

Borrowing in the Shadow of China

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The views expressed herein are those of the authors and not necessarily those of the Federal Reserve Bank of Minneapolis, or the Federal Reserve System.

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Table: The Rise of Chinese Lending

	Borrowing countries	CHN debt over GDP (pct., median)	CHN debt over ext. debt (bondholders, median) (all lenders, median)	
2000	15	0.32	0.02	0.00
2005	61	0.42	0.16	0.01
2010	95	1.69	0.13	0.10
2015	102	5.19	0.69	0.27

Notes: Authors' calculations using dataset on Chinese overseas lending in Horn, Reinhart, and Trebesch (2020).

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- China has become a major official lender to developing countries
- Yet, developing nations' debt to China
 - is notoriously hard to estimate
 - gives substantial 'cancellation, acceleration, and stabilization' privileges to China
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- We study the impact of official borrowing from China on quantities and prices of **marketable sovereign debt**
 - Welfare implications
 - Optimal exposure to CHN \leftrightarrow geopolitical changes

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- We assemble a dataset on CHN funding and restructuring events (Horn et al., 2020) + sov. debt issuance & prices from bond-level data (Bloomberg)

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- We assemble a dataset on CHN funding and restructuring events (Horn et al., 2020) + sov. debt issuance & prices from bond-level data (Bloomberg)
- Following CHN lending events,
 - + External borrowing from private lenders falls
 - + Sovereign bond yields decline
- But, during CHN debt restructuring events,
 - Sovereign bond yields increase sharply

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- Debt restructuring, in the model, is akin to both a sudden stop and a negative income shock
 - Default risk on long-term market debt therefore rises
- CHN debt inflow leads to deleveraging from market debt and lower yields on sovereign debt
 - “Disciplining” effect → can lead to welfare gains

EMPIRICAL FINDINGS

Data

Our annual country-level dataset (2000–2017) combines

- Chinese debt restructuring events + estimated debt stocks
(Horn, Reinhart, and Trebesch, 2020)
- Long-term bond issuance and yields
(constructed using 45k+ bond observations in Bloomberg)
(this is the main source of unbalanced-ness, due to intermittent coverage and limited capital market participation)
- External debt statistics
(World Bank, IDS)

Benchmark estimation

In our benchmark specifications, we estimate

$$Y_{i,t} = \alpha + \beta \text{ CHN debt event}_{i,t} + \gamma X_{i,t} + \varepsilon_{i,t}$$

- i represents a country, t denotes a year
- $Y_{i,t}$ is an outcome related market debt prices or quantities
- $\text{CHN debt event}_{i,t} = 1$ if a China debt event (funding or restructuring) occurred in $\{i, t\}$
- $X_{i,t}$ are additional controls incl. GDP growth, FX reserves, lagged DV, time and country FEs

Note: CHN funding event = 1 when inflow from CHN is large (above median change).

Chinese lending and market debt deleveraging

Dep. variable:	log(Ext. debt)		New Bond Issuance	
CHN funding event	-0.183*** (0.0576)		-0.105** (0.0510)	
CHN funding era		-0.124 (0.0845)		-0.143* (0.0745)
adj. R^2	0.985	0.985	0.282	0.281
N	640	640	698	698

All specs. include country and time FEs. Robust standard errors in parentheses.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Effect on market-debt prices: the **lending discount**

Dep. variable:	Long Term Bond Yields		
	level	change	level
CHN funding event	-0.852*** (0.297)	-0.996*** (0.352)	
CHN funding era			-0.497 (0.427)
adj. R^2	0.842	0.243	0.838
N	299	299	299

All specs. include country and time FEs. Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Effect on market-debt prices: the **restructuring premium**

Dep. variable:	Long Term Bond Yields		
CHN restructuring event	3.220** (1.535)	3.101** (1.524)	
Non CHN restructuring event		2.780*** (0.621)	3.041*** (0.683)
CHN funding rounds	-0.523*** (0.183)	-0.507*** (0.182)	-0.466** (0.181)
adj. R^2	0.850	0.852	0.845
N	298	298	298

Country and time FEs included. Robust SEs in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Summary of our stylized facts

1. External public debt (held by bondholders) is 10 to 20 percent lower following Chinese lending events
2. International sovereign bond issuance is 10 to 20 percent less likely following Chinese lending events

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1. External public debt (held by bondholders) is 10 to 20 percent lower following Chinese lending events
2. International sovereign bond issuance is 10 to 20 percent less likely following Chinese lending events
3. Sovereign bond yields decline by 80 to 100 bps following Chinese lending events
4. Sovereign bond yields increase sharply by almost 300 bps after Chinese debt restructuring events

A MODEL OF SOVEREIGN DEBT AND DEFAULT
WITH CHN OFFICIAL DEBT

Environment

- Small open economy, one good, discrete time $t = 0, 1, 2, \dots$
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- Debt vis-à-vis China $b_c \in \{L, H\}$ follow a Markov process
 - transitions gov. by random var $a = \{0, 1\}$
 - inflow = transition from L to H
 - outflow = transition from H to L

Chinese debt fluctuations

$$\text{net flows: } z(b_c, a) \equiv \begin{cases} H - L & \text{if } a = 1 \cap b_c = L \\ 0 & \text{if } a = 0 \\ L - H & \text{if } a = 1 \cap b_c = H \end{cases}$$

and

$$\text{debt positions: } b'_c(b_c, a) \equiv \begin{cases} H & \text{if } a = 1 \cap b_c = L \\ L & \text{if } a = 1 \cap b_c = H \\ b_c & \text{otherwise} \end{cases}$$

Government problem: repay (V_0) or default (V_1)

Given a price func. q and exo. state $s = (y, a)$, the gov. solves:

$$V(b, b_c, s) = \max_{d \in \{0,1\}} \left\{ d V_1(b_c, s) + (1 - d) V_0(b, b_c, s) \right\}$$

$$V_0(b, b_c, s) = \max_{b'} \left\{ u(c) + \beta \mathbb{E}_{s'|s} V(b', b'_c, s') \right\}$$
$$c + \kappa b = y + q(b', b'_c, s) [b' - (1 - \delta)b] + z(b_c, a)$$

$$V_1(b_c, s) = u(y - \phi(y) + z(b_c, a))$$
$$+ \beta \mathbb{E}_{s'|s} [\theta V(0, b'_c, s') + (1 - \theta) V_1(b'_c, s')]$$

Bond prices

The bond price is given by the following functional equation:

$$q(b', b'_c, s) = \frac{1}{1+r} \mathbb{E}_{s'|s} \left\{ \overbrace{\left[1 - \hat{d}(b', b'_c, s') \right]}^{\text{repayment}} \times \left[\kappa + (1-\delta) \underbrace{q(\hat{b}(b', b'_c, s'), b''_c, s')}_{\text{outstanding debt price}} \right] \right\}$$

\hat{d} and \hat{b} denote the future default and borrowing rules that lenders expect the gov. to follow

Functional forms and calibration

- Annual calibration (based on the panel used for empirical results)
- CRRA utility; Income process follows AR(1) in logs
- Quadratic cost of default, $\phi(y) \rightarrow 2$ params calibrated to match: mean debt (30%) and mean spreads (3.5%)

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- CHN lending block:

	Symbol	Value	Source
Low China debt	L	0.00	Normalization
High China debt	H	0.05	Max. CHN debt flow = 5.0%
Rollover probability	π_a	0.10	CHN financing freq.

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- Rest of parameters: standard calibration

► full calib.

Simulation Results

Statistics	Unconditional
Market Debt to GDP	30.0
Market Issuance to GDP	6.0
Consumption to GDP	99.0
Spread	3.5
S.D. Spread	2.2
Corr(Spread, GDP)	-0.6
P(Default $t+1$)	3.0
Default Frequency	2.6
S.D. Consumption/S.D. GDP	1.1

Simulation Results

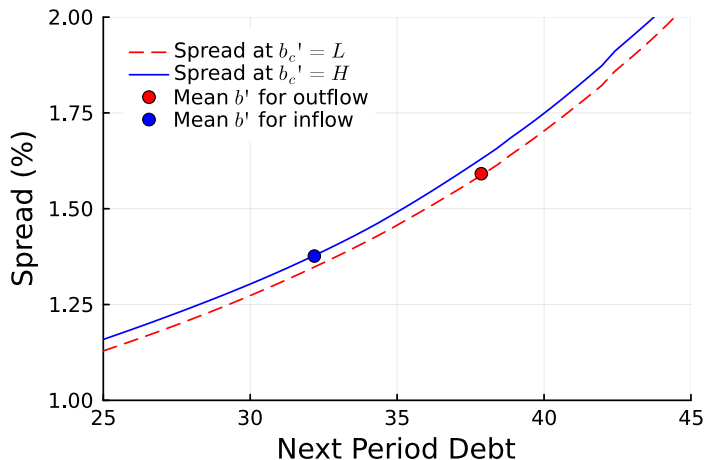
Statistics	Unconditional	Inflow	Outflow
Market Debt to GDP	30.0	31.0	28.9
Market Issuance to GDP	6.0	2.7	9.0
Consumption to GDP	99.0	101.0	96.6
Spread	3.5	3.1	4.0
S.D. Spread	2.2	1.8	2.5
Corr(Spread, GDP)	-0.6	-0.6	-0.7
P(Default $t+1$)	3.0	2.1	3.8
Default Frequency	2.6	2.9	2.2
S.D. Consumption/S.D. GDP	1.1	1.0	1.3

Consistent with empirical evidence:

- Effect on quantities → substitution away from mkt debt
- Effect on prices → lower spreads on inflows; higher spreads on outflows

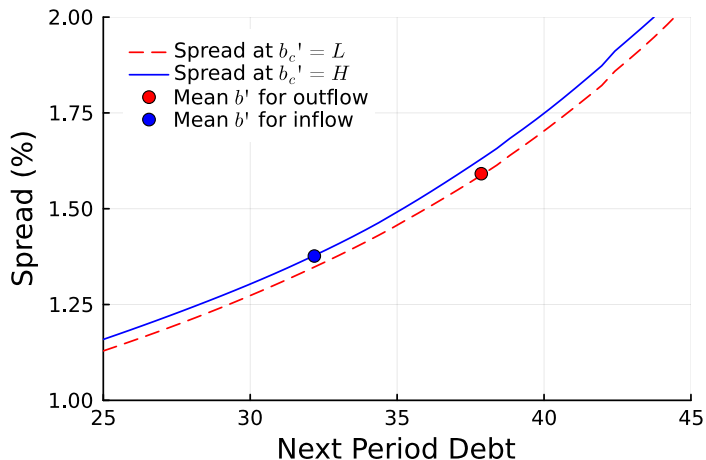
CHN funding shocks: spread–debt menus

▶ event



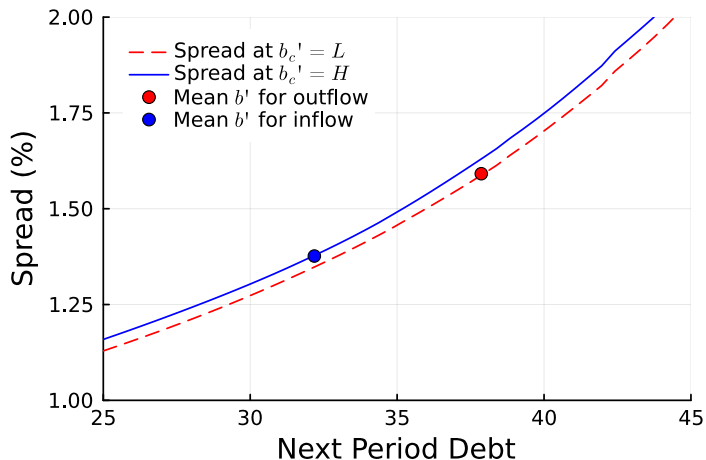
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- Having high CHN debt **worsens** borrowing opportunities

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- Having high CHN debt **worsens** borrowing opportunities
- But has a **disciplining** effect: country delevers and pays lower spreads in eqm

Taking stock

- Developed a quantitative model which can account for stylized facts
- Key mechanisms: rollover risk + debt substitution
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- Robust to:
 1. Interest on CHN debt
 2. 'Asymmetric' CHN debt process
 3. Allowing default on CHN

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- Next: use model to study different risk-scenarios

Risk of a “Chinese Retrenchment”?



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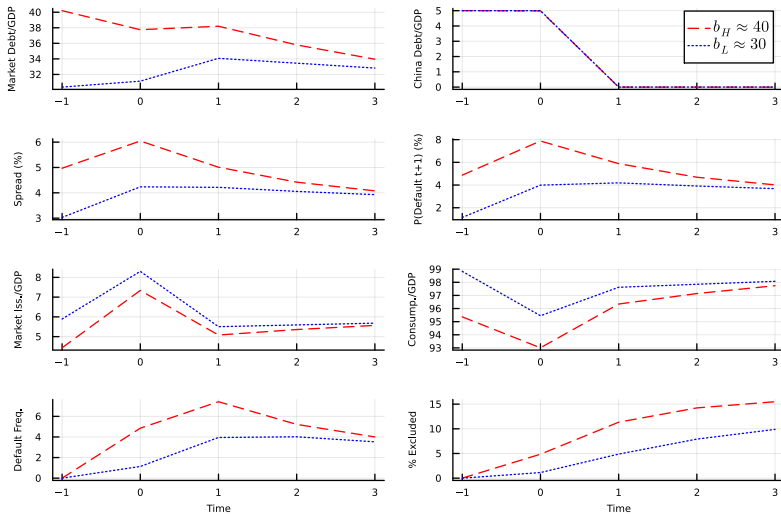
Risk of a “Chinese Retrenchment”?

- We use our model to assess the quantitative implications of this type of geopolitical risk
- Model extension: exogenous prob. that CHN severs ties w/ the country
 - If that happens, b_c has to be paid off immediately
 - And country gets ‘cut off’ from CHN funds permanently

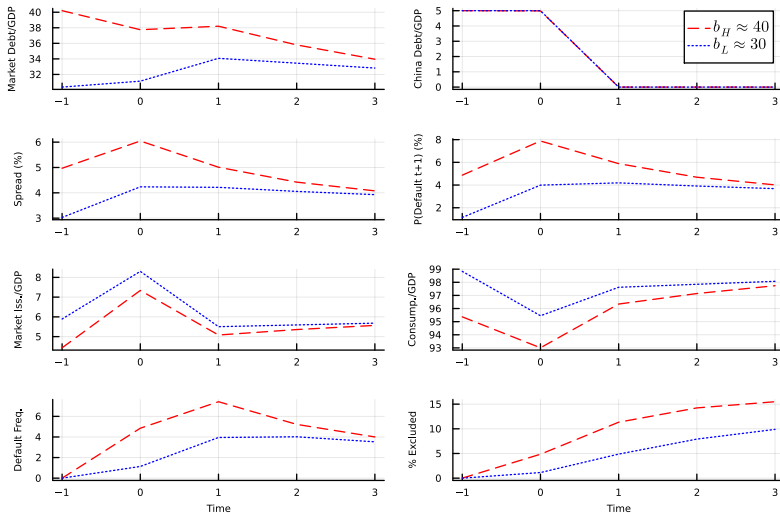
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 - After ‘Retrenchment shock’ → model becomes standard sov. debt framework
 - Setting this prob to zero → baseline model

Dynamics of a Retrenchment Shock



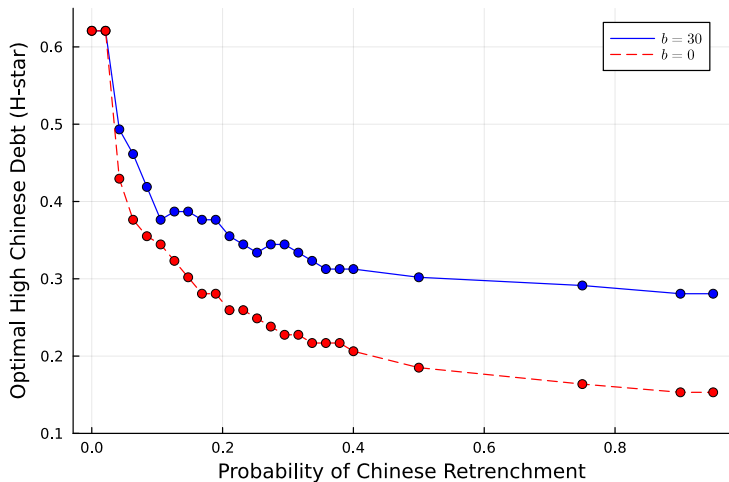
Dynamics of a Retrenchment Shock



- Costly adjustments: \downarrow consumption, \uparrow defaults, spreads

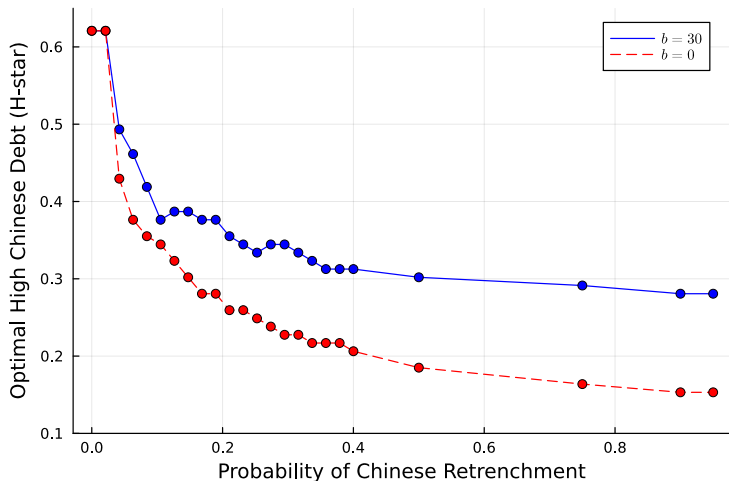
How Exposed Should the Country be to CHN funding?

► welfare



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- Higher mkt debt, higher ex-ante optimal exposure
- Higher retrenchment risk, lower ex-ante optimal exposure

Take-away from introducing Retrenchment Risk

- We live in turbulent times \leftrightarrow High risk of sharp geopolitical re-alignments
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Let me speculate about **Argentina**

- long period of close geopol. proximity to CHN (Peronist governments) \rightarrow increases its exposure
- sudden (and unanticipated) domestic political shock (swing to right-wing policies under Milei presidency)
- exposed to higher risk of having to pay down non-trivial Chinese loans

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- **More general point:** cautionary tale for EMEs with volatile political environments and that have so far relied heavily on CHN lending

Concluding remarks

- We document significant effects of Chinese debt events sovereign debt prices and its dynamics
- We use a standard sovereign debt model to rationalize these facts
- CHN debt has a strong disciplining effect: when getting an inflow, country lowers mkt debt + preserves mkt access to finance upcoming outflow
- Explore the implications of a particular form of geopolitical risk: Chinese Retrenchment
 - Costly adjustments
 - Cautionary tale for countries relying 'too much' on CHN lending

THANK YOU!

APPENDIX

Special Clauses

Sample No Paris Clause

The Borrower shall under no circumstances bring or agree to submit the obligations under the Finance Documents to the Paris Club for restructuring or into any debt reduction plan of the IMF, the World Bank, any other multilateral international financial institution to which the State is a part of, or the Government of the PRC without the prior written consent of the Lender.

“How China Lends: A Rare Look into 100 Debt Contracts with Foreign Governments”, Gelpern et al., AidData, 2021

Special Clauses

Sample Collateral Clause

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“How China Lends: A Rare Look into 100 Debt Contracts with Foreign Governments”, Gelpert et al., AidData, 2021

Countries with Debt data

World Bank – External debt held by bondholders

AGO, ALB, ARG, ARM, AZE, BGR, BIH, BLR, BLZ, BOL, BRA, CIV, CMR, COD, COG, COL, CRI, DMA, DOM, ECU, EGY, ETH, FJI, GAB, GEO, GHA, GRD, GUY, HND, IDN, IND, JAM, JOR, KAZ, KEN, LAO, LBN, LKA, MAR, MDV, MEX, MKD, MNE, MNG, MOZ, NGA, PAK, PER, PHL, PRY, RUS, RWA, SEN, SRB, TJK, TUN, TUR, UGA, UKR, VEN, VNM, ZAF, ZMB, ZWE

Countries with Debt data

Bloomberg – Issued 10+ year bonds

AGO, ALB, ARG, ARM, AZE, BGR, BHS, BLR, BLZ, BOL, BRA, BRB, CHL, CIV, CMR, COG, COL, CRI, DOM, ECU, EGY, ETH, GAB, GEO, GHA, GRC, GRD, HND, HRV, IDN, IRQ, JAM, JOR, KAZ, KEN, LAO, LBN, LKA, MAR, MEX, MKD, MNE, MNG, MOZ, NAM, NGA, OMN, PAK, PAN, PER, PHL, POL, PRY, ROU, RUS, RWA, SEN, SRB, SVN, SYC, TTO, TUR, UKR, URY, VEN, VNM, ZAF, ZMB

CHN lending and external debt: deleveraging

► back

	(1)	(2)	(3)	(4)	(5)	(6)
	log External debt held by bondholders					
	level	level	change	change	change	level
CHN funding event	-0.183*** (0.0576)	-0.129*** (0.0400)	-0.177*** (0.0618)	-0.136*** (0.0404)		
CHN funding event (change)					-0.159*** (0.0409)	
CHN funding era						-0.124 (0.0845)
adj. R^2	0.985	0.989	0.059	0.069	0.080	0.985
N	640	583	640	583	640	640

CHN lending and debt issuance: ↓ prob. of new issuance

▶ back

	(1)	(2)	(3)	(4)	(5)	(6)
	New Bond Issuance on International Markets					
	level	level	change	change	change	level
CHN funding event	-0.105** (0.0510)	-0.120* (0.0699)	-0.167** (0.0668)	-0.234*** (0.0891)		
CHN funding event (change)					-0.123*** (0.0449)	
CHN funding event era						-0.143* (0.0745)
adj. R^2	0.282	0.286	0.002	0.008	0.004	0.281
N	698	652	698	652	698	698

CHN funding events and and market-debt prices: ↓ yields

▶ back

	(1)	(2)	(3)	(4)	(5)	(6)
		Long Term (10+ years) Bond Yields				
	level	level	change	change	change	level
CHN funding event	-0.852*** (0.297)	-0.837** (0.414)	-0.996*** (0.352)	-0.953** (0.480)		
CHN funding event (change)					-0.391* (0.225)	
CHN funding era						-0.497 (0.427)
adj. R^2	0.842	0.846	0.243	0.248	0.224	0.838
N	299	275	299	275	299	299

CHN restructurings and market-debt prices: ↑ yields

▶ back

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	(1)	(2)	(3)	(4)	(5)	(6)
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Non CHN restructuring event		2.780*** (0.621)	3.041*** (0.683)			
CHN restructuring event (lagged)				3.544*** (1.203)	3.661*** (1.209)	
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CHN funding rounds	-0.523*** (0.183)	-0.507*** (0.182)	-0.466** (0.181)	-0.495*** (0.184)	-0.456*** (0.171)	-0.443*** (0.170)
adj. R^2	0.850	0.852	0.845	0.845	0.854	0.849
N	298	298	298	298	298	298

Equilibrium

A Markov Perfect Equilibrium is characterized by

1. a default rule \hat{d} and a borrowing rule \hat{b} ,
2. a bond price function q ,

such that:

- (a) given \hat{d} and \hat{b} , the bond price function q is given by the bond prices equation ; and
- (b) the default rule \hat{d} and borrowing rule \hat{b} solve the dynamic programming problem corresponding to V , V_0 , V_1 , when the government can trade bonds at q .

Calibration

[▶ back](#)

	Symbol	Value	Source
Default income cost - Intercept	λ_0	0.11	Avg. market debt = 30%
Default income cost - Slope	λ_1	0.945	Avg. spread = 3.55%
Risk aversion coefficient	γ	2.00	Standard
Risk-free rate	r	0.04	Standard
Discount factor	β	0.90	Standard
Market re-entry probability	θ	0.20	$\mathbb{E}(\text{exclusion}) = 5 \text{ years}$
Debt duration	δ	0.168	Debt duration = 5 years
Bond coupon	κ	$\frac{r+\delta}{1+r}$	Risk-free bond price = $\frac{1}{1+r}$
Income process - autocorr.	ρ	0.784	GDP fluctuations (PWT)
Innovations to y - std dev	σ_ϵ	0.033	GDP fluctuations (PWT)
Income process - avg	μ	$-\frac{1}{2}\sigma_\epsilon^2$	$\mathbb{E}(y) = 1$
Low China debt	L	0.00	Normalization
High China debt	H	0.05	Max. CHN debt flow = 5.0%
Rollover probability	π_a	0.10	CHN financing freq.

Simulation results

[▶ back](#)

Statistics	Unconditional	Inflow	Outflow	No Flow:	
				$b_c = L$	$b_c = H$
Market Debt to GDP	29.97	31.04	28.93	31.04	28.92
Market Issuance to GDP	5.99	2.71	8.96	6.17	5.83
Consumption to GDP	98.96	101.04	96.56	98.87	99.08
Spread	3.54	3.06	4.0	3.74	3.35
S.D. Spread	2.2	1.8	2.45	2.35	2.04
Corr(Spread, GDP)	-0.63	-0.62	-0.66	-0.62	-0.65
P(Default $t+1$)	2.97	2.14	3.76	3.36	2.59
Default Frequency	2.59	2.94	2.24	2.94	2.24
S.D. Consumption/S.D. GDP	1.14	0.99	1.29	1.13	1.12

Robustness #1: Interest on Chinese Debt

▶ back

- In the benchmark model, the government pays no interest on the Chinese debt
- **Question:** How do our results change if the Chinese debt contract requires coupon payments?
- **Extension:** In periods of neither inflows nor outflows ($a = 0$), and when entering Chinese position is high ($b_c = H$), the government must pay a coupon payment of $H \times r$

Simulated Statistics: Interest on Chinese Debt

[▶ back](#)

Statistics	Unconditional	Inflow	Outflow	No Flow:	
				$b_c = L$	$b_c = H$
Market Debt to GDP	30.01	31.03	29.01	31.03	29.01
Market Issuance to GDP	6.0	2.64	8.94	6.16	5.88
China Debt to GDP	2.52	0.0	4.98	0.0	4.98
Net Flow from China to GDP	-0.01	4.97	-4.98	0.0	0.0
Consumption to GDP	98.87	100.98	96.53	98.87	98.9
Spread	3.56	3.05	4.01	3.73	3.39
S.D. Spread	2.22	1.79	2.47	2.34	2.08
Corr(Spread, GDP)	-0.63	-0.61	-0.66	-0.62	-0.65
P(Default $t+1$)	2.98	2.09	3.8	3.36	2.62
Default Frequency	2.6	2.94	2.26	2.94	2.26
S.D. Consumption/S.D. GDP	1.14	0.99	1.29	1.13	1.12

- **Takeaway:** A coupon payment has very little impact on the simulated statistics

Robustness #2: Asymmetric Chinese Debt Flows

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- In the benchmark model, the probability of receiving an inflow given a low Chinese debt position equals the probability of receiving an outflow given a high Chinese debt position
- **Question:** How do the simulated statistics change when the Chinese debt flows process is asymmetric?
- **Extension:** The probability of a Chinese outflow, conditional on outstanding Chinese debt, is now 0.25 instead of 0.1

Simulated Statistics: Asymmetric Chinese Debt Flows

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Statistics	Unconditional	Inflow	Outflow	No Flow:	
				$b_c = L$	$b_c = H$
Market Debt to GDP	29.97	30.84	27.82	30.84	27.82
Market Issuance to GDP	5.99	2.3	9.09	6.15	5.68
China Debt to GDP	1.45	0.0	4.98	0.0	4.98
Net Flow from China to GDP	-0.01	4.97	-4.98	0.0	0.0
Consumption to GDP	98.91	100.74	96.95	98.91	98.99
Spread	3.54	3.03	3.79	3.68	3.22
S.D. Spread	2.21	1.74	2.32	2.31	1.92
Corr(Spread, GDP)	-0.63	-0.62	-0.67	-0.63	-0.65
P(Default $t+1$)	2.97	1.95	3.4	3.29	2.23
Default Frequency	2.59	2.85	1.92	2.87	1.89
S.D. Consumption/S.D. GDP	1.14	0.98	1.29	1.13	1.12

- Relative to the benchmark, market debt is lower when there is an outflow, as the government has fewer periods to lever back up after the last inflow

Robustness #3: Default on Market *and* Chinese Debt

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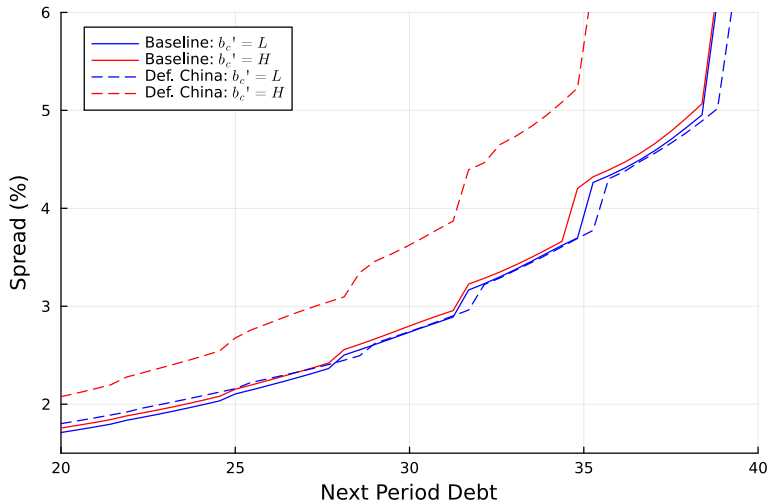
- In the benchmark model, the government cannot default on outstanding Chinese debt; any inflows must be eventually repaid
- **Question:** To what extent does the option to default on outstanding Chinese debt (jointly with market debt) weaken its “market disciplining” effect?
- **Extension:** A government in default (whether they defaulted today or in the past) cannot receive Chinese debt inflows and does not pay back any outstanding Chinese debt

Simulated Statistics: Default on Market *and* Chinese Debt [▶ back](#)

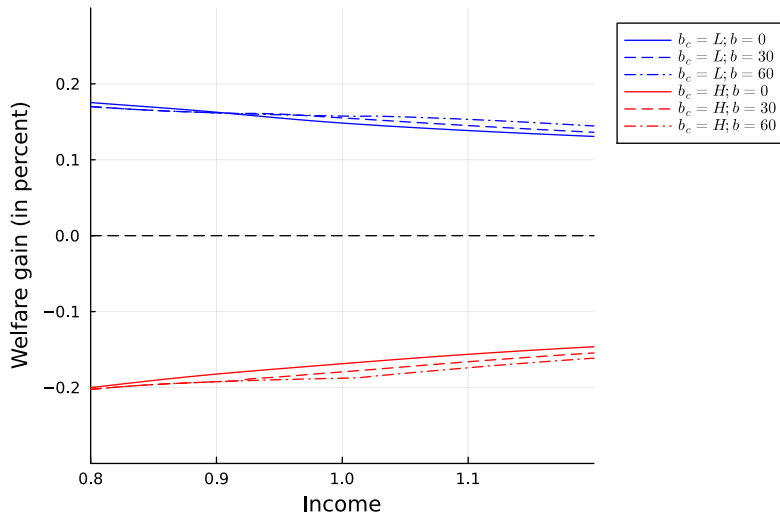
Statistics	Unconditional	Inflow	Outflow	No Flow:	
				$b_c = L$	$b_c = H$
Market Debt to GDP	28.99	29.08	28.93	28.99	28.97
Market Issuance to GDP	5.82	2.39	9.21	6.38	5.22
China Debt to GDP	2.12	0.0	4.94	0.0	4.95
Net Flow from China to GDP	0.08	4.99	-4.94	0.0	0.0
Consumption to GDP	99.09	101.13	96.9	99.51	98.47
Spread	3.72	4.19	3.44	3.52	3.95
S.D. Spread	2.38	3.74	1.54	2.14	2.46
Corr(Spread, GDP)	-0.63	-0.56	-0.8	-0.57	-0.76
P(Default $t+1$)	3.1	4.31	2.24	2.69	3.57
Default Frequency	2.69	0.0	0.0	2.26	4.06
S.D. Consumption/S.D. GDP	1.13	1.0	1.26	1.13	1.14

- Intuitively, relative to the benchmark model, the government is significantly more likely to default when it has outstanding Chinese debt ($b_c = H$)

Spread-Debt Menus at Mean Income: Default on Chinese Debt

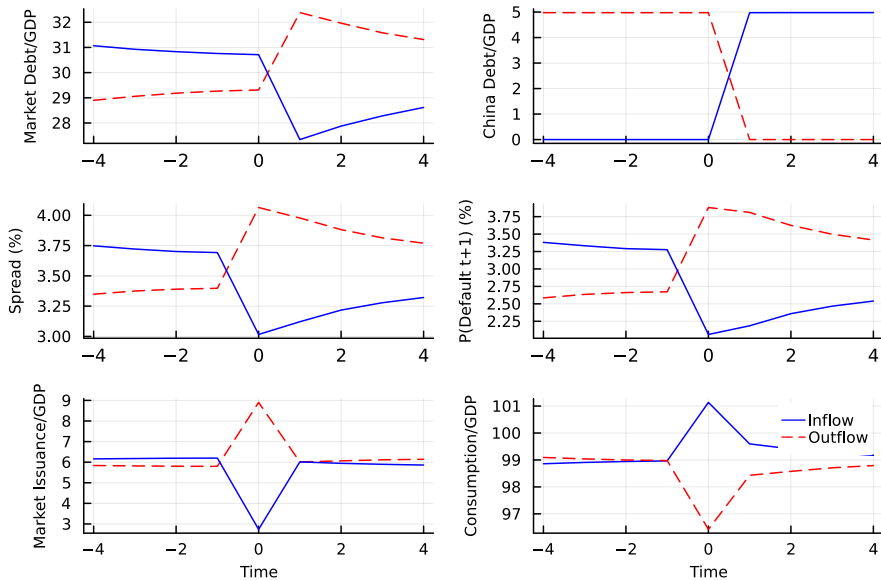


Welfare



Note: A positive number means that agents prefer the benchmark economy.

Dynamics around CHN funding events

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Welfare gains from H-star

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