Official Sovereign Debt

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Introduction

- Emerging markets borrow heavily from official lenders (Schlegl-Trebesch-Wright 2019)

  - Official lenders largely bilateral governments

  - About half of all the sovereign debt is official

  - Flows in during disasters–wars, natural, financial (Horn-Trebesch-Reinhart 2020)

- Debt tends to increase during sovereign defaults

  (Arellano-MateosPlanas-RiosRull 2023, Benjamin-Wright 2009)

  - Default does not lead to a reduction in debt burden

Introduction

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    - ▶ Default does not lead to a reduction in debt burden

What is the role of official debt during sovereign defaults?

What we do

- ▶ Document patterns of official and private debt during defaults in emerging markets
    - ▶ Official debt flows in during sovereign defaults

- ▶ Framework of sovereign partial default with official and private debt
    - ▶ Private debt: shorter maturity (cross-acceleration clauses)
    - ▶ Official debt: lower recoveries (more concessional)
    - ▶ With partial default longer maturity debt is better for pledgeability
    - ▶ Can rationalize much of the patterns

Case Study: Peru
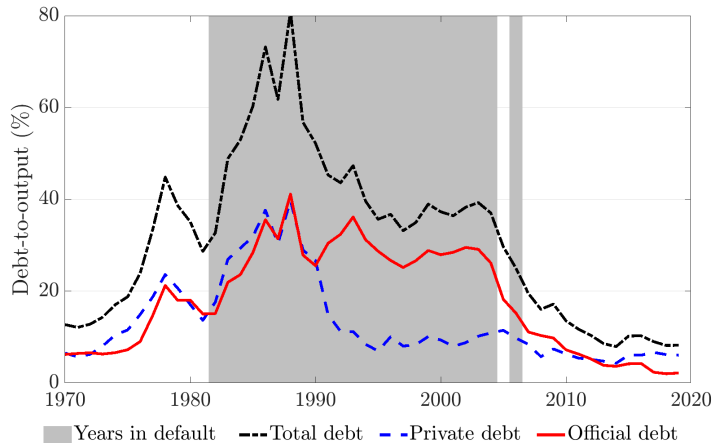
- ▶ Default: positive debt in arrears
- ▶ Total debt little change at the end of episode
- ▶ Official debt grew more during the episode: accounts for much of the debt at the end
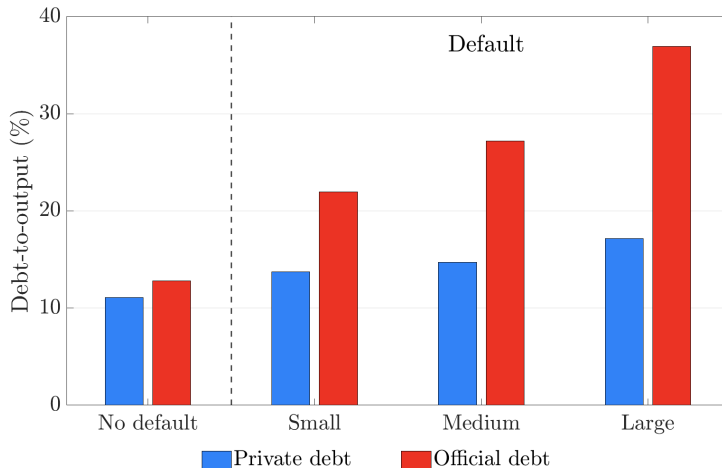
Debts during Defaults

30 countries, 50 years

	No default	Partial default
Partial default	0	32
Debt to output (in %)		
Total	23	44
Official	13	29
Private	11	15
Spreads	4	11
Output	2	-3

- ▶ Partial defaults (arrears/debt due) associated with higher debt, spreads, and lower output

- ▶ Official debt more than doubles during defaults

- ▶ Private debt increases only moderately

Debts during Default

▶ Official debt flows in during defaults, more so in severe defaults

Model: Environment

▶ Small open economy with stochastic endowment z_t that borrows internationally

▶ Borrows long-term from official lenders f_t and short-term from private lenders b_t

  ▶ Long-term official loans are perpetuities with decay ϑ

▶ Can partially default on its official d_t^f and/or private d_t^b debt coupons

  ▶ Defaults reduce income: cost depends on default intensities
  ▶ Fractions κ^f, κ^b of defaulted coupons accumulate as future debts
  ▶ Can continue to borrow official and private loans during defaults

▶ All lenders are risk-neutral and competitive, bond prices compensate for default risk

Sovereign Borrower

- Preferences over consumption $E \sum_{t=0}^{\infty} \beta^t u(c_t)$

- Consumption is income y_t net of repayment of debt service and borrowing

$$c_t = y_t - f_t(1 - \vartheta + r)(1 - d_t^f) - b_t(1 + r)(1 - d_t^b) + q_t^f \ell_t^f + q_t^b \ell_t^b$$

- Laws of motion for debts: legacy debts, new borrowings, accumulation of defaulted debt

$$f_{t+1} = \vartheta\, f_t + \ell_t^f + \kappa^f d_t f_t$$
$$b_{t+1} = \ell_t^b + \kappa^b d_t b_t$$

- Defaults d_t^f, d_t^b expand c_t but depress income: $y_t = z_t \psi(d_t^f, d_t^b, z_t) \leq z_t$

- Sovereign can always borrow, even with default, but prices q_t^f, q_t^b respond

Value and Bond Prices Functions

▶ State is $s = (f, b, z)$: $\qquad V(s) = \max_{\ell^f, \ell^b, d^f, d^b} \{u(c) + \beta E_z V(s')\}$

subject to budget constraint, laws of motion for debts

▶ Bond prices compensate lenders for default losses

▶ Private bond: default next period + value of accumulated arrears

$$q^b(f', b', z) = \frac{1}{1+r} E \left((1 - d^b(s'))(1+r) + \kappa^b d^b(s') q^b(f'', b'', z') \right)$$

▶ Official bond: default next period + value of accumulated arrears + future coupons

$$q^f(f', b', z) = \frac{1}{1+r} E \left((1 - d^f(s'))(1 - \vartheta + r) + \left[\kappa^f d^f(s') + \vartheta \right] q^f(f'', b'', z') \right)$$
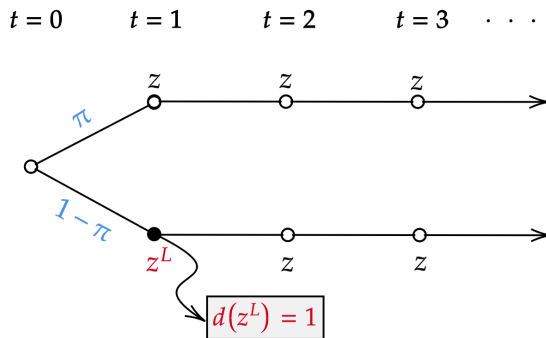
Official Debt Better for Pledgeability

- Consider $\kappa^f = \kappa^b = 0, \vartheta = 1$, binary $d^i = \{0, 1\}$, one time shock, official or private debt

- Key differences to standard model: market access during default + partial default
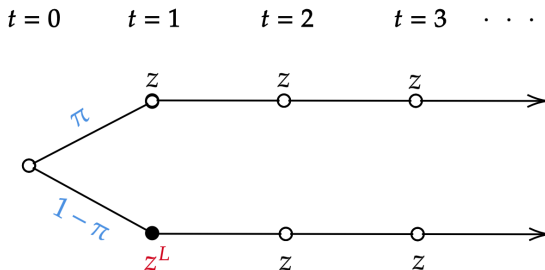
Official Debt Better for Pledgeability

▶ Default on coupon reduces $z_t \to z^L$, pledgeable resources for loans each period $z_t - z^L$

▶ Defaults allows for some state contingency

Official Debt Better for Pledgeability

Period 1:

- Risk free prices ($q^f = q^b = 1$) but with limits
- Private maximum loan: depends on default incentives in $t = 2$

$$q_1^b \ell_1^{b,\max} = \frac{z - z_L}{1 + r}$$

If repay:	$c_2 = z - (1+r)b_2 + q^b \ell_3^b$
If default:	$c_2 = z_L + q^b \ell_3^b$

- Official maximum loan: depends on legacy debt and default incentives in all future t

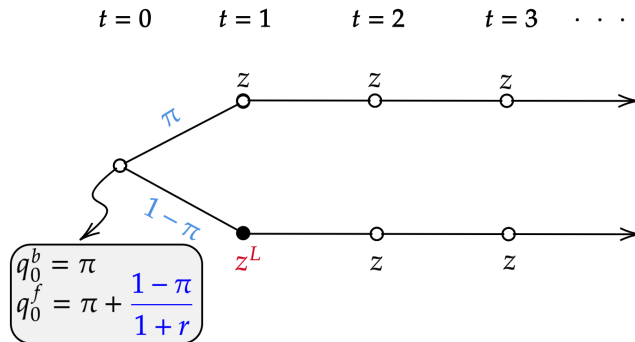|		
If repay:	$c_t = z - rf_t + q^f \ell_t^f,$	$f_{t+1} = f_t + \ell_t$
If default:	$c_t = z_L + q^f \ell_t^f,$	$f_{t+1} = f_t + \ell_t$

$$q_1^f \ell_1^{f,\max} = \frac{z - z_L}{r} - f_1,$$

- Rolling over private contracts cannot replicate pledgeability of official contracts (market access)

Official Debt Better for Pledgeability

Period 0:

▶ Price for official is higher: repayment after $t = 1$ default matters

$$t = 0 \qquad t = 1 \qquad t = 2 \qquad t = 3 \qquad \cdots$$

$$
\begin{aligned}
q_0^b &= \pi \\
q_0^f &= \pi + \frac{1-\pi}{1+r}
\end{aligned}
$$

Official Debt Better for Pledgeability

Period 0:

▶ Price for official is higher: repayment after $t = 1$ default matters

▶ So is maximum loan $\quad q_0^f \ell_0^{f,\max} = \left(\pi + \frac{1-\pi}{1+r}\right)\frac{z-z_L}{r}, \qquad q_0^b \ell_0^{b,\max} = \pi \frac{z-z_L}{1+r}$

▶ Partial default additional force that breaks the rollover chain
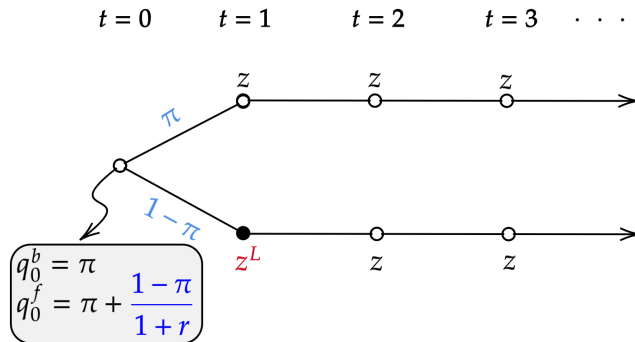
Quantitative Analysis

▶ Parameterize model to panel data of official and private debt and partial default

  ▶ Estimate 4 parameters and take others from literature–in progress

 Official debt: 10 year duration
  Private debt: 6 year duration

▶ Evaluate performance for debts during partial defaults

▶ Counterfactuals and welfare: reference model with only private debt

Moments in Model and Data

|	Data	Model
Total debt to output	32	31
Partial default	32	24
Debt service to debt		
Official	8	7
Private	14	14
Debt to output		
Official	20	23
Private	12	8
Partial Default		
Official	29	24
Private	29	13
Spreads	6	0.7
Corr(d^f, d^p)	72	80

▶ Debt service/debt informs debt duration (in model $= (1 - \vartheta + r)$)

▶ Model delivers higher official debt relative to private

▶ In model too little private partial default and smaller spreads (smaller private debt)

▶ Model delivers positive correlation of official and private default

Official and Private Debt Prices
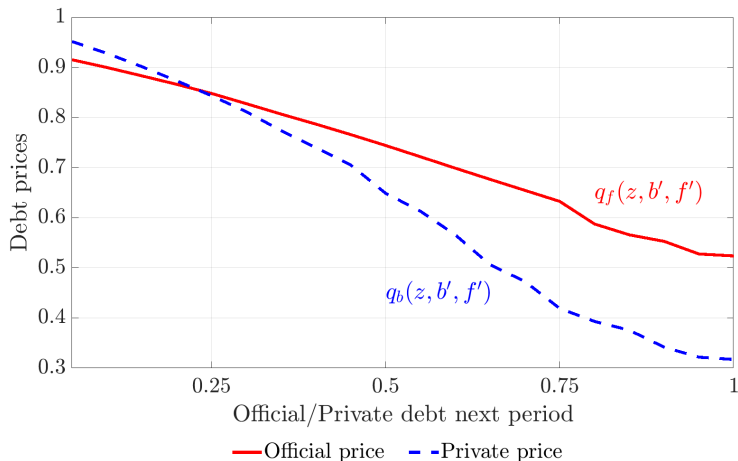
▶ The model validates better pleadgeability for official debt

Debts during Default
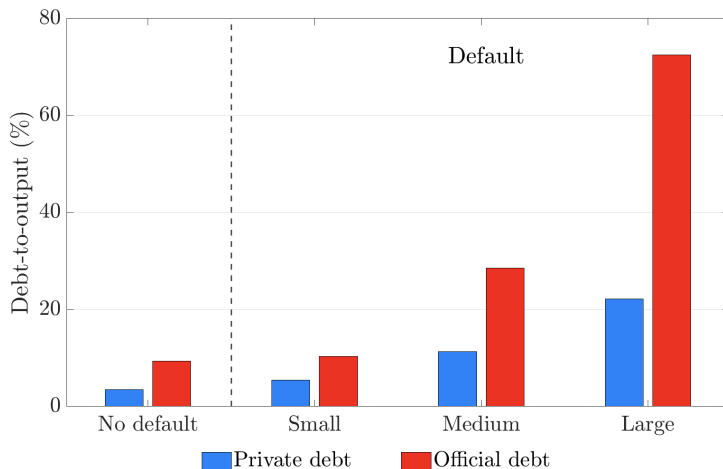
- ▶ Official debt flows in during defaults, more so in severe defaults
- ▶ Maturity difference very powerful in model

Role of Official Debt

		Baseline	Only Private
Mean			
	Total debt	32	20
	Partial default	24	21
	Default costs	0.3	0.2
	Spread	0.7	0.9
Std. Dev.	Consumption	0.90	0.93
Welfare	$(f = b = 0, \bar{z})$	1.0	0.999

▶ More sustainable debt but more default

▶ Private bonds do better with official

▶ Better insurance: lower consumption volatility

▶ Higher welfare (even higher if only official debt)

Conclusion

▶ Official loans support economies during sovereign defaults

▶ With partial default, longer official debt is better for pledgeability

▶ Welfare is higher with longer debt after all

▶ In progress:

   ▶ Cross-acceleration clauses for private bonds

   ▶ Swaps during defaults: private for official

   ▶ Lower recoveries

Debts during Defaults

	Data		Model	
	No default	Partial default	No default	Partial default
Partial default	0	32	0	24
Debt to output	23	44	11	50
Official	13	29	8	37
Private	11	15	3	13
Spreads	4	11	0.1	1.3
Output	2	-3	11	-10

▶ Debt increases during default, especially official debt, in model and data

▶ Spreads increase and output falls during default (in model: less intense spreads, more intense output)

Other

Default cost function: symmetric across both debts

$$y = z \, (1 - \gamma \, d_b^{\gamma_1})(1 - \gamma d_f^{\gamma_1})(1 - \mathcal{I}_{d>0}\gamma_2(z - z^*))$$