreads require risk

Risk-taking Incentives and Relational Overborrowing

Main findings

- Swap drawings small relative to debt, but
  - Presence of swaps affects sovereign debt markets

    … can provide financing when other sources dry up

    … can increase risk-taking

- Lending around or in default maximizes surplus in swap negotiations
  - Availability of swaps in default:

    … raises the value of default

    … which increases the default frequency

    … and worsens borrowing terms in bond markets
  - Without restricting swaps in default, welfare losses for the government

- Swap lines induce relational overborrowing similar to the debt dilution problem
  - Surplus requires spreads — spreads require risk

Literature

- Central Bank swaps among advanced economies
  ... Bahaj and Reis (2021); Cesa-Bianchi, Eguren-Martin, and Ferrero (2022)
- Data on Central Bank swaps for EMs
  ... Perks, Rao, Shin, and Tokuoka (2021); Horn, Parks, Reinhart, and Trebesch (2023)
- Sovereign debt/default with interactions from 'official' debt
  ... Boz (2011), Hatchondo, Martinez, and Onder (2014), Arellano and Barreto (2024), Liu, Liu, and Yue (2025)

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 swap m each period
  … Involves a transfer x and a new loan size m'
  … Swap is non-defaultable $\Longrightarrow$ 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

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

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 swap m each period
  ... Involves a transfer x and a new loan size m'
  ... Swap 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

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

Warm-up: Bargaining with Monopolist Only

- At income state z and loan m, solve

Government surplus

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

Lender surplus

- Government (borrower) surplus

$$\mathcal{B}(x,m,m',z) = \underbrace{u(y(z)+x) + \beta\mathbb{E}\left[v(m',z') \mid z\right]}_{\text{agreement: receive } x, \text{ owe } m'} - \underbrace{\left(u(y(z)-m) + \beta\mathbb{E}\left[v(0,z') \mid z\right]\right)}_{\text{threat point: repay } m, \text{ clean slate}}$$

- Lender surplus

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

- Value functions $v(m,z)$ and $h(m,z)$ encode expected outcomes of future rounds

Warm-up: Bargaining with Monopolist Only

- At income state z and loan m, solve

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

- Government (borrower) surplus

$$\mathcal{B}(x,m,m',z) = \underbrace{u(y(z)+x) + \beta\mathbb{E}\left[v(m',z') \mid z\right]}_{\text{agreement: receive } x \text{, owe } m'} - \underbrace{\left(u(y(z)-m) + \beta\mathbb{E}\left[v(0,z') \mid z\right]\right)}_{\text{threat point: repay } m \text{, clean slate}}$$

- Lender surplus

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

- Value functions $v(m,z)$ and $h(m,z)$ encode expected outcomes of future rounds

Warm-up: Bargaining with Monopolist Only

- At income state z and loan m, solve

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

- Government (borrower) surplus

$$\mathcal{B}(x,m,m',z) = \underbrace{u(y(z)+x) + \beta\mathbb{E}\left[v(m',z') \mid z\right]}_{\text{agreement: receive } x\text{, owe } m'} - \underbrace{\left(u(y(z)-m) + \beta\mathbb{E}\left[v(0,z') \mid z\right]\right)}_{\text{threat point: repay } m\text{, clean slate}}$$

- Lender surplus

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

- Value functions $v(m,z)$ and $h(m,z)$ encode expected outcomes of future rounds

Warm-up: Bargaining with Monopolist Only

- At income state z and loan m, solve

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

- Government (borrower) surplus

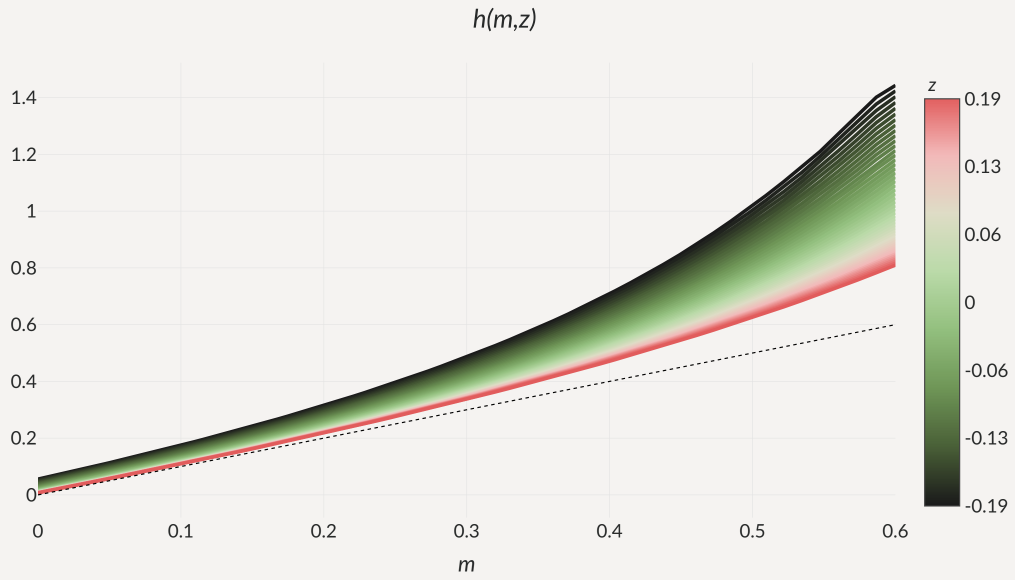
$$\mathcal{B}(x,m,m',z) = \underbrace{u(y(z)+x) + \beta\mathbb{E}\left[v(m',z') \mid z\right]}_{\text{agreement: receive } x\text{, owe } m'} - \underbrace{(u(y(z)-m) + \beta\mathbb{E}\left[v(0,z') \mid z\right])}_{\text{threat point: repay } m\text{, clean slate}}$$

- Lender surplus

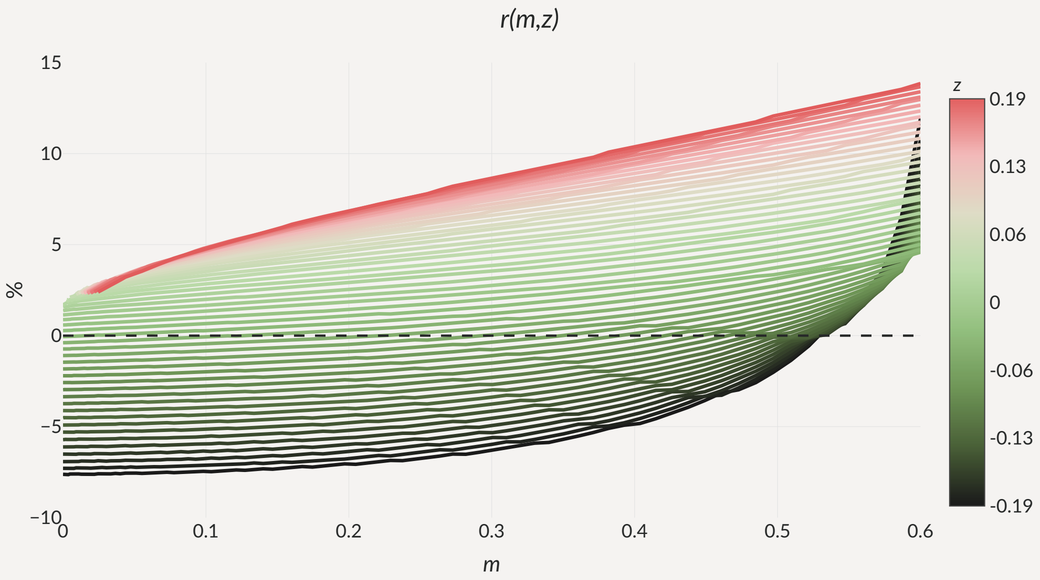
$$\mathcal{L}(x,m,m',z) = \underbrace{a - x + \beta_L\mathbb{E}\left[h(m',z') \mid z\right]}_{\text{agreement}} - \underbrace{(a+m+\beta_L\mathbb{E}\left[h(0,z') \mid z\right])}_{\text{threat point}}$$

- Value functions $v(m,z)$ and $h(m,z)$ encode expected outcomes of future rounds

Monopolist Terms: Lender's Value Function



Monopolist Terms: Implicit Interest Rate



Monopolist Terms: Takeaways

key requirement:
threat point value decreasing in m

The threat point is less 'credible' when m is large

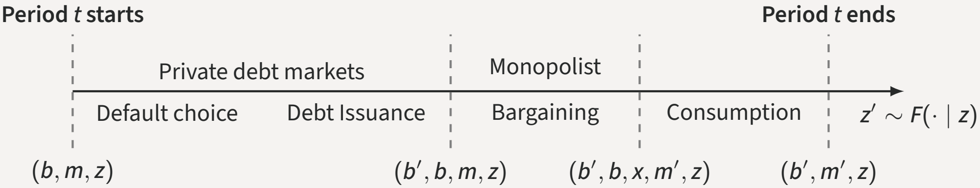
- This creates convexity in the lender's value function

  … making the lender act 'as if' risk-loving

- The lender initially subsidizes the loan to induce indebtedness and high profits
  - Gamble for debt overhang

- Initial subsidy and high rates consistent with B's risk aversion – 'Participation constraint'

Timeline of Events



Borrowing from Markets

- Debt is a geometrically-decaying coupon

  … for each unit, get q, pay $\kappa, (1-\rho)\kappa, \ldots (1-\rho)^{s-1}\kappa$
- Government enters first stage owing b in debt, m in swaps, income state z

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

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

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

Borrowing from Markets

- Debt is a geometrically-decaying coupon

  … for each unit, get q, pay $\kappa, (1-\rho)\kappa, \ldots (1-\rho)^{s-1}\kappa$

- 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

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

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

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

Borrowing from Markets

- Debt is a geometrically-decaying coupon

  … for each unit, get q, pay $\kappa, (1-\rho)\kappa, \dots (1-\rho)^{s-1}\kappa$

- Government enters first stage owing b in debt, m in swaps, income state z

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

$$v_R(b, m, z) = \max_{b'} w_R(b', b, m, z)$$

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

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

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

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

same sdf as monopolist

Bargaining Stage with Monopolist

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

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

$$- \underbrace{\left(u\left(y(z) + B(b', b, m, z) - m\right) + \beta \mathbb{E}\left[v(b', 0, z') \mid z\right]\right)}_{\text{threat point}}$$

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

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

same sdf as markets

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

- Government's surplus

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

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

Bargaining Stage with Monopolist

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

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

- 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

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

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

Bargaining: Intuition

Lender's surplus

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

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

Government's surplus

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

- 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

Bargaining: Intuition

Lender's surplus

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

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

Government's surplus

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

- 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 Swap Lines

Calibration

- Calibrate to Argentina without swaps (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	ρ	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 without swaps (as in Roch & Roldán, 2023)

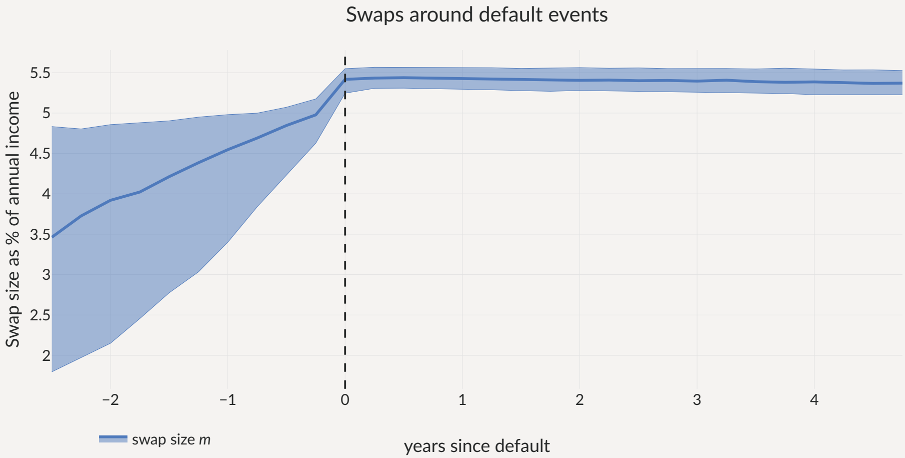
	Parameter	Value
Sovereign's discount factor	β	0.9504
Sovereign's risk aversion	γ	2
Preference shock scale parameter	χ	0.02
Lender's bargaining power	θ	0.5
Risk-free interest rate	r	0.01
Duration of debt	ρ	0.05
Income autocorrelation coefficient	ρ_z	0.9484
Standard deviation of y_t	σ_z	0.02
Reentry probability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

How Do Swaps Affect Equilibrium?

	No swap	Unrestricted, $\theta = 0.25$	Unrestricted, $\theta = 0.5$
Avg spread (bps)	804	1841	2396
Std spread (bps)	470	1099	1541
$\sigma(c)/\sigma(y)$ (%)	111	111	110
Debt to GDP (%)	21.4	20.8	20.2
Swap to GDP (%)	0	3.74	3.32
Corr. swap & spreads (%)	–	53.8	62.2
Default frequency (%)	6.53	13.0	14.7
Welfare gains (rep)	–	-0.082%	-0.41%

When Is the Swap Used?

- Swaps shoot up before *and during* defaults

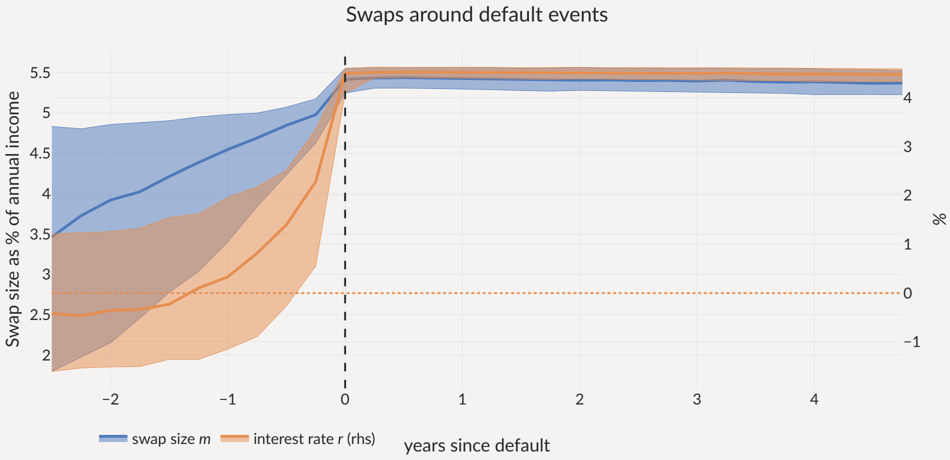


- Also consider Limited versions: $m' \leq \Gamma(m)$ while in default

When Is the Swap Used?

Limited More

- Swaps shoot up before *and during* defaults

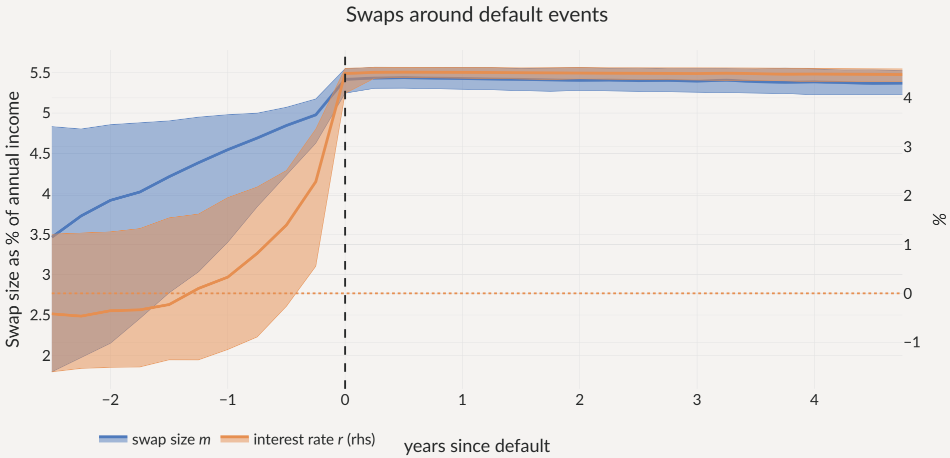


- Also consider Limited versions: $m' \leq \Gamma(m)$ while in default

When Is the Swap Used?

▸ Limited ▸ More

- Swaps shoot up before *and during* defaults



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

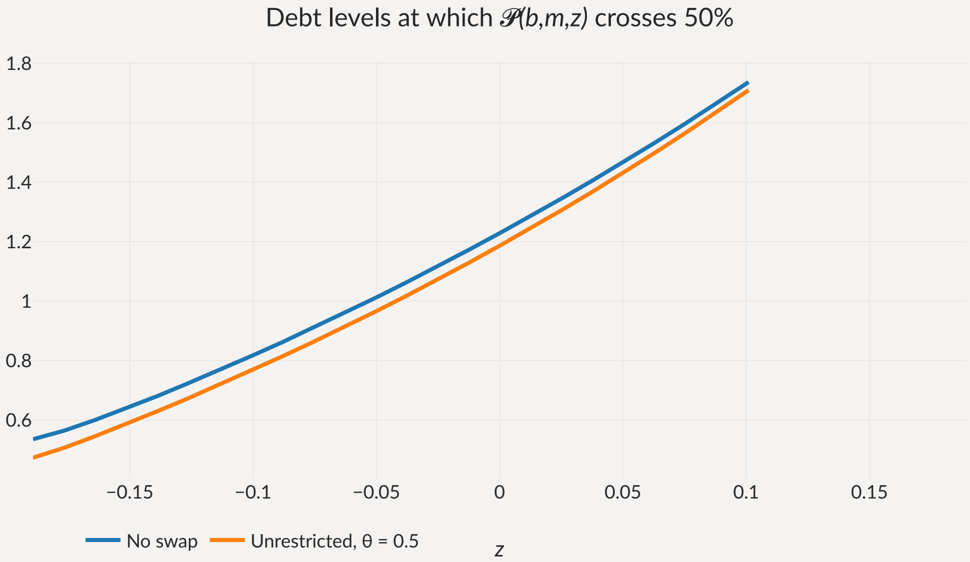
Limiting Swaps in Default

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

	No swap	**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
Swap to GDP (%)	0	3.32	1.05
Corr. swap & spreads (%)	–	62.2	69.4
Default frequency (%)	6.53	14.7	9.34
Welfare gains (rep)	–	-0.41%	-0.084%

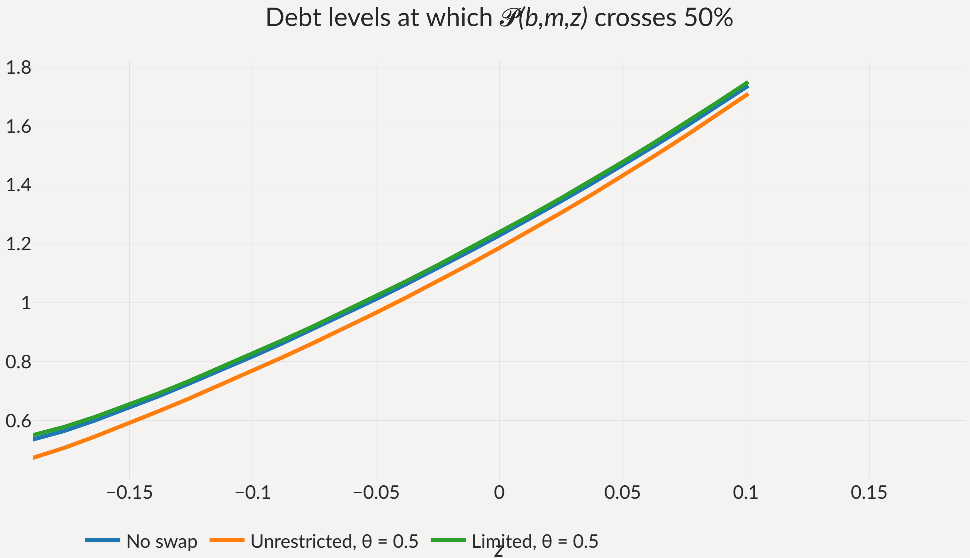
Default Barriers with Swaps

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



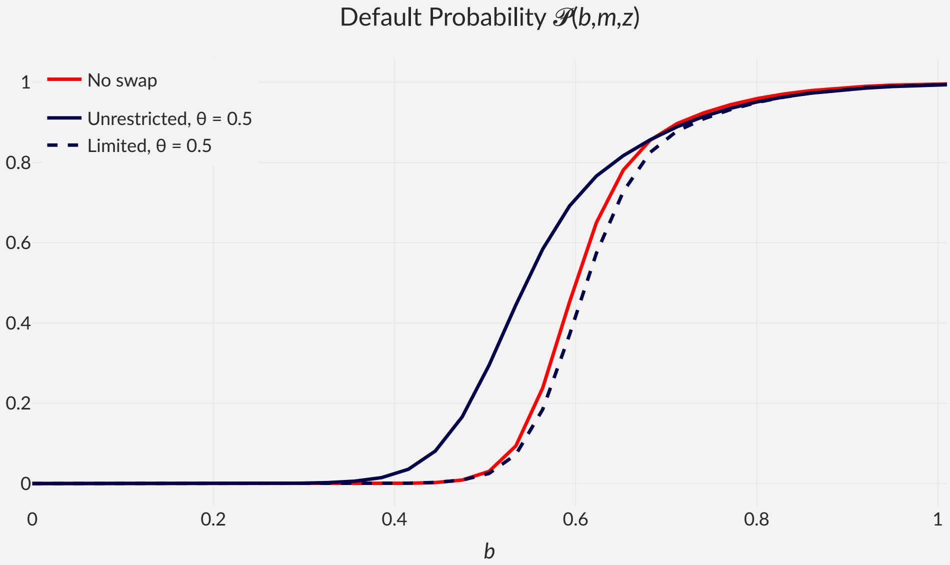
Default Barriers with Swaps

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



Debt Tolerance with Swaps

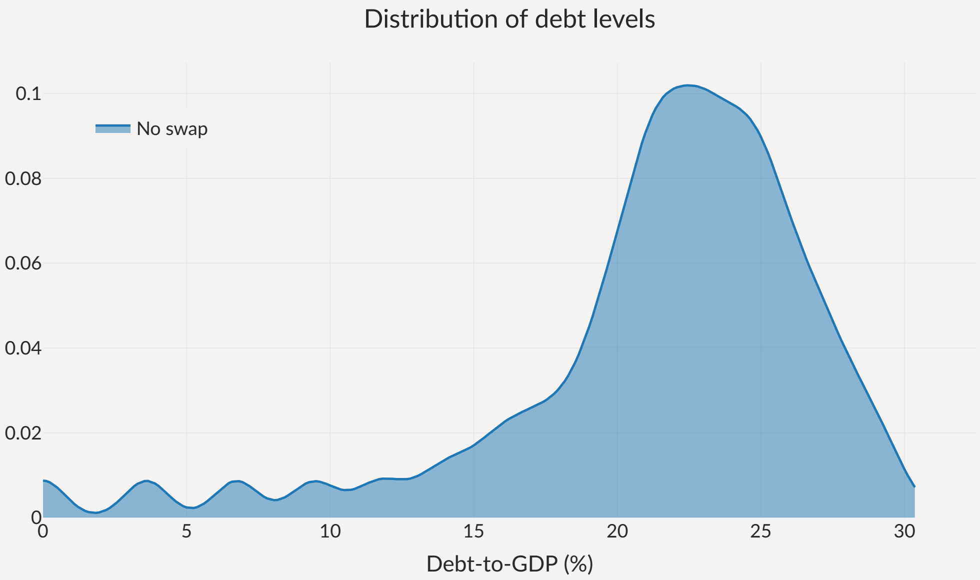
- **Unrestricted:** default more often, **Limited:** marginal impact



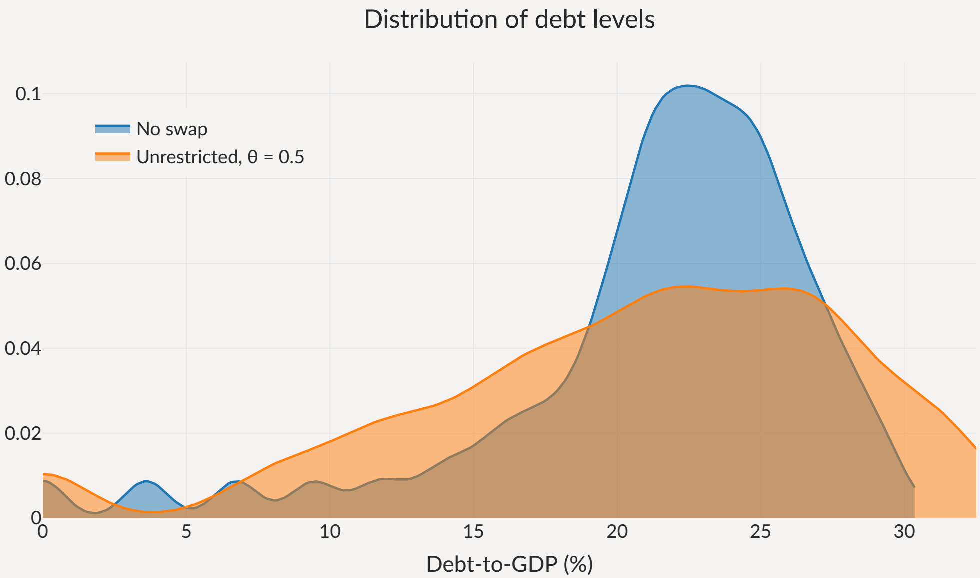
If **Limited** swaps help repay the debt,

Why are there more defaults with swaps?

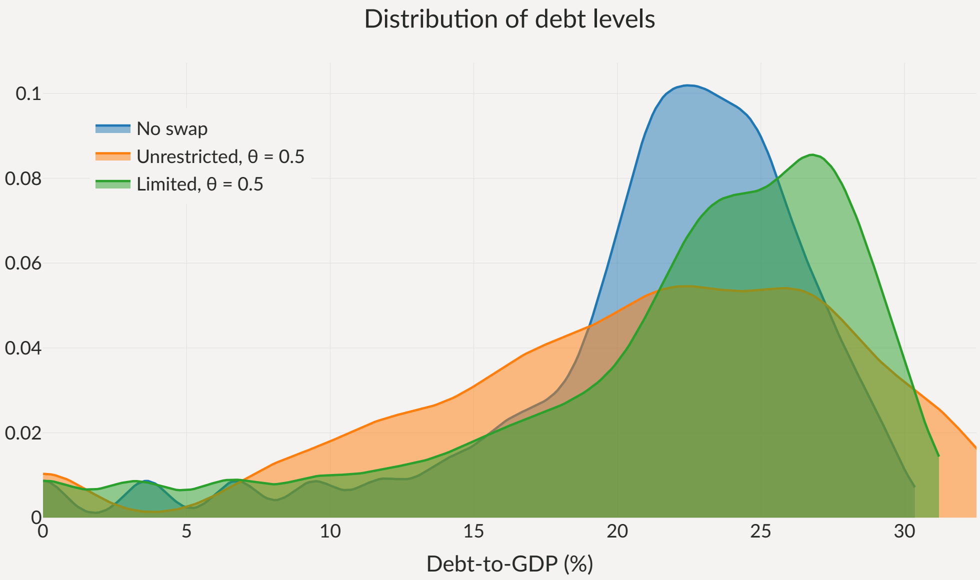
Debt Levels with Swaps



Debt Levels with Swaps

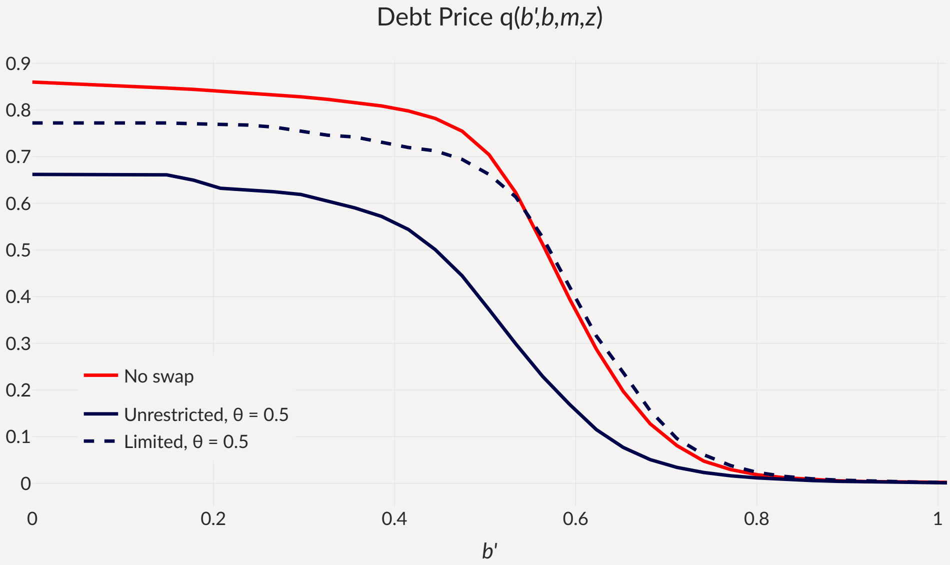


Debt Levels with Swaps



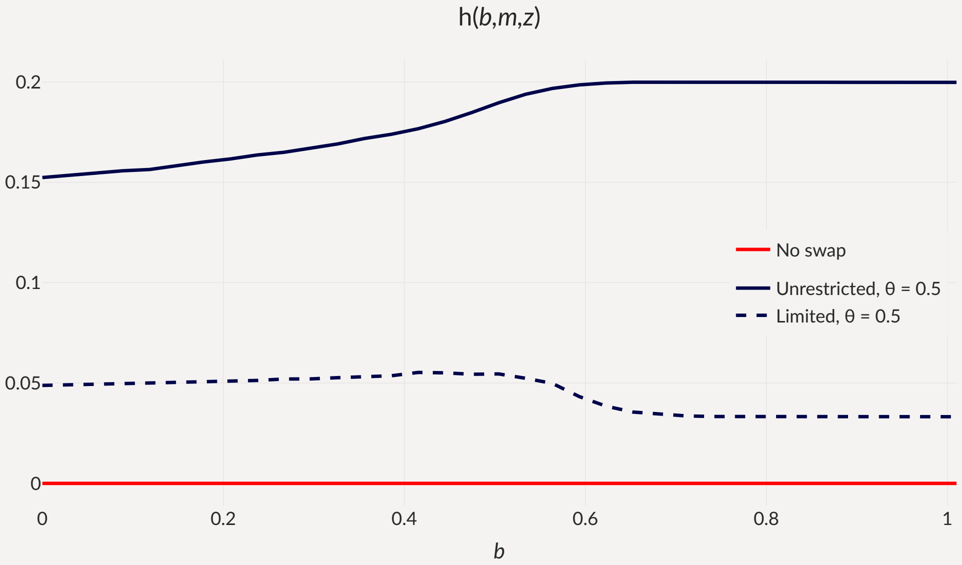
Debt Prices with Swaps

Lower prices with same default rates: relational overborrowing similar to debt dilution



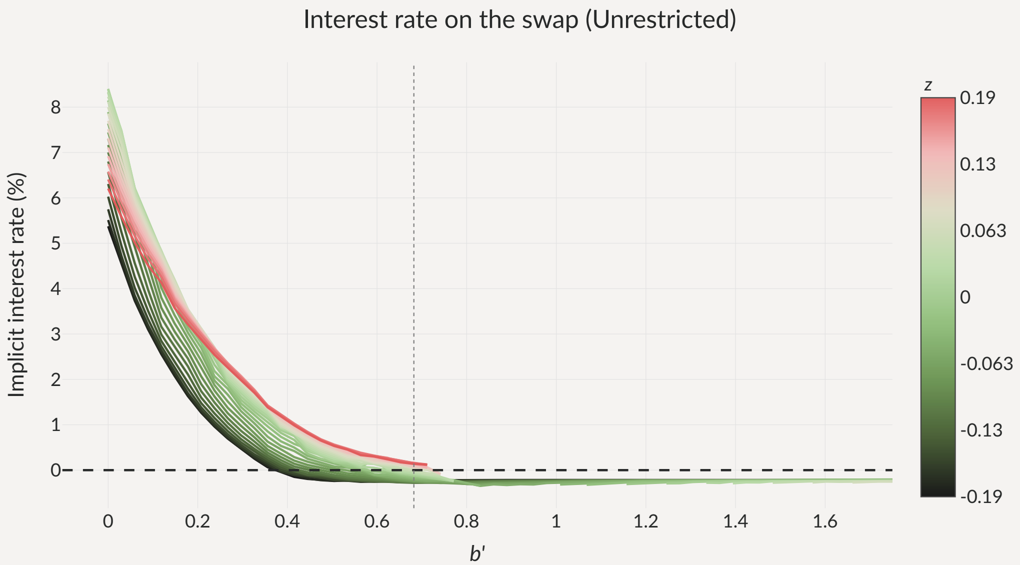
Monopolist's Profits

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



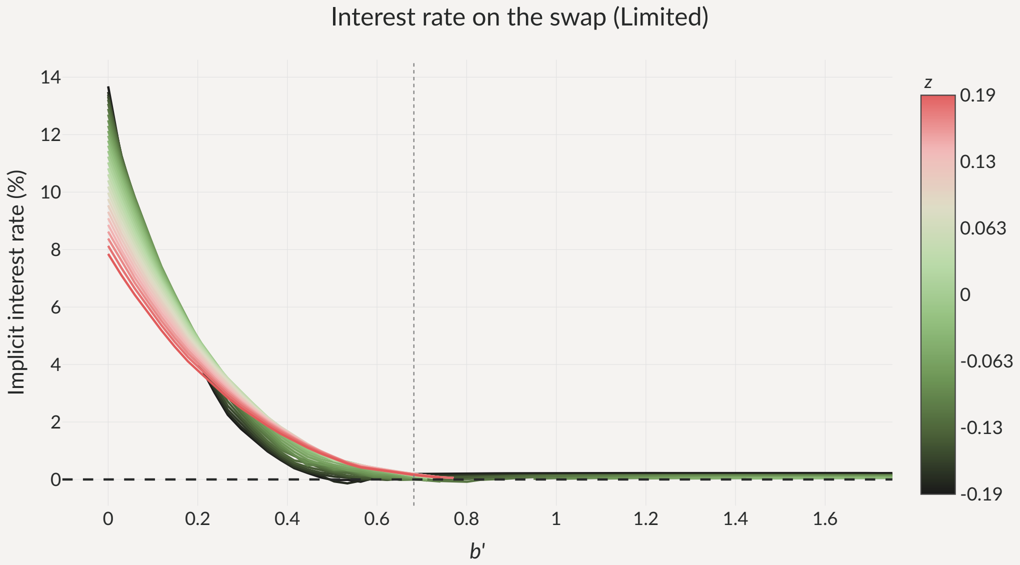
Risk-taking Incentives

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



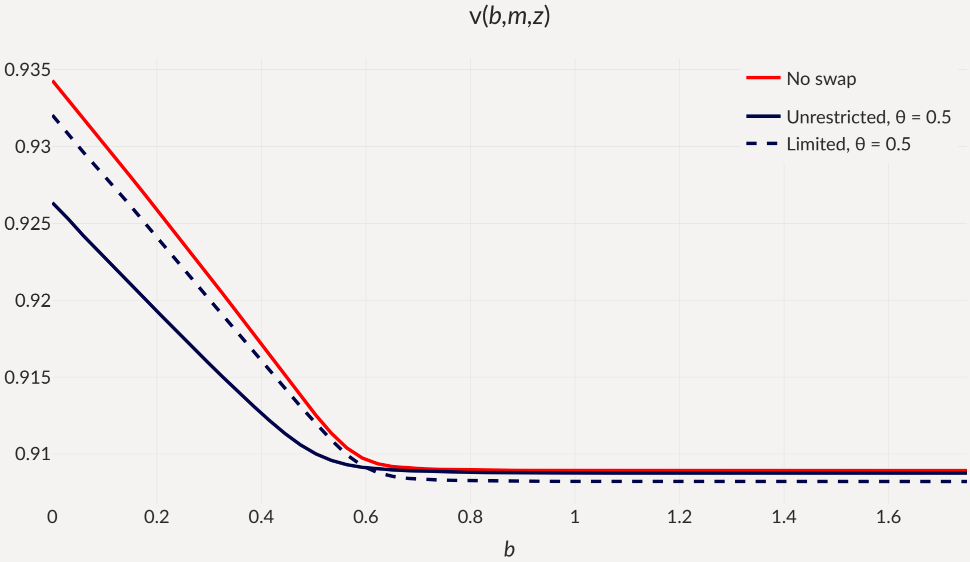
Risk-taking Incentives

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



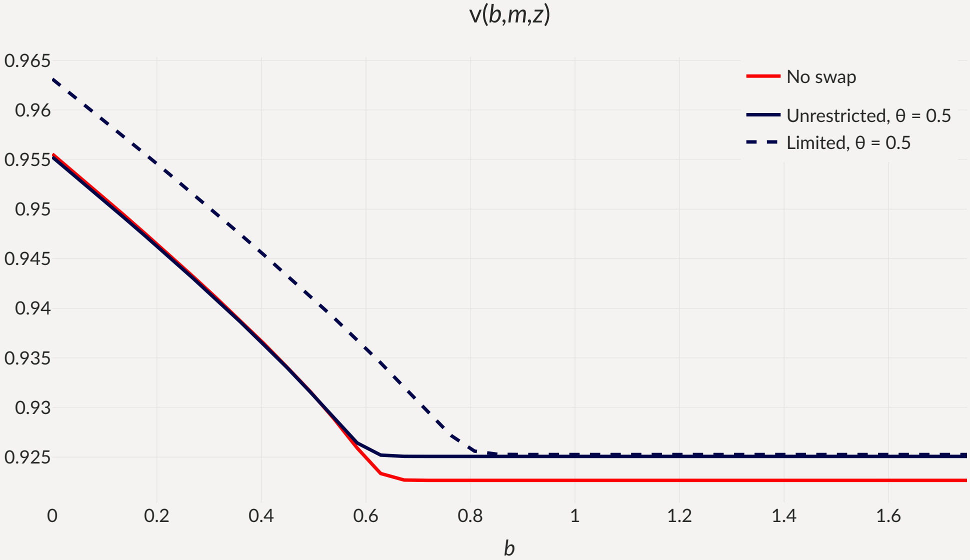
Welfare Effects of Swap Lines

Limited $\succcurlyeq$ Unrestricted, but…



Welfare Effects of Swap Lines — Short-term Debt

Short-term debt: swaps beneficial – interest on the swap small wrt to *whole* debt stock



Exogenous Terms for Bilateral Loan

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

	No swap	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
Swap to GDP (%)	0	2.32	1.37	1.05
Swap spread (bps)	–	836	2,267	408
Corr. swap & 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

The Perils of Bilateral Sovereign Debt

- Simple model with monopolist/fringe structure

- Strong interaction between two markets for sovereign debt

  … even if swaps are not used intensely on the equilibrium path

- Market power crucial in model

  … how to discipline in model?

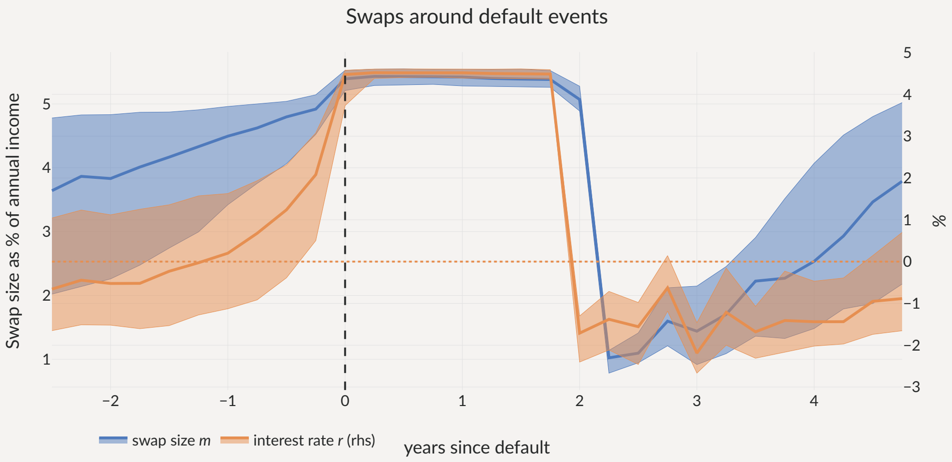
  … how to affect in reality?

- 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

When is the Swap Used?

- Further conditioning on default events lasting exactly two years



When is the Swap Used?

Back

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