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Borrowing in the Shadow of China[†]

Illenin O. Kondo

Federal Reserve Bank of Minneapolis
kondo@illenin.com

Astghik Mkhitaryan

Amazon
amkhitar@nd.edu

César Sosa-Padilla

University of Notre Dame
and NBER
csosapad@nd.edu

Abstract

Emerging economies' debt to China is large, non-marketable, and opaque. We study the impact that such borrowing from China–which is almost completely official debt–has on the equilibrium quantities and prices for *marketable* sovereign debt. We do so by using a standard sovereign debt model with long-term debt augmented with subsidized Chinese loans that are subject to rollover risk. We find that following a positive inflow from China the model economy chooses to re-balance its debt portfolio by deleveraging from market debt. In the process it pays lower spreads and faces less volatile consumption. On the other hand, when facing a capital outflow vis-à-vis China, the economy taps international debt markets, levers up on defaultable market debt, and ends up paying higher and more volatile spreads in equilibrium. These model predictions are consistent with our panel-data evidence from emerging and low-income economies. Finally, we use the model to discuss the welfare gains from having access to Chinese loans and find that they are positive but smaller when default risk is material.

KEYWORDS: Sovereign Debt, Defaults, Chinese Overseas Lending.
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1 Introduction

We study the impact that borrowing from China (which is almost completely official debt) has on the equilibrium quantities and prices for *marketable* sovereign debt. As recent work has made clear (e.g. the work of Horn, Reinhart, and Trebesch, 2020), Chinese lending to emerging economies is (i) large, (ii) non-marketable, and (iii) noisy (data is scarce and terms are opaque). Is having such debt vis-à-vis China a good or a bad signal for private international investors? Does it mean the country has a "trusted partner" on whom to rely during bad times? Or is it an additional vulnerability?

Using data on emerging and developing economies, we have suggestive evidence on a positive and significant "China debt restructuring event" premium: on average, after a Chinese-debt restructuring episode countries face larger spreads on their market debt (i.e. less favorable borrowing terms) in the order of 300 basis points. We also uncover a significant effect on market borrowing: a "China funding event" is associated with a market debt deleveraging, in the order of 10 to 20 percent. Moreover, after a Chinese funding event, a borrowing country's international sovereign bond yields fall by 80 to 100 basis points.

We use a standard sovereign debt model with long term debt to rationalize the above mentioned facts. We model Chinese official lending as non-defaultable subsidized debt subject to rollover risk as it can become due at a random date. We find that following a positive inflow from China our model economy chooses to re-balance its debt portfolio by deleveraging from market debt. In the process it pays lower spreads and faces less volatile consumption. On the other hand, when facing a capital outflow vis-à-vis China, the economy taps private markets, levers up on defaultable debt and ends paying higher and more volatile spreads in equilibrium. Most of these model dynamics are in line with our empirical findings.

Overall, in our calibrated model, a country is better off with access to Chinese loans subject to rollover risk. However, when default is more salient, e.g. low income states, the welfare gains from having access to Chinese loans (compared to an economy without China debt) are lower-yet-positive because the country needs to borrow more from international lenders in the future. Similarly, at higher levels of market debt, the welfare gains from access to Chinese debt are lower because of the rise in default risk induced by future market borrowing against Chinese debt rollover shocks. These results show that the costs and benefits of having access to Chinese loans depend on interaction between endogenous market debt issuance, default risk, and rollover risk.

Related literature. The official reporting of China's international financing terms and arrangements can be characterized as being vague and sporadic. A wide array of literature

shed light on particular features of China's massive lending. Horn et al. (2020) construct a comprehensive dataset to identify that China lent $1.5 trillion to more than 150 countries worldwide which previously were unidentified by official sources. To investigate the same issue, Morris, Parks, and Gardner (2020) investigate this issue on AidData to find that China's lending terms has some degree of concessionality. Bräutigam and Gallagher (2014) bring an evidence of resource-secured financing from China to African and Latin American countries. The research also focuses on the effects of the funding inflows on the economies of recipient countries. Onjala (2018) and Hurley, Morris, and Portelance (2019) identify that getting funding from China puts countries under the risk of debt distress. Bandiera and Tsiropoulos (2020) assess the debt sustainability of countries which have China's infrastructure financing projects and find that in the medium term at least 50% of these countries will face elevated debt vulnerability. Horn et al. (2020) highlight that there should have been an additional 15 to 20 "missing" defaults in the post 2010 period that pose a great risk to debt sustainability analysis in loan recipient countries and challenge the market pricing of the sovereign risk. Mkhitaryan (2021) develops and quantitatively evaluates a sovereign debt model to explore China's overseas lending arrangements and predict the periods of unidentified defaults. In contrast, Dreher, Fuchs, Parks, Strange, and Tierney (forthcoming) show that China's funds boost the country's economic growth in the short-term and with additional funding projects the economy grows even two years after the commitment.

Our paper builds on the quantitative literature on sovereign defaults, following Eaton and Gersovitz (1981), Aguiar and Gopinath (2006), and Arellano (2008). In particular, we extend the model in Hatchondo and Martinez (2009) to allow for official, non-defaultable flows with China. These flows 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). Since we model long-term debt, the issue of debt dilution (Hatchondo, Martinez, and Sosa-Padilla, 2016) is key to understanding the mechanisms at play. Other papers in the literature that relate to our work are Hur and Kondo (2016), Johri, Khan, and Sosa-Padilla (2019), Bianchi, Hatchondo, and Martinez (2015), among many others.

Layout. Section 2 documents the motivating facts. Section 3 introduces the model. Section 4 explains the parametrization of the model. Section 5 presents the quantitative results, discusses the properties of the optimal policies, and studies the welfare effects of being 'under the Shadow' of China. Section 6 concludes.

2 Motivating facts

2.1 Data description

We assemble a dataset to document new facts on the effects of Chinese lending on the amount and the pricing on marketable external public debt. As noted by Horn et al. (2020), Chinese lending terms and amounts are difficult to measure. We build on their extensive work and supplement it with data sources on the amount and the timing of Chinese lending relationships from Acker, Bräutigam, and Huang (2020), Kratz, Feng, and Wright (2019), and Hurley et al. (2019).

For each country, using these data sources, we add to the yearly debt stock positions with China, indicators of events related to the Chinese loans such as new funding round or restructuring events. Horn et al. (2020) document Chinese loans between 2000 and 2017 to more than 100 emerging and developing economies. We derive Chinese funding events as large surges 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. The median number of Chinese funding years per country is 3.[1]

We then construct measures of new market debt issuance and yields on marketable international debt using bond-level data extracted from Bloomberg. We also collect annual measures of external public debt help by bondholders from the World Bank International Debt Statistics (IDS) along with standard macroeconomic variables such as output and foreign reserves. These variables constitute our annual country-level dataset on China funding events and Chinese debt stocks, sovereign bond prices and marketable debt dynamics.

2.2 Empirical strategy

Using the annual dataset on Chinese funding events, Chinese debt stocks, and external public debt held by bondholders, we estimate the effects of Chinese lending events. To do so we estimate the following regression on our annual data:

$$\log \text{external debt}_{i,t} = \alpha + \beta \text{ CHN funding}_{i,t} + \theta \log \text{external debt}_{i,t-1} + \gamma X_{i,t} + \varepsilon_{i,t} \quad (1)$$

[1]For more details, see Table A1 in the appendix. While the data on Chinese debt stocks covers many countries, most developing countries do not issuing foreign-currency debt in international capital markets. Restructuring events with China are also less common than funding. In fact, the countries with **restructuring** events in our dataset and bonds data in Bloomberg are: Angola, Côte d'Ivoire, Congo (Rep.), Ghana, Sri Lanka, Mongolia, Mozambique, Nigeria, Ukraine, Venezuela, and Zambia.

where i represents a country, t denotes a year, $\log \text{external debt}_{i,t}$ is the log of the external debt held by bondholders, $\text{CHN funding}_{i,t}$ indicates whether a China funding has occurred for country i in period t, and $X_{i,t}$ are additional controls including GDP growth, foreign reserves, time fixed effects, and country fixed effects. We report our estimates under various specifications in Table 1.

Furthermore, we explore more directly the effect of Chinese funding on marketable debt dynamics using sovereign bond issuance in international capital markets. We construct an issuance indicator from the Bloomberg bond-level extract and estimate a linear probability:

$$\text{new bond issuance}_{i,t} = \alpha + \beta\ \text{CHN funding}_{i,t} + \theta\ \text{new bond issuance}_{i,t-1} + \gamma\ X_{i,t} + \varepsilon_{i,t} \quad (2)$$

where i represents a country, t denotes a year, $\text{new bond issuance}_{i,t}$ indicates whether a long-term international foreign currency bond was issued by country i in year t, $\text{CHN funding}_{i,t}$ indicates whether a China funding has occurred for country i in period t, and $X_{i,t}$ are additional controls including GDP growth, foreign reserves, time fixed effects, and country fixed effects. We report our estimates under various specifications in Table 2.

Finally, using the yields constructed from the bond-level data, we estimate the effect of Chinese funding events on bond prices in the following regressions:

$$\text{sovereign yields}_{i,t} = \alpha + \beta\ \text{CHN funding}_{i,t} + \theta\ \text{sovereign yields}_{i,t-1} + \gamma\ X_{i,t} + \varepsilon_{i,t} \quad (3)$$

and

$$\text{sovereign yields}_{i,t} = \alpha + \beta\ \text{CHN restructuring}_{i,t} + \theta\ \text{sovereign yields}_{i,t-1} + \gamma\ X_{i,t} + \varepsilon_{i,t} \quad (4)$$

where i represents a country, t denotes a year, $\text{sovereign yields}_{i,t}$ is the average yields (yield-to-maturity) on long-term international bonds of country i in year t, $\text{CHN funding}_{i,t}$ indicates whether a China funding has occurred in period t for country i, , $\text{CHN restructuring}_{i,t}$ indicates whether a China restructuring has occurred in period t for country i, and $X_{i,t}$ are additional controls including annual GDP growth, lagged external debt, time fixed effects, and country fixed effects. We report our estimates in Table 3 and in Table 4.

2.3 Stylized facts

We document our empirical results in Tables 1 and 2 for external debt dynamics, and in Tables 3 and 4 for international bond prices. We find four main stylized facts:

1. external public debt (held by bondholders) is lower following Chinese lending events
2. international sovereign bond issuance is reduced following Chinese lending events
3. sovereign bond yields decline following Chinese lending events
4. sovereign bond yields increase sharply after Chinese debt restructuring events

Table 1: External Debt Dynamics and China Debt Events

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

All regressions include country fixed effects and time fixed effects. Robust standard errors in parentheses. Regressions in levels include lagged debt values as controls. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

The external debt reduction effect of Chinese lending. Let us first discuss the evidence on the effect of Chinese lending on external public debt presented in Table 1. We estimate a lagged specification in log levels of the debt Equation 1 in columns (1), (2), and (6). We also estimate a specification in log changes in columns (4), (5), and (6).

In our baseline sample, we find in column (1) that China lending events are associated with approximately 18 percent reduction in total external debt. We find similar point estimates in specifications (3) and (5) that use log changes in debt as opposed to the baseline lagged specification in levels.

In specifications (2) and (4), given that most countries experience multiple China lending events, we exclude from our sample a country's first funding event with China. The estimates of the impact on China lending on external debt reduction falls slightly at around 13 percent.

Finally, we estimate the effect of the advent of Chinese loans in specification (6). We do so using a Chinese funding era$_{i,t}$ variable that equals 1 for country i in all the years t after a her first Chinese funding. Though not statistically significant, we find that a negative

debt reduction effect estimate of approximately 12 percent. We conjecture that the lack of statistical significance is partly driven by the fact that most countries got their first Chinese loans at the beginning of the sample in the early 2000s.

Altogether, we conclude that China lending events are associated with an overall reduction in the external debt of the recipient country to other bondholders.

Table 2: Market Debt Issuance and China Debt Events

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

All regressions include country fixed effects and time fixed effects. Robust standard errors in parentheses. Regressions in levels include lagged outcome values as controls. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

The international bond issuance effect of Chinese funding. We further assess the effects of Chinese lending on debt dynamics using sovereign bonds issuance indicator in Table 2. We estimate a lagged specification of the debt issuance linear probability Equation 2 in columns (1), (2), and (6). We also estimate a specification in log changes in columns (4), (5), and (6). These specifications mirror the ones in Table 1 with the notable difference that we add as control the log of (lagged) outstanding external public debt held by bondholders.

In our baseline sample, we find in column (1) that China lending events are associated with approximately 10 percent reduction in the (linear) probability of issuing new long term international bonds. We find slightly larger point estimates of approximately 17 percent and 12 percent in specifications (3) and (5) when we use changes as opposed to the baseline lagged specification in levels.

In specifications (2) and (4), given that most countries experience multiple China lending events, we drop a country's first China funding event. China lending events reduce the linear probability of debt issuance by 12 percent and 23 percent respectively.

Finally, we estimate the effect of the advent of Chinese loans in specification (6). We do

so using a Chinese funding era$_{i,t}$ variable that equals 1 for country i in all the years t after a her first Chinese funding. Though only marginally statistically significant, we find that a negative debt issuance effect of approximately 14 percent.

Consistent with the evidence from World Bank IDS external debt, we conclude that China lending events are also associated with an overall reduction in the probability that the recipient country will issue debt in international capital markets.

Table 3: Yields and China Funding Event

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

All regressions include country fixed effects and time fixed effects. Robust standard errors in parentheses. Regressions in levels include lagged outcome values as controls. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

The China lending discount. We now turn to Table 3 to document how sovereign bond yields respond to new China funding events. While the framework is similar to the one used for external debt dynamics, the sample size is smaller. This is due to the fact (i) few countries issue bonds in international capital markets, and (ii) bond-level coverage in Bloomberg is not complete for emerging and frontier economies. We use the yield-to-maturity on long term bond with 10+ years of remaining maturity as yield measure in Equation 3.

In our baseline sample, we find in column (1) that China lending events are associated with a reduction of 85 basis points in the country's sovereign bond yields. We find a slightly larger point estimates of approximately 95 basis points in specification (3) when we use changes as opposed to the baseline lagged specification in levels. We obtain a more modest and only marginally significant reduction of around 40 basis points in specification (5) where we regress changes in the funding variable on changes in yields.

In specifications (2) and (4), given that most countries experience multiple China lending events, we drop a country's first China funding event. China lending events are associated

with a reduction in sovereign yields by 83 percent and 95 percent respectively.

Finally, we estimate the effect of the advent of Chinese loans in specification (6). As in the previous tables, the standard errors are large here and find that a insignificant negative debt issuance estimate of approximately 50 basis points.

Overall, these various estimates suggest that China lending events are associated with an reduction in a sizeable sovereign bond yields debt for borrowing countries.

Table 4: Yields and China Debt Restructuring

	(1)	(2)	(3)	(4)	(5)	(6)
	Long Term (10+ years) Bond Yields					
	level	level	level	level	level	level
CHN restructuring event	3.220**	3.101**				
	(1.535)	(1.524)				
Non CHN restructuring event		2.780***	3.041***			
		(0.621)	(0.683)			
CHN restructuring event (lagged)				3.544***	3.661***	
				(1.203)	(1.209)	
Non CHN restructuring event (lagged)					3.572	3.502
					(2.396)	(2.428)
CHN funding rounds	-0.523***	-0.507***	-0.466**	-0.495***	-0.456***	-0.443***
	(0.183)	(0.182)	(0.181)	(0.184)	(0.171)	(0.170)
adj. R^2	0.850	0.852	0.845	0.845	0.854	0.849
N	298	298	298	298	298	298

All regressions include country fixed effects and time fixed effects. Robust standard errors in parentheses. Regressions controls include lagged yields . * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

The China debt restructuring premium. In Table 4, we document how China restructuring events affect sovereign bond yields. We use the yield-to-maturity on long term bond with 10+ years of remaining maturity as yield measure in Equation 4. Building on the China funding event discount, we control for past Chinese funding rounds also.

It is important to note that restructuring events are less common than funding events. In fact, the China debt restructuring events with available bond yields data in our data are: Angola (2015), Côte d'Ivoire (2011), Ghana (2007, 2015), Sri Lanka (2012), Nigeria (2003), Venezuela (2015, 2016, 2017), and Zambia (2017). To further corroborate and contrast the the effect of Chinese debt restructuring on marketable debt yields, we augment our dataset with Paris Club and commercial restructuring events from the updated data of Trebesch,

Papaioannou, and Das (2012) and Asonuma and Trebesch (2016).

With these sample size considerations in mind, we find that Chinese debt restructuring events are associated with a large increase of nearly 320 basis points in the country's long term sovereign bond yields in our baseline specification in column (1). Even though the estimate is significant, the standard errors are large. This is not surprising given the small number of episodes restructuring events around which we have yields data. Nonetheless, the point estimate is similar in magnitude to the estimated bond premium of 300 basis points associated with a Paris Club or commercial restructuring event in specification (3). We find an increase of similar magnitude when we include both restructuring event variables in the regression.

Given the limited number of restructuring events with bond yields data, we also use the lagged value of the restructuring event in specification (4), (5), and (6) instead of the change specification used the China funding discount regressions. We find a positive, significant, and large increase in yields of around 350 basis points following Chinese debt restructuring events. We view these various results are strong evidence that China debt restructuring events are associated with an large increase sovereign bond yields debt for borrowing countries.[2]

3 Model

We build from the simplest version of the sovereign default model with long-term debt. The main modification is to include a process for capital flows vis-a-vis China: this process captures both new Chinese funding as well as restructuring events.

3.1 Environment

Preferences and income process. The preferences are give by

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

[2]It is important to note that the estimated China debt restructuring premium is similar in magnitude to the estimated effect of other restructuring events. Because our dataset is not fully balanced due to gaps in bond data coverage, our estimates are sensitive to the exclusion or inclusion of specific restructuring events. The results are particularly sensitive to the inclusion of Venezuela: it is the only country with multiple restructuring events in Venezuela and the near-complete bond data coverage. In a previous version of this paper, we found similar-but-not-so-large effects when we used monthly credit default swap data and monthly restructuring event dates.

where $\mathbb{E}$ denotes the expectation operator, β denotes the subjective discount factor, and c_t represents consumption of private agents. The utility function is strictly increasing and concave. The government cannot commit to future (default and borrowing) decisions.[3]

The economy's endowment of the single tradable good is denoted by $y \in Y \subset \mathbb{R}_{++}$. This endowment follows a Markov process.

Capital flows vis-à-vis China. We assume that the small open economy is a net borrower from China: its Chinese debt level can be either low ($b_c = L$) or high ($b_c = H$). Transitioning from low to high b_c implies a capital inflow (and transitioning from high to low implies a capital outflow). These transitions are governed by a random variable $a = \{0, 1\}$: most of the time $a = 0$ and the net flows vis-à-vis China are zero, when $a = 1$ the net flows are non-zero.[4]

Market debt. The small open economy also borrows from a large pool of international investors by issuing long-duration bonds. As in Hatchondo and Martinez (2009), a bond issued in period t promises an infinite stream of coupons, which decreases at a constant rate δ. Hence, debt dynamics can be represented as follows:

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

where b_t is the initial debt level in period t, and ℓ_t is the number of long-term bonds issued in period t. The advantage of this payment structure is that it enables us to condense all future payment obligations derived from past debt issuances into a one-dimensional state variable: the payment obligations that mature in the current period. Bonds are priced in a competitive market inhabited by a large number of risk-neutral foreign investors that discount future payoffs at the risk-free rate, r.

Defaults. When the government defaults, it does so on all current and future debt obligations. This is consistent with the observed behavior of defaulting governments and it is a standard assumption in the literature.[5] A default event triggers exclusion from the debt

[3]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 (default and borrowing) strategies of other players (governments) who will decide after t.

[4]Note that we are assuming that debt obligations with China are non-defaultable. This is in line with the reported seniority of Chinese debt (Horn et al., 2020).

[5]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.

market for a stochastic number of periods. Furthermore, income is given by $y - \phi(y)$ in every period in which the government is excluded from debt markets. Starting the first period after the default period, with a constant probability $\theta \in [0, 1]$, the government may regain access to debt markets. The government exits default without debt (a standard assumption in the literature).

Timing. The timing of events within each period is as follows. First, the government learns the economy's income and the realization of the *net flows* vis-à-vis China. After that, the government chooses whether to default on its market debt. Before the period ends, the government may change its market debt positions, subject to the constraints imposed by its default decision.

3.2 Recursive formulation

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

Let d denote the current-period default decision. 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. Let V denote the government's value function at the beginning of a period, that is, before the default decision is made. Let V_0 denote the value function of a sovereign not in default. Let V_1 denote the value function of a sovereign in default. For any bond price function q, the function V satisfies the following functional equation:

$$V(b, b_c, s) = \max_{d \in \{0,1\}} \Big\{ dV_1(b_c, s) + (1 - d)V_0(b, b_c, s) \Big\}, \tag{5}$$

where

$$V_0(b, b_c, s) = \max_{b'} \Big\{ u(c) + \beta \, \mathbb{E}_{s'|s} V(b', b'_c, s') \Big\}, \tag{6}$$

subject to

$$c + \kappa b = y + q(b', b'_c, s)(b' - (1 - \delta)b) + z(b_c, a) \tag{7}$$

with

$$b'_c = \mathcal{B}'_c(b_c, a) = \begin{cases} H & \text{if } a = 1 \cap b_c = L \\ L & \text{if } a = 1 \cap b_c = H \\ b_c & \text{otherwise} \end{cases} \tag{8}$$

and

$$z(b_c, a) = \mathcal{B}'_c(b_c, a) - b_c = \begin{cases} H - L & \text{if } a = 1 \cap b_c = L \\ L - H & \text{if } a = 1 \cap b_c = H \\ 0 & \text{if } a = 0 \end{cases} \tag{9}$$

where κ represents the coupon, $z(b_c, a)$ in (9) represents the *net flows* vis-à-vis China, and $\mathcal{B}'_c(b_c, a)$ in (8) indicates how the debt level with China evolves. The value of default is:

$$V_1(b_c, s) = u\big(y - \phi(y) + z(b_c, a)\big) + \beta \mathbb{E}_{s'|s}\Big[\theta V(0, b'_c, s') + (1-\theta) V_1(b'_c, s')\Big], \tag{10}$$

subject to (9) and (8).

The bond price is given by the following functional equation:

$$q(b', b'_c, s) = e^{-r}\, \mathbb{E}_{s'|s}\left[1 - \hat{d}\,(b', b'_c, s')\right]\left[\kappa + (1-\delta)\, q\left(\hat{b}\,(b', b'_c, s'), b''_c, s'\right)\right], \tag{11}$$

where $b''_c = \mathcal{B}'_c(b'_c, a')$ and 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 (11) equals the expected value of the next-period coupon payment promised in a bond. The second term in the right-hand side of equation (11) 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.

3.3 Equilibrium definition

A Markov Perfect Equilibrium is characterized by

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

such that:

(a) given $\hat{d}$ and $\hat{b}$, the bond price function q is given by equation (11); and

(b) the default rule $\hat{d}$ and borrowing rule $\hat{b}$ solve the dynamic programming problem defined by equations (5)-(10), when the government can trade bonds at q.

Table 5: Benchmark parameter values.

Risk aversion	γ	2
Risk-free rate	r	1%
Discount factor	β	0.98
Probability exclusion ends	θ	0.083
Debt duration	δ	0.03
Bond coupon	κ	$(r+\delta)e^{-r}$
Income autocorrelation coefficient	ρ	0.94
Standard deviation of innovations	σ_ε	1.5%
Mean log income	μ	$(-1/2)\sigma_\epsilon^2$
Income cost of defaulting	λ_0	0.18
Income cost of defaulting	λ_1	1.30
High China debt	H	0.4
Low China debt	L	0.0
Probability of $a = 1$	π	5%

4 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 endowment process follows:

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

with $|\rho| < 1$, and $\varepsilon_t \sim N(0, \sigma_\varepsilon^2)$. As in Chatterjee and Eyigungor (2012), we assume a quadratic loss function for income during a default episode $\phi(y) = \max\{y[\lambda_0 + \lambda_1[y - \mathbb{E}(y)]], 0\}$. We assume that a follows an iid process and takes a value of 1 with probability π and a value of 0 with probability $1 - \pi$.

Parametrization. Table 5 presents the benchmark values given to all parameters in the model.[6] A period in the model refers to a quarter. The coefficient of relative risk aversion, the risk-free interest rate, and the discount factor β take standard values. We assume an average duration of sovereign default events of three years ($\theta = 0.083$), following Dias and Richmond (2007).

[6] Our parametrization follows closely the one in Hatchondo and Martinez (2017).

The parameters that govern the endowment process are set to common values in the literature. These values, $\rho = 0.94$ and $\sigma_\varepsilon = 1.5\%$, are typical for studies that focus on emerging economies and low-income countries, as we do. The parameters of the income cost of defaulting λ_0 and λ_1 are parametrized as in Hatchondo and Martinez (2017).

We set $\delta = 3.3\%$, which is also the value used in Hatchondo and Martinez (2017). With this value and the mean sovereign spread observed in our simulations (roughly 4.4%), sovereign debt has an average duration of 5 years in the simulations, which is close to the average duration found in previous literature.[7] The coupon is normalized to $\kappa = (r + \delta)e^{-r}$, which ensures that a default-free bond (with the same coupon structure of our sovereign bonds) trades at a price of e^{-r}.

The capital flows vis-à-vis China are characterized by three parameters: L, H, and π. We normalize L to be zero, and use H to target an average level of Chinese debt to GDP of roughly 10%. The frequency of Chinese financing events is set to once every twenty quarters ($\pi = 0.05$).

5 Results

We start by presenting the simulated moments produce by our model, and show that it is a reasonable approximation to data from low-income countries. We then study the effect that the types of China funding events ($H \to L$ and $L \to H$) have on the market bond price schedule and on the borrowing decisions. Third, we show the typical dynamics around these funding events. Finally, we analyze the welfare implications of borrowing 'in the Shadow of China.'

[7] We use the Macaulay definition of duration that, with the coupon structure in this paper, is given by $D = (1 + i^*)/(\delta + i^*)$, where i^* denotes the constant per-period yield delivered by the bond. 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.

5.1 Simulations

Table 6: Simulated moments.

	Unconditional	Inflow from China	Outflow from China
Market debt/GDP	38.37	42.88	34.05
China debt/GDP	5.12	0.00	9.99
Market issuance/GDP	1.34	-8.55	10.87
Avg. net flow from China/GDP	-0.01	9.96	-9.98
Spreads	1.93	1.52	3.64
S.D. spreads	2.44	1.09	10.91
Corr(spreads, GDP)	-0.49	-0.69	-0.39
S.D. consumption/ S.D. GDP	1.17	0.98	2.24
Avg. consumption/GDP	0.99	1.02	0.92
Default frequency	1.65	1.48	7.22

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

As Table 6 shows, our model was parametrized to feature an average China debt ratio of 10 percent of GDP (conditioning on non-zero Chinese debt) , a number in between the estimates provided by Horn et al. (2020). We also see that market debt is roughly 38 percent of GDP, in line with the evidence in emerging economies. Regarding spreads, computed as the difference in yields between the sovereign bonds and comparable default-free bonds, we see that they are moderately high, volatile and countercyclical. On average the economy pays 200 basis points over the risk free rate, with a standard deviation of 240 basis points. Since we have long-term debt, it is not surprising that spreads are higher than the default frequency (which is roughly 1.65% annually).

The last two columns in Table 6 report statistics conditioning on China 'funding events', i.e. conditioning on $a = 1$.[8] We can see that our model captures clear effects on both quantities and prices, reminiscent of the facts documented in section 2. First, the issuance of market debt shows that the country actively changes its portfolio when hit by an a shock. If experiencing a capital inflow, the economy chooses to delever on market debt (over and above the geometric decline implied by our coupon structure, hence the observed negative issuances). However, this decline in market debt is not one-to-one with the inflow from China: this implies that part of the Chinese inflow is going to be consumed (see also Figure

[8]Recall, if $b_c = L \cap a = 1$ then the economy receives a capital inflow from China (second column of Table 6); if $b_c = H \cap a = 1$ then the economy experiences a capital outflow vis-à-vis China (third column of Table 6).

2). A similar behavior, with opposite sign, is observed when the country undergoes a capital outflow vis-à-vis China: it taps private markets to offset the outflow but not fully – it also adjusts consumption down. Even though the nominal issuance in this negative flow episodes is larger than the payments due to China, we see that consumption drops – this is due to the worse prices faced in these cases.

With regards to sovereign spreads we see, as expected, China outflow events are associated with higher and more volatile spreads than 'normal times.' These premium paid during outflow events is consistent with the positive and significant of Chinese debt restructuring on CDS spreads (see section 2). In the case of China inflows, we see the opposite behavior but to a much lesser extent: the level and the volatility of the spreads are only 40 and 140 basis points lower than in normal times, respectively. So, the effect on spreads is *asymmetric*.

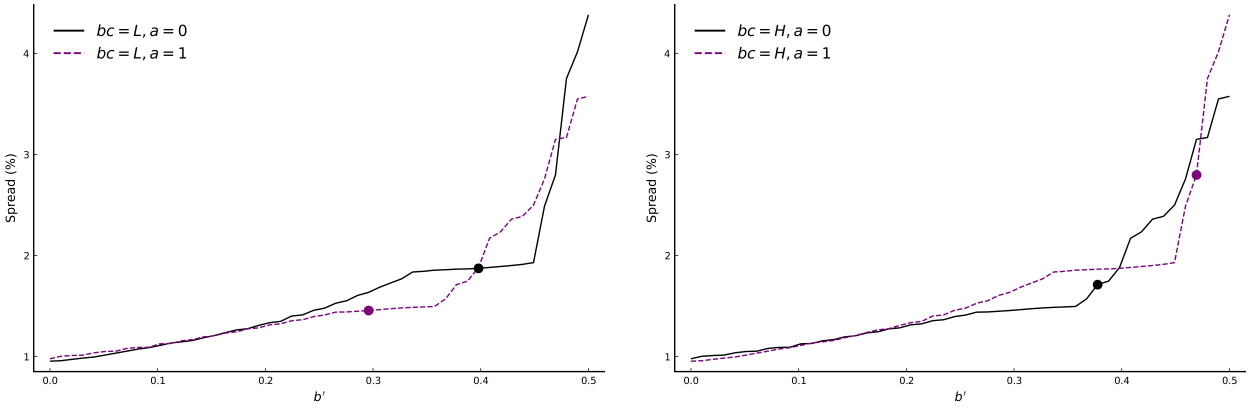
Regarding default frequencies, we see that a positive inflow from China is associated with less frequent defaults than in both 'normal times and outflow events. The fact that defaults are much more frequent during China-outflow periods is expected: these are periods in which the country *has* to repay to China (recall this debt is non-defaultable) and more frequently chooses to finance part of this repayment with a default on other creditors.

5.2 Effects on borrowing opportunities and policy functions

Figure 1 shows the borrowing opportunity set faced by the small open economy. It presents the spread–debt menus for the case of $b_c = L$ (on the left) and $b_c = H$ (on the right). Consider first the case of $b_c = L$: in it we can see that if the economy faces a funding event from China ($a = 1$) then it *has* to be a positive inflow ($L \to H$) and the country reacts by delevering (choosing lower level of next-period market debt, as denoted by the purple dot on the menu) and paying lower spreads. The opposite results is observed when $b_c = H$: if a funding event occurs, then it *must* be a capital outflow, to which the economy reacts by borrowing more form the private lenders and paying higher spreads. The overall effect on debt is in line with our findings in section 2.

One other feature of our model is that what matters for the price schedule is not b_c nor a themselves but what they imply for b_c'.

Figure 1: Spread–debt menus



Note: The left panel shows the spread–debt menu available to the economy when $b_c = L$, and the right panel when $b_c = H$. The solid (dashed) line is for the case $a = 0$ ($a = 1$). The dots denote the optimal choices for the corresponding case, when the initial debt level is equal to the mean in the simulations. All lines and panels assume income at its mean.

5.3 Dynamics around Chinese funding events

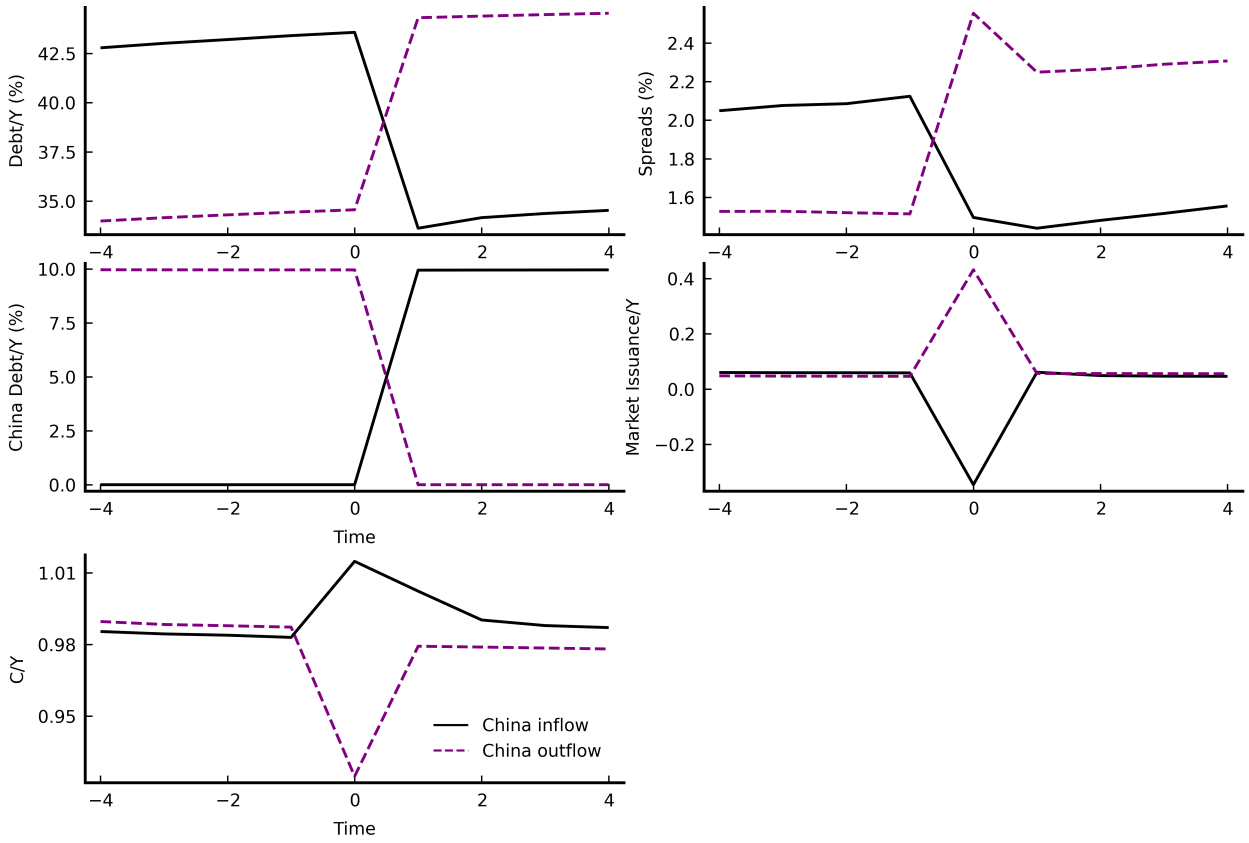
Figure 2 shows the dynamics of our model around China funding events, both inflows and outflows. The most clear message comes from the behavior of market debt: we see that the economy re-balances its portfolio right after these events. In case of an capital inflow from China, the country lowers its market debt (from roughly 42% to less than 35% of mean GDP) and therefore the equilibrium spreads also decrease (by roughly 50 bps). In case of a capital outflow vis-à-vis China, the economy increases its market debt (roughly from 35% to 43% of mean GDP) and ends up paying higher spreads (roughly 100 bps higher).

The other clear feature observed in these dynamics is the asymmetry between a positive and a negative China flow: after an outflow consumption decreases by more (in absolute terms) than what it increases after a positive flow. This implies that economy finances more the positive shock than the negative shock: 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 decreases sharply which limits the equilibrium borrowing and triggers a large consumption adjustment. Naturally, this asymmetric response is captured in the equilibrium spreads.

After the aforementioned portfolio re-balancing the model exhibits somewhat of an inertia: market issuances are close to zero, the debt stocks are fairly constant and so are the spread and consumption levels.

Once more, we see that our simple model produces spread and debt dynamics that are consistent with the empirical evidence obtained form our panel of emerging and low-income

Figure 2: Dynamics round Chinese funding events



Note: The plots show the average dynamics for 4 quarters before and after a Chinese funding event (conditioning on no exclusion). Solid black lines are for 'inflow' events ($L \to H$) and dashed purple lines are for 'outflow' events ($H \to L$).

economies.

5.4 Welfare

We next study the welfare implications of having access to Chinese funding. To do this we define a 'No-China' model, which is identical to the benchmark except that it is not a possibility to receive (nor pay) funds from (to) China.

We measure welfare gains as the constant proportional change in consumption that would leave a consumer indifferent between continuing living in the No-china economy and moving to the benchmark economy (where China lending exists). The welfare gain of moving to the benchmark economy (or the welfare gain of 'China financing') is given by

$$\left[\frac{V^{\text{Bench}}}{V^{\text{No-China}}}\right]^{1/(1-\gamma)} - 1\,.$$

As Table 7 documents, having access to Chinese lending lowers the default frequency, and with that it reduces the deadweight losses caused by defaults. Accordingly, the benchmark economy pays lower and less countercyclical spreads. Interestingly, having access to China funding the benchmark economy features a lower market debt to GDP ratio, but a larger total debt to GDP ratio.

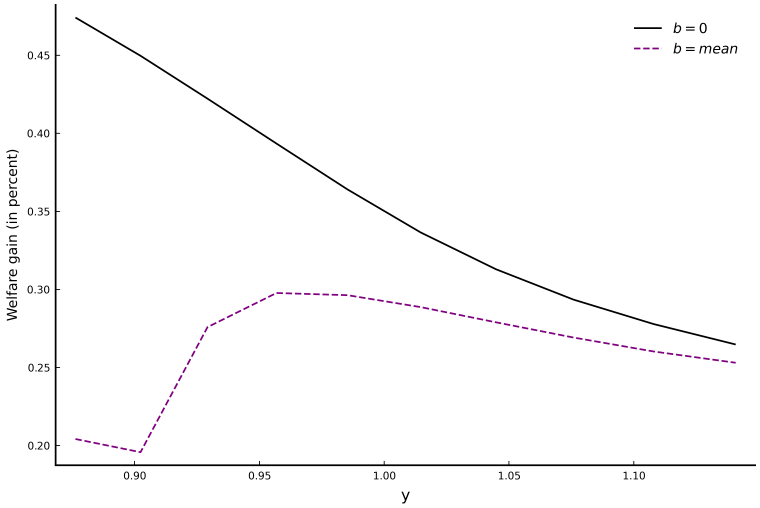
Table 7: Simulated moments: Benchmark and No-China models.

	Benchmark	No-China
Mkt. Debt/GDP	38.37	40.96
China debt/GDP	5.12	-.-
Average market issuance/GDP	5.35	5.91
Spreads	1.93	2.62
S.D. spreads	2.44	2.24
Corr(spreads, GDP)	-0.49	-0.70
S.D. consumption/S.D. GDP	1.17	1.13
Avg. consumption/GDP	0.99	0.99
Default frequency	1.65	2.12

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

We find that, on average, having access to China funding produces a welfare gain of 0.35% of permanent consumption. Figure 3 plots the welfare gain as a function of initial income for two values of initial market debt: zero and the mean in the simulations (roughly 38% of annual GDP). We can see that for zero initial debt the welfare gains are monotonically decreasing in income: even though the economy benefits unconditionally from having Chinese funding, this benefit is relatively higher if the current income level is low as these are the states of the world where Chinese lending becomes especially useful. For the case of positive initial debt we see a hump-shaped behaviour. At low income levels, the welfare gains are particularly low since default is more likely and the value of defaulting is not dramatically higher in the benchmark economy than in the No-China economy. However, as income improves having access to China funding is more valuable for a high initial debt economy since it creates the possibility of a positive inflow which can relax borrowing constraints.

Figure 3: Welfare gains



Note: The figure was constructed assuming that the initial debt level is equal to zero or to the mean debt level in the simulations of the benchmark economy (with China funding). A positive number means that agents prefer the benchmark economy.

6 'Opaque debt' model extension

Throughout the model outlined above, we ignored the recurring references to the opaque nature of debt contracts with China. We modify the baseline model to capture the market participants' lack of full information on emerging economies' debt vis-à-vis China.

Opaque debt We assume that lenders only get a noisy signal, $\tilde{b}_c^{'}$, of the country's true debt with China, $b_c^{'}$. The government in turns takes into account the lenders' uncertainty concerning its true debt vis-à-vis China when borrowing on international capital markets. In particular, by varying the precision of the signal, we explore the role of 'uninformative' debt statistics to capture popular conversations around the 'opacity' of Chinese lending to emerging economies.

Opaque debt signals Specifically, we assume that the debt level signals $\tilde{b}_c \in \{H, L\}$ and that the process for generating the debt signals follows

$$\Pr\left(\tilde{b}_c = j \mid b_c = i\right) = \nu_{i,j} \tag{12}$$

for $i, j \in \{H, L\}$.

The lenders know that the process governing the evolution of the Chinese debt follows

$$\Pr(b_c = i' \mid b_c = i) = \eta_{i,i'} \tag{13}$$

The ergodic distribution can then be shown to satisfy

$$\Pr\left(b_c = i\right) = p_i^* = \frac{\eta_{-i,i}}{\eta_{i,-i} + \eta_{-i,i}} = \left(1 + \frac{\eta_{i,-i}}{\eta_{-i,i}}\right)^{-1} \tag{14}$$

where $-H \equiv L$ and $-L \equiv H$.

We can then recover the probability of a debt level conditional on a signal by Bayes' rule

$$\Pr\left(b_c = i \mid \tilde{b}_c = j\right) = \frac{\Pr\left(\tilde{b}_c = j \mid b_c = i\right) \times \Pr\left(b_c = i\right)}{\Pr\left(\tilde{b}_c = j\right)}. \tag{15}$$

Given these primitives $\left\{\nu_{i,j} : i, j = H, L\right\}$ and $\left\{\eta_{i,i'} : i, i' = H, L\right\}$, the lenders' assign a debt (b_c) probability mass function conditional on the debt statistic signal $(\tilde{b}_c)$ such that

$$\Pr\left(b_c = i \mid \tilde{b}_c = j\right) = \left(1 + \frac{\nu_{-i,j}}{\nu_{i,j}} \times \frac{\eta_{i,-i}}{\eta_{-i,i}}\right)^{-1} \equiv \tilde{\nu}_{j,i}. \tag{16}$$

Timing We assume that lenders are one-period lived and that the following order of events occurs within each period:

1. the aggregate state $s = (a, y)$ is realized,
2. the government makes default decision $\widehat{d}\,(b, b_c, s)$ and borrowing decisions $\widehat{b}\,(b, b_c, s)$ taking as given the lenders' pricing function $q^{\mathrm{OP}}(b', \tilde{b}_c', s)$, and then
3. the lenders' common noisy signal $\tilde{b}_c'$ of b_c' is realized.

Under these assumptions, the bond price satisfies:

$$
\begin{aligned}
q^{\mathrm{OP}}(b', \tilde{b}_c' = i, s) = & e^{-r} \sum_{j=H,L} \Bigg\{ \Pr\left(b_c' = j \mid \tilde{b}_c' = i\right) \\
& \times \Bigg[\sum_{y'|y} \sum_{a'=k} \Pr\left(y' \mid y\right) \times \Pr\left(a' = k \mid a, b_c' = j\right) \\
& \quad \times \left(1 - \widehat{d}\left(b', b_c' = j, s'\right)\right) \\
& \quad \times \Bigg\langle \sum_{i'=H,L} \Pr\left(\tilde{b}_c'' = i' \mid b_c'' = \mathcal{B}_c'\left(b_c' = j, a' = k\right)\right) \\
& \qquad \times \left(\kappa + (1-\delta)\, q^{\mathrm{OP}}\left(\underbrace{\widehat{b}\left(b', b_c' = j, s'\right)}_{b''}, \tilde{b}_c'' = i', s'\right)\right) \\
& \quad \Bigg\rangle \Bigg] \Bigg\}
\end{aligned}
\tag{17}
$$

where $s' = (a', y')$, $\mathcal{B}_c'$ denotes the law of motion of Chinese debt stocks, and $\widehat{d}$ and $\widehat{b}$ denote the borrower's default and borrowing functions.

The government also takes into account the lender's uncertainty in the repayment and default decisions. We have:

$$
V^{\mathrm{OP}}\left(b, b_c, s\right) = \max_{d \in \{0,1\}} \left\{ d V_1^{\mathrm{OP}}(b_c, s) + (1-d) V_0^{\mathrm{OP}}(b, b_c, s) \right\}, \tag{18}
$$

where

$$
V_0^{\mathrm{OP}}(b, b_c, s) = \max_{b'} \sum_{j=H,L} \left\{ \Pr\left(\tilde{b}_c' = j \mid b_c' = i\right) \times \left\{ u(c) + \beta\, \mathbb{E}_{s'|s} V^{\mathrm{OP}}(b', b_c', s') \right\} \right\}, \tag{19}
$$

subject to

$$
c + \kappa b = y + q^{\mathrm{OP}}(b', \tilde{b}_c', s)(b' - (1-\delta)b) + z(b_c, a). \tag{20}
$$

6.1 Results with 'opaque debt' model

We plan to use the above extension to compute the value of transparency for the borrowing country. In particular, how much is the borrowing country willing to pay (as a percent of permanent consumption) in order to eliminate the opacity surrounding the Chinese debt?

To be completed.

7 Concluding remarks and future work

We use a standard sovereign debt model with long term debt to rationalize a set of facts about emerging economies borrowing from private markets and the impact that Chinese official lending has on it. We find that following a positive inflow from China our model economy chooses to re-balance its debt portfolio by deleveraging from market debt. In the process it pays lower spreads and faces less volatile consumption. On the other hand, when facing a capital flow vis-à-vis China, the economy taps private markets, levers up on defaultable debt and ends paying higher and more volatile spreads in equilibrium. All these model dynamics are in line with panel-data evidence from emerging and low income economies. Furthermore, we use the model to study the welfare gains from having access to Chinese loans and find that they are positive but smaller when default risk is material.

Current extensions in progress include incorporating information asymmetries and imperfect information to further capture the opaque nature of Chinese loans. In particular, we use these extensions to evaluate the welfare effects of improving the transparency of these contracts. Preliminary results (not yet incorporated in this document) indicate that it is in the borrowing countries' best interest to disclose the details of their Chinese loans.

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A Data appendix

A.1 Country list

Annual public external debt. The annual total public external debt dataset includes data on the following countries: Albania, Algeria, Angola, Argentina, Armenia, Azerbaijan, Bahamas, Bangladesh, Barbados, Belarus, Benin, Bolivia, Bosnia and Herzegovina, Botswana, Brazil, Bulgaria, Burkina Faso, Burundi, Cabo Verde, Cambodia, Cameroon, Central African Republic, Chad, Chile, Colombia, Comoros, Congo Democratic Republic, Congo Rep, Costa Rica, Côte d'Ivoire, Djibouti, Dominica, Ecuador, Egypt, Equatorial Guinea, Eritrea, Ethiopia, Fiji, Gabon, Ghana, Guinea, Guyana, India, Indonesia, Iran, Jamaica, Jordan, Kazakhstan, Kenya, Kyrgyz Republic, Laos, Lebanon, Lesotho, Liberia, Macedonia, Madagascar, Malawi, Malaysia, Maldives, Mali, Mauritania, Mauritius, Mexico, Mongolia, Montenegro, Morocco, Mozambique, Myanmar, Namibia, Nepal, Niger, Nigeria, Oman, Pakistan, Papua New Guinea, Peru, Philippines, Romania, Russia, Rwanda, Samoa, Senegal, Serbia, Seychelles, Sierra Leone, South Africa, South Sudan, Sri Lanka, Sudan, Suriname, Tajikistan, Tanzania, Togo, Tonga, Trinidad and Tobago, Tunisia, Turkey, Turkmenistan, Uganda, Ukraine, Uruguay, Uzbekistan, Vanuatu, Venezuela, Vietnam, Yemen, Zambia, Zimbabwe.

Table A1: CHN funding and debt statistics.

Country	CHN funding (count)	CHN debt (pct. GDP)	External debt (bondholders, pct. GNI)	Yields (10y+, percent)
AGO	6	7.98	1.57	10.14
ALB	1	0.9	3.87	.
ARG	4	0.43	22.76	18.82
ARM	1	0.04	7.69	7.42
AZE	0	0	4.63	4.71
BDI	3	0.48	.	.
BEN	2	1.41	.	.
BFA	0	0	.	.
BGD	3	1.17	.	.
BGR	2	0.22	12.38	4.53
BHS	2	8.54	.	6.47
BIH	2	2.4	1.07	.
BLR	5	3.64	2.48	6.39
BLZ	0	.	22.83	9.03
BOL	4	2.2	2.55	5.41
BRA	5	0.27	4.86	8.25
BRB	1	0.59	.	7.62
BWA	4	3.04	.	.
CAF	1	1.58	.	.
CHL	3	0.17	.	4.08
CIV	6	1.86	13.15	8.52
CMR	3	4.1	2.2	10.28
COD	1	2.64	0.02	.
COG	3	19.28	3.71	8.63
COL	1	0.01	9.03	7.33
COM	2	3.24	.	.
CPV	4	1.93	.	.
CRI	1	0.12	8.41	7.1
DJI	4	19.76	.	.
DMA	2	7.65	12.43	.
DOM	0	.	5.65	7.66
DZA	0	0	.	.
ECU	3	4.29	13.74	10.45
EGY	4	0.16	1.5	7.67
ERI	4	5.76	.	.
ETH	4	8.72	1.48	6.89
FJI	4	5.04	5.17	.
GAB	2	2.59	10.33	7.2
GEO	0	.	7.45	6.69
GHA	4	3.42	5.05	8.83

Continued on next page

Country	CHN funding (count)	CHN debt (pct. GDP)	External debt (bondholders, pct. GNI)	Yields (10y+, percent)
GIN	3	2.26	.	.
GMB	0	.	.	.
GNQ	4	4.64	.	.
GRC	0	.	.	6.86
GRD	0	.	16.87	14.75
GUY	3	3.23	0.91	.
HND	0	.	5.85	7.72
HRV	0	.	.	5.24
IDN	3	0.42	5.06	6.2
IND	2	0.1	1.41	.
IRN	2	0.05	.	.
IRQ	0	.	.	8.59
JAM	4	3.34	29.33	9.12
JOR	3	0.34	5.71	5.92
KAZ	5	1.63	4.17	5.38
KEN	8	3.04	4.12	6.01
KGZ	6	11.45	.	.
KHM	6	16.51	.	.
LAO	5	13.56	5.24	.
LBN	1	0.01	56.55	8.41
LBR	2	0.23	.	.
LKA	4	4.46	4.17	6.17
LSO	2	1.09	.	.
MAR	3	0.16	2.37	5.22
MDG	2	0.39	.	.
MDV	4	5.41	5.71	.
MEX	1	0.05	11.07	5.88
MKD	2	2.12	5.59	4.53
MLI	3	1.57	.	.
MMR	3	5.16	.	.
MNE	1	7.09	17.16	.
MNG	3	3.3	12.46	5.5
MOZ	5	5.47	5.44	.
MRT	2	4.43	.	.
MUS	4	2.22	.	.
MWI	1	2.23	.	.
MYS	1	0.16	.	.
NAM	3	1.37	.	5.64
NER	2	12.7	.	.
NGA	3	0.34	1.11	9.21
NPL	3	0.64	.	.
OMN	1	0.28	.	5.22

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Country	CHN funding (count)	CHN debt (pct. GDP)	External debt (bondholders, pct. GNI)	Yields (10y+, percent)
PAK	6	2.79	1.19	9.69
PAN	0	.	.	6.58
PER	6	1.34	7.54	6.01
PHL	3	0.34	8.97	6.75
PNG	3	1	.	.
POL	0	.	.	4.09
PRY	0	.	4.96	5.42
ROM	1	0.27	.	.
ROU	0	.	.	5.4
RUS	3	1.51	3.47	6.96
RWA	5	0.9	4.82	.
SDN	4	5.81	.	.
SEN	4	2.08	3.92	6.91
SLE	5	1.35	.	.
SRB	4	1.23	9.99	7.16
SSD	2	2.67	.	.
SUR	3	3.76	.	.
SVN	0	.	.	5.35
SYC	2	0.55	.	.
TCD	1	2.42	.	.
TGO	4	5.19	.	.
TJK	1	10.18	5.97	.
TKM	5	10.62	.	.
TON	3	15.68	.	.
TTO	1	0.27	.	5.51
TUN	0	.	10.19	.
TUR	3	0.09	7.06	7.49
TZA	5	2.22	.	.
UGA	5	2.73	0.06	.
UKR	2	0.95	9.11	7.78
URY	1	0.01	.	7.23
UZB	6	3.35	.	.
VEN	3	5.56	15.81	12.44
VNM	6	2.03	1.36	5.82
VUT	5	10.34	.	.
WSM	3	12.22	.	.
YEM	2	0.6	.	.
ZAF	6	0.46	7.71	5.94
ZMB	6	6.89	8.94	8.14
ZWE	6	5.05	0	.