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Borrowing in the Shadow of China[†]

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Abstract

China's lending to emerging economies has considerably risen since the early 2000s, and its debt contracts feature exceptional lender privileges. We argue that China's unusual lender power and discretion also shape its debtors' bond market outcomes. In a long-term sovereign debt model, Chinese loans' non-defaultable and rollover-prone features expose the recipient's market debt to greater dilution risks which in turn make the country's borrowing more disciplined: a borrower who cannot later default on new Chinese loans chooses to rebalance its debt away from market debt, and thereby enjoys lower spreads. Market debt and bond yield dynamics in the data are consistent with this *disciplining effect*. While subsidized official finance from China can act as a powerful disciplining, it also has the potential to reshape the global sovereign debt architecture. We use the model to explore the geopolitical implications of China lending policies for the attractiveness of international bond markets.

KEYWORDS: Sovereign Debt, Default, China's Overseas Lending, Geopolitical Risk.
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1 Introduction

Over the past two decades, China has emerged as a major lender to governments across the world and profoundly transformed the anatomy of sovereign debt globally. Chinese overseas lending now rivals the scale of traditional official creditors and international capital markets, reaching over $1.5 trillion and extending to more than 100 countries (Horn, Reinhart, and Trebesch, 2021). Table 1 illustrates the surge in Chinese debt obligations between 2000 and 2017 across developing economies, underscoring the scale and breadth of China's new financial reach.

Table 1: Rising Chinese Debt Obligations

	Number of Countries with		Debt vis-à-vis China relative to					
			GDP (in pct.)		External Bond Debt		External Debt	
Year	Positive China Debt	China Inflow	Mean	Median	Mean	Median	Mean	Median
2000	15	0	0.42	0.32	0.78	0.02	0.01	0.00
2005	59	18	1.01	0.36	1.14	0.06	0.03	0.01
2010	93	73	3.98	1.67	0.74	0.13	0.33	0.10
2015	100	97	8.47	5.08	1.99	0.69	0.69	0.27
2017	101	101	8.66	5.06	2.10	0.55	0.61	0.22

Note: We include countries with a positive debt stock vis-à-vis China using data from Horn et al. (2021) from 2000 to 2017, when their sample ends.

China's overseas lending differs significantly from that of other official creditors. For instance, its debt contracts often feature exceptional seniority privileges, stringent confidentiality clauses, and lender-controlled debt acceleration or rollover provisions (Gelpern, Horn, and Trebesch, 2021). These terms give China substantial discretion over whether loans are renewed, while limiting the borrower's ability to default. In effect, Chinese loans embed *rollover risk without default risk*—a distinctive asymmetry that reflects China's leverage over its borrowers.

This asymmetry raises the central question we address in this paper: *How do non-defaultable, rollover-prone official loans from China affect a country's market borrowing, sovereign spreads, and default risk?* We argue these unique properties of Chinese lending operate as a form of *geopolitical rollover power* that can discipline the recipient's borrowing behavior vis-à-vis private credit markets, but may also induce the debtor to opt out of debt markets altogether.

In our framework, China's creditor power manifests as sudden stops that could emanate from geopolitical forces. Because Chinese loans are non-defaultable but may be withdrawn exogenously, they act as a commitment device that forces governments to maintain fiscal

space against such rollover risk and more prudently manage their private market debt's exposure. The geopolitical origins of this rollover risk may have become more salient recently, as Horn, Reinhart, and Trebesch (2025) argue that China's lending boom tapered and net flows have reversed towards China since 2019. China's power and discretion as a lender can also be deployed strategically with important geopolitical implications for who has access to international bond markets and when.

This paper makes two contributions. First, we develop a quantitative sovereign debt model with *Chinese-style* loans: subsidized, non-defaultable, but subject to rollover risk determined outside the country's control (or influence). In this setup, China's lender power resides in its ability to enforce repayment and to decide when loans are rolled over, while the sovereign takes this process as exogenous. The model uncovers a "market disciplining effect" of Chinese loans: when the country receives a loan inflow from China, it deleverages from the market as it anticipates that a future Chinese outflow will require tapping private markets to help finance the repayment and smooth consumption. The intuition is that the government understands that planning to repay China through future new borrowing is costly, as it creates dilution risk for market lenders. To counteract this force, the government chooses to deleverage from the market up front, that is, when it receives an inflow from China. This disciplining effect implies that inflows from China are associated with lower market issuance and reduced spreads, a feature we confirm empirically, using extensive data on Chinese funding events, debt stocks, and bond prices from emerging economies.

Second, we use our quantitative model to run welfare experiments and to analyze geopolitical risk scenarios that reshape the value and risks of *Chinese-style* lending. Access to subsidized, non-defaultable Chinese loans generates state-dependent welfare gains by amplifying the model's market-disciplining channel, but it also exposes borrowers to sharper adjustment costs if these bilateral flows were to stop. To capture this, we introduce the possibility of a sudden and permanent *Chinese retrenchment* and characterize the sovereign's optimal ex ante exposure to China: optimal Chinese borrowing rises with existing market indebtedness (reflecting substitution across funding sources) and falls with the probability of retrenchment (reflecting geopolitical rollover risk).

These experiments also clarify how *geopolitical lender power* can operate strategically through market access itself. In a bloc-formation counterfactual, China makes targeted take-it-or-leave-it offers that trade a loan inflow for permanently cutting ties with private international capital markets. We derive the threshold loan size required to induce financial alignment and show how it varies with country fundamentals and with the income state, implying that the "price" of attracting countries into a China-centered financing bloc is lowest

in low-income periods and for countries with weaker fundamentals. Taken together, our results show how subsidized official finance can simultaneously discipline market borrowing in normal times and, when geopolitical ties weaken, become a source of destabilizing rollover risk in the global sovereign debt architecture.

Related literature. The disclosure of China's international financing terms and arrangements often remains vague and sporadic, which has propelled a substantial body of literature aimed at shedding light on the specific characteristics and implications of China's extensive overseas lending.

Building on Horn, Reinhart, and Trebesch (2021) who assemble a comprehensive dataset on China's global rise as an official lender, our paper contributes to the quantitative literature on sovereign defaults (Eaton and Gersovitz, 1981; Aguiar and Gopinath, 2006; Arellano, 2008). In particular, we extend the workhorse model of sovereign default with long-term debt (Hatchondo and Martinez, 2009) to allow for stochastic official, non-defaultable debt with China. Changes in the level of debt vis-à-vis China imply net flows that are sometimes positive (in which case the model behaves as if the country experienced a transitory windfall) and sometimes negative (in which case the economy faces adverse terms similar to sudden stops and rollover risk). With long-term debt, it is crucial to understand the debt dilution implications of Chinese loans (Hatchondo, Martinez, and Sosa-Padilla, 2016). We highlight the *disciplining effect* of Chinese lending: borrowing governments adjust their market debt as windfalls from China sow the seeds of future sudden stops and create dilution risk for bondholders.[1] Gamboa-Arbelaez (2025) studies the debt sustainability and welfare implications of hidden Chinese debt in a model of sovereign default with asymmetric information while Horn, Mihalyi, Nickol, and Sosa-Padilla (2024) study the *measurement* of hidden debt and its implications for debt pricing and default risk.[2]

Given the official nature of the Chinese loans, our paper is related to the literature concerned with the interaction between official and private sovereign debt. Recent additions to this literature include the works of Arellano and Barreto (2025), Liu, Liu, and Yue (2025), and Roldan and Sosa Padilla (2025). We differ from these studies in our focus on Chinese debt and our emphasis on the interaction of non-defaultability and rollover-risk as the main

[1] See Hur and Kondo, 2016, Johri, Khan, and Sosa-Padilla, 2022, Bianchi, Hatchondo, and Martinez, 2018, and Barbosa-Alves, Bianchi, and Sosa-Padilla, 2026, among many others on debt crises and rollover risk.

[2] Horn et al. (2021), Onjala (2018), Bandiera and Tsiropoulos (2020), Jiang (2025), and Hurley, Morris, and Portelance (2019) study how China funding affects the risk of debt crises and defaults.

characteristic of this debt.[3]

Finally, our analysis of China retrenchment risk and China's effects on the attractiveness of international bond markets connects us to the growing literature on geopolitical risks, geoeconomics, and fragmentation (e.g., Clayton, Maggiori, and Schreger, 2026, Moro and Landi, 2024, and Bianchi, Horn, Rosso, and Sosa-Padilla, 2026). We contribute by stressing novel channels and geopolitical implications of China's lending policies. Official borrowing from China not only changes a country's default risk and borrowing on international capital markets, but China can also be strategically reshape the global financial order by offering loans that induce a country to solely borrow from China.

2 Model

Our starting point is the canonical model of sovereign default with long-term debt (e.g., Hatchondo and Martinez, 2009, 2017). We modify the income process to include capital flows that capture both new Chinese lending and restructuring events. In our benchmark model, informed by the empirical evidence on Chinese debt contracts (Horn et al., 2021; Gelpern et al., 2021), these capital flows vis-à-vis China are subsidized, non-defaultable, and taken as given by the borrowing economy.

2.1 Environment

Preferences and income process. The representative agent in the borrowing economy has preferences given by

$$\mathbb{E}_t \sum_{j=t}^{\infty} \beta^{j-t} u\left(c_j\right) ,$$

where $\mathbb{E}$ denotes the expectation operator, β stands for the subjective discount factor, and c_t represents domestic consumption. The utility function is strictly increasing and concave. The economy's endowment of the single tradable good is denoted by $y \in Y \subset \mathbb{R}_{++}$ and follows a Markov process.

Capital flows vis-à-vis China. We assume the small open economy is a net borrower from China. We make the simplification that Chinese loans are zero-coupon bonds, that

[3] Boz (2011) and Hatchondo, Martinez, and Onder (2017) also study the implications of having non-defaultable debt in the standard sovereign debt model.

is to say, they require no debt service until they are due.[4] Thus, the economy's Chinese debt position $b_{c,t}$ fluctuates exogenously between low (L) and high (H) values, that is: $b_{c,t} \in \{L, H\}$, with $L < H$. In our baseline model, Chinese debt obligations are non-defaultable, in line with the reported seniority of Chinese debt (Horn et al., 2021).

We capture the uncertainty and opacity of Chinese debt contracts (Gelpern et al., 2021) by making the Chinese debt inflows and due dates random. We assume the transition $a_t \equiv \mathbb{1}\{b_{c,t+1} \neq b_{c,t}\}$ is drawn independently such that $\Pr(a_t = 1) = \pi$ effectively governs both the maturity and rollover risk associated with the Chinese loans.[5]

Transitioning between low and high debt positions implies capital net flows vis-à-vis China of size $z_t = H - L > 0$ during inflows and $z_t = L - H < 0$ during outflows. In our model, the risks and rewards associated with these subsidized, stochastic, and non-defaultable capital flows to/from China ultimately influence the government borrowing choices in international capital markets.

Market debt. The government borrows on capital markets using long-duration defaultable bonds. As in Hatchondo and Martinez (2009), we assume a bond issued in period t promises an infinite stream of coupons, which decrease at a constant rate δ. With this payment structure, all future obligations derived from past debt issuances map into a one-dimensional state variable: the payment obligations that mature in the current period, b_t. Hence, debt dynamics can be represented as follows:

$$b_{t+1} = (1 - \delta)b_t + \ell_t,$$

where b_t is the incoming debt level in period t, and ℓ_t is new long-term debt issued in period t. The government owes a coupon payment κb_t on the outstanding debt b_t at date t.

[4] The disciplining effect of Chinese loans on the recipient's market debt holds when we relax the zero-coupon assumption to allow for subsidized coupon payments in the appendix.

[5] Debt contract opacity and China lender power may manifest as information frictions. Our model captures opacity in the form of uncertainty around the duration of the Chinese debt. Consider, for example, that Chinese debt is due in n periods, and the markets know the size of the loan $b_c \in \{L, H\}$ but not n. The random nature of the implied repayment date is here captured by the a process. However, other types of information frictions are challenging to capture in a stylized framework. An example would be debt opacity modeled as an amount b_c that is not fully observed by market lenders. We conjecture our insights about increased dilution risk and its disciplining effect would still apply. See Horn et al. (2024) and Gamboa-Arbelaez (2025) for related work on information frictions, hidden debt, and sovereign default.

Market debt defaults. The government cannot commit to future market debt repayment or future market borrowing decisions.[6] When the government defaults, it does so on all current and future market debt obligations. This is consistent with the observed behavior of defaulting governments, and it is a standard assumption in the literature.[7]

A default event triggers exclusion from the debt market for a stochastic number of periods, but does not disrupt capital flows to or from China. Furthermore, every period in which the government is excluded from debt markets, income is lower and given by $y - \phi(y)$. Starting the first period after the default period, with a constant probability $\theta \in [0, 1]$, the government may regain access to debt markets and exit default without debt.

Timing. The timing of events within each period is as follows. First, the government learns the economy's income and the realization of a (which controls the *net flows* and positions vis-à-vis China). Then, the government chooses whether to default ($d = 1$) or not ($d = 0$) on its incoming market debt, b. Finally, the government chooses its new market debt positions, subject to the constraints imposed by its default decision.

2.2 Recursive formulation

There are four state variables: one endogenous and three exogenous. The endogenous state variable is the market debt level, b. The exogenous state variables are y (the income level), b_c (the Chinese debt level), and a (the random variable triggering non-zero Chinese net flow). Let us denote $s \equiv (a, y)$.

Value functions. Let V denote the government's value function at the beginning of a period–that is, before the default decision d is made–and let V_d denote the value function of a sovereign choosing the default option $d \in \{0, 1\}$. For any bond price function q, the government value function V satisfies the following functional equation:

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

[6] Thus, one may interpret this environment as a game in which the government making decisions in period t is a player who takes as given the (repayment and borrowing) strategies of other players (governments) who will decide after t.

[7] Sovereign debt contracts often contain an acceleration clause and a cross-default clause. The first clause allows creditors to call the debt they hold in case the government defaults on a payment. The cross-default clause states that a default in any government obligation constitutes a default in the contract containing that clause. These clauses imply that after a default event, future debt obligations become current.

where the value of default is

$$V_1(b_c, s) = u\big(y - \phi(y) + b'_c(b_c, a) - b_c\big) + \beta\, \mathbb{E}_{s'|s}\Big[\theta V(0, b'_c, s') + (1-\theta)V_1(b'_c, s')\Big], \quad (2)$$

and the value of repayment satisfies

$$V_0(b, b_c, s) = \max_{b'} \Big\{u(c) + \beta\, \mathbb{E}_{s'|s} V(b', b'_c, s')\Big\}, \quad (3)$$

subject to

$$c + \kappa b = y + q(b', b'_c, s)[b' - (1-\delta)b] + [b'_c(b_c, a) - b_c] \quad (4)$$

with the end-of-period Chinese debt level evolving according to

$$b'_c(b_c, a) = \mathbf{1}_{\{a=1 \,\cap\, b_c=L\}} \times H \;+\; \mathbf{1}_{\{a=1 \,\cap\, b_c=H\}} \times L \;+ \mathbf{1}_{\{a=0\}}\, b_c\,. \quad (5)$$

Bond pricing. The small open economy also borrows from a large pool of risk-neutral foreign investors that discount future payoffs at the risk-free rate, r. The bond price q satisfies the following functional equation:

$$q(b', b'_c, s) = \frac{1}{1+r}\, \mathbb{E}_{s'|s}\left[1 - \hat{d}\left(b', b'_c, s'\right)\right]\left[\kappa + (1-\delta)\, q\left(\hat{b}\left(b', b'_c, s'\right), b''_c, s'\right)\right], \quad (6)$$

where $\hat{d}$ and $\hat{b}$ denote the future default and borrowing rules that lenders expect the government to follow. The first term in the right-hand side of equation (6) equals the expected value of the next-period coupon payment promised in a bond. The second term equals the expected value of all other future coupon payments, which is summarized by the expected price at which the bond could be sold next period.

2.3 Equilibrium definition

A *Markov Perfect Equilibrium* is characterized by (i) a default rule $\hat{d}$ and a borrowing rule $\hat{b}$, and (ii) a bond price function q; such that (a) given $\hat{d}$ and $\hat{b}$, the bond price function q is given by equation (6), and (b) the default rule $\hat{d}$ and borrowing rule $\hat{b}$ solve the dynamic programming problem defined by equations (1)–(5), when the government can trade bonds at q.

3 Quantitative Analysis

Functional forms and stochastic processes. The utility function displays a constant coefficient of relative risk aversion, i.e.,

$$u(c) = \frac{c^{1-\gamma}}{1-\gamma}, \text{ with } \gamma \neq 1.$$

The logarithm of the endowment follows an AR(1) process:

$$\log(y_t) = (1-\rho)\mu + \rho \log(y_{t-1}) + \varepsilon_t,$$

with $|\rho| < 1$, and $\varepsilon_t \sim N(0, \sigma_\varepsilon^2)$. We assume that $a \in \{0, 1\}$ follows an iid process such that $a = 1$ with probability π. As in Chatterjee and Eyigungor (2012), we assume a quadratic loss function for income during a default episode:

$$\phi(y) = \max\left\{y\left[\lambda_0 + \lambda_1[y - \mathbb{E}(y)]\right], 0\right\}.$$

Calibration. A period in the model refers to a year. Table 2 presents the parameter values in our benchmark model calibration. The parameters above the line are the ones that we set by simulating the model to match certain empirical moments. The income cost of defaulting is governed by λ_0 and λ_1: these are calibrated to match the mean market debt (30%) and the mean spread (3.55%) in our data.[8]

The coefficient of relative risk aversion, the risk-free interest rate, and the discount factor take standard values. We assume an average duration of sovereign default events of five years ($\theta = 0.20$), a number in the range of estimates reported in Gelos, Sahay, and Sandleris (2011) and Uribe and Schmitt-Grohé (2017).

The parameters governing the endowment process are estimated using real GDP data for the countries used in our empirical analysis (see Section 4.5). We obtain the following averages for the persistence and innovation volatility parameters: $\rho = 0.784$ and $\sigma_\varepsilon = 3.3\%$. These values are in line with typical values for emerging economies and low-income countries.[9]

We set $\delta = 0.168$. With this value, the risk-free duration of the debt is 5 years, which

[8] Let $\text{YTM}(\cdot) = \frac{\kappa}{q(\cdot)} - \delta$ denote the yield to maturity implicit in the bond price $q(\cdot)$. Then the spread (in percent) is defined as $s(\cdot) = 100 \times (\text{YTM}(\cdot) - r)$.

[9] We estimate the persistence and the volatility of the residuals from detrended annual real GDP series using the Hodrick-Prescott filter. We use real GDP data from the Penn World Table version 10.01 (Feenstra, Inklaar, and Timmer, 2015) for the countries borrowing both from China and in international capital markets.

Table 2: Benchmark calibration parameter values

Parameter	Symbol	Value	Source
Default income cost - Intercept	λ_0	0.109	Avg. market debt = 30%
Default income cost - Slope	λ_1	0.924	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	$\mathbb{E}$(exclusion) = 5 years
Debt duration	δ	0.168	Debt duration = 5 years
Bond coupon	κ	$(r+\delta)\frac{1}{1+r}$	Risk-free bond price = $\frac{1}{1+r}$
Income process - autocorrelation	ρ	0.784	GDP fluctuations (PWT)
Income innovations - standard deviation	σ_ϵ	0.033	GDP fluctuations (PWT)
Income process - average	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. China debt flow = 5.0%
Rollover probability	π_a	0.10	China financing frequency

is close to the average duration found in previous literature.[10] The coupon is normalized to $\kappa = (r+\delta)\frac{1}{1+r}$, which ensures that a default-free bond (with the same coupon structure as our sovereign bonds) trades at a price of $\frac{1}{1+r}$.

The capital flows vis-à-vis China are characterized by three parameters: L, H, and π.[11] Since we only have two levels of Chinese debt in our model, we normalize L to zero and set $H = .05$, the maximum annual change in Chinese debt stocks relative to GDP.[12] Looking at Chinese funding and restructuring events in our dataset, we find a frequency of approximately 10% per year, and so we set $\pi = 0.10$.[13]

[10] We use the Macaulay definition of duration that, with the coupon structure in this paper, is given by $D = (1+r)/(\delta+r)$, where r denotes the risk-free rate. Using a sample of 27 emerging economies, Cruces, Buscaglia, and Alonso (2002) find an average duration of 4.77 years, with a standard deviation of 1.52 years. Bai, Kim, and Mihalache (2017) report an average debt duration of 6.7 years in a panel of 11 emerging economies.

[11] In Appendix B.6, we verify that the inclusion of a coupon payment on Chinese debt has an immaterial affect on our benchmark results.

[12] $L = 0$ is a normalization in the sense that we can adjust the mean income y for the stream of payments associated with $L > 0$. We use two approaches to construct H: in the first approach, we compute the maximum of flows using changes in debt stocks reported in Horn et al. (2021). In the second approach, we use flows in Dreher, Fuchs, Parks, Strange, and Tierney (2021), constructed using microdata on Chinese projects. These measures yield maximum inflow values of 3.8% and 5.8% of annual GDP. We set H to 5%, close to their midpoint.

[13] Given the initial rise in Chinese loans disbursements, we focus on the period after 2005 to measure the frequency of inflow and restructuring events. Inflow events occur more often than restructuring events. Depending on how we define "large" inflows, we find inflow probabilities between 5% and 15%, whereas restructuring probabilities range between 3% and 6.5%. We set the symmetric probability π to 10% in the baseline calibration and perform a robustness test of our results, allowing for Chinese outflows to be more likely than inflows (see Appendix B.5).

4 Results

We begin by presenting the simulated moments produced by the benchmark calibration of our model and show that it is a reasonable approximation to data from low-income countries. We then study how the country's borrowing opportunities (as captured by the spread–debt menus) are affected by the presence of Chinese lending. Third, we show the typical dynamics around these funding events. Fourth, we focus on the disciplining effect of Chinese loans and their welfare implications. Fifth, we present empirical evidence suggesting that the disciplining effect highlighted in our model is found in the data. Finally, we show that the non-defaultability on Chinese loans is key to the disciplining effect.

4.1 Benchmark economy

Table 3: Simulated moments in the calibrated benchmark model

Statistic	Baseline	Inflow	Outflow	$b'_c = H$	$b'_c = L$
Market Debt to GDP	30.12	31.09	29.13	29.34	30.91
Market Issuance to GDP	6.0	2.8	8.91	5.57	6.44
Consumption to GDP	98.97	101.11	96.52	99.29	98.64
Spread	3.55	3.07	4.02	3.35	3.76
S.D. Spread	2.22	1.84	2.48	2.07	2.35
Corr (Spread, GDP)	-0.64	-0.62	-0.67	-0.65	-0.63
Prob (Default t+1)	2.94	2.1	3.76	2.54	3.35
Default Frequency	2.57	2.86	2.26	2.3	2.84
S.D. Consumption/S.D. GDP	1.14	0.99	1.29	1.12	1.16

Note: Moments are computed for non-exclusion periods, except for the default frequency, which uses all simulation periods. The first column shows unconditional moments, the second and third show periods when a China funding event occurs ($a = 1$), and the last two columns contrast states with and without China debt at the end of the period. Units: percent (except for the correlations and relative volatilities).

Simulated moments. The first column in Table 3 (labeled 'Baseline') shows that our model approximates well the moments used as targets (average debt and spread levels) and is broadly consistent with non-targeted moments in the data. In both the model and data, consumption is more volatile than income, and the sovereign spreads (computed as the difference in yields between the sovereign bonds and comparable default-free bonds) are volatile and countercyclical. Since we have long-term debt, it is not surprising that spreads are higher than the default frequency (which is approximately 2.6%). Importantly for our discussion, the statistics reported on this column result from averaging periods in which

$a = 0$, so the net-flows from China are zero, and periods with $a = 1$, implying non-zero Chinese flows.

Chinese loan inflow periods. The second column in Table 3 (labeled "Inflow") focuses on periods when the economy receives a Chinese capital inflow. In this case, the government chooses to rely less heavily on market debt, and we see a decline in market issuances to roughly 3% (compared to an average of 6%). However, this decline in market debt is not one-to-one with the inflow from China: this implies that part of the Chinese inflow (coupled with the optimal issuance policy) is translating into higher consumption in those inflow periods (see also Figure 2).

When the borrowing country receives an inflow from China, its one-period-ahead default probability falls substantially (to roughly 2%). The spread, however, prices in all future default probabilities, and market participants, understanding that those new funds the country obtained from China will need to be paid back later on, charge a spread that is 1% higher than the immediate default probability—this reflects the pricing of dilution risk over and above the decline in immediate default risk (Hatchondo et al., 2016). The level and volatility of the spreads are 50 and 40 basis points lower than average, respectively. The price impact of Chinese inflows is a prediction of the model that we later contrast with the data (see section 4.5).

China repayment or outflow periods. The third column in Table 3 (labeled "Outflow") contrasts debt dynamics when the country undergoes a capital outflow vis-à-vis China. In this case, the government taps private markets more heavily to offset the outflow, but not fully. Note that, even though the average market debt issuance is larger than the payments due to China, consumption drops: this is due to the worse bond prices the country faces.

After the typical outflow, the country ends the period with a debt level of around 33% of GDP, leaving it especially vulnerable to negative income realizations in the near future. An outflow event is accompanied by an increase in the one-period-ahead default probability of roughly 1 percentage point (compared to the Baseline column). Thus, Chinese outflow events are associated with higher and more volatile spreads than the average period.[14] This premium paid during outflow events is consistent with the positive and significant effect of Chinese debt restructuring on CDS spreads (see section 4.5).

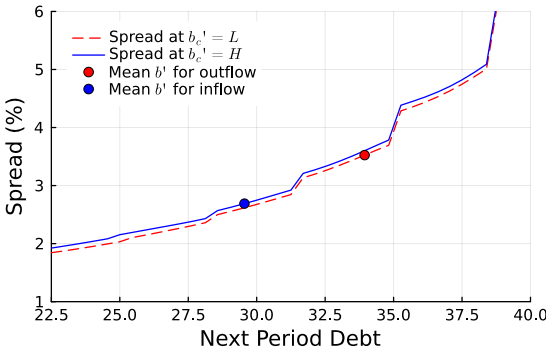
[14]Both consumption levels and their volatility fluctuate with Chinese flows: inflows make consumption less volatile while outflows make it more volatile than on average.

4.2 China debt and market borrowing opportunities

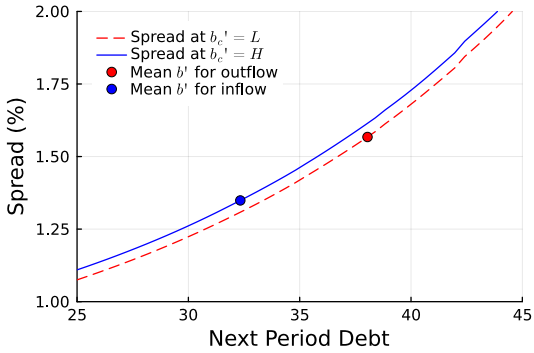
Here we study how the position vis-à-vis China affects the country's market borrowing opportunities. Figure 1 presents the spread–debt *menus* for two different values of current income (mean and above-mean) and for the two possible values of b'_c.[15]

Figure 1: Spread–debt menus

(a) Mean income



(b) High income



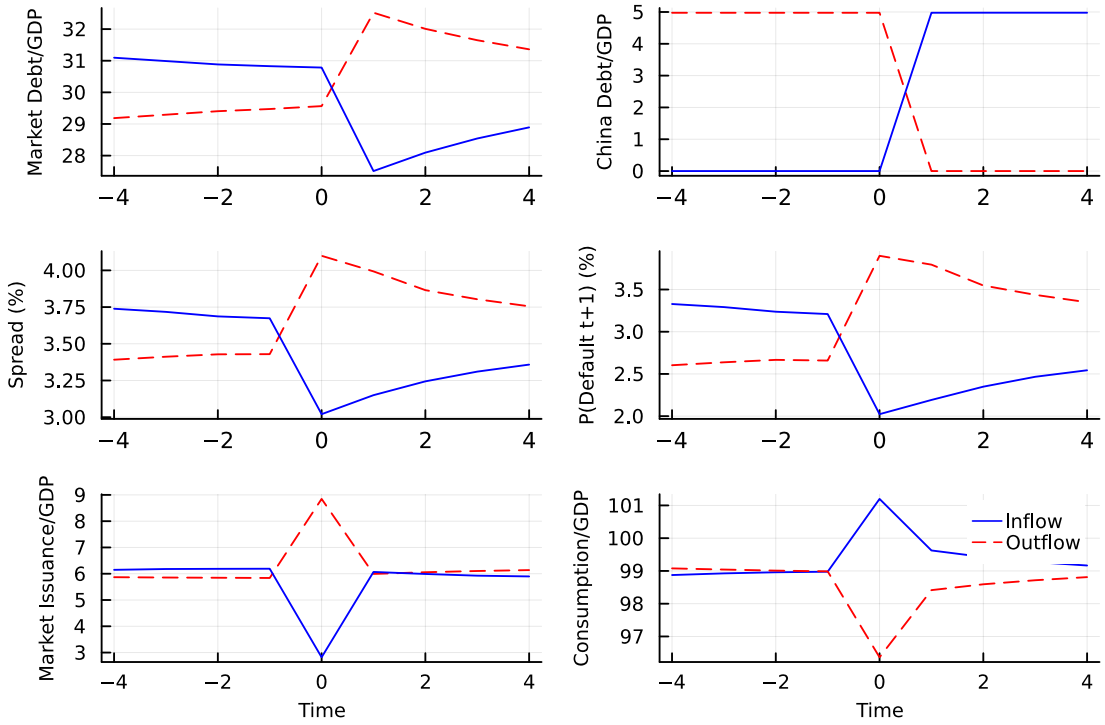
Note: Panel (a) shows the spread–debt menu available to the economy when current income is at its mean ($y = 1$), and panel (b) is for when current income is 10 percent above its mean. The blue solid line is for the case when end-of-period Chinese debt is high ($b'_c = H$), and the red dashed line is for when it is low ($b'_c = L$). The dots denote the mean market debt chosen during an outflow (red) or an inflow (blue) in the simulations (during non-exclusion periods).

Figure 1 shows that when the country carries a high level of Chinese debt into the next period (i.e., when $b'_c = H$), it faces worse borrowing terms, that is to say that for the same level of next-period market debt b', the country needs to pay a higher spread. At the same time, the figure also shows that when the economy faces these less favorable price schedules, it endogenously chooses to rely less on market debt: the chosen portfolios (denoted with the dots in Figure 1) imply lower market debt issuances in these cases. This 'deleveraging' is such that, in equilibrium, the economy pays lower spreads on market debt when the end-of-period Chinese debt is high. The last two columns of Table 3 show that this is indeed the case in the simulations.

[15]Notice that what matters for the price schedules is not the current level of Chinese debt b_c alone nor the current realization of flow transition a alone, but the resulting end-of-period level of Chinese debt, b'_c.

4.3 Dynamics around Chinese funding events

Figure 2: Dynamics around Chinese funding events



Note: The plots show the average dynamics for 4 years before and after a Chinese funding event (conditioning on no exclusion). Blue solid lines are for inflow events ($L \to H$) and red dashed lines are for outflow events ($H \to L$).

Figure 2 shows the dynamics of our model around China funding events, both inflows (b_c changing from L to H) and outflows (b_c switching from H to L). The clearest message comes from the behavior of market debt: we see that the economy rebalances its portfolio right after these events. In the case of a capital inflow from China, the country lowers its market debt (from roughly 31% to less than 28% of mean GDP), and therefore the equilibrium spreads also decrease on impact (by roughly 75 bps). In the case of a capital outflow from China, the economy increases its market debt (roughly from 29% to slightly over 32% of mean GDP), and it ends up paying higher spreads (roughly 50 bps higher).

Another feature observed in these dynamics is a slight asymmetry between a positive and a negative China flow: after an outflow, consumption decreases slightly more (in absolute terms) than it increases after an inflow. This implies that the country *finances* the positive shock more than the negative one: this is due to the pricing of default risk. As the economy increases debt to finance the Chinese outflow, the market price for its bonds moves against

it, which limits the equilibrium borrowing and triggers a larger consumption adjustment. Naturally, this asymmetric response is captured in the equilibrium spreads.

After the aforementioned portfolio rebalancing, market debt issuances move back to their mean, and the debt level slowly reverts to its mean. Spreads, however, remain elevated for longer after an outflow: this is because the economy is more vulnerable to a bad income realization in the early periods after having to borrow to repay Chinese loans (as reflected in the higher one-period-ahead default probability). After inflows, spreads slowly return to their mean as debt increases, and lenders also price in the probability of an outflow.[16]

4.4 The disciplining effect

As hinted above, the presence of this official, non-defaultable, and roll-over prone debt creates a "disciplining effect" for the borrowing country. This operates through the government's borrowing policy and then gets reflected in equilibrium prices and welfare.

Debt choice probabilities. We begin by using the government's debt choice probabilities at different levels of income to illustrate the disciplining effect.[17] Figure 3 displays these debt choice probabilities for three cases: (i) the benchmark economy facing a CHN outflow, (ii) the benchmark economy facing a CHN inflow, and (iii) a No-China economy.[18] In each of these cases, the government enters the period with a level of outstanding market debt equal to 30% of mean income.

As we move across the panels (a)–(c), going from lower to higher income, a clear pattern emerges: when an outflow event happens, the economy levers up (in many cases borrowing more than in the No-China scenario); after an inflow event, the economy reduces its market debt exposure.

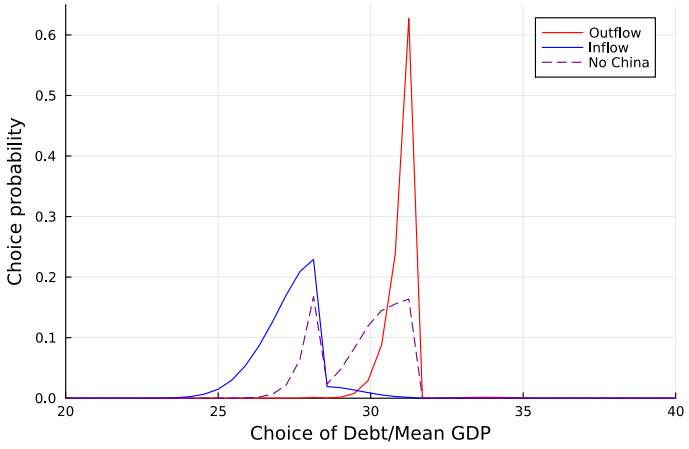
[16] In Appendix B.1, we contrast the effect of Chinese inflows and outflows with the effect of a one-time income shock of similar size. The income flows do not trigger the same portfolio rebalancing dynamics seen around the Chinese funding events.

[17] In our quantitative implementation, the government's choice of next-period market debt is made over a discrete grid and is subject to i.i.d. taste (preference) shocks across all debt grid levels. These shocks "smooth" the otherwise discrete borrowing rule and imply *debt choice probabilities* $\mathbb{P}^{b'}(b, b_c, s)$—i.e., the probability, prior to the realization of the taste shocks, that a government that repays selects each feasible debt level b' given the state (b, b_c, s). Appendix C presents the details of the model solution using taste shocks and shows how these choice probabilities enter equilibrium bond pricing.

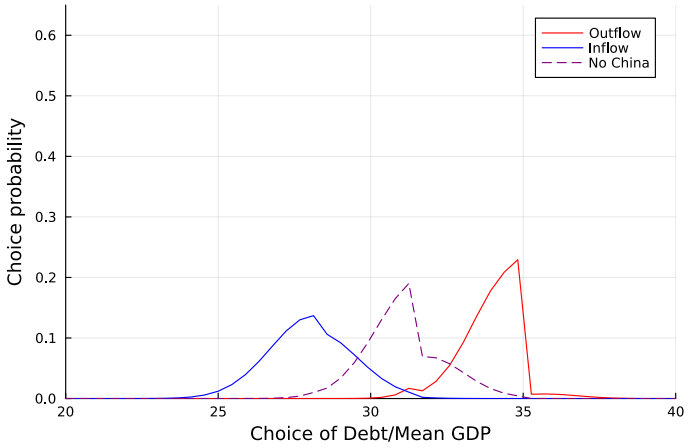
[18] The No-China economy is identical to the benchmark one, except that it is not a possibility to receive (nor pay) funds from (to) China. Parametrically, the No-China economy can be obtained by setting the possible values of b_c to $L = H = 0$.

Figure 3: Debt choice probabilities

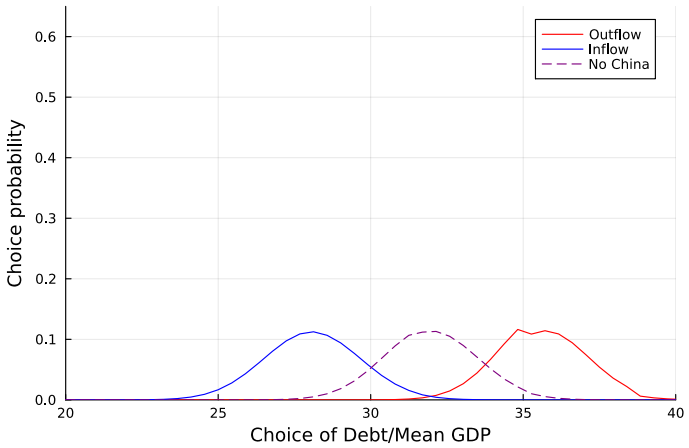
(a) Low Income: $\approx 0.95 \times \bar{y}$



(b) Mean Income: $\bar{y}$



(c) High Income: $\approx 1.05 \times \bar{y}$



Note: Each panel varies the level of initial income and presents debt choice probabilities for inflow and outflow events in the benchmark economy (blue and red solid lines, respectively) as well as for the No-China economy (dashed line). The incoming market debt level is set at 30% of mean income.

A second clear pattern is that the modal debt choice in the outflow state increases with income. This relates to how the price schedule reacts: for high-income states, the debt price is less sensitive to the indebtedness level, and so it is optimal to lever up more. In low-income states, however, prices move against the country and become very sensitive to higher debt: we can see from panel (a) that the modal debt choice is the same as in the No-China case, even though the two economies have the same incoming levels of market debt and income.

A third pattern is that the modal debt choice in the inflow states remains largely unchanged as income increases. The fact that the country chooses to deleverage in low-income states (with high marginal utility) by roughly the same amount as in high-income states (with low marginal utility) is telling of the disciplining effect of Chinese debt: the government understands that there is a non-defaultable outflow coming after an inflow, and it chooses to create "fiscal space" (by reducing debt) to cope better with that. These debt choices are what explain the fact observed in the simulations: even though after an inflow event, the country exits the period with more Chinese debt, its market sovereign spreads are lower—this is due to the deleveraging.

Welfare. The disciplining effect that Chinese debt has on the borrowing country's behavior has implications for welfare. We define the consumption-equivalent welfare gain of having access to Chinese debt as:

$$\Delta w_{\text{TOT}} = \left(\frac{V^{\text{Bench}}}{V^{\text{NC}}} \right)^{\frac{1}{1-\gamma}} - 1 \,,$$

where 'TOT' refers to the total welfare gain, 'Bench' points to the benchmark economy, and 'NC' to the No-China economy. There are two key factors that may cause a government to prefer living in a world with Chinese debt. The first is the higher net present value (NPV) of resources afforded by the Chinese loans (they are, after all, subsidized loans). The second factor is the disciplining effect of Chinese debt: the government's behavioral response to the Chinese debt flows results in different borrowing behavior and, therefore, different (more favorable) spreads.

To separate these two effects, we compute the lifetime utility of a government in the benchmark economy that does not benefit from the NPV of the Chinese debt flows. This government has τ units less of consumption every period, where the NPV of τ equals the NPV of the Chinese debt flow.[19] We denote the value attained in this case by $V^{\text{Bench.Net.NPV}}$.

[19]The NPV is computed using the discount factor of the international lenders and from the perspective of a government that has zero initial outstanding Chinese debt.

We can then rewrite the welfare gains of Chinese debt as:

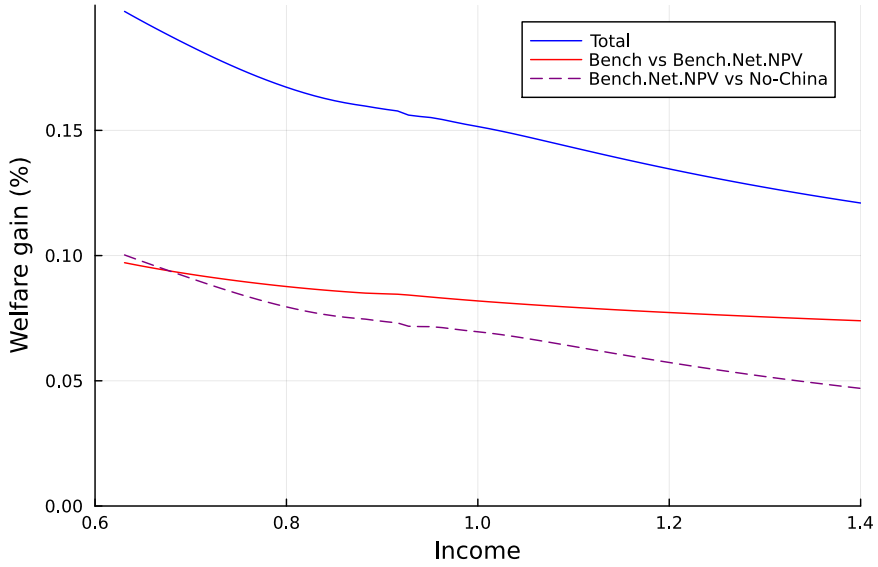
$$\Delta w_{\text{TOT}} = \left(\frac{V^{\text{Bench}}}{V^{\text{Bench.Net.NPV}}} \right)^{\frac{1}{1-\gamma}} \left(\frac{V^{\text{Bench.Net.NPV}}}{V^{\text{NC}}} \right)^{\frac{1}{1-\gamma}} - 1 \,.$$

After a simple manipulation, we obtain the following decomposition:[20]

$$\ln(1 + \Delta w_{\text{TOT}}) = \ln\left(1 + \Delta w_{\text{NPV}}\right) + \ln\left(1 + \Delta w_{\text{DISC}}\right).$$

We refer to Δw_{NPV} as the welfare gain resulting from the higher NPV of resources in the benchmark economy. Figure 4 below depicts these gains with the solid red line, and they account for roughly half of the total welfare gains. The other term, Δw_{DISC}, is the welfare gain resulting from the disciplining effect of Chinese loans. It is denoted by the purple dashed line in Figure 4.

Figure 4: Welfare decomposition: disciplining effect and NPV of Chinese loans



Note: The welfare gains are computed assuming zero initial Chinese debt and an initial level of market debt equal to 30% of mean income.

[20] Note that the total welfare gain can be written as:

$$1 + \Delta w_{\text{TOT}} = \left(1 + \left(\frac{V^{\text{Bench}}}{V^{\text{Bench.Net.NPV}}} \right)^{\frac{1}{1-\gamma}} - 1\right) \cdot \left(1 + \left(\frac{V^{\text{Bench.Net.NPV}}}{V^{\text{NC}}} \right)^{\frac{1}{1-\gamma}} - 1\right).$$

Let's define $\Delta w_{\text{NPV}} \equiv \left(\frac{V^{\text{Bench}}}{V^{\text{Bench.Net.NPV}}} \right)^{\frac{1}{1-\gamma}} - 1$ and $\Delta w_{\text{DISC}} \equiv \left(\frac{V^{\text{Bench.Net.NPV}}}{V^{\text{NC}}} \right)^{\frac{1}{1-\gamma}} - 1$. Taking logs, we obtain the decomposition in the text.

Notice the welfare gain associated with the disciplining effect declines faster with income than the gains resulting from NPV differences. This is consistent with the fact that the NPV of Chinese loans is constant across income levels, whereas the disciplining effect is less consequential as initial income grows: those 'good states of nature' are the ones in which the bond price is less sensitive to debt choices and therefore where the 'disciplined borrowing behavior' accrues lower returns.

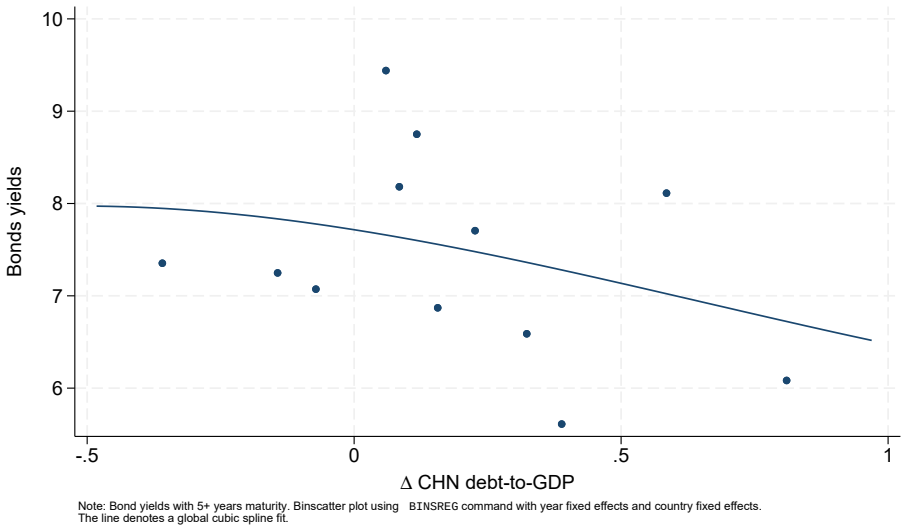
4.5 Empirical evidence on the discipline effect

We now turn to the data for evidence of the disciplining effect of Chinese debt flows.[21]

Data description. Horn et al. (2021) note that China's lending terms and amounts are difficult to measure. They construct annual Chinese overseas lending stocks between 2000 and 2017 for more than 100 emerging and developing economies.

For the subset of countries that issue debt in international capital markets, we construct bond yields on marketable international debt using bond-level data extracted from Bloomberg. We obtain annual measures of external public debt held by bondholders from the World Bank International Debt Statistics (IDS).

Figure 5: Bond Yields and Changes in China Debt Flows



[21] Our results and approach here refine our initial findings in Kondo, Mkhitaryan, and Sosa-Padilla (2024). We also do not study the effects of debt restructuring events in this paper. Restructuring events with China are rather rare in our data. In section 5, we study the risk of a "Chinese retrenchment," which can be understood as an alternative interpretation of China's debt restructuring events in the data.

To illustrate our approach, Figure 5 shows a simple binscatter plot of bond yields and changes in China debt relative to GDP.[22] This figure suggests that increases in the indebtedness vis-à-vis China are associated with lower bond yields. We explore this relationship—a potential sign of the disciplining effect—more systematically below.

China debt inflows and sovereign bond yields. For each country, we construct Chinese funding events as relatively large increases in the flow of funding from China. Specifically, for a country-year pair (i, t), we set CHN funding$_{i,t} = 1$ if the change in reported debt vis-à-vis China in that year is above country i's median value of positive debt changes vis-à-vis China.[23] On average, in the cross-section, we find that yields are 60 to 70 basis points lower when there is a China funding event.

Using our (unbalanced) annual panel dataset, we estimate the effects of Chinese lending events on bond yields and external debt held by bondholders using the following regressions:

$$\log \text{external debt}_{i,t} = \alpha_b + \beta_b \text{ CHN funding}_{i,t} + \theta_b \log \text{external debt}_{i,t-1} + \gamma_b X_{i,t} + \varepsilon^b_{i,t} \quad (7)$$

$$\text{sovereign yields}_{i,t} = \alpha_q + \beta_q \text{ CHN funding}_{i,t} + \theta_q \text{ sovereign yields}_{i,t-1} + \gamma_q X_{i,t} + \varepsilon^q_{i,t}, \quad (8)$$

where $\log \text{external debt}_{i,t}$ is the log of the external debt held by bondholders, CHN funding$_{i,t}$ is as explained above, and $X_{i,t}$ are additional controls including lagged real GDP, lagged market debt, as well as time fixed effects, country-specific time trends, or country fixed effects, depending on the specifications.[24]

We report our estimates in Tables 4 and 5, and discuss our various regression specifications in more detail below. For both tables, we consider the following specifications: column (1) has year fixed effects, column (2) excludes consecutive Chinese inflow events, column (3) adds country-specific linear time trends, column (4) includes both year and country fixed effects, and column (5) uses a country-specific China Funding Era variable which is equal to 1 after the country's first China funding event.

Taken together, our results suggest that China debt inflows may have a disciplining effect on market debt prices and quantities: Chinese lending events are associated with (i) lower

[22] Figure A.1 in the appendix has a related binscatter plot of bond yields and Chinese debt/GDP levels.

[23] See Figures A.2 and A.3 in the appendix for debt vis-à-vis China and the implied China funding events for each country in our sample.

[24] We also construct an issuance indicator from the Bloomberg bond-level extract and estimate the following linear probability model:

$$\text{new bond issuance}_{i,t} = \alpha + \beta \text{ CHN funding}_{i,t} + \theta \text{ new bond issuance}_{i,t-1} + \gamma X_{i,t} + \varepsilon_{i,t}.$$

The new bond issuance estimates are noisier, probably due to the less complete bond data coverage.

external public debt (held by private bondholders), and (ii) lower sovereign bond yields faced by the borrowing countries.

External debt reduction following Chinese lending events. Across specifications (1)–(4) in Table 4, we find that China funding events are associated with 10 to 12 log points reductions in the borrowing countries' external public debt held by private bondholders. The pre/post China Funding Era estimates in column (5) are not significantly larger, perhaps due to the offsetting effect of past China inflow events that tend to push up the debt level (see lagged China funding event effect in specifications 1–4). Overall, Chinese lending events are associated with an overall reduction in the external debt of the recipient country vis-à-vis private bondholders.

Table 4: External Debt (log Bonds) and China Inflows

	(1) with Year FE	(2) without Long Spells	(3) with Country Trends	(4) with Country FE	(5) pre/post China Era
CHN funding event	-0.122***	-0.114**	-0.111**	-0.111**	
	(0.038)	(0.048)	(0.044)	(0.044)	
(lag) CHN funding event	0.133***	0.137**	0.099**	0.098**	
	(0.046)	(0.058)	(0.041)	(0.041)	
CHN funding era					-0.152**
					(0.066)
adj. R^2	0.971	0.970	0.975	0.975	0.985
N	444	418	444	444	642

Notes: Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. The year fixed effects sample includes: AGO, ALB, ARG, ARM, BGR, BIH, BLR, BOL, BRA, CIV, CMR, COD, COG, COL, CRI, DMA, ECU, EGY, ETH, FJI, GAB, GHA, IDN, IND, JAM, JOR, KAZ, KEN, LAO, LBN, LKA, MAR, MEX, MKD, MNE, MNG, MOZ, NGA, PAK, PER, PHL, RUS, RWA, SEN, SRB, TUR, UKR, VEN, VNM, ZAF, ZMB. The pre/post China Era sample includes: AGO, ALB, ARG, ARM, AZE, BGR, BIH, BLR, BOL, BRA, CIV, CMR, COD, COG, COL, CRI, DMA, ECU, EGY, ETH, FJI, GAB, GHA, GUY, IDN, IND, JAM, JOR, KAZ, KEN, LAO, LBN, LKA, MAR, MEX, MKD, MNE, MNG, MOZ, NGA, PAK, PER, PHL, RUS, RWA, SEN, SRB, TUR, UGA, UKR, VEN, VNM, ZAF, ZMB, ZWE.

The China funding discount: A sign of discipline? Table 5 more closely mirrors the data in Figure 5 on the correlation between sovereign bond yields dynamics and China funding events. While the framework is similar to the one used for external debt dynamics, the sample size is smaller. This is because (i) few countries issue bonds in international capital markets, and (ii) bond-level coverage in Bloomberg is incomplete for emerging and frontier economies. We use the yield-to-maturity on long-term bonds with 5+ years of remaining maturity as our yield measure in equation (8).

In specifications (1)–(4), the point estimates are negative, but statistically significant

Table 5: Bond Yields and China Inflows

	(1) with Year FE	(2) without Long Spells	(3) with Country Trends	(4) with Country FE	(5) pre/post China Era
CHN funding event	-0.332	-0.269	-0.527**	-0.529**	
	(0.220)	(0.264)	(0.254)	(0.254)	
(lag) CHN funding event	-0.045	0.025	-0.105	-0.106	
	(0.215)	(0.258)	(0.232)	(0.232)	
CHN funding era					-1.364**
					(0.615)
adj. R^2	0.816	0.819	0.814	0.814	0.822
N	319	297	319	319	422

Notes: Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. The year fixed effects sample includes: AGO, ARG, ARM, BGR, BLR, BOL, BRA, CIV, CMR, COG, COL, CRI, ECU, EGY, ETH, GAB, GHA, IDN, JAM, JOR, KAZ, KEN, LAO, LBN, LKA, MAR, MEX, MKD, MNE, MNG, MOZ, NGA, PAK, PER, PHL, RUS, RWA, SEN, SRB, TUR, UKR, VEN, VNM, ZAF, ZMB. The pre/post China Era sample includes: AGO, ARG, ARM, AZE, BGR, BLR, BOL, BRA, CIV, CMR, COG, COL, CRI, ECU, EGY, ETH, GAB, GHA, IDN, JAM, JOR, KAZ, KEN, LAO, LBN, LKA, MAR, MEX, MKD, MNE, MNG, MOZ, NGA, PAK, PER, PHL, RUS, RWA, SEN, SRB, TUR, UKR, VEN, VNM, ZAF, ZMB.

only after the inclusion of country-specific time trends (3) or country fixed effects (4). We find in column (4) that China lending events are associated with a reduction of around 50 basis points in the country's sovereign bond yields. When we estimate the effect of the advent of Chinese loans in specification (5), we find a larger effect: a reduction of around 135 basis points in bond yields once countries have access to Chinese lending.[25]

We view these various estimates of a significant borrowing discount around China lending events as potential evidence of the disciplining effect highlighted by our model. In the next section, using an extension of the model with the option to default on China, we confirm that such lower spreads and the disciplining effect are indeed a consequence of the recipient country's inability to default on its Chinese debt.

4.6 The disciplining effect and the no-default assumption

Our benchmark model does not allow the borrowing country to default on Chinese loans. This assumption reflects the significant geopolitical influence that China has over debtor countries. As it turns out, the non-defaultable nature of Chinese debt is an important driver

[25] Liu and Mosley (2025) use daily frequency bond yield data to document that borrowing countries' bond spreads *rise* on news of new Chinese loans for "budget and liquidity," while "project" loans have no effect on bond prices. Their results suggest that some new Chinese loans are *bad news*. However, we did not find a cyclical pattern to China inflows in our annual frequency data: inflows are not more likely during economic slowdowns. The global nature of China's lending boom also suggests idiosyncratic liquidity factors in borrowing countries may not be the primary driver of China's loan supply (see Horn et al., 2025).

of the disciplining effect. Here, we show how this comes to be and study further implications of this assumption.

Introducing default on market and China debt. In this section, we assume that if the government defaults, it does so on all of its outstanding debt (b and b_c) in a non-discriminatory way.[26] This implies that a country in default pays no coupons and receives no funding from China. In other words, the government is excluded from both funding sources for as long as it is in the default state.[27]

In this setting, the level of Chinese debt and the flows within a period significantly alter the incentives to default. When a government has outstanding Chinese debt at the beginning of a period, its incentive to default is higher relative to an identical government in the benchmark economy. These higher default incentives come from two sources. The primary benefit is that the government can consume more from its income, given that (i) it does not need to repay H, and (ii) the income costs of default are independent of the 'size' of the default. A second, less obvious benefit is that the government no longer faces the risk of an outflow when it lacks market access, being in the default state. The reduced volatility of consumption in default makes this option more attractive. Altogether, we should see more frequent defaults when $b_c = H$ relative to the benchmark economy. By the same token, when the country does not default in period t and carries high Chinese debt into the next period (i.e., $b_c' = H$), the spreads should be higher in period t, other things equal.

In contrast, default is relatively more costly when the government has no outstanding Chinese debt at the beginning of the period, relative to the benchmark model. This is because defaulting results in a temporary exclusion from Chinese loans: it delays a new Chinese inflow until (at least) financial exclusion ends. Since Chinese loans are subsidized and the government is relatively inpatient, this is costly. Therefore, we expect a lower default frequency in periods with $b_c = L$.

Default on China and spreads. Figure 6 displays the spread–debt menu in this new environment (dashed lines) compared to the menu in the baseline model (solid lines). Spreads are higher for $b_c' = H$ at every level of debt, driven by the larger incentive to default in the subsequent period. The other notable change is that the gap in the spread menus between

[26] The inability to discriminate across lenders is a common assumption in the sovereign debt literature (e.g., Broner, Martin, and Ventura, 2010 and Gennaioli, Martin, and Rossi, 2014). Relatedly, Bianchi et al. (2026) test the non-discriminatory default assumption using bilateral (official debt) data on missed principal and interest payments during sovereign default episodes over the past fifty years, and they find no systematic evidence that sovereigns discriminate against *geopolitical-rival* countries when accumulating arrears.

[27] The recursive formulation of this modified environment is in the Appendix B.2.

$b_c' = H$ and $b_c' = L$ has now widened: carrying high Chinese debt into $t+1$ increases the default risk substantially more than in the baseline economy. The ability to default on b_c delivers a sure short-run gain (not paying back b_c), which increases the default probability substantially, and this translates into higher spreads.

Figure 6: Spreads: Defaulting on the market and China

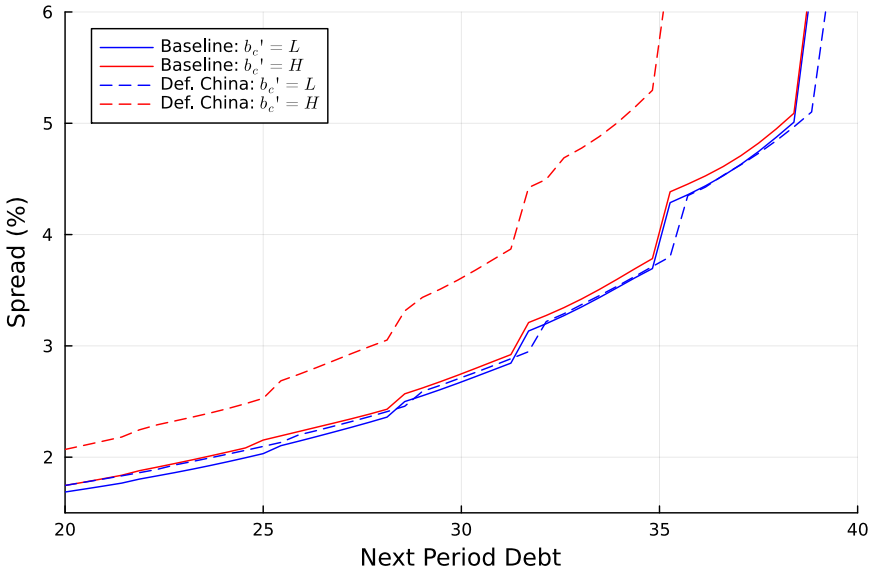


Table 6 displays the simulated statistics from this modified economy, highlighting key differences in outcomes compared to the baseline model. First, note that across all simulation periods, market debt-to-GDP is lower and average spreads are higher relative to the benchmark economy. Lower borrowing and higher spreads reflect a higher probability of default—in other words, the economy has a reduced debt-carrying capacity (or, using the terminology in Reinhart, Rogoff, and Savastano, 2003, it has a lower *debt tolerance*). Comparing the "Inflow" and "Outflow" columns with those in Table 3, we observe that both of our predictions related to spreads are confirmed.[28] In the baseline economy, the average spread during inflow periods is 3 percent. When Chinese debt is defaultable, the mean spread during inflows is 4.2 percent. This significant difference in spreads can be explained by the larger incentive to default in $t+1$ (since market *and* Chinese debt would be discharged in that event). Conversely, outflow periods are associated with lower spreads when Chinese debt is defaultable; the corresponding numbers are 3.4 percent in this environment and 4 percent in the baseline economy.

[28] Note that in this extension, the "Inflow" and "Outflow" columns are conditioned on periods with *realized* inflows or outflows; i.e., periods where default did not occur.

Table 6: Simulated statistics: Defaulting on the market and China

Statistics	Unconditional	Inflow	Outflow
Market Debt to GDP	29.04	29.17	28.93
Market Issuance to GDP	5.81	2.41	9.18
China Debt to GDP	2.12	0.0	4.94
Net Flow from China to GDP	0.08	4.99	-4.94
Consumption to GDP	99.1	101.13	96.92
Spread	3.72	4.2	3.44
S.D. Spread	2.39	3.77	1.55
Corr(Spread, GDP)	-0.64	-0.56	-0.8
P(Default t+1)	3.06	4.27	2.21
Default Frequency	2.66	0.0	0.0
S.D. Consumption/S.D. GDP	1.13	1.0	1.26

Note: Moments are computed for non-exclusion periods, except for the default frequency, which uses all simulation periods.

In terms of market debt issuance, we see a behavior similar to the benchmark economy: the country engages in debt substitution, deleveraging from the market when receiving a Chinese inflow; leaning on the market when it is time to pay back China. However, the effect on equilibrium spreads, as previewed above, is the *opposite*: the country ends up paying higher spreads on inflows. This is inconsistent with the empirical findings we presented in Section 4.5. In other words, the disciplining effect of Chinese debt is gone.[29]

5 Chinese Lending and Geopolitical Counterfactuals

In this section, we use our model to study how Chinese official lending can operate not only as a purely passive source of external finance but also as a geopolitical instrument. We consider two related but distinct counterfactual exercises.

In the first one, we think of China as making targeted take-it-or-leave-it loan offers to sovereign borrowers to induce financial and geopolitical alignment. This exercise delivers threshold conditions under which countries optimally join a China-centered financing bloc and permanently forgo access to international capital markets. In the second exercise, we focus on the borrowing country and ask how much Chinese debt is optimal, from an ex ante perspective, when there is a risk of sudden and permanent Chinese retrenchment.

[29] Appendix B.2 presents a welfare decomposition analysis confirming that there is evidence of positive welfare gains stemming from the disciplining effect of non-defaultable Chinese debt.

5.1 Geopolitical Bloc Formation: China or Market Access

We consider a counterfactual scenario in which China strategically deploys its lending capacity to expand its sphere of financial influence. Suppose, for instance, that China allocates its lending capacity by making take-it-or-leave-it loan offers that force borrowing governments to forego international capital markets debt issuance in exchange for Chinese funding.

We characterize how country fundamentals—such as impatience, default costs, and income level and volatility—shape the threshold loan size China needs to offer in order to induce the borrowing country's financial allegiance. This exercise also informs China's optimal lending portfolio calculus since different countries are unequally expensive to attract in its bloc.[30]

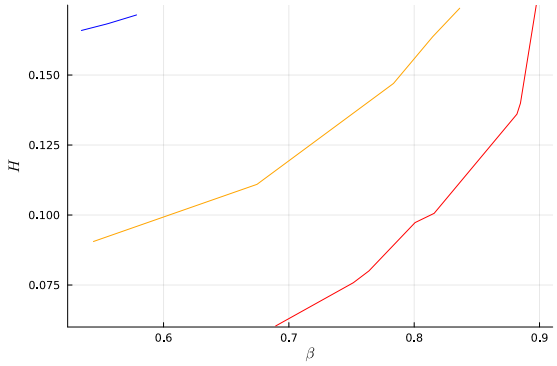
In particular, we assume that accepting the debt offer delivers a Chinese loan of size H for the country but also permanently eliminates the country's ability to issue market debt. On the other hand, rejecting the offer implies permanent exclusion from future Chinese lending and, de facto, a continuation in the No-China economy. We assume China can credibly extract and enforce this commitment from the borrower. The borrower, therefore, compares the value of these two regimes to decide whether to align with China: market access without China or autarky with China.[31]

Figure 7 shows the threshold value for H over which the country will prefer to align with China, with the conditions above. Fixing all other parameters and starting from a point on any of the thresholds, a higher H makes the country strictly better off accepting China's take-it-or-leave-it offer. We plot these threshold values for different income levels ($y \in \{0.8, 0.9, 1.0\}$) as we vary one of the parameters characterizing the borrowing government.

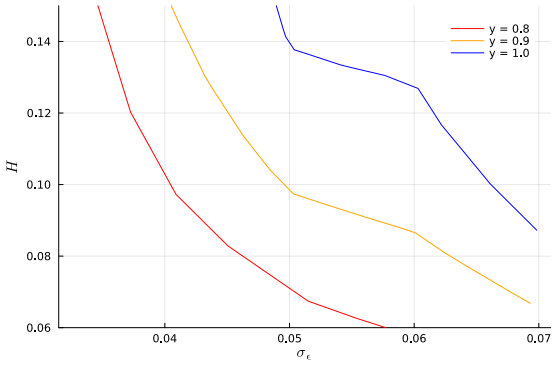
Discount factor (β) As panel (a) shows, the minimum loan threshold is increasing in β. That is, the more patient the government in the borrowing country, the higher the loan needed to make that country align with China. This is intuitive: other things equal, higher-β economies face better borrowing terms, so it takes a larger Chinese loan to entice these countries to permanently give up a more favorable funding source. Notice, however, that higher discount factors affect the values of both the China-only regime and the No-China regime. In the China-only case, the H inflow is guaranteed in period t, and the repayment follows the stochastic process described in section 2. Therefore, a less patient government

[30] Notice that we study only the effect of local factors in this subsection, but similar tradeoffs emerge if we consider global factors, like the risk-free rate (see Johri et al., 2022 for a study of how time-varying interest rates affect the borrowing opportunities and welfare of a small open economy with default risk).

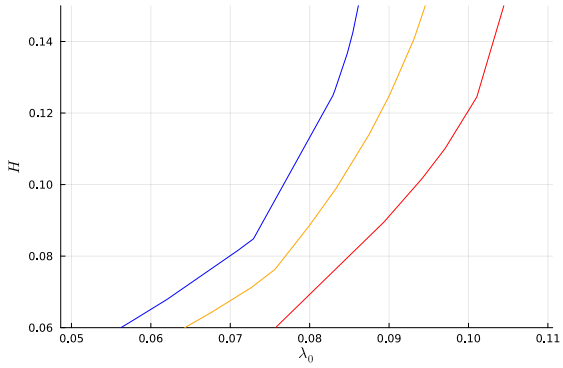
[31] Appendix B.3 has the formal presentation of how the government computes these two values and decides on its Chinese alignment.



(a) Discount factor, β



(b) Standard deviation of income innovations, σ_ε



(c) Cost of default, λ_0

Figure 7: Threshold values for H

puts a disproportionately high weight on the period-t consumption gains and a lower weight on the future adjustments needed to repay that debt. At the same time, a lower β makes the No-China option less attractive: the country is more likely to default, markets understand and price this in, and therefore the borrowing terms are less favorable. Both of these forces go in the same direction, implying that China can entice a lower-β country with fewer resources.

Income volatility (σ_ε) In panel (b), we vary the volatility of the income process, σ_ε. Other things equal, lower income volatility leads the economy to less frequent defaults and higher debt capacity. We find the thresholds are decreasing in the volatility: consistent with the intuition above, it takes a larger loan to attract a more stable economy.

Default cost (λ_0) Panel (c) illustrates how the cost of default affects the thresholds. Notice that, in this case, default costs shift the value of the No-China regime but do not change the value of the regime with only China lending. An economy with higher costs of defaults can sustain higher levels of market debt, other things equal. So, the higher the

market debt capacity of the country, the higher the H needed to convince the government to live in the China-only regime.

Income gradient (y) Finally, across all panels, we observe that there is an *income gradient* in the China loan amount thresholds: The 'generosity' of the loan needed to align a country with China increases with the country's current income. In other words, it is cost-minimizing for China to engage in *bloc building* when the borrowing countries are in low-income periods.

5.2 Optimal China Debt under Chinese Retrenchment Risk

We now study a different geopolitical risk scenario that has recently become a salient policy concern as China's lending boom has slowed. In a world with shifting geopolitical alliances, countries borrowing heavily from China could face the risk of a sudden and permanent "Chinese retrenchment," i.e., an abrupt reversal in financial ties that leaves the sovereign excluded from Chinese funding and forced to repay outstanding obligations. Such an abrupt adjustment may prove costly for the borrower and the pricing of its market debt.

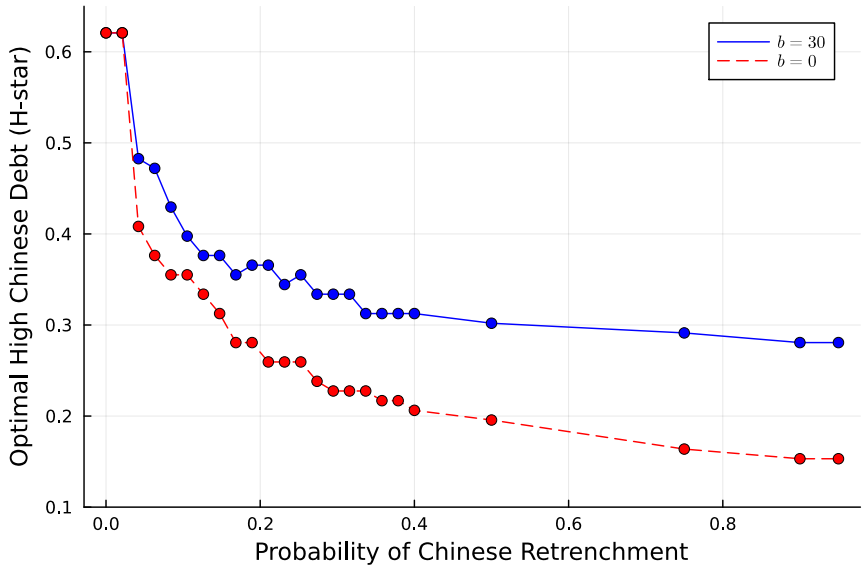
The possibility of Chinese retrenchment introduces a fundamental trade-off for borrowers: subsidized financing from China can provide insulation from market conditions, but it also introduces an additional source of *geopolitically-driven* rollover risk that can sharply worsen debt market outcomes when funding stops. We ask how much Chinese debt a country would optimally choose, given its existing market indebtedness and the likelihood that China may sever ties and end its financial largesse. We focus on the resulting ex ante optimal exposure to Chinese funding, while the dynamic responses to retrenchment shocks are relegated to Appendix B.4.[32]

We define $H^*(b, p_{SS})$, the ex ante optimal level of high Chinese debt a country would choose, as a function of its market debt (b) and the probability of a Chinese retrenchment (p_{SS}). Figure 8 tells a clear story: (i) other things equal, if a country has a higher level of market debt, it prefers a higher level of Chinese loans, pointing to the importance of the substitution between these two funding sources; and (ii) regardless of the market debt level, the higher is p_{SS} the lower is the optimal exposure to China, pointing to the undesirability of this additional source of 'rollover' risk.

Overall, the findings in this subsection (and Appendix B.4) suggest that exposure to Chinese lending can display boom–bust patterns as geopolitical conditions evolve. Because

[32]The appendix also presents the formal model description and the recursive formulation when we introduce the risk of retrenchment.

Figure 8: Optimal Chinese Debt by Market Debt Level



Note: This figure shows H^* given the sovereign has outstanding debt of 30% (blue) and 0% (red/dotted) of outstanding debt as a percent of mean income.

the ex ante optimal exposure $H^*(b, p_{SS})$ is decreasing in the probability of a permanent retrenchment, shifts in p_{SS}—interpretable as changes in the perceived stability of financial ties with China—can induce sharp re-optimizations of the desired China-debt position. This mechanism implies that economies with volatile political environments may accumulate substantial exposure when retrenchment risk is perceived to be low, only to face abrupt and costly adjustment when domestic or international political events raise the perceived hazard of retrenchment.

6 Conclusion

This paper studies how Chinese official lending affects sovereign borrowing from private international capital markets. To do so, we augment a standard quantitative sovereign default model with long-term market debt by introducing Chinese loans that are subsidized, non-defaultable, and subject to rollover risk outside the borrower's control. This structure allows us to analyze how Chinese lending changes the sovereign's financing choices and default incentives.

Our main result is that Chinese lending disciplines market borrowing. Following a positive Chinese capital inflow, the sovereign reduces its issuance of defaultable market debt, leading to lower spreads and lower consumption volatility. Conversely, when repayments to China

come due, the sovereign increases market borrowing and faces higher and more volatile spreads. These portfolio adjustments are a central equilibrium implication of the model and are consistent with the empirical patterns we document for emerging and developing economies.

The model also provides a quantitative assessment of the value of access to Chinese funding. Although subsidized loans relax financing constraints directly, a substantial share of the welfare gains arises from the endogenous reduction in market indebtedness induced by future repayment obligations to China. The benefits of Chinese lending, therefore, operate not only through cheaper funding but also through their effect on the sovereign's borrowing behavior.

Finally, we use the model to run two geopolitical counterfactuals. First, in a bloc-formation exercise, China can induce financial alignment by offering sufficiently large official loans in exchange for a permanent loss of market access, and we characterize how the required offer varies with country fundamentals and the income state. Second, we characterize the ex-ante optimal level of exposure to Chinese debt. Optimal exposure is increasing in a country's level of market indebtedness and decreasing in the probability of Chinese retrenchment. Taken together, these exercises highlight the central trade-off emphasized by the paper: Chinese lending can improve borrowing conditions by substituting away from costly defaultable debt, but greater reliance on it also increases vulnerability to disruptions in bilateral financing relationships.

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A Empirical Appendix

Figure A.1: Bond Yields and China Debt Flows

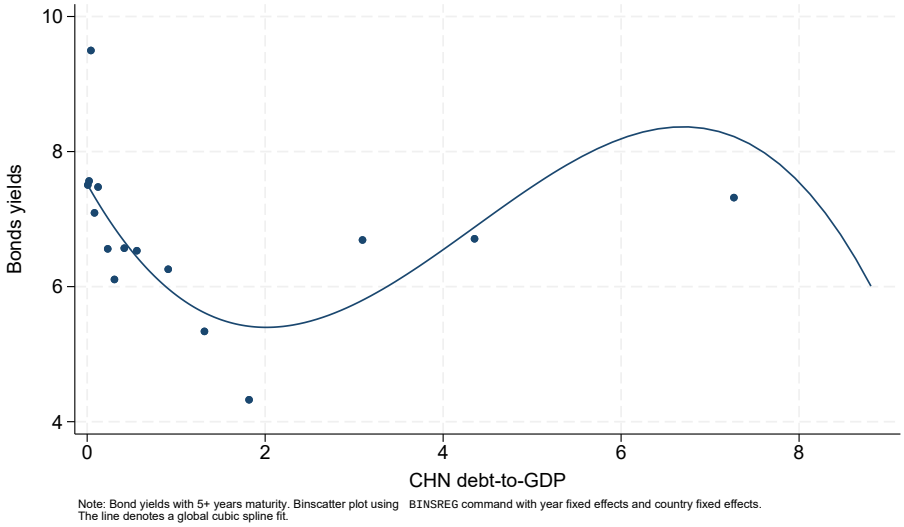


Figure A.2: China Debt Flows vs GDP and Market Debt

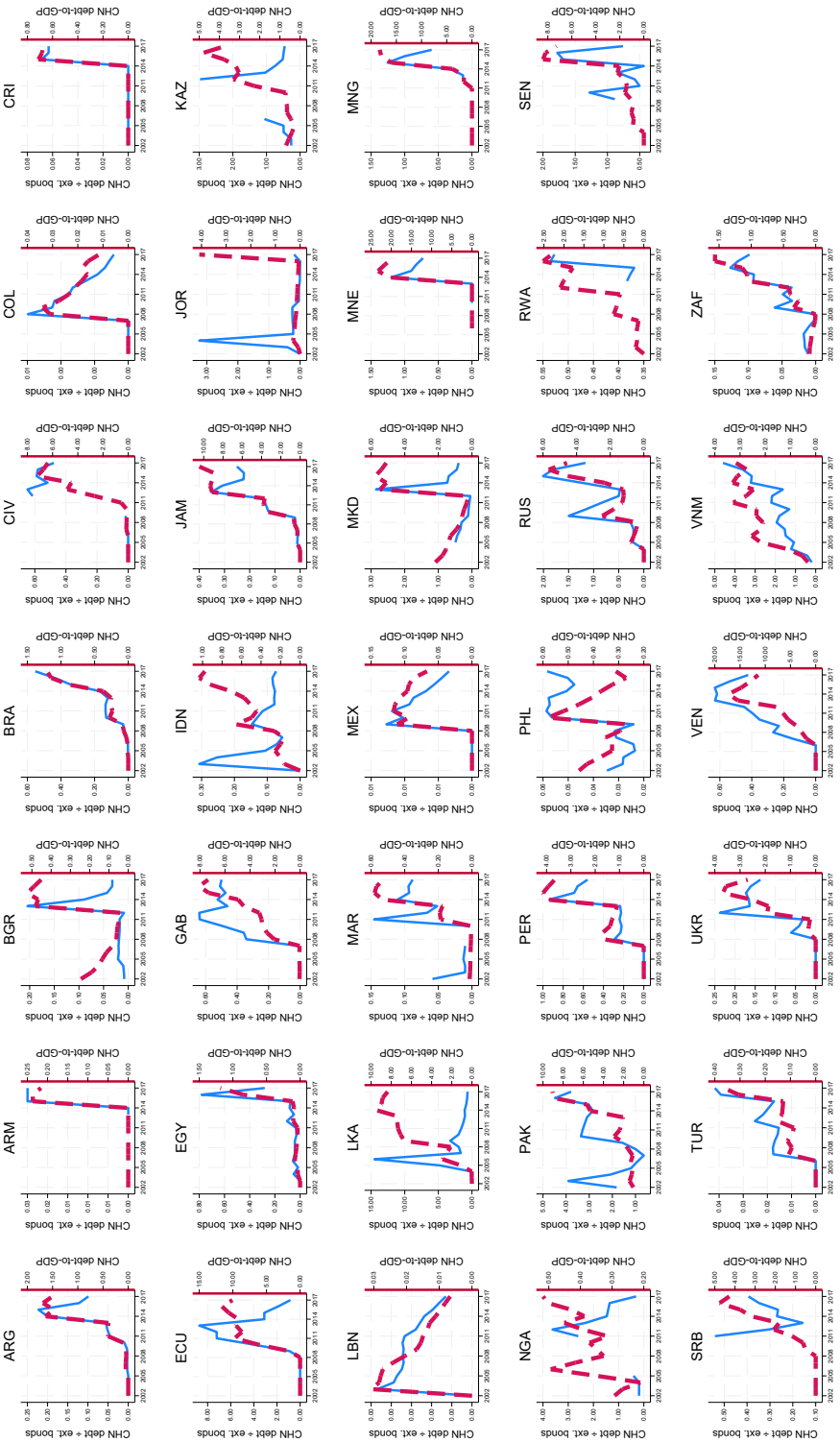
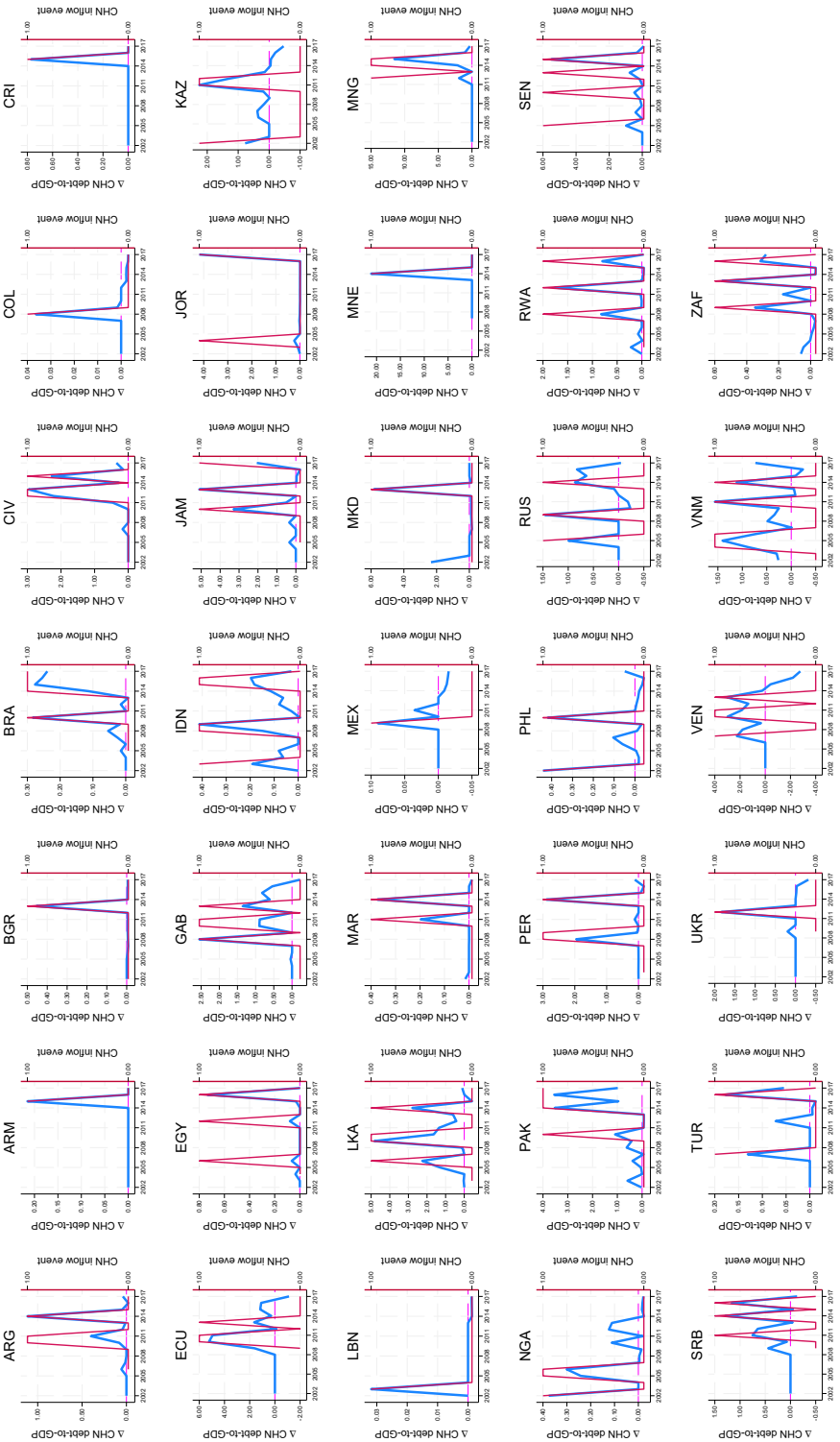


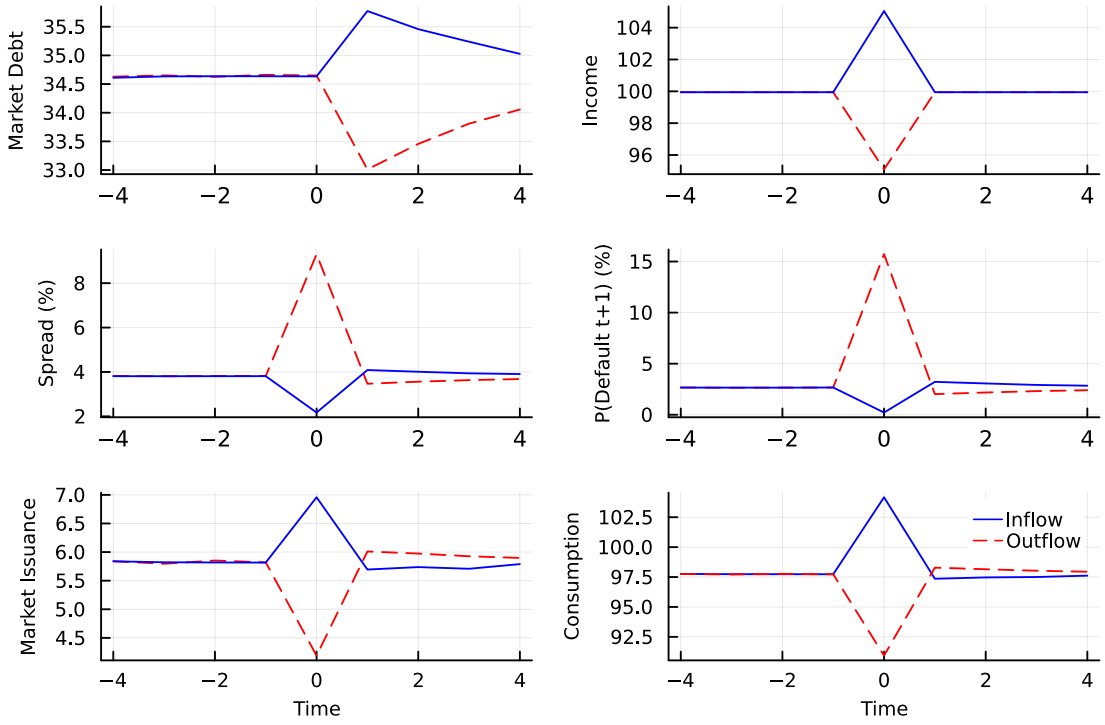
Figure A.3: China Debt Flows and Inflow Events



B Extensions and Robustness

B.1 Dynamics around Income Flows

Figure B.1: Dynamics around Income Flows



Note: The plots show the average dynamics for 4 years before and after an income flow of comparable size to Chinese inflows/outflows (conditioning on no exclusion). Blue solid lines are for a one-time increase in income, and red dashed lines are for a one-time decrease in income.

B.2 Default on market and China

We modify the baseline model to allow for the possibility of default on outstanding Chinese debt, in addition to market debt. An important feature of this extension is that the government can not experience Chinese inflows or outflows while in default. Upon exiting default, the government reenters with no market debt and no Chinese debt.

B.2.1 Recursive formulation

As in the baseline model, there are four state variables. The market debt level b is the sole endogenous state variable. The other state variables are the income level y, the Chinese debt level b_c, and the realization of a Chinese net flow a (conditional on not defaulting). To simplify notation, let $s \equiv (a, y)$. For this extension, the only modification to the recursive formulation relative to the baseline is the value function for a government in default.

Denote $d \in \{0,1\}$ as the government's default decision in the current period. Let $V_1(y)$ denote the value of defaulting and $V_0(b, b_c, s)$ denote the value of repaying. The government's value function at the beginning of a period is:

$$V(b, b_c, s) = \max_{d \in \{0,1\}} \Big\{ dV_1(y) + (1-d)V_0(b, b_c, s) \Big\}, \tag{B.1}$$

where the value of default satisfies

$$V_1(y) = u\big(y - \phi(y)\big) + \beta\, \mathbb{E}_{s'|s} \Big[\theta V(0, L, s') + (1-\theta) V_1(y') \Big], \tag{B.2}$$

where θ is the reentry probability. Notice that b_c' is already set to L since a government exits the default state with no outstanding Chinese debt.

The recursive formulations for the value of repayment and the pricing functions are unchanged relative to the baseline model. Refer to Section 2.2 for these functional equations.

B.2.2 Welfare decomposition

Figure B.2 displays a welfare decomposition comparing three versions of our model: the benchmark model, the No-China economy, and the present extension (in which default on China is possible). In the body of the paper, we defined the consumption-equivalent *total* welfare gain of having access to Chinese debt as:

$$\Delta w_{\text{TOT}} = \left(\frac{V^{\text{Bench}}}{V^{\text{NC}}} \right)^{\frac{1}{1-\gamma}} - 1\,. \tag{B.3}$$

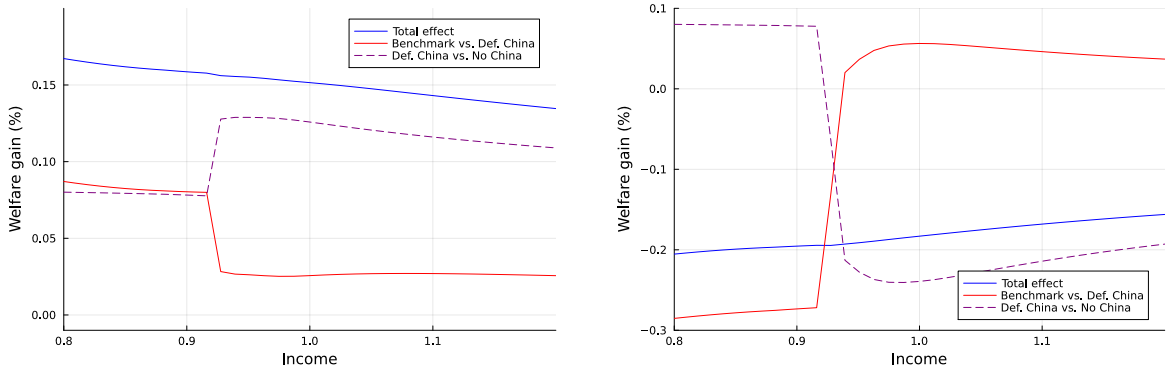
There are two key factors that cause the government to prefer living in a world with Chinese debt. The first is the higher net present value of resources (given the subsidized nature of Chinese debt). The second factor is the disciplining effect of Chinese debt: the government's behavioral response to the debt flows results in different borrowing policies and, therefore, different spreads. We attempt to isolate the welfare gains that come from the disciplining effect. To do this, consider the following decomposition of the total welfare gain:

$$\Delta w_{\text{TOT}} = \left(\frac{V^{\text{Bench}}}{V^{\text{Def.China}}} \right)^{\frac{1}{1-\gamma}} \cdot \left(\frac{V^{\text{Def.China}}}{V^{\text{NC}}} \right)^{\frac{1}{1-\gamma}} - 1\,.$$

We think of $\left(\frac{V^{\text{Bench}}}{V^{\text{Def.China}}} \right)^{\frac{1}{1-\gamma}} - 1$ as the welfare gain from the disciplining effect of Chinese debt. It is represented by the solid red line in Figure B.2. $\left(\frac{V^{\text{Def.China}}}{V^{\text{NC}}} \right)^{\frac{1}{1-\gamma}} - 1$ is the welfare gain resulting from other factors and is represented by the dashed purple line.

Figure B.2: Welfare decomposition: Defaulting on the market and China debt

(a) $b_c = L$ (b) $b_c = H$



Note: The left (right) panel is for the case in which the initial level of Chinese debt is low (high). The solid blue line depicts the total welfare gain, the solid red line is the welfare gain coming from the disciplining effect, and the dashed purple line captures all other factors. All lines assume initial income at the mean and market debt at 30% of mean income.

First, consider panel (a) in Figure B.2. This figure displays the welfare decomposition when the government starts with low outstanding Chinese debt ($b_c = L = 0$) and does not receive an inflow this period ($a = 0$). Thus, the government is expecting to receive an inflow in the (near) future. The discontinuity around the 0.9 income level is related to the binary default decision. Below that level, the government prefers to default in all three economies. The red line is positive (and 'high') because the government in the baseline economy can still receive inflows while excluded (but this is not possible in the Default-on-China extension). This effect masks the true value of the disciplining effect for low income levels. For values of income above the discontinuity, the disciplining effect accounts for around 15 percent of the total welfare gain. The total welfare gain is positive for all values of income, indicating that the government prefers to reside in the benchmark economy.

Panel (b) in Figure B.2 displays the welfare decomposition when the government begins the period with a high level of Chinese debt ($b_c = H > 0$) and does not have an outflow in the current period ($a = 0$). As expected, the solid blue line, which portrays our main welfare measure (equation B.3), is negative for all values of income. Thus, a government would rather occupy an economy with no Chinese debt than an economy where it immediately holds positive outstanding Chinese debt. The solid red and dashed purple lines, on the other hand, both take positive and negative values. As in panel (a), there is a sharp discontinuity just above 90 percent of mean income. For the lowest values of income, as before, default incentives are high. Since the costs of defaulting are independent of the size of the default, it is natural that in these states the government would prefer to have the ability to default on China— this is what a negative red solid line is capturing. The purple dashed line is positive; the government would rather default on Chinese debt today and still have the positive NPV of future flows than live in an economy without any Chinese debt. For income values above the discontinuity, default is not optimal in any of the three economies. At these income levels, the government would prefer to reside in the benchmark economy compared to the economy with defaultable Chinese debt. This is substantial evidence for the welfare gains

stemming from the disciplining effect of non-defaultable Chinese debt. The source of the welfare gains is clearly reflected in Figure 6. Conditional on $b'_c = H$, spreads are significantly higher when Chinese debt is defaultable.

B.3 Bloc Formation via Strategic Lending: China or Market Access?

In section 5.1, we study how differences in a country's characteristics impact the appeal of borrowing from China. We also produce predictions about the characteristics of countries that are most likely to borrow from China. In this appendix, we describe the theory underlying the "Geopolitical Bloc Formation: China or Market Access" exercise.

A country with permanent characteristics $\mathbf{p}$, current income y, and zero market debt is offered a loan by China. The country understands that this is a take-it-or-leave-it offer. If the country agrees, it immediately receives a financial inflow of value H. After this, the process for capital flows vis-a-vis China is identical to the benchmark model. However, the terms of the offer preclude the country from ever borrowing from other sources. Consequently, agreeing to China's offer results in permanent autarky from international financial markets.

A country that accepts the Chinese loan offer effectively becomes hand-to-mouth; they do not have any means to insure against stochastic income/debt fluctuations. The value for a country that accepted the loan offer in the past is

$$V_{\text{CHN-Only}}(y, a, b_c, \mathbf{p}) = u(c) + \beta \mathbb{E}\, V_{\text{CHN-Only}}(y', a', b'_c, \mathbf{p})\,, \tag{B.4}$$

with consumption equaling the sum of current period income and the net financial flows from China

$$c = y \ + (b'_c(b_c, a) - b_c)\,, \tag{B.5}$$

and where b'_c was defined as in the main body of the paper

$$b'_c(b_c, a) = \ \mathbf{1}\{a = 1 \cap b_c = L\}\ H + \mathbf{1}\{a = 1 \cap b_c = H\}\ L \ + \ \mathbf{1}\{a = 0\} b_c\,. \tag{B.6}$$

Let $V_{\text{MKT-Only}}(y, b, \mathbf{p})$ denote the market-only value function. Observe that b_c and a do not enter this function (as discussed above). In the period that China makes the take-it-or-leave-it offer, the Bellman equation is

$$\widehat{V}(y, \mathbf{p}) = \max\{V_{\text{MKT-Only}}(y, \bar{b}, \mathbf{p}), V_{\text{CHN-Only}}(y, \bar{a}, \bar{b}_c, \mathbf{p})\}\,, \tag{B.7}$$

where $\bar{b}_c = L$, $\bar{a} = 1$, and $\bar{b} = 0$.

At the benchmark parameter values and in the vicinity of mean income, retaining international financial market access is the country's preferred option. To study how changes in parameter values and income transmit to changes in preference ordering, we solve for of $\mathbf{p}$ and values of y such that the country is indifferent between accepting and declining China's offer. That is, we find parameter and income values such that $V_{\text{MKT-Only}}(y, \bar{b}, \mathbf{p}) = V_{\text{CHN-Only}}(y, \bar{a}, \bar{b}_c, \mathbf{p})$. These indifference points are the ones plotted in Figure 7.

B.4 Adding Retrenchment Risk

B.4.1 Recursive formulation

We augment the baseline model with the possibility that the country has to repay the debt owed to China (if any) and permanently lose access to Chinese flows. We denote by p_{SS} the probability of this sudden and permanent stop.

There are four state variables: one endogenous and three exogenous. The endogenous state variable is the market debt level, b. The exogenous debt variables are y (the income level), b_c (the Chinese debt level), and a (the realization of a Chinese net flow). Let us denote $s \equiv (a, y)$. The recursive representation of this problem follows:

Let d denote the current-period default decision prior to a Chinese retrenchment. We assume that d is equal to 1 if the government defaulted in the current period, and is equal to 0 if it did not. Below, we will denote with $\tilde{d}$ the default decision after the retrenchment has occurred.

$$V\left(b, b_c, s\right) = \max_{d \in \{0,1\}} \Big\{ d V_1(b_c, s) + (1-d) V_0(b, b_c, s) \Big\}, \tag{B.8}$$

where

$$V_0(b, b_c, s) = \max_{b'} \Big\{ u(c) + \beta(1-p_{SS})\, \mathbb{E}_{s'|s} V(b', b_c', s') + \beta p_{SS}\, \mathbb{E}_{y'|y} W(b', b_c', y') \Big\}, \tag{B.9}$$

subject to

$$c + \kappa b = y + q(b', b_c', s)(b' - (1-\delta)b) + b_c'(b_c, a) - b_c \tag{B.10}$$

The value of default prior to retrenchment is

$$\begin{aligned} V_1(b_c, s) = u\big(y - \phi(y) + b_c'(b_c, a) - b_c\big) \\ + \beta(1-p_{SS}) \mathbb{E}_{s'|s} \Big[\theta V(0, b_c', s') + (1-\theta) V_1(b_c', s') \Big] \\ + \beta p_{SS} \mathbb{E}_{y'|y} \Big[\theta W(0, b_c', y') + (1-\theta) W_1(b_c', y') \Big]. \end{aligned} \tag{B.11}$$

In both of these *pre-retrenchment* cases, repayment and default, b_c' follows the same law of motion as in the benchmark model, given by (5) in the main body of the paper.

The value functions W, W_0, W_1 satisfy:

$$W\left(b, b_c, y\right) = \max_{\tilde{d} \in \{0,1\}} \Big\{ \tilde{d} W_1(b_c, y) + (1-\tilde{d}) W_0(b, b_c, y) \Big\}, \tag{B.12}$$

where

$$W_0(b, b_c, y) = \max_{b'} \Big\{ u(c) + \beta\, \mathbb{E}_{y'|y} W(b', 0, y') \Big\}, \tag{B.13}$$

subject to

$$c + \kappa b = y + \tilde{q}(b', y)(b' - (1-\delta)b) - b_c \tag{B.14}$$

The value of default is:

$$W_1(b_c, y) = u\big(y - \phi(y) - b_c\big) + \beta \mathbb{E}_{y'|y}\Big[\theta W(0, 0, y') + (1-\theta) W_1(0, s')\Big]. \tag{B.15}$$

The bond prices q and $\tilde{q}$ are jointly given by the following functional equations:

$$\begin{aligned} q(b', b'_c, s) = \frac{1}{1+r}(1 - p_{SS})\, \mathbb{E}_{s'|s}\left[1 - \hat{d}\left(b', b'_c, s'\right)\right]\left[\kappa + (1-\delta)\, q\left(\hat{b}\left(b', b'_c, s'\right), b''_c, s'\right)\right] \\ + \quad \frac{1}{1+r} p_{SS}\, \mathbb{E}_{y'|y}\left[1 - \hat{\tilde{d}}\left(b', b'_c, s'\right)\right]\left[\kappa + (1-\delta)\, \tilde{q}\left(\hat{\tilde{b}}\left(b', b'_c, y'\right), y'\right)\right], \end{aligned} \tag{B.16}$$

and

$$\tilde{q}(b', y) = \frac{1}{1+r}\, \mathbb{E}_{y'|y}\left[1 - \hat{\tilde{d}}\left(b', 0, y'\right)\right]\left[\kappa + (1-\delta)\, \tilde{q}\left(\hat{\tilde{b}}\left(b', 0, y'\right), y'\right)\right], \tag{B.17}$$

where $\{\hat{d}, \hat{\tilde{d}}\}$ and $\{\hat{b}, \hat{\tilde{b}}\}$ denote the future default and borrowing rules that lenders expect the government to follow. The price in (B.17) is equivalent to the one observed in a standard sovereign model with long-term debt: this is because the 'retrenchment shock' induces a permanent loss of Chinese funding.

B.4.2 Simulation Results

Table B.1 shows the main moments of interest when the economy is living under the risk of a Chinese retrenchment. We find that for a (modest) 1% probability of China exogenously cutting ties with the borrowing country, the moments before the retrenchment look similar to the baseline economy. The period of the retrenchment is a turbulent period: it is characterized by repayment of the Chinese debt (by construction), lower consumption, a higher issuance of market debt, and a higher level of spreads than in the median year before or after the retrenchment.

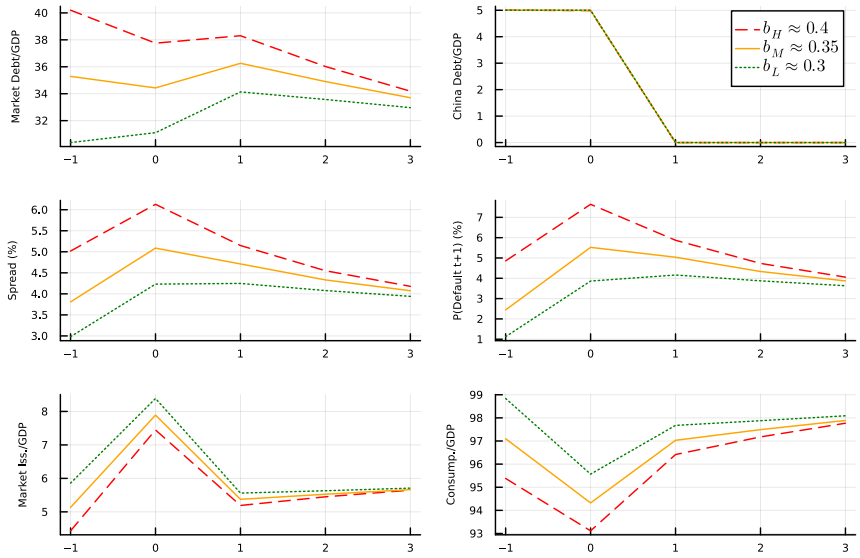
Table B.1: Simulated Moments for the Chinese Retrenchment Risk Model: $p_{SS} = 0.01$

Statistic	Pre-Retrenchment			Retrench.	Post
	Average	Inflow	Outflow	Period	Retrench.
Market Debt to GDP	30.09	31.11	29.1	30.11	30.22
Market Issuance to GDP	5.99	2.76	8.91	7.32	6.01
Consumption to GDP	98.97	101.08	96.53	97.52	98.97
Spread	3.54	3.05	4.02	3.84	3.54
S.D. Spread	2.22	1.82	2.48	2.39	2.19
Corr(Spread, GDP)	-0.64	-0.63	-0.67	-0.65	-0.64
P(Default t+1)	2.93	2.08	3.76	3.44	2.94
Default Frequency	2.56	2.88	2.21	2.62	2.57
S.D. Consumption/S.D. GDP	1.14	0.99	1.29	1.23	1.13

Note: Moments are computed for non-exclusion periods, except for the default frequency which uses all simulation periods.

Figure B.3 displays the heterogeneous responses to a retrenchment shock. Each line corresponds to the simulated moments of a sample of governments who at $t = -1$ possess market debt of $b \in \{0.3, 0.35, 0.4\}$, earn mean income ($y = \bar{y}$), have outstanding Chinese debt ($b_c = H$), and experience no Chinese funding flows ($a = 0$). At $t = 0$, the retrenchment shock is realized. Governments respond to retrenchment similarly across initial market debt levels. Market issuance spikes as a means to finance the Chinese debt outflow. Spreads spike, driving up the cost of the newly issued debt. The required repayment of the Chinese loan, paired with higher spreads, induces significant declines in consumption. These patterns suggest that Chinese retrenchment can be exceedingly costly, especially for highly indebted governments.

Figure B.3: Dynamics around Outflow-inducing Retrenchment Shock



Note: Moments are computed for non-exclusion periods.

B.5 Asymmetric Chinese debt flows

In the baseline model, the probability of a Chinese debt flow is the same whether the government has low or high debt. In this robustness exercise, we make the debt flow probabilities asymmetric. That is, the probability of a Chinese outflow is higher when the government has outstanding Chinese debt. Specifically, when the government enters the period with outstanding debt Chinese debt, the probability of an outflow is now 0.25 (compared to 0.1 in the baseline model). Conditional on entering the period with low Chinese debt, the probability of inflow remains the same as in the baseline model. Simulated statistics from this economy are in Table B.2.[33]

Table B.2: Simulated moments: Asymmetric Chinese Debt Flows

Statistics	Unconditional	Inflow	Outflow	No Flow: $b_c = L$	No Flow: $b_c = H$
Market Debt to GDP	30.06	30.93	27.94	30.93	27.94
Market Issuance to GDP	5.98	2.42	9.06	6.14	5.65
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	98.97	100.83	96.94	98.92	99.18
Spread	3.52	3.0	3.77	3.66	3.18
S.D. Spread	2.2	1.75	2.32	2.29	1.91
Corr(Spread, GDP)	-0.64	-0.63	-0.68	-0.64	-0.67
P(Default t+1)	2.92	1.92	3.36	3.24	2.17
Default Frequency	2.55	2.82	1.88	2.83	1.85
S.D. Consumption/S.D. GDP	1.15	0.98	1.29	1.14	1.12

Note: Moments are computed for non-exclusion periods, except for the default frequency which uses all simulation periods. Units: percent (except for the correlations and relative volatilities).

[33]It is important to note that by changing the rollover probabilities, we are changing the aggregate resources in the economy.

B.6 Coupon Payment on Chinese Debt

In this section we show that adding a small coupon payment to outstanding Chinese debt does not materially alter our results. The coupon payment is $r \times H$, where r is the risk-free rate and H is the amount of outstanding Chinese debt. The government pays the coupon only if Chinese debt is outstanding at the end of the period. Table B.3 displays the simulated statistics from this extension. The moments are virtually unchanged relative to the benchmark model. This owes primarily to the magnitude of the coupon payment - it amounts to 0.2 percent of mean GDP.

Table B.3: Simulated moments: Coupon payment on Chinese debt

Statistic	Baseline	Inflow	Outflow	b'_c High	b'_c Low
Market Debt to GDP	30.11	31.08	29.13	29.34	30.9
Market Issuance to GDP	6.0	2.69	8.9	5.58	6.43
China Debt to GDP	2.51	0.0	4.98	4.49	0.51
Net Flow from China to GDP	-0.01	4.97	-4.98	0.49	-0.51
Consumption to GDP	98.88	101.02	96.52	99.11	98.64
Spread	3.55	3.05	4.02	3.36	3.75
S.D. Spread	2.22	1.82	2.5	2.07	2.35
Corr(Spread, GDP)	-0.64	-0.62	-0.66	-0.65	-0.63
P(Default t+1)	2.94	2.06	3.78	2.54	3.35
Default Frequency	2.57	2.88	2.24	2.3	2.84
S.D. Consumption/S.D. GDP	1.14	0.99	1.29	1.12	1.16

C Computational appendix

C.1 Baseline model with preference shocks

We utilize i.i.d. Type 1 Extreme Value preference shocks to ensure convergence of the pricing schedule and value functions, similar to the method used by Dvorkin, Sánchez, Sapriza, and Yurdagul (2021) and several other quantitative sovereign default papers. The basic computational strategy is described in Mihalache (2025).

Conditional on choosing to repay their outstanding debt, the sovereign receives an additive preference shock $\epsilon(b')$ for every possible value of debt b'.[34] Let $\mathbb{B} \equiv \{\underline{b}, b_1, ..., b_{N-1}, \overline{b}\}$ where $\underline{b} < b_1 < ... < b_{N-1} < \overline{b}$, the nodes are equally spaced, and positive values indicate borrowing. This grid represents all debt positions the sovereign could take on.

The cumulative density function of the vector of preference shocks, ϵ, is distributed according to the Type 1 Extreme Value distribution:

$$F(\epsilon) = \exp\left[-\sum_{b' \in \mathbb{B}} \exp\left(-\frac{\epsilon(b') - \mu_\eta}{\rho_\eta}\right)\right]$$

where μ_η is the location parameter, ρ_η is the scale parameter, and $\tilde{\gamma}$ is the Euler-Mascheroni constant. We choose ρ_η so that it is small enough to maintain the economic content of the sovereign's borrowing decision but large enough to ensure that computation of the value and price functions occur in a timely manner.[35] We fix $\rho_\eta = 0.0005$ and $\mu_\eta = -\tilde{\gamma}\rho_\eta$.[36]

The sovereign's problem in the baseline model is given by:

$$V(b, b_c, s) = \max_{d \in \{0,1\}} \Big\{ dV_1(b_c, s) + (1-d)EV_0(b, b_c, s) \Big\}, \tag{C.1}$$

where the ex-ante value of not defaulting is

$$EV_0(b, b_c, s) = \int V_0(b, b_c, s, \epsilon) dF(\epsilon) \tag{C.2}$$

with ϵ representing a vector of i.i.d. preference shocks; one for each value of $b' \in \mathbb{B}$. That is, $\epsilon \equiv (\epsilon(\underline{b}), \epsilon(b_1), ..., \epsilon(b_{N-1}), \epsilon(\overline{b}))$. The value function conditional on a particular realization of the preference shock vector ϵ is

$$V_0(b, b_c, s, \epsilon) = \max_{b' \in \mathbb{B}} v_0^{b'}(b, b_c, s) + \epsilon(b') \tag{C.3}$$

with

$$v_0^{b'}(b, b_c, s) = u(c^{b'}(b, b_c, s)) + \beta \, \mathbb{E}_{s'|s} V(b', b_c', s'), \tag{C.4}$$

[34] Note that the default/repayment choice is not subject to preference shocks. It would be straightforward to extend the model to include default choice shocks, but it is not necessary to achieve convergence.

[35] All else equal, increasing the scale parameter makes the pricing function more well-behaved, which aids in computation. But this comes at the cost of infusing more noise into the sovereign's borrowing decision.

[36] This implies that the expectation of an individual $\epsilon(b')$ is equal to 0.

where $c^{b'}(b, b_c, s)$ denotes current period consumption given the incoming state (b, b_c, s) and a particular value of b'. Thus $c^{b'}(b, b_c, s)$ equals

$$c^{b'}(b, b_c, s) = y + q(b', b'_c, s)(b' - (1-\delta)b) - \kappa b + b'_c(b_c, a) - b_c \tag{C.5}$$

with

$$b'_c(b_c, a) = \mathbf{1}_{\{a=1 \,\cap\, b_c=L\}} \times H \;+\; \mathbf{1}_{\{a=1 \,\cap\, b_c=H\}} \times L \;+ \mathbf{1}_{\{a=0\}}\, b_c\,. \tag{C.6}$$

where κ represents the coupon, $b'_c(b_c, a) - b_c$ represents the *net flows* vis-à-vis China, and $b'_c(b_c, a)$ indicates how the debt level with China evolves.

With $v_0^{b'}(b, b_c, s)$ in hand, we know the analytic solution for the ex-ante[37] choice probabilities and the ex-ante value of not defaulting. For states where $d(b, b_c, s) = 0$, the probability the sovereign chooses debt position $b' \in \mathbb{B}$ is:

$$\mathbb{P}^{b'}(b, b_c, s) = \frac{\exp\left(\frac{v_0^{b'}(b,b_c,s)}{\rho_\eta}\right)}{\sum_{b'\in\mathbb{B}} \exp\left(\frac{v_0^{b'}(b,b_c,s)}{\rho_\eta}\right)} \tag{C.7}$$

In other words, conditional on choosing not to default, $\mathbb{P}^{b'}(b, b_c, s)$ is the probability that the sovereign chooses b' given state (b, b_c, s). The lenders take these choice probabilities as given and use them to price the bonds.

We can calculate the ex-ante value of not defaulting as:

$$EV_0(b, b_c, s) = \mu_\eta + \tilde{\gamma}\rho_\eta + \rho_\eta \log\left(\sum_{b'\in\mathbb{B}} \exp\left(\frac{v_0^{b'}(b, b_c, s)}{\rho_\eta}\right)\right) \tag{C.8}$$

The functional form of the value of default is unchanged relative to that shown in the main body of the paper:

$$V_1(b_c, s) = u\big(y - \phi(y) + b'_c(b_c, a) - b_c\big) + \beta \mathbb{E}_{s'|s}\Big[\theta V(0, b'_c, s') + (1-\theta)V_1(b'_c, s')\Big], \tag{C.9}$$

subject to (C.6).

Let $\hat{d}(b', b'_c, s')$ denote the period-ahead default policy and $\hat{b}(b', b'_c, s', \epsilon')$ the period-ahead borrowing policy. Note that while $\hat{b}(\cdot)$ depends on the realization of the preference shock vector ϵ', the period-ahead default policy $\hat{d}(\cdot)$ does not. This is because the preference shocks are only realized if the sovereign chooses not to default; that is $\hat{d}(b', b'_c, s') = 0$. The equilibrium pricing function then follows:

$$q(b', b'_c, s) = \frac{1}{1+r}\, \mathbb{E}_{s'|s}\left[1 - \hat{d}\,(b', b'_c, s')\right]\left[\kappa + (1-\delta)\int_{\epsilon'} q\left(\hat{b}\,(b', b'_c, s', \epsilon')\,, b''_c, s'\right) dF(\epsilon')\right], \tag{C.10}$$

Let $\mathbb{P}^{b'}(b, b_c, s)$ denote the probability a borrower will choose b' given that it entered the period with states (b, b_c, s) *and* chose to repay its current period debt. We can replace the

[37] Ex-ante as in prior to the realization of ϵ.

integral in the second bracketed term with a summation because of the type 1 extreme value shocks:

$$q(b', b'_c, s) = \frac{1}{1+r}\, \mathbb{E}_{s'|s} \left[1 - \hat{d}\,(b', b'_c, s')\right] \left[\kappa + (1-\delta) \sum_{\hat{b}'' \in \mathbb{B}} q\left(\hat{b}'', b''_c, s'\right) \times \mathbb{P}^{\hat{b}''}(b', b'_c, s')\right], \tag{C.11}$$

C.2 Chinese retrenchment risk model with preference shocks

To incorporate preference shocks, the retrenchment risk model needs to be amended in a similar manner as the baseline model.

The government's value function at the beginning of the period is:

$$V\,(b, b_c, s) = \max_{d\,\in\,\{0,1\}} \Big\{ dV_1(b_c, s) + (1-d) EV_0(b, b_c, s) \Big\}, \tag{C.12}$$

The value of not defaulting, prior to the realization of ϵ, is:

$$EV_0(b, b_c, s) = \int V_0(b, b_c, s, \epsilon) dF(\epsilon) \tag{C.13}$$

After ϵ is realized, the ex-post no-default value function is:

$$V_0(b, b_c, s, \epsilon) = \max_{b' \in \mathbb{B}} v_0^{b'}(b, b_c, s) + \epsilon(b') \tag{C.14}$$

where

$$v_0^{b'}(b, b_c, s) = u(c^{b'}(b, b_c, s)) + (1 - p_{SS}) \beta \mathbb{E}_{s'|s} V(b', b'_c, s') + p_{SS} \beta \mathbb{E}_{y'|y} W(b', b'_c, y'), \tag{C.15}$$

where $c^{b'}(b, b_c, s)$ equals

$$c^{b'}(b, b_c, s) = y + q(b', b'_c, s)(b' - (1-\delta)b) - \kappa b + b'_c(b_c, a) - b_c \tag{C.16}$$

The choice probabilities are denoted by $\mathbb{P}_V^{b'}(b, b_c, s)$.

The value of default is:

$$\begin{aligned} V_1(b_c, s) = u\big(y - \phi(y) + b'_c(b_c, a) - b_c\big) \\ + \beta(1 - p_{SS}) \mathbb{E}_{s'|s} \Big[\theta V(0, b'_c, s') + (1-\theta) V_1(b'_c, s')\Big] \\ + \beta p_{SS} \mathbb{E}_{y'|y} \Big[\theta W(0, b'_c, y') + (1-\theta) W_1(b'_c, y')\Big], \end{aligned} \tag{C.17}$$

A new set of value functions and pricing schedules are required for the periods on and after

retrenchment shock realization. The value functions W, EW_0, W_0, W_1 satisfy:

$$W\left(b, b_c, y\right) = \max_{\tilde{d} \in \{0,1\}} \left\{ \tilde{d} W_1(b_c, y) + (1 - \tilde{d}) EW_0(b, b_c, y) \right\}, \tag{C.18}$$

where

$$EW_0(b, b_c, y) = \int W_0(b, b_c, y, \epsilon) dF(\epsilon) \tag{C.19}$$

with

$$W_0(b, b_c, y, \epsilon) = \max_{b' \in \mathbb{B}} w_0^{b'}(b, b_c, y) + \epsilon(b'), \tag{C.20}$$

where

$$w_0^{b'}(b, b_c, y) = u(c(b', b_c, y)) + \beta \, \mathbb{E}_{y'|y} W(b', 0, y') \tag{C.21}$$

subject to

$$c(b', b_c, y) = y + \tilde{q}(b', y)(b' - (1 - \delta)b) - \kappa b - b_c \tag{C.22}$$

The b' choice probabilities are denoted by $\mathbb{P}_W^{b'}(b, b_c, y)$.
The value of default is:

$$W_1(b_c, y) = u\big(y - \phi(y) - b_c\big) + \beta \mathbb{E}_{y'|y} \Big[\theta W(0, 0, y') + (1 - \theta) W_1(0, y') \Big]. \tag{C.23}$$

The bond prices q and $\tilde{q}$ are jointly given by the following functional equations:

$$q(b', b_c', s) = \frac{1}{1+r}(1 - p_{SS}) \, \mathbb{E}_{s'|s} \left[1 - \hat{d}\left(b', b_c', s'\right) \right] \left[\kappa + (1 - \delta) \sum_{\hat{b} \in \mathbb{B}} q\left(\hat{b}, b_c'', s'\right) \times \mathbb{P}_V^{\hat{b}}(b', b_c'', y') \right] \tag{C.24}$$

$$+ \quad \frac{1}{1+r} p_{SS} \, \mathbb{E}_{y'|y} \left[1 - \hat{\tilde{d}}\left(b', b_c', s'\right) \right] \left[\kappa + (1 - \delta) \sum_{\hat{\tilde{b}} \in \mathbb{B}} \tilde{q}\left(\hat{\tilde{b}}, y'\right) \times \mathbb{P}_W^{\hat{\tilde{b}}}(b', b_c', y') \right],$$

and

$$\tilde{q}(b', y) = \frac{1}{1+r} \, \mathbb{E}_{y'|y} \left[1 - \hat{\tilde{d}}\left(b', 0, y'\right) \right] \left[\kappa + (1 - \delta) \sum_{\hat{\tilde{b}} \in \mathbb{B}} \tilde{q}\left(\hat{\tilde{b}}, y'\right) \times \mathbb{P}_W^{\hat{\tilde{b}}}(b', 0, y') \right], \tag{C.25}$$

where $b_c'' = b_c'(b_c', a')$ (with $b_c'(\cdot)$ defined by (C.6)) and where $\{\hat{d}, \hat{\tilde{d}}\}$ denote the period-ahead default rules the lenders expect the government to follow.

C.3 Computational strategy

We discretize both the bond grid and the income grid. The bond grid has 225 equally-spaced nodes between 0 and 1. We use the Rouwenhorst method to approximate the log income

process, and the income grid has 75 nodes. To compute the Markov Perfect Equilibrium, we utilize a strategy that is similar to the method outlined in Mihalache (2025).

C.4 Computation of the baseline model

We will describe the solution method starting from arbitrary iteration $k \geq 1$. For $k = 0$ (i.e. at the beginning of the algorithm), we set the initial values of the pricing, value, and policy functions as follows:[38]

$$\begin{aligned}
V_1^0(b_c, s) &= \frac{u(y - \phi(y) + b_c'(b_c, a) - b_c)}{1 - \beta} \\
\mathbb{P}^{0,b'=0}(b, b_c, s) &= 1 \\
q^0(b', b_c', s) &= 0 \\
EV_0^0(b, b_c, s) &= \frac{u(y - \kappa b - q^0(b', b_c', s)(b' - (1-\delta)b) + b_c'(b_c, a) - b_c)}{1 - \beta} \\
V^0(b, b_c, s) &= \max\{V_1^0(y, b_c, a), EV_0^0(b, b_c, s)\} \\
d^0(b, b_c, s) &= \mathbf{1}_{\{V_1^0(\cdot) > EV_0^0(\cdot)\}}
\end{aligned}$$

At the start of an iteration, we enter with pricing schedule $q^k(\cdot)$, choice probabilities $\mathbb{P}^k(\cdot)$, default policy $d^k(\cdot)$, and value functions $V_1^k(\cdot)$, $EV_0^k(\cdot)$, $V^k(\cdot)$.

1. Use the choice probability $\mathbb{P}^k(\cdot)$ and default policy $d^k(\cdot)$ to calculate $q^{k+1}(\cdot)$ according to:

$$q^{k+1}(b', b_c', s) = \frac{1}{1+r} \mathbb{E}_{s'|s} \left[1 - d^k\left(b', b_c', s'\right)\right] \left[\kappa + (1-\delta) \sum_{\hat{b}'' \in \mathbb{B}} q^k\left(\hat{b}'', b_c'', s'\right) \times \mathbb{P}^{k,\hat{b}''}(b', b_c', s')\right] \tag{C.26}$$

2. Use $q^{k+1}(\cdot)$ and the iteration k value functions to compute $EV_0^{k+1}(\cdot)$, $\mathbb{P}^{k+1,b'}(\cdot)$, and $V_1^{k+1}(\cdot)$.

$$\begin{aligned}
v_0^{b',k+1}(b, b_c, s) &= u(c^{b',k+1}(b, b_c, s)) + \beta \, \mathbb{E}_{s'|s} V^k(b', b_c', s') \\
&\text{s.t } c^{b',k+1}(b, b_c, s) = y + q^{k+1}(b', b_c', s)(b' - (1-\delta)b) - \kappa b + b_c'(b_c, a) - b_c
\end{aligned}$$

$$EV_0^{k+1}(b, b_c, s) = \rho_\eta \log\left(\sum_{b' \in \mathbb{B}} \exp\left(\frac{v_0^{b',k+1}(b, b_c, s)}{\rho_\eta}\right)\right)$$

[38] Models of long-term debt are known to suffer from multiple equilibria. Different initial guesses may lead to different equilibrium objects.

$$\mathbb{P}^{k+1,b'}(b,b_c,s) = \frac{\exp\left(\frac{v_0^{b',k+1}(b,b_c,s)}{\rho_\eta}\right)}{\sum_{b'\in\mathbb{B}}\exp\left(\frac{v_0^{b',k+1}(b,b_c,s)}{\rho_\eta}\right)}$$

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

3. Use $EV_0^{k+1}(\cdot)$ and $V_1^{k+1}(\cdot)$ to calculate $V^{k+1}(\cdot)$ and $d^{k+1}(\cdot)$.

$$V^{k+1}(b,b_c,s) = \max\{V_1^{k+1}(b_c,s), EV_0^{k+1}(b,b_c,s)\}$$

$$d^{k+1}(b,b_c,s) = \mathbf{1}_{\{V_1^{k+1}(b_c,s)>EV_0^{k+1}(b,b_c,s)\}}$$

4. Check for convergence: if $\max|q^{k+1}(\cdot)-q^k(\cdot)| < 10^{-9}$ and $\max|V^{k+1}(\cdot)-V^k(\cdot)| < 10^{-9}$, convergence is achieved. If not, return to step 1 with the updated functions.

C.5 Computation of the retrenchment risk model

In the version of the model with retrenchment risk, the sovereign can be in one of three stages: (i) prior to the retrenchment shock, (ii) the period of the retrenchment shock, (iii) all periods after the retrenchment shock (post-retrenchment). To compute the Markov Perfect Equilibrium, we start with the last stage. We first compute the post-retrenchment equilibrium objects (stage (iii)). We then use these post-retrenchment functions to compute the retrenchment shock period objects (stage (ii)). Finally, we use the compute functions from stages (ii) and (iii) to compute the equilibrium objects prior to the shock.

We compute the retrenchment risk version of the Markov Perfect Equilibrium as follows:

1. Follow the steps described in section C.4 to compute the post-retrenchment (i.e. $b_c = 0$ for the rest of time) equilibrium objects: $W_1(0,y)$, $EW_0(b,0,y)$ $W(b,0,s)$, $\tilde{d}(b,0,y)$, $\mathbb{P}_W^{b'}(b,0,y)$, and $\tilde{q}(b',y)$.

2. Use the post-exclusion equilibrium objects from step (1) to compute these same functions but for $b_c > 0$. Use equations C.12 through C.17 to calculate these objects.

3. Given the already computed $W_1(b_c,y)$, $EW_0(b,b_c,y)$ $W(b,b_c,s)$, $\tilde{d}(b,b_c,y)$, $\mathbb{P}_W^{b'}(b,b_c,y)$,$\tilde{q}(b',y)$, use the strategy described in section C.4 to compute the pre-retrenchment equilibrium objects $V(\cdot)$, $EV_0(\cdot)$, $V_1(\cdot)$, $d(\cdot)$, and $\mathbb{P}_V^{b'}(\cdot)$.