

# Central Bank Swap Lines as Bilateral Sovereign Debt

---

Francisco Roldán  
IMF

César Sosa-Padilla  
Notre Dame

DebtCon 7  
PSE, May 2024

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

# Symmetric and Asymmetric Swap Lines

---

- **Swap** line: two lines of credit involving two central banks
  - ... Each makes available an amount 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-BoC
  - ... 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)

Question

How do swap lines interact with sovereign debt?

# Symmetric and Asymmetric Swap Lines

---

- **Swap** line: two lines of credit involving two central banks
  - ... Each makes available an amount 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-BoC
  - ... 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)

Question

How do swap lines interact with sovereign debt?

# Symmetric and Asymmetric Swap Lines

---

- **Swap** line: two lines of credit involving two central banks
  - ... Each makes available an amount 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-BoC
  - ... 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)

Question

How do swap lines interact with sovereign debt?

# Symmetric and Asymmetric Swap Lines

---

- **Swap** line: two lines of credit involving two central banks
  - ... Each makes available an amount 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-BoC
  - ... 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)

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



# The Dangers of Borrowing through Swap Lines

---

## 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 create overborrowing incentives similar to the debt dilution problem
  - Surplus requires spreads — spreads require risk

# The Dangers of Borrowing through Swap Lines

---

## 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 create overborrowing incentives similar to the debt dilution problem
  - Surplus requires spreads — spreads require risk

# The Dangers of Borrowing through Swap Lines

---

## 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 create overborrowing incentives similar to the debt dilution problem
  - Surplus requires spreads — spreads require risk

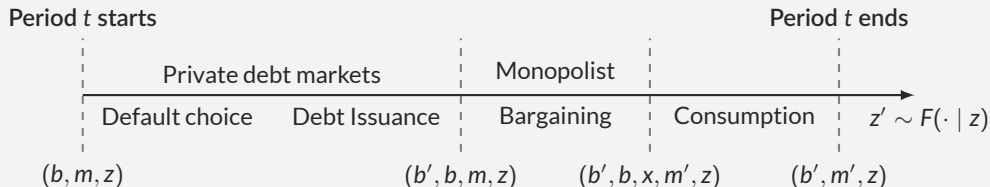
Model

---

# Timeline of events

## Two markets

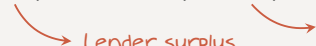
- Owe debt  $b$  in markets: long-term debt, geometrically-decaying coupons
- Owe drawn amount  $m$  to “monopolist” Central Bank [Total amount available =  $k$ ]



# Bargaining for swap line terms

- Nash bargaining over transfer  $x$  and amount owed/drawn  $m'$

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



## Lender surplus

- Interest rate:  $x = \frac{1}{1+r} m' - m$
- Expected profits from  $m'$

## Government surplus

- Extra **financing** after  $b'$
- Interest rate  $\neq$  default prob.

- Lender has pure **profit** motive ...and same *sdf* as private creditors  
... to focus on the effect of market structure
- Market **discipline**: monopolist cannot offer worse terms than private creditors

# Bargaining for swap line terms

- Nash bargaining over transfer  $x$  and amount owed/drawn  $m'$

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

Government surplus

## Lender surplus

- Interest rate:  $x = \frac{1}{1+r} m' - m$
- Expected profits from  $m'$

## Government surplus

- Extra **financing** after  $b'$
- Interest rate  $\neq$  default prob.

- Lender has pure **profit** motive ...and same *sdf* as private creditors  
... to focus on the effect of market structure
- Market **discipline**: monopolist cannot offer worse terms than private creditors

## Bargaining for swap line terms

- Nash bargaining over transfer  $x$  and amount owed/drawn  $m'$

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

### Lender surplus

- Interest rate:  $x = \frac{1}{1+r} m' - m$
- Expected profits from  $m'$

### Government surplus

- Extra **financing** after  $b'$
- Interest rate  $\neq$  default prob.

- Lender has pure **profit** motive ...and same *sdf* as private creditors  
... to focus on the effect of market structure
- Market **discipline**: monopolist cannot offer worse terms than private creditors



## Bargaining for swap line terms

- Nash bargaining over transfer  $x$  and amount owed/drawn  $m'$

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

### Lender surplus

- Interest rate:  $x = \frac{1}{1+r} m' - m$
- Expected profits from  $m'$

### Government surplus

- Extra **financing** after  $b'$
- Interest rate  $\neq$  default prob.

- Lender has pure **profit** motive ...and same *sdf* as private creditors  
... to focus on the effect of market structure
- Market **discipline**: monopolist cannot offer worse terms than private creditors

## Bargaining for swap line terms

- Nash bargaining over transfer  $x$  and amount owed/drawn  $m'$

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

### Lender surplus

- Interest rate:  $x = \frac{1}{1+r} m' - m$
- Expected profits from  $m'$

### Government surplus

- Extra financing after  $b'$
- Interest rate  $\neq$  default prob.

- Lender has pure profit motive ...and same *sdf* as private creditors  
... to focus on the effect of market structure
- Market discipline: monopolist cannot offer worse terms than private creditors

# Dynamics and Quantitative Implications

---

## When are gains from trade largest?

---

- Monopolist cannot offer **worse** terms than private creditors  
... Implicit interest rate on the swap cannot exceed that on bonds
- When debt is low and default is **unlikely**, private markets lend at close to  $r$   
... Little value added from the monopolist's presence
- When debt is less safe, **spreads** open up  $r^p > r$   
... Monopolist can offer better terms and make a profit  $r^p > r^m > r$
- **Twist**: monopolist can charge lower rates during debt accumulation episodes  
... Conversely, charge higher rates during debt deleveraging
- Bilateral relationship creates incentives for risk-taking and **overborrowing**

## When are gains from trade largest?

---

- Monopolist cannot offer **worse** terms than private creditors  
... Implicit interest rate on the swap cannot exceed that on bonds
- When debt is low and default is **unlikely**, private markets lend at close to  $r$   
... Little value added from the monopolist's presence
- When debt is less safe, **spreads** open up  $r^p > r$   
... Monopolist can offer better terms and make a profit  $r^p > r^m > r$
- **Twist:** monopolist can charge lower rates during debt accumulation episodes  
... Conversely, charge higher rates during debt deleveraging
- Bilateral relationship creates incentives for risk-taking and **overborrowing**

## When are gains from trade largest?

---

- Monopolist cannot offer **worse** terms than private creditors  
... Implicit interest rate on the swap cannot exceed that on bonds
- When debt is low and default is **unlikely**, private markets lend at close to  $r$   
... Little value added from the monopolist's presence
- When debt is less safe, **spreads** open up  $r^p > r$   
... Monopolist can offer better terms and make a profit  $r^p > r^m > r$
- **Twist**: monopolist can charge lower rates during debt accumulation episodes  
... Conversely, charge higher rates during debt deleveraging
- Bilateral relationship creates incentives for risk-taking and **overborrowing**

## When are gains from trade largest?

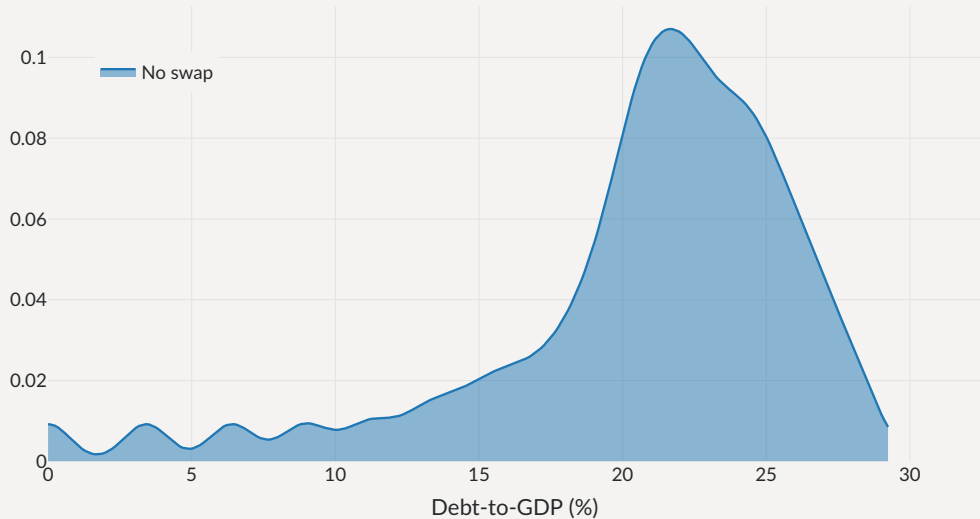
---

- Monopolist cannot offer **worse** terms than private creditors  
... Implicit interest rate on the swap cannot exceed that on bonds
- When debt is low and default is **unlikely**, private markets lend at close to  $r$   
... Little value added from the monopolist's presence
- When debt is less safe, **spreads** open up  $r^p > r$   
... Monopolist can offer better terms and make a profit  $r^p > r^m > r$
- **Twist**: monopolist can charge lower rates during debt accumulation episodes  
... Conversely, charge higher rates during debt deleveraging
- Bilateral relationship creates incentives for risk-taking and **overborrowing**

# Dynamics with swap lines

need to redo the graph with name Delevered

Distribution of debt levels

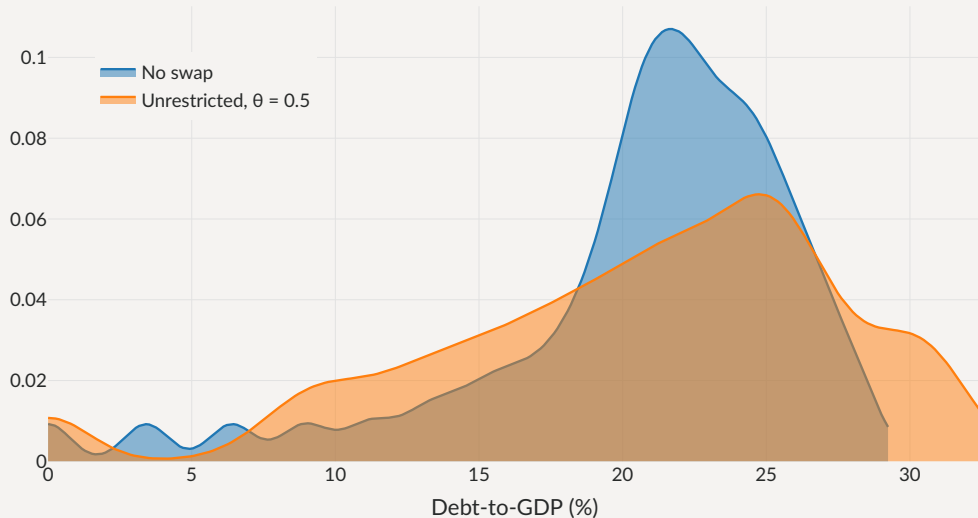




# Dynamics with swap lines

need to redo the graph with name Delevered

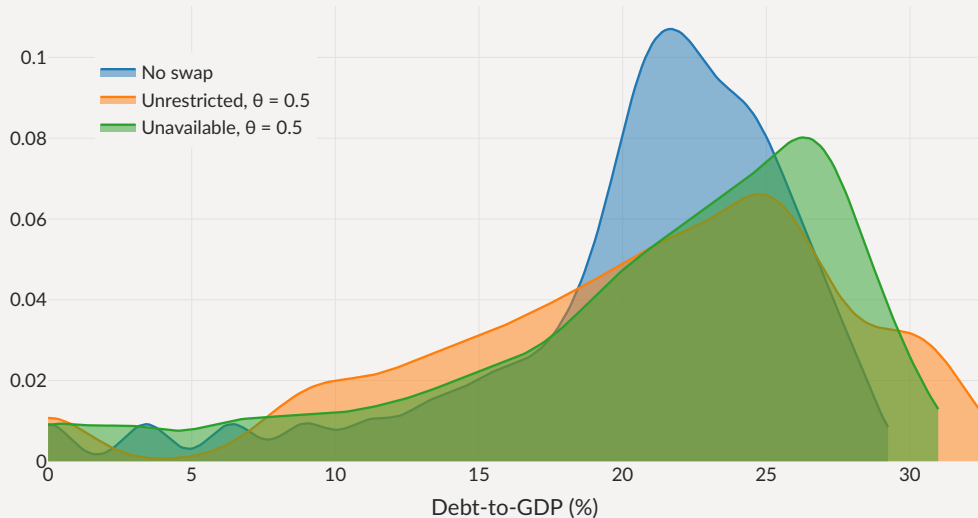
Distribution of debt levels



# Dynamics with swap lines

need to redo the graph with name Delevered

Distribution of debt levels



## Welfare effects of swap lines

	No swap	Unrestricted, $\theta = 0.5$	Delevered, $\theta = 0.5$
Avg spread (bps)	901	2447	1406
Std spread (bps)	532	1578	960
$\sigma(c)/\sigma(y)$ (%)	110	110	114
Debt to GDP (%)	20.5	19.6	20.5
Swap to GDP (%)	0	3.25	1.27
Corr. swap & spreads (%)	-	62.6	70.1
Default frequency (%)	7.07	15.2	10.7
Welfare gains (rep)	-	-0.36%	-0.22%

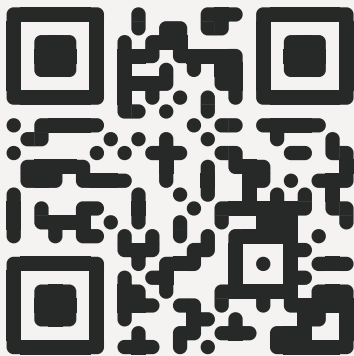
## Concluding Remarks

---

## Concluding remarks

---

- 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 — gains from fiscal rules, state-contingent debt?



*Scan to find the paper*