Chinese Sovereign Lending in Developing Economies

Laura Alfaro* Bulent Guler† Yasin Kürşat Önder‡ Temel Taskin§

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Abstract

This paper revisits the quantitative sovereign debt literature against the new realities of sovereign lending in developing countries: the dominant role of China. First, we review the recent stylized facts building on the data and findings from Horn et al. (2021, 2022) complemented with the Bank of Canada-Bank of England sovereign debt database and other sources. Countries with histories of chronic debt problems are increasingly borrowing from—and defaulting on—Chinese loans. The frequency of defaults to China is higher while the duration of exclusion is shorter, and the correlation of default episodes with output fluctuations is weaker. There are substantial differences in maturity and borrowing terms between multilateral and Chinese borrowing, and a positive correlation exists between these two sources. This phenomenon has generated concerns with international financial institutions, which remain their primary lender. In the second part of the paper, we construct and calibrate a sovereign default model considering these new empirical facts. The government has access to non-contingent Chinese loans as well as multilateral lending that is available during periods of financial distress. Multilateral lending carries seniority status and longer maturity. Consistent with our stylized facts, the model generates a positive correlation between borrowing from China and multilateral lenders as the availability of multilateral debt improves the price of China's debt. We show that the long-term nature of non-defaultable debt plays an important role in this result. As the duration of multilateral debt is shortened, this positive correlation disappears.

JEL Codes: F, H.
Keywords: China, sovereign default, multilateral lending, seniority, maturity

*Harvard Business School; email: lalfaro@hbs.edu
†Deparment of Economics, Indiana University; email: bguler@iu.edu
‡Ghent University; email: kursat.onder@ugent.be
§Bank of Canada; email: ttaskin@bankofcanada.ca

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1 Introduction

The landscape of sovereign borrowing has transformed dramatically over the past two decades, with developing countries increasingly turning to China as their primary source of official lenders. The Fourth Wave of Debt, as dubbed by the World Bank, marks the largest, fastest, and most widespread rise in debt across poor countries in the last 50 years, along with significant shifts in financial markets and geopolitics.[1] In response, there is renewed interest in exploring the implications of this shift within the quantitative sovereign debt literature as most of the contributions to this important literature have focused on previous waves and private flows.[2]

In this paper, we first build upon the recent efforts in data collection by (Horn et al., 2020, 2021, 2022; Gelpern et al., 2021) complemented with the Bank of Canada-Bank of England sovereign default database (Beers et al., 2020) to revisit the existing stylized facts on sovereign defaults and reassess the quantitative sovereign debt models against the new realities of sovereign lending. In the first part of the paper, focusing on developing countries, and in particular Africa countries for which detailed data has been collected, we divide nations according to their primary source of borrowing (China, multilateral, or private). We focus on the following stylized facts:

i. Countries with histories of chronic debt problems increasingly borrow from China. In particular, China's share of lending to African countries has increased substantially over the past two decades, yet, multilateral debt remains the largest component on average. For poor countries, private borrowing is very limited.

ii. The average interest rate of China's lending is higher than that of multilateral loans (close to 2 percentage points differential) while the average maturity duration of China's lending is shorter than multilateral loans.

iii. There is a significant positive correlation between debtor countries' borrowing from alternative sources (China vs. multilateral).

iv. Compared to the defaults on private debt pre-2000, there is more frequent defaults on China debt post-2000. However, the duration of exclusion is shorter, and the correlation of default episodes with output fluctuations is weaker.

These stylized facts speak to the state contingent vs. non-contingent interpretation of sovereign debt markets.[3] Moreover, they highlight the long-term nature of the sovereign debt

[1] For historical perspectives and overviews of debt crises and stylized facts, see Eichengreen and Portes (1986), Reinhart and Rogoff (2009), Panizza et al. (2009), Reinhart and Trebesch (2016), Meyer et al. (2022). See Mitchener and Trebesch (2022) and Kose (2021) for recent characterizations.

[2] See for example recent work by Arellano and Barreto (2024), Liu et al. (2024); Yoon (2024), Alfaro and Kanczuk (2022), Guler et al. (2022), Kondo et al. (2024). Aguiar and Amador (2014), Aguiar et al. (2016), Uribe and Schmitt-Grohé (2017) overview the quantitative debt literature.

[3] See Grossman and van Huyck (1988) and Grossman and Han (1999).

contracts is an important feature, with debt dilution shown to be important.

In the second part of the paper, building on the stylized facts (i) and (ii), we study the interaction between Chinese debt and multilateral debt through the construction and calibration of a quantitative sovereign default model. An important feature of the countries that receive loans from China is that multilateral loans constitute the largest component of their sovereign debt. Motivated by this observation, we extend the standard sovereign default model to include defaultable Chinese debt alongside senior borrowing from multilateral. In particular, we construct a model of a small open economy that receives a stochastic income stream of a single tradable good. The government's objective is to maximize the expected utility of private agents.

Each period, the government first decides whether to default on its Chinese debt and then determines its borrowing level. In the event of default, the government incurs an income cost, is temporarily barred from issuing Chinese debt, and loses access to multilateral loans. These multilateral loans are accessible only during financial distress episodes, specifically when the government faces a liquidity shock that increases the risk aversion of Chinese lenders. Using this model, we focus on the interaction between defaultable non-contingent debt, represented as Chinese loans in our framework, and non-defaultable debt, represented as multilateral debt.

Motivated by the empirical observations, we model both the Chinese loans and multilateral loans as long-term assets. We calibrate the model to the average characteristics of selected countries that heavily borrow from China. Using this framework, we examine how the decision to borrow and repay multilateral debt is influenced by the presence and magnitude of long-term defaultable Chinese debt, as well as how the terms of Chinese debt are affected by the level of long-term non-defaultable multilateral debt. Our quantitative exercises show that the combination of long maturities and seniority status in multilateral lending increases countries' reliance on Chinese borrowing. The availability of inexpensive multilateral debt reduces the default probability of the sovereign. This pushes up the price of defaultable debt and encourages more borrowing from China.

Consistent with our stylized fact (iii), the model generates a positive correlation between borrowing from China and multilateral lenders as the availability of multilateral debt improves the price of China's debt. We show that the long-term nature of non-defaultable debt plays an important role in this result. As the duration of multilateral debt is shortened, this positive correlation disappears.

Related literature. Our work builds and contributes to the expanding literature on the characteristics, functions, and impacts of sovereign lending.Chinese lending has become a significant source of financing for low- and middle-income countries, reshaping global trade and international lending, particularly since the Global Financial Crisis.[4] This shift marks

[4]This paper also complements previous research that has studied the role of sovereign-to-sovereign capital

a transition away from traditional multilateral and bilateral lenders, such as the Paris and London Clubs, introducing new complexities in debt transparency, terms, and restructuring.

Horn et al. (2021, 2020) provide extensive documentation on the historical reach of official lending, noting its increased use during economic crises and adverse shocks. In addition, a growing recent literature has begun to document and analyze the effects of China on world financial markets (e.g., Agarwal et al., 2019; Clayton et al., 2022) with an emphasis in the interaction against private lenders (Alfaro and Kanczuk, 2022, Guler et al., 2022, Kondo et al., 2024). Our paper, in contrast, focuses on Chinese lending's competing role with multilateral lending. As countries increasingly transition to non-traditional markets and non-atomistic players such as China, the consequences of defaulting may differ from the previous episodes dominated by default to private lenders.

Debt maturity also plays a vital role in sovereign debt management. The work by Arellano and Ramanarayanan (2012), Hatchondo et al. (2016), Chatterjee and Eyigungor (2012) highlight the role of the inclusion of long-term bonds in debt models improves debt sustainability by addressing the "debt dilution problem" and providing a hedge against fluctuations in debt spreads. Our research aligns with these findings by illustrating that Chinese official debt, despite being defaultable, behaves similarly to long-term assets and exacerbates the debt dilution issue when combined with non-defaultable, multilateral loans.

Boz (2011) shows that the non-defaultable characteristic of multilateral agencies' loans may allow for countercyclical support during downturns, particularly when private debt becomes risky or unavailable.[5] In contrast, our framework considers Chinese debt as defaultable, contributing to debt dilution and influencing sovereign risk and welfare outcomes. Our paper's modeling choice aligns with Hatchondo et al. (2017), which discusses a Eurobonds proposal enabling governments to issue non-defaultable debt up to a specified limit, accessible at all times. Mimir and Önder (2024) investigate the impact of multilateral loans with grace periods and show that grace periods exacerbate the debt dilution problem.

The change in the composition of sovereign debt is significant in the context of data gaps in this literature. Chinese official bilateral loans and Chinese commercial bank lending since the 2000s are less transparent and require substantial work to document the loans' terms of the loans (Horn et al., 2021, 2022). Notably, the vast majority of defaults during the 2000s were on these less transparent and sporadically documented loans. Gelpern et al. (2021) highlight the similarities and differences between the terms in China's lending and standard commercial lending and official bilateral loans. The declining number of documented defaults, along with the rising debt during the 2000s, referred to as a puzzle labeled "missing defaults".After

flows and lending (e.g., Alfaro et al., 2014; Horn et al., 2020, 2021).

[5]The insurance function of official lending has been a focal point of theoretical research. Boz (2011), for example, notes that IFI loans are more enforceable and come with conditionality requirements, unlike private loans. The author's paper develops a model showing that the superior enforceability of IFI contracts explains the smaller, countercyclical nature of IFI borrowing, while conditionality accounts for its intermittent nature.

documenting a large set of unreported defaults on China loans during the 2000s, Horn et al. (2022) amended the term to "hidden defaults". In our work, we consider the increasing role of defaulting to China's debt.

Arellano and Barreto (2024) provides valuable empirical and theoretical insights into the nature of official sovereign debt. The authors find that official sovereign debt constitutes more than half of total debt in emerging markets and that its volume tends to increase significantly during default episodes, contrasting with debt from private creditors. Their model captures the dynamics of partial default, where defaulted official debt accumulates until the obligations are repaid. This model aligns with observed trends by showing that official debt is typically longer-term and more concessional than private debt, a characteristic that helps rationalize common patterns in emerging market debt. Additionally,the authors show that official debt improves welfare for indebted countries and propose that voluntary swaps of private for official debt during crises could mitigate economic distress, providing an innovative approach to managing sovereign debt in times of crisis. In related new work, Liu et al. (2024) introduce dynamic incentives and monitoring mechanisms to mitigate moral hazard, contrasting ideal resource allocations with more constrained, practical allocations that account for borrower behavior. The paper highlightsthe role of official lenders, such as China and multilateral institutions, in providing countercyclical financing that ensures consumption smoothing during crises. The model suggests that official lending can improve sovereign welfare and debt sustainability by filling gaps left by risk-averse private creditors, particularly in times of crisis. Complementing their work, w focus on the interaction with multilateral borrowing. As mentioned, countries increasingly relying on China's debt, such as those in Africa, have limited levels of private debt.

Recent work has extended these findings to study the welfare impacts of development finance (DF), particularly from China. Yoon (2024) models DF flows to developing countries, revealing that high corruption levels can influence countries to favor Chinese DF, which allows more opportunities for diversion but comes at a higher cost. This preference can lead to misallocation, overinvestment, and inefficiencies, particularly in less-monitored sectors. Our analysis similarly recognizes how non-traditional lenders like China have influenced sovereign borrowers' behaviors and strategic debt management choices. We abstract from this level of strategic consideration but our analysis is consistent. Indeed, the role of corruption is likely to exacerbate welfare implications.

Our paper, in contrast, studies the interaction between defaultable debt, represented as Chinese loans in our framework, and non-defaultable debt, represented as multilateral loans. Unlike these papers, we model multilateral loans as long-term assets. We show that the long-term nature of non-defaultable debt exacerbates the debt dilution problem of defaultable debt.Some of our results depend crucially on various assumptions that have been at the core of

traditional sovereign debt models, such as defaulting costs and exclusion.[6] These assumptions have been known to be crucial for debt sustainability.

The rest of the paper proceeds. Section 2 describes the data and the main stylized facts. Section 3 advances the calibration exercise discussed in Section 4. Section 5 analyzes the robustness of the results. The last section concludes.

2 Rise of China in Sovereign Lending: Recent Developments and Stylized Facts

We review the recent stylized facts building on the recently documented sovereign debt and default statistics from Horn et al. (2021, 2022, 2020) and complement them with information from Gelpern et al. (2021), World Bank (2022a), and Bank of Canada-Bank of England (Beers et al., 2020) sovereign debt and default databases. The data appendix describes the sources in detail.

The standard definition of restructuring used by credit rating agencies considers all loan term adjustments that resulted in less favorable terms for the creditors (reduced interest rates, maturity changes, write-offs Thus, standard default data sets such as World Bank's Debt Reporting System, Standard and Poor Global, and Fitch ratings do not include many of the defaults to China. World Bank Debt Reporting System includes only voluntarily reported data, and missing information likely reflects a lack of reporting. Rating agencies, on the other hand, use a wider set of data sources but do not include defaults on official bilateral loans. A possible reason for "missing defaults" in the rating agencies' data sets, therefore, could reflect the fact that the loans extended by Chinese Banks are considered under official bilateral loans. However, as shown recently by Gelpern et al. (2021), the terms of these loans are usually less favorable than official loans, even in some cases more restrictive than commercial loans. The appendix presents a comparison of the data.

Data for private creditor, bilateral and multilateral debt comes from the bilateral section of the International Debt Statistics database maintained by World Bank (2022a). The sample focuses on public and publicly guaranteed debt of low- and middle-income countries by creditor type as the primary reporting sources focus on these types of countries.[7] Private creditors include bondholders, banks, and other private entities. Paris Club includes twenty-one permanent Paris Club members. Other bilateral includes all other government-to-government debt except China. Government-to-government lending data comes from its bilateral section, aggregated by country.

[6] See Bulow and Rogoff (1988); Eaton and Gersovitz (1981); Arellano (2008); Mendoza and Yue (2012); Uribe and Schmitt-Grohé (2017).

[7] In the appendix, we show the main results to be robust to transitioning middle-income countries to high development levels during the sample period.

2.1 Countries with Histories of Chronic Debt Problems Increasingly Borrow from China

Figure 1 displays the evolution of outstanding public and publicly guaranteed external debt between 2000 and 2019 in billions of nominal USD and about the GNI divided between the debt owed to China and other creditors to low and middle-income countries. The debt to GNI ratio is computed as simple averages to avoid that large country over-proportionally influencing the figures. Debt levels have risen sharply since the onset of the financial crisis of 2008-09 across developing countries following easy financial conditions and prolonged periods of low-interests.

During this period, as noted by Horn et al. (2021), there has been a growth in lending from China (many hidden in traditional sources).[8] China expanded its lending volume from a negligible amount before the GFC to 300 billion USD in 2017 and now accounts for 1/5 of outstanding debt relative to GNI.[9] The exposure to Chinese debt is higher today for most countries, but particularly high in Africa Countries with a history of chronic debt problems increasingly borrow from China, a fact noted by Horn et al. (2021, 2022). Panel B in Figure 1 highlights that most of the lending happens to the 73 countries eligible to receive debt relief via the Debt Service Suspension Initiative (DSSI). In 2017, $125bn out of $250bn outstanding Chinese debt was lent to these countries, equivalent to 12% of their GDP.[10] In contrast, lending by other bilateral creditors was stagnant over the past 15 years.

Detailed loan-level data from African Debt Database (Mihalyi and Trebesch, 2023) is also consistent with the rising role of China in the sovereign debt market. As seen in Figure 2, China's share of lending to African countries has increased substantially over the past two decades. Multilateral debt is the largest component on average, and private borrowing is very limited for most African countries.

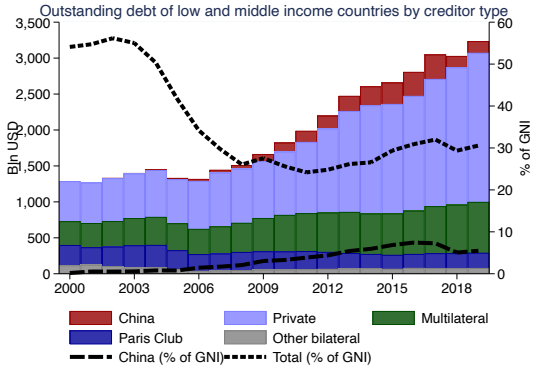
[8] See Figure 18 in Horn et al. (2021).

[9] Note that many countries do not report the debt to China because they do not borrow. However, the sample for outstanding debt with China only comprises countries with outstanding debt, thus effectively excluding many zeros from the sample. The figure represents those countries with outstanding debt with China rather than an average over the whole sample.

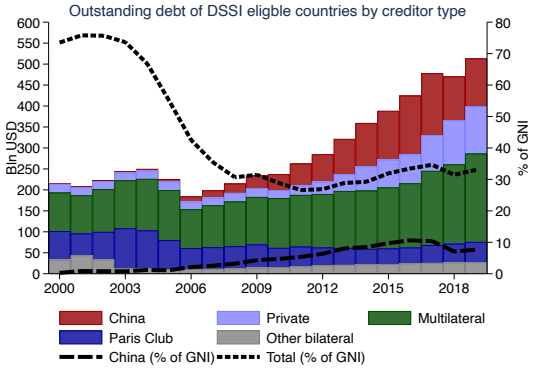
[10] The Horn et al. (2021) series end in 2017 and the drop in outstanding debt shown in the graph is due to missing or under-reported data in the IDS database.

Figure 1: Evolution of public and publicly guaranteed debt in low- and middle income countries by creditor type

(a) *All countries*

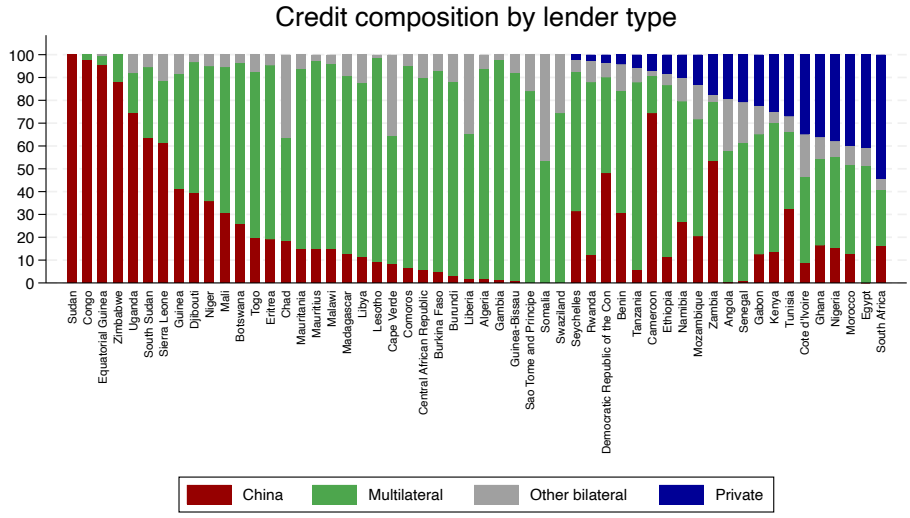


(b) *DSSI eligible countries*



Notes: Figure 1 displays the evolution of public and publicly guaranteed debt of low- and middle income countries by creditor type. Private creditors include bondholders, banks, and other private entities. Paris Club includes twenty-one permanent Paris Club members. Other bilateral includes all other government-to-government debt except China. Data for private creditor, bilateral and multilateral debt comes from the bilateral section of the International Debt Statistics database maintained by World Bank (2022a). Government-to-government lending data comes from its bilateral section, aggregated by country. The indicator is DT.DOD.DPPG.CD. Gross National Income (GNI) Shares are computed using the supplementary indicator NY.GNP.MKTP.CD from the same database. For the Chinese debt data, we the bilateral data of the database for the period up until 1999 and from 2018 to 2019. From 2000 to 2017, we replace the data with estimates from Horn et al. (2021) if available to account for "hidden" debts.

Figure 2: Lending to African Governments by Creditor Type



Notes: The displays the average debt levels and their composition by country.

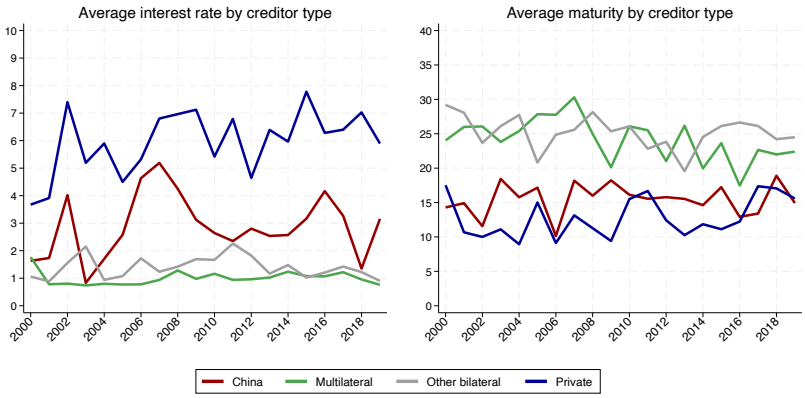
Figure 2 shows the percentage of credit from different sources across various African nations. Some countries, like Sudan and Congo, have a significant portion of their credit coming from China. Countries such as Madagascar, Mauritius, and Botswana have most of their credit from multilateral sources. In some cases, like South Africa and Egypt, there is a no-

ticeable amount of credit from private lenders. The graph highlights the varied dependence on different types of lenders by each country. Overall, there is a significant negative correlation between debtor countries' borrowing from alternative sources (China vs multilateral).

2.2 Terms of Chinese Lending

This section draws on a number of papers describing the terms and conditions of distressed debt restructurings with Chinese creditor entities, especially Acker et al. (2020), Horn et al. (2021, 2022) who compare the characteristics of Chinese debt restructurings with private creditors and Paris Club credit events.[11]

Figure 3: Average Interest and Maturity by Creditor Type

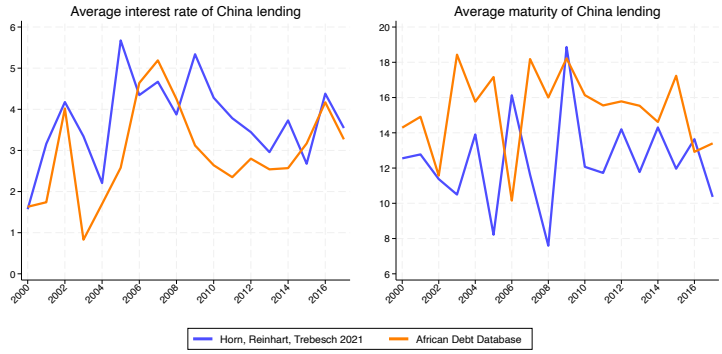


Notes: The displays the average interest rate and maturity in the African Debt Database.

Figure 3 compares how different creditor types differ in their loan terms, specifically interest rates and loan maturity, over two decades. The left Panel (Average interest rate by creditor type) of the figure shows fluctuations in interest rates over the 20-year period. Private borrowing interest rates were consistently higher interest rates, peaking in the early 2000s before fluctuating between 5% and 8% in subsequent years. China's rates remain relatively low and stable, with rates generally under 3%, and multilateral rates have remained fairly constant around 1%. On the right panel, we show the average maturity by creditor type. This panel depicts the loan maturities over time, measured in years. Maturity levels show distinct patterns, with multilaterals maintaining a consistently high average maturity (around 25 to 30 years), while for private and China, they fluctuate more significantly between 10 and 20 years. Note that Private shows a notable rise in average maturity starting around 2005, followed by some decline after 2010.

[11]The authors gather detailed information on restructurings of debt owed to banks and SOEs and debt owed to the government separately. The authors find that restructurings of debt owed to the Chinese government are mostly "symbolic" and concern tiny amounts. Most debt is canceled and written off as part of China's development aid program.

Figure 4: Average Interest and Maturity: China's Lending



Notes: The figure compares the average interest rate and maturity in the African Debt Database and Horn et al. (2021).

Figure 4 consists of two panels comparing data on Chinese lending from two sources: Horn, Reinhart, and Trebesch 2021 (in blue) and the African Debt Database (in orange), showing different perspectives but generally following similar patterns. The left panel, the Average interest rate of China lending, shows the average interest rates on Chinese loans from 2000 to 2016, comparing the two sources. Both datasets display considerable fluctuations in interest rates over the years, with the rates generally between 2% and 5%. The blue line (Horn, Reinhart, Trebesch 2021) tends to be higher from 2004 to 2014, except in a few years where the orange line (African Debt Database) spikes higher. The data generally shows a decreasing trend in interest rates starting around 2014. The right panel, the average maturity of China lending, depicts the average maturity of Chinese loans, measured in years, over the same period. The two lines show high variability, with significant jumps and drops in certain years. Around 2004 and 2007, the orange line (African Debt Database) shows much higher maturities, peaking at around 18 years. Meanwhile, the blue line fluctuates more sharply, reaching a peak in 2012 before decreasing.

Appendix Table 8 displays additional summary statistics of the loans' main characteristics in the dataset by loan type: Annual volumes, interest rates, maturities, and grace periods. The commitment amount is available for all loans in the dataset, except for four zero-interest loans. Hence, the values for volumes in the last two columns serve as a benchmark for assessing the data availability of the remaining variables. For instance, out of 554 commercial loans in the dataset, information on interest rates is available for 232 loans (41% of the observations), equivalent to 27.8% of the total loan volume. Thus, smaller loans are overrepresented in the statistics for interest rates. Data availability is generally better for concessional loans. No interest rate data is available if there is no information on the loan type. In the dataset, commercial loans account for the lion's share of the total volume granted by Chinese creditors. The total volume we cover is $346bn, or 72% of all loans. They have the most significant

amounts, charge higher interest rates, and have shorter maturities than the other loan types.

Table 1: Default statistics of major borrowers from China

	Post-2000				Pre-2000	
	# of restructurings vis-à-vis China lending	# of years in default vis-a-vis China	# of restructurings vis-à-vis Private lenders	# of years in default vis-a-vis Private lenders	# of restructurings vis-à-vis Private lenders	# of years in default vis-a-vis Private lenders
Angola	4	4	0	20	1	15
Belarus	0	0	0	0	0	0
Bolivia	3	2	0	0	2	18
Botswana	2	1	0	0	0	0
Cote d'Ivoire	3	3	2	13	1	17
Cameroon	5	5	1	6	1	15
Congo, Dem. Rep.	2	1	0	11	7	24
Congo, Rep.	4	4	1	15	1	17
Ecuador	1	1	2	3	4	16
Eritrea	3	1	1	13	0	0
Ethiopia	3	4	0	0	1	9
Ghana	3	3	0	0	1	6
Guinea	3	2	0	0	2	12
Guinea-Bissau	2	2	0	0	1	14
Kenya	1	1	1	1	1	5
Lao PDR	2	1	0	0	1	13
Sri Lanka	3	2	0	0	2	4
Mali	3	1	1	1	2	3
Myanmar	3	2	1	19	1	3
Mongolia	3	1	1	0	0	0
Mozambique	5	5	2	4	2	11
Mauritania	1	1	0	0	3	9
Mauritius	1	0	0	0	0	0
Niger	3	2	0	0	3	9
Pakistan	0	1	0	0	3	8
Sudan	7	7	0	20	1	21
Senegal	2	1	0	0	4	12
Chad	2	2	2	6	0	0
Togo	4	2	0	0	2	19
Tajikistan	3	0	1	10	1	6
Tanzania	3	2	1	5	1	16
Uganda	2	2	0	0	1	14
Zambia	5	3	0	0	1	12
Zimbabwe	6	10	2	19	0	11

Notes: Table documents the cyclicality of external debt and correlation between external debt stocks by creditor, for major borrowers from China. Sources: Horn et al. (2021, 2022), IMF, World Bank.

Additional analysis breaks down the lending volumes at the annual level for each loan type (available upon request). Commercial and concessional loans were at par with the respective number of loans granted. However, starting in 2015, the number of concessional loans decreased.[12] Zero-Interest loans were only granted in exceptional cases, and non was granted in 2016-17. Each year, the total volume granted on commercial terms far exceeds those of the remaining types. The number of countries to which loans were granted increased over the 2000s and peaked between 2009 to 2014, when up to 79 received loans from China.

Concessional loans consistently had average maturities of around 20 years attached to them, while loans with commercial terms had a maturity of around 8 to 12 years. Zero-interest loans varied between 10 and 30 years; however, data availability is minimal. Unknown type loans, on average, had maturities between 12 to 25 years. Concessional loans were typically granted with an interest of around two percent, while commercial term loans, on average, had an interest rate of about 3 to 6 percent attached to them. Coverage generally is much

[12]The volume and number of loans for which we do not have any information about the loan type are similar to the concessional loans.

lower for interest rates than maturities, both in terms of the number of loans and the volumes granted. As expected, loans on commercial terms have even more sparse data. In some years, we only have information on interest rates for loans equivalent to 5 to 20% of the total volume lent. Loans of unknown types are not displayed in the table because almost no information is available regarding interest rates.

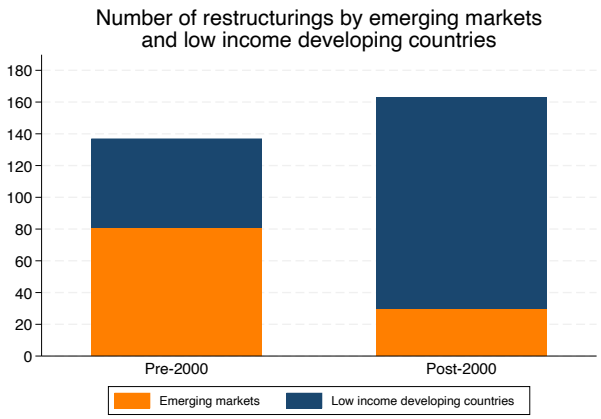
To summarize: The Average interest rate of China's lending is higher than that of multilateral loans. The interest rate differential between China loans and multilateral loans is 4 percent (after controlling for country and year fixed effects). The Average maturity duration of China's lending is shorter than that of multilateral loans.

2.3 Borrowing and Default: China vs. Multilaterals

Next we analyze debt restructurings in developing and emerging market economies, comparing two periods: pre-2000 and post-2000. Figure 5 presents the number of restructurings by Emerging Markets and Low-Income Developing Countries Pre-2000. The total number of restructurings is approximately 140. More than half of these restructurings are for emerging markets; the rest account for the remaining restructurings. Post-2000, the total number of restructurings increases to nearly 180 with Low-Income Developing Countries restructuring dominating this period.

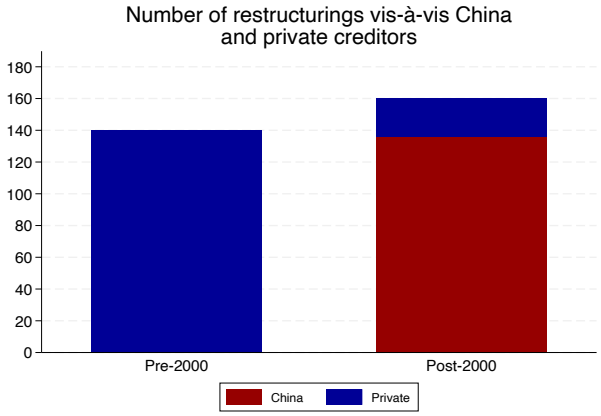
Figure 6 decomposes the umber of nestructurings vis-à-vis China and Private Creditors Pre-2000. The total number of restructurings, around 140, involved Private Creditors. Post-2000, the total number of restructurings increases slightly to over 160. A significant portion of the restructurings (shown in red) involves China, with the Private Creditors (blue) making up a smaller share compared to the pre-2000 period. In summary, these figures illustrate a rise in restructurings post-2000, with a significant shift towards more involvement from low-income developing countries and China, compared to the dominance of emerging markets and private creditors in the pre-2000 period.

Figure 5: Restructurings: Low Income Countries vs Emerging Markets



Notes: The displays the average debt levels and their composition by country type.

Figure 6: Restructurings: Vis-a-vis China vs Private Lenders



Notes: The displays the average debt levels and their composition by country type.

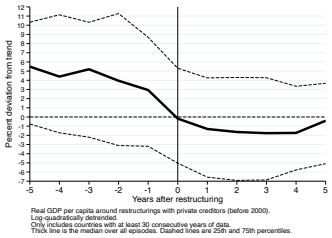
Default Rate, Duration, Correlation with GDP. Following Uribe and Schmitt-Grohé (2017), Figure 7 displays the evolution of real GDP per capita around the beginning of the restructuring episode with private creditors or the completion of restructurings with Chinese creditors. Real GDP per capita is log-quadratically de-trended.[13] We complement the analysis by replicating the findings from Borensztein and Panizza (2009) using the same regression design on a country-year-augmented dataset (see Appendix for further details). Defaulting to China does not appear to be associated with clear output cost. Only 16% of today's defaults with China happened during a recession in the 2000s default (compared to 39% of private

[13]De-trended series using the Hodrick-Prescott filter yields similar quantitative results.

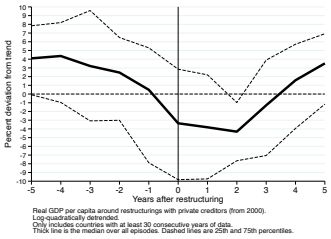
creditor defaults).[14]

Figure 7: Evolution of real GDP per capita around debt restructurings

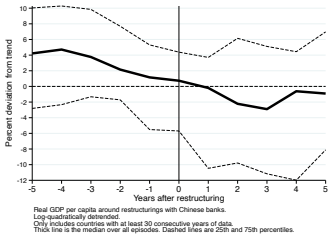
(a) *with private creditors, 1970 - 1999*



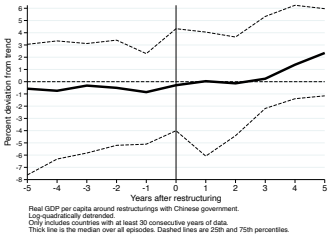
(b) *with private creditors, 2000 - 2019*



(c) *with Chinese banks, 2000 - 2019*



(d) *with the Chinese government, 2000 - 2019*



Notes: Figure 7 displays the evolution of real GDP per capita around the beginning of the restructuring episode with private creditors or the completion of restructurings with Chinese creditors. Real GDP per capita is log-quadratically detrended. The median is computed from countries with more than thirty years of GDP data. We use the indicator NY.GDP.PCAP.KN from the World Development Indicators database maintained by World Bank (2022b).

In regards to the length of market exclusion and to define market access, we make use of instrument-level datasets provided by Refinitiv Eikon (bonds) and Horn et al. (2021) and define market access as every year in which a debtor country successfully takes on debt with the respective creditor type.[15] Similar to Cruces and Trebesch (2013); Gelos et al. (2011), we restrict the market access to cases in which the debt level outstanding with the respective creditor type increases.[16] We define the length of market exclusion as the time between the *beginning* of the default episode and the subsequent debt issuance that meets the criteria

[14] Recession is defined as a year with negative real GDP growth. Even after excluding cases that involved countries that received debt relief through the HIPC initiative, the share is only 14%. Costs of default might be lower, thus reducing the incentive to commit to debt service until an outright crisis occurs. See Asonuma and Trebesch (2016); Trebesch and Zabel (2017) who studied the output cost of sovereign default and found that "pre-emptive" (AT) or "soft" (TZ) defaults are associated with lower output costs.

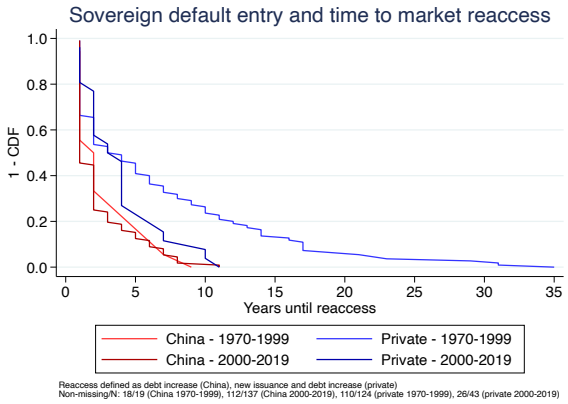
[15] In the case of China, we use the year of loan commitment. However, we know that disbursements may vary by contract, as pointed out by Horn et al. (2021).

[16] In particular, we use the information from IDS for the bond data. The indicators DT.NTR.PBND.CD and DT.NTR.PCBK.DT provides the net transfers of debt for bonds and banks, respectively. For the Chinese data, we use a dummy that takes 1 if the debt level at the end of the current year is higher than in the previous year, based on the estimates by Horn et al. (2021).

above. In Figure 8, the definition of market access restricts the amount issued to be at least 1% of GDP.

When defaulting to China, the exclusion of defaulting debtors from new loan commitments in terms of average and median exclusion length is shorter (See Figure 8).[17] The median country enters a loan agreement with China after only two years of market exclusion, while it takes four years to borrow from private creditors after defaulting on its debt. Exclusion lengths for private creditors are higher.[18] The cumulative distribution of market exclusion length is much more right-tailed for private creditors.[19]

Figure 8: Market access after default



Notes: Figure 8 displays the cumulative distribution of market exclusion length after default entry by creditor type and sample period.

2.4 Correlation between China debt and multilateral debt

Table 2 reports the estimated coefficients from a fixed effect regression using the cross-country panel data of borrowing from China and multilateral institutions. It shows that there is significant positive correlation between the two types of borrowing, a 1 percentage point

[17] There are two important limitations to keep in mind. We define market access ex-post; we only consider the event of issuing successfully. However, governments may be able to issue debt sooner but refrain from doing so due to debt sustainability concerns. We measure market access via the demand side, forgoing over supply-side issues, e.g., factors that shift the availability of funds in the market to access. Lastly, as a gross issuance measure, our market access dummy might capture debt issuances that follow a debt restructuring. In this case, the issuance may not reflect access properly as investors might abstain from lending new funds. While it may be possible to disentangle these two on the bond level, we do not have sufficient information on the terms of Chinese loans. However, it is unclear to what extent restructurings might involve new debt components.

[18] Gelos et al. (2011) had find that countries regain partial market access after 4.7 years (our total estimate: 5.2), while Cruces and Trebesch (2013) are substantially higher with an estimated exclusion length 13.1 years.

[19] However, this might be caused by our sample limitation. Restructuring debt with China might be much more efficient and payment difficulties easier to resolve, thus enabling a country to reenter debt agreements earlier.

Table 2: Correlation between borrowing from China and multilaterals

	(1) D.Multilateral debt/GDP	(2) D.Multilateral debt/GDP	(3) D.Multilateral debt/GDP	(4) D.Multilateral debt/GDP
D.China debt/GDP	0.382***	0.255***	0.451***	0.239***
	(0.0688)	(0.0693)	(0.0879)	(0.0888)
Constant	0.492	-0.0512	0.178	-0.0489
	(1.213)	(0.0867)	(1.531)	(0.148)
Observations	2,917	2,917	1,212	1,212
R-squared	0.162	0.005	0.256	0.006
Number of countries	96	96	34	34
Country FE	Yes	Yes	Yes	Yes
Year FE	Yes	No	Yes	No

Notes: Table reports estimated coefficients of cross country fixed effect regressions. Columns (1) and (3) report the results for all countries with available data, and columns (2) and (4) for major borrowers from China. Standard errors are reported in parentheses and *** p¡0.01, ** p¡0.05, * p¡0.1. Sources: Horn et al. (2021), IMF, World Bank.

increase in the China debt/GDP is associated with a .2 to .5 percentage point increase in borrowing from multilateral institutions depending on empirical specification.

2.5 Taking Stock: Changing Landscape

Appendix Tables 10 and 11 compare the main characteristics of countries generally used in calibration exercise (Argentina, Brazil, Mexico, etc.), which have generally defaulted to private creditors in the 80s and 90s, against the new set of countries defaulting to China in this century. As the table shows, the major borrowers of private debt and China loans differ significantly. Interestingly, most of the serial defaulters of the 80s and '90s, subject to calibration in baseline studies, have not defaulted anymore in the past twenty years. Yet, a new list of serial defaulters emerges, especially those defaulting on China loans. To sum up, the analysis reveals the following stylized facts: recent default episodes are typical in China, and there is no clear identification of adverse income shocks. When defaulted in China, recovery episodes are quicker than traditional lending standards.

3 Quantitative model

In this section, we construct an endogenous sovereign default model with Chinese bonds and multilateral loans. We consider the quantitative implications of the model in the in the next section.

Time is discrete and the economy is populated by a sovereign government and two types of infinitely many lenders. The sovereign maximizes welfare of its citizens by making consumption and borrowing/saving decisions in the face of fluctuating endowment. We assume the sovereign has sufficient instruments to implement the desired consumption allocations for its citizens, so we abstract from individual's problem living in the economy. The sovereign's

economy is a small open economy, and the risk-free interest rate for borrowing and saving, r, is assumed to be exogenous.

Preferences: The sovereign is infinitely lived and the preferences of the sovereign over aggregate private consumption $\{c_t\}$ is given by

$$\mathbb{E}_t \sum_{t=0}^{\infty} \beta^t u\left(c_t\right),$$

where $\mathbb{E}$ is the expectation operator and β denotes the subjective discount factor. We assume $u' > 0$ and $u'' < 0$.

Endowments: The sovereign receives a stochastic endowment y_t in each period and we assume the log of the endowment follows the following process:

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

with $|\rho| < 1$ is the persistency of the endowment and $\varepsilon_t \sim N\left(0, \sigma_\varepsilon^2\right)$ is a white noise. We assume a fixed level of government expenditures $g > 0$.[20]

Financial Markets: There are two types of lenders and the sovereign can borrow from both types of lenders simultaneously. The first type of lenders are capturing China's lending practices. Following the stochastic discount factor (SDF) representation of Hatchondo et al., 2022, the price of Chinese bonds satisfies a no-arbitrage condition with SDF

$$M(\varepsilon', p) = exp(-r - p\varepsilon' - 0.5p^2\sigma_\varepsilon^2), \tag{2}$$

where r denotes the risk-free rate at which lenders can borrow or lend and p represents Chinese bondholders' risk aversion.Since the repayment decision is positively correlated with income, the risk-premium compensation increases with p. The risk-premium shock faced by Chinese bondholders, denoted as $p \in \{p_L, p_H\}$ with $p_L < p_H$, evolves according to a Markov process. The onset of a high-risk-premium phase occurs with probability $\pi_{LH}(y) \in [0,1]$, while its termination happens with probability $\pi_{HL} \in [0,1]$. Given the empirical observation that unfavorable conditions in global capital markets often align with periods of low domestic income, we impose the assumption that π_{LH} declines as y increases. Formally, we define π_{LH} as:

$$\pi_{LH}(y) = Min\left\{\pi_0 e^{-\pi_1 \log(y) - 0.5\pi_1^2\sigma_\varepsilon^2}, 1\right\}. \tag{3}$$

[20] See Mendoza and Yue (2012) for a production economy with a sovereign default model.

This structure reflects the idea that higher domestic income reduces the probability of entering a high-risk-premium period.

We assume that in every period δ fraction of bonds mature in every period and the sovereign needs to pay back the matured loan balance together with the interest payments. This structure makes all bonds symmetric and we do not need to keep track of maturities. Then, we can represent the evolution of the non-contingent debt as follows:

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

where i_t is the number of non-contingent bonds issued in period t.

The second type of lenders is capturing multinationals. They provide long-term loans at risk price rate $q_a = \frac{1}{1+r}$. As evidenced in 3, these loans are usually available during risk-on episodes. Thus, multilateral loans are assumed to be available to the sovereign whenever $p_t = p_H$.

In contrast to Chinese bonds, multilateral loans have seniority and are not defaultable. Similar to non-contingent debt, loans from multinationals are also long-term provisions and promise a continuous stream of coupons. These coupons represent periodic interest payments, and in this case, they decrease at a constant rate denoted by δ_a. which follows:

$$a_{t+1} = (1-\delta_a)a_t + i_{a,t},$$

where $i_{a,t}$ is the number of multinational bonds issued in period t. If the access to multilateral loans is triggered, $p = p_H$, then the consumption is given by

$$c = y - g - \kappa b - \kappa_a a + q(b', a', y, p)\left[b' - b(1-\delta)\right] + q_a\left[a' - a(1-\delta_a)\right],$$

where q and q_a denote the price of Chinese bonds and multilateral loans, respectively. $\kappa = \frac{r+\delta}{1+r}$ and $\kappa_a = \frac{r+\delta_a}{1+r}$ denote coupon payments of Chinese bonds and multilateral loans, respectively.

If the access to multilateral loans is not triggered, $p = p_L$, then the consumption is given by

$$c = y - g - \kappa b - \kappa_a a + q(b', a', y, p)\left[b' - b(1-\delta)\right].$$

Defaults: The sovereign has the option to default on the non-contingent bonds. Default incurs incurs a loss of endowment and lasts one period as we document that defaulting countries can borrow again within a year from China. This cost is proportional to the level of endowment and is assumed to be a convex function of the endowment and represented by the function $\phi(y)$.

In order to end the default, the government needs to exchange the bonds that are in default with bonds that promise to pay constant $\alpha < 1$ times the payments promised by

the exchanged bonds (see Yue, 2010 for endogenous debt renegotiation following a default episode). The default on multinational loan is not permissible, as it is a typical assumption in the literature. Thus the sovereign has to honor its obligations to multinationals. The consumption in default is given by $c = y - \phi(y) - g$.

In models featuring long-term debt, the possibility of a positive recovery rate may incentivize governments to accumulate excessive debt prior to default, leading to a sharp increase in consumption (Hatchondo et al., 2017). To prevent this issue, we assume that the government cannot issue bonds at a price lower than a threshold, $\underline{q}$, though the secondary market price of debt can fall below this level. We select $\underline{q}$ to eliminate pre-default consumption surges while ensuring it remains non-binding in the simulations.

3.1 Recursive Formulation of Sovereign's Problem

Let $s \equiv (y, p)$ denote the vector of exogenous states. Let V denote the value function of a government that is not currently in default. The function V satisfies the following functional equation:

$$V(b, a, s) = \max \left\{ V^R(b, a, s), V^D(b, a, s) \right\}, \tag{4}$$

where the government's value of repaying is given by

$$V^R(b, a, s) = \max_{b' \geq 0,\, a' \geq 0,\, c \geq 0} \left\{ u(c) + \beta \mathbb{E}_{(y'|y,p'|(y',p),g'|(p,g))} V(b', b'_C, s') \right\}, \tag{5}$$

subject to

$$c = y - g - \kappa b - \kappa_a a + q(b', a', s) i + \mathcal{I}(p) q_a i_a, \tag{6}$$

$$i = b' - b(1 - \delta),$$

$$i_a = a' - a(1 - \delta_a),$$

$$a' = a(1 - \delta_a) \text{ if } \mathcal{I}(p) = 0, \tag{7}$$

$$q(b', a', s) \geq \underline{q} \;\forall\; b' > b(1 - \delta),$$

and $\mathcal{I}(p)$ is an indicator function that becomes unity when $p = p_H$ and the government has access to multilateral loans.

Value of defaulting is

$$V^D(b, a, s) = u\left(y - g - \phi(y) - \kappa_a a\right) + \beta \mathbb{E}_{s'|s} \left[V(\alpha b, (1 - \kappa_a)(1 + r) a, s') \right]. \tag{8}$$

3.2 Chinese Lenders' problem

Lenders need to take into account the default likelihood when pricing the loans. The price will not only depend on the default probability of lender's own bond, but also on the other loan the sovereign might have. Given the assumption that coupon payments include the interest

payments and maturing portion of outstanding balance $\left(\kappa = \frac{r+\delta}{1+r}\right)$, the price of a risk-free bond needs to be $1/(1+r)$. However, in the presence of default option for both loans, the price of the bond needs to reflect it and will be lower than $1/(1+r)$.

The price of the Chinese bonds when the sovereign has access to both financial markets will be

$$q(b', a', s) = \mathbb{E}_{s'|s} \left(\underbrace{M(\varepsilon', p)}_{\substack{\text{SDF} \\ \text{in equation (2)}}} \underbrace{(1-d')(\kappa + (1-\delta)q(b'', a'', s'))}_{\substack{\text{Chinese lenders receive coupon } \kappa \\ \text{and are entitled to remaining coupon} \\ \text{stream, worth } (1-\delta)q\,(b'', a', s').}} + \underbrace{d'\alpha q(\alpha b', (1-\kappa_a)(1+r)a', s'))}_{\substack{\text{With default, Chinese lenders} \\ \text{receive } \alpha \text{ bonds per bond} \\ \text{in default, while multi-laterals} \\ \text{receive in full, } \kappa_a}} \right), \tag{9}$$

where $d' = \hat{d}(b', a', s')$ is a binary decision rule for the next-period equilibrium default decision and takes the value of 1 of if value of repayment is greater than defaulting and 0 otherwise. The next-period equilibrium China (non-contingent) debt decision is denoted by $b'' = \hat{b}(b', a', s')$, and $a'' = \hat{a}(b', a', s')$ is the next period multilateral debt decision.

3.3 Recursive Equilibrium

A *Markov Perfect Equilibrium* is characterized by

1. rules for default $\hat{d}$, non-contingent borrowing $\hat{b}$, and China debt borrowing $\hat{b}_c$
2. and bond price function q for non-contingent debt

such that:

i. given the bond price functions q and q_c, the policy functions $\hat{d}$, $\hat{b}$, and $\hat{b}_c$ solve the Bellman equations (4) and (8).

ii. given policy rules $\left\{\hat{d}, \hat{b}, \hat{b}_c\right\}$, the bond price function q satisfies condition (9).

3.4 Computation

The solution approach involves iterating on the value functions V^R and V^D alongside the price function q. To address the issue of potential multiplicity, as discussed in Krusell and Smith (2003), we begin by solving for the equilibrium in a finite-horizon economy. Starting with an initial guess for the terminal value, we employ backward iteration until the differences in both the value and price functions between consecutive periods fall below 10^{-5}. The resulting values are then used as the equilibrium for the infinite-horizon case. The model employs 40

grid points for non-contingent debt, 40 for credit lines, and 30 for income. Expectations are calculated using 300 Gauss-Legendre quadrature points.[21]

4 Calibration of the Quantitative Model

We calibrate the benchmark model with China debt to match salient features of the data post 2000 as shown in Tables 4 and 1. A period in the model is set to 1 year.

Table 5 presents the benchmark values assigned to all model parameters. Each period in the model represents one year. The risk-free interest rate is set at 4 percent, and the discount factor β is set at 0.92, both standard values in quantitative studies on sovereign defaults and business cycles in small open economies.

Preferences: The utility function displays a constant coefficient of relative risk aversion, i.e.,

$$u(c) = \frac{c^{1-\gamma} - 1}{1-\gamma}$$

We set the risk aversion parameter, $\gamma = 2$, following the standard assumption in the literature.

Endowment: Endowment is stochastic and follows an AR(1) process as in equation (1), with persistency ρ and standard deviation to innovations σ_ϵ. Using the set of countries labeled as "major borrowers of China loans" in Table 10, we estimate equation (1) after log-quarterly detrending the GDP per capita for each country, and use the average of the estimated coefficients, and set $\rho = 0.79$ and $\sigma_\epsilon = 0.06$ as shown in columns 4 and 8 of Table 10. The average of the log-endowment is represented by μ and is set to $0.5\sigma_\epsilon^2$ to normalize the average of endowment to 1 as normalization.

The income cost of defaulting follows a quadratic cost given by $\phi(y) = \max\{0, \lambda_0 y + \lambda_1 y^2\}$. Having two parameters in the cost of defaulting allows us to match the average level of the debt and spread in the data.

Financial parameters: The risk-free interest rate is set to 4%. The average maturity of bonds from China issued after 2000 is approximately 12 years. We use Macaulay debt duration to align the model's average bond maturity, setting $\delta = 0.1$. The average maturity of multilateral loans is 18 years, so we set $\delta_a = 0.018$. We estimate the average haircut on Chinese loans to be 18%, implying an α value of 82%.

The parameters governing the income cost of default, λ_0 and λ_1, are primarily calibrated to match two targets: (1) the level of Chinese debt at 8.4% of GDP, and (2) an average bond

[21] We utilize methods developed in Önder (2023) for the portfolio problem, specifically leveraging bi-dimensional optimizers, which outperform taste shock-based methods in portfolio optimization.

spread of 2.5% for Chinese debt. We set the cap on multilateral loans, $\overline{a}$, to 0.14 to align with the multilateral loan level, which is 11.2% of GDP. The remaining parameters—π_0, π_1, π_{HL}, and π_H—determine the severity, frequency, and persistence of the risk-premium shock, as well as its correlation with endowment shocks.

Lastly, we set $\underline{q} = 0.45$, which prevents consumption booms prior to defaults and is never binding in the simulations.

5 Quantitative Results

Table 6 presents the fit of the model for the calibrated moments. The first column displays the targeted data moments, while the second column presents the results of the baseline model. The model reasonably matches the targeted moments, which include the mean China debt-to-GDP ratio, mean multilateral debt-to-GDP ratio, mean China debt spread, its duration, and the additional spread during periods of high premium. The third column, on the other hand, presents the results for which multilateral debt is designed to be one period, that is $\delta_a = 1$, as in the existing studies.

The upper panels of Figure 9 illustrate the impact of multilateral debt duration on the borrowing policy functions when the economy faces a risk-premium shock; thus, have access to multilateral loans. The left panel plots the Chinese debt policy function, $\hat{b}'$, as a function of multilateral debt a, for an economy with mean income normalized to one. It compares the policy functions for economies with long-term multilateral loans and those with one-period multilateral loans. The initial Chinese debt level is set to its ergodic value for each corresponding economy: 8.6 percent for long-term multilateral debt and 6.8 percent for one-period multilateral debt.

In the economy with long-term multilateral debt, as a sovereign's multilateral debt holdings increase, its reliance on Chinese debt rises significantly, indicating a strong positive correlation. However, this relationship is broken in the economy with one-period multilateral debt. In this case, the response of Chinese debt holdings to a given level of multilateral debt remains largely unchanged.

The right chart of Figure 9 presents intriguing dynamics in multilateral debt policy. The chart plots the next-period equilibrium multilateral debt policy function, $\hat{a}'$, as a function of Chinese debt b, for income levels subject to a two-standard-deviation positive and negative shock. The initial multilateral debt level is set to its ergodic value for each respective economy: 11.2 percent for long-term multilateral debt and 5.1 percent for one-period multilateral debt. Economies with both long-term and one-period multilateral debt fully utilize their multilateral borrowing capacity when faced with adverse shocks. The more interesting case is the sovereign's saving behavior during positive shocks. Despite the significantly lower cost of multilateral debt compared to Chinese debt, its availability is capped and temporal, only

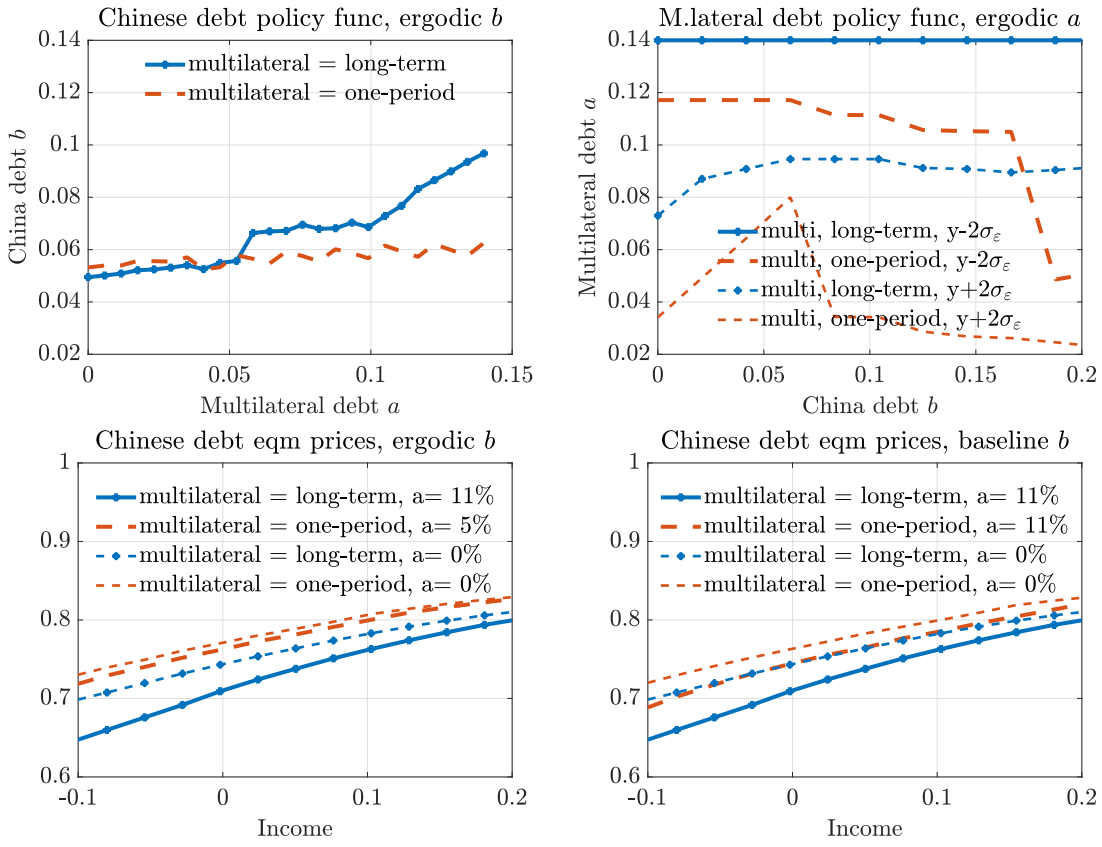


Figure 9: Chinese debt and equilibrium price policy functions when economies face risk-premium shocks so have access to multilateral loans. The upper charts depict Chinese debt policy functions, evaluated at the ergodic mean for each corresponding economy, while the lower charts show the equilibrium prices. The bottom-left chart illustrates equilibrium prices when each economy's Chinese debt is set to its corresponding ergodic debt level, whereas the bottom-right chart displays price functions when each economy's Chinese debt is fixed at the baseline debt level of 8.6%.

available when hit by a liquidity shock. Therefore, during periods of positive income growth, the sovereign restrains its use of multilateral debt, preserving it for potential adverse shocks.

The bottom panels of Figure 9 illustrate the equilibrium pricing functions when the economy faces a risk-premium shock. The bottom-left chart plots prices where the initial multilateral loans are set to zero or at their ergodic levels: 8.6% (6.8%) of Chinese debt and 11% (5%) of multilateral debt when multilateral debt is long-term (one-period) debt. Prices are plotted as a function of income, y. Since default likelihood decreases as income rises, the price curve slopes upward. Similarly, prices are higher when the economy has zero multilateral debt balances while still having access to such loans, as the sovereign is less likely to default on Chinese bonds in this scenario. The sovereign always retains the option to tap into multilateral loans to repay its existing Chinese debt. An interesting observation is that prices in the economy with one-period multilateral loans are uniformly higher than in the economy with long-term loans. This also holds true in the bottom-right chart, where initial Chinese and multilateral debt holdings are equalized to the baseline economy's ergodic values of 8.6% for Chinese debt and 11% for multilateral debt.

To better understand the model dynamics between one-period and long-term multilateral loans, we turn to model inspection in the next section.

5.1 Model Inspection

In this section, we highlight two key mechanisms that distinguish the results between the long-term and one-period nature of multilateral loans: *(i)* the *market discipline* imposed by the temporal arrangement, and *(ii)* the debt dilution problem.

In our model, the sovereign is not allowed to borrow from multilaterals during exclusion and has to honor its dues during exclusion. We relax these assumptions below to inspect the model mechanism.

5.1.1 Permanent arrangement

In this section, we allow the sovereign to continuously borrow from multilaterals, even during default episodes. Specifically, we set $\mathcal{I}(p) = 1$ at all times. As in Hatchondo et al. (2017), the government is also permitted to determine the volume of multilateral loans to be acquired. The results are presented in columns (1) and (2) of Table 7. The table demonstrates that when non-defaultable debt is continuously available, the maturity of such debt becomes irrelevant. When multilateral loans are always accessible, the rollover cost of holding these loans for the sovereign is negligible. In contrast, under a temporal arrangement, the sovereign must pay $\kappa_a a$ for long-term debt or a for short-term debt. Thus, temporal arrangement better completes markets by providing the right covariance.

5.1.2 Paying none during exclusion - debt dilution

Note that in the main model, the cost of defaulting on short- and long-term multilateral loans may differ. For a given level of multilateral loans, the default cost is significantly higher for short-term loans than for long-term loans by a factor of $a(1-\kappa_a)$. In this section, we equalize the default costs across loan maturities. To do that $a\kappa_a$ term is omitted, and consumption during default simplifies to $c = y - g$. The results of this analysis are presented in columns (3) and (4). They show that, even when we equalize the default costs between economies, substantial differences persist. Long-term multilateral loans exacerbate the debt dilution problem, leading the sovereign to rely more heavily on Chinese loans.

6 Conclusion

To Be Added

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Table 3: External debt properties of major borrowers from China

	Cyclicality of debt, by creditor type		
	$\rho(Multi, y)$	$\rho(China, y)$	$\rho(Priv, y)$
Angola	-0.91	-0.38	-0.70
Belarus	-0.45	-0.32	-0.09
Bolivia	-0.54	0.59	0.20
Botswana	0.40	0.07	-0.23
Cote d'Ivoire	-0.36	0.75	0.57
Cameroon	-0.31	0.87	0.38
Congo, Dem. Rep.	-0.88	0.66	-0.88
Congo, Rep.	-0.80	0.49	-0.59
Ecuador	-0.85	0.82	-0.85
Eritrea	-0.22	0.34	-0.62
Ethiopia	-0.68	0.65	0.01
Ghana	0.11	0.08	-0.60
Guinea	0.10	0.05	0.12
Guinea-Bissau	-0.84	0.52	0.89
Kenya	-0.75	0.86	0.64
Lao PDR	-0.27	0.23	-0.38
Sri Lanka	-0.73	0.68	0.33
Mali	0.10	-0.73	0.68
Myanmar	-0.21	0.59	-0.16
Mongolia	-0.71	0.06	0.01
Mozambique	-0.57	-0.74	-0.67
Mauritania	-0.86	0.29	-0.06
Mauritius	-0.53	-0.52	0.80
Niger	-0.63	0.54	-0.57
Pakistan	-0.66	0.50	0.63
Sudan	0.04	0.17	-0.37
Senegal	0.27	0.32	0.60
Chad	-0.18	0.22	-0.50
Togo	-0.35	0.36	-0.14
Tajikistan	0.08	0.15	-0.80
Tanzania	-0.48	-0.03	-0.51
Uganda	-0.32	-0.61	-0.39
Zambia	-0.70	0.19	-0.51
Zimbabwe	-0.74	0.00	-0.71

Notes: Table documents the cyclicality of external debt and correlation between external debt stocks by creditor, for major borrowers from China. Sources: Horn et al. (2021), IMF, World Bank.

Table 4: Business cycle properties and external debt of major borrowers from China

	Business cycle statistics, post-2000						External debt stock/GDP (2010-2017) by creditor type, percent			
	$\sigma(y)$	$\sigma(c)$	$\sigma(TB/y)$	$\rho(c,y)$	$\rho(TB,y)$	$\rho(y)$	Multilateral	China	Private	Bilateral ex. China
Angola	0.13	0.17	10.18	-0.01	0.21	0.89	1.47	20.30	15.43	4.26
Belarus	0.13	0.09	3.73	0.92	-0.23	0.97	4.47	7.85	6.15	9.03
Bolivia	0.02	0.06	5.35	0.35	-0.26	0.79	12.86	4.73	2.53	1.18
Botswana	0.03	0.11	9.03	0.35	0.19	0.19	11.14	5.46	0.10	0.27
Cote d'Ivoire	0.07		2.02		-0.16	0.75	3.13	3.08	5.47	9.12
Cameroon	0.02	0.03	1.23	0.91	0.11	0.91	4.37	8.65	1.28	3.51
Congo, Dem. Rep.	0.09	0.06	2.04	0.63	-0.17	0.96	7.06	4.63	0.08	5.20
Congo, Rep.	0.11	0.15	19.66	0.22	-0.25	0.91	2.15	25.67	5.99	1.93
Ecuador	0.05	0.04	2.36	0.57	-0.04	0.87	7.01	9.22	4.87	1.34
Eritrea	0.05	0.12	7.87	0.47	-0.37		36.62	8.43	2.08	9.67
Ethiopia	0.06	0.09	2.45	0.75	-0.06	0.85	10.65	14.15	4.25	3.34
Ghana	0.04	0.08	2.78	0.52	0.12	0.84	8.30	4.75	8.49	2.86
Guinea	0.04	0.07	11.22	0.04	0.58	0.85	12.28	4.96	0.30	7.47
Guinea-Bissau	0.03	0.07	5.43	0.77	-0.26	0.67	16.33	5.89	2.48	16.63
Kenya	0.02	0.03	2.14	0.05	-0.53	0.73	9.27	5.78	3.15	3.76
Lao PDR	0.02		4.30		-0.17	0.98	16.14	25.12	4.08	8.37
Sri Lanka	0.04	0.04	2.29	0.72	-0.57	0.83	9.30	8.05	11.15	8.18
Mali	0.03	0.03	3.57	0.30	0.23	0.44	17.49	3.45	0.02	3.06
Myanmar	0.08	0.12	8.71	0.33	-0.27	0.88	2.64	6.70	0.57	8.04
Mongolia	0.08	0.12	8.36	-0.10	-0.19	0.90	10.98	7.37	12.76	7.37
Mozambique	0.03	0.08	10.61	0.71	-0.15	0.94	22.11	10.71	8.45	13.25
Mauritania	0.05	0.09	9.31	-0.07	0.37	0.69	29.93	6.13	0.01	16.00
Mauritius	0.01	0.04	4.33	0.03	0.19	0.33	6.39	3.78	0.50	2.85
Niger	0.02	0.02	3.33	0.02	-0.12	0.21	12.18	9.19	0.01	2.59
Pakistan	0.03	0.03	2.51	0.87	-0.64	0.81	10.36	4.58	1.58	5.76
Sudan	0.07	0.10	2.68	0.55	0.15	0.70	4.30	5.09	5.23	7.72
Senegal	0.03	0.02	2.06	0.60	-0.13	0.85	14.59	4.13	4.53	10.54
Chad	0.15	0.12	22.52	0.44	0.61	0.81	9.81	3.78	6.93	4.43
Togo	0.05	0.04	3.25	0.68	0.24	0.83	9.05	9.32	0.62	1.69
Tajikistan	0.15	0.10	12.38	0.17	-0.64	0.98	12.79	14.17	1.04	1.69
Tanzania	0.03	0.04	5.67	0.29	-0.84	0.90	14.67	4.75	2.00	4.72
Uganda	0.03	0.06	2.22	0.84	-0.33	0.86	11.90	4.51	0.01	0.74
Zambia	0.08		5.23		0.58	1.02	5.08	14.15	7.73	0.98
Zimbabwe	0.18	0.10	7.51	0.74	0.58	0.80	9.34	6.28	7.73	7.39

Notes: Table documents business cycle statistics and external debt stocks by creditor, for major borrowers from China. Sources: Horn et al. (2021), IMF, World Bank.

Parameter Explanation	Parameter	Value	Source
Risk-free rate	r	4%	literature
Risk aversion	γ	2	literature
Discount factor	β	0.92	literature
Endowment persistency	ρ	0.79	Data
Std of endowment innovations	σ_ϵ	6%	Data
Mean log endowment	μ	$(-1/2)\sigma_\epsilon^2$	Normalization
Recovery rate	α	0.82	Data
China debt duration	δ	0.03	12 years
Multinational loan duration	δ_a	0.018	18 years
Minimum bond price	$\underline{q}$	0.45	
Government consumption	g	0.12	data
Multilateral loan cap	$\overline{a}$	0.14	data
Probability of entering high risk premium	π_0	0.9	data
Probability of entering high risk premium	π_1	2	data
Risk-premium shock	p_H	2.8	data
Probability of exiting high risk premium	π_{HL}	0.8	data
Cost of defaulting	λ_0	-0.01	Spread and China debt-to-GDP ratio
Cost of defaulting	λ_1	0.033	Spread and China debt-to-GDP ratio

Table 5: Calibrated parameter values. See the text for explanations.

Table 6: Main Results

	(1) Data	(2) Baseline	(3) One period multil. debt	(4) No multil. debt
Mean China debt/y (%)	8.4	8.6	6.8	7.9
Mean Multilateral debt/y (%)	11.1	11.2	5.1	$n.a$
Mean China debt spread (%)	2.5	2.4	1.7	2.5
China debt duration (in yrs)	12	11.2	12	11.2
Multilateral debt duration	18	18	1	$n.a$
Extra spread during high premium	0.14	0.15	0.2	0.2
Default Rate (%)	12	11.9	17.9	11.5
Consumption volatility $\sigma(c/y)$	1.3	1	1	1
Spread volatility $\sigma(r_s)$		0.8	0.5	0.8
$\rho(r_s, y)$		-0.8	-0.9	-0.9
$\rho(b', a')$		$n.a.$	-0.2	0.3

The first column reports the averages of developing countries that borrow from China. For details, see Table XX. The second column reports the results of the baseline model and the third column presents the results where multilateral debt is set to be one-period. The Standard deviation of a variable is denoted by σ, and the coefficient correlation between variables is denoted by ρ. Consumption and income are reported by natural logs.

Table 7: Permanent Multilateral Loans

	Permanent arrangement		Pay none during exclusion	
	(1)	(2)	(3)	(4)
	Long-term multil. debt	One period multil. debt	Long-term multil. debt	One period multil. debt
Mean China debt/y (%)	9.4	9.6	5.9	3.9
Mean Multilateral debt/y (%)	10.3	10.3	10.4	4.9
Mean China debt spread (r_s) (%)	2.5	2.5	2.8	3.5
China debt duration (in yrs)	11.2	11.5	10.8	10.2
Extra spread during high premium	0.1	0.1	0.2	0.6
Multilateral debt duration	18	1	18	1
Default Rate (%)	12.4	12.4	14.9	20.1
Consumption volatility $\sigma(c/y)$	1	1	1	1
Spread volatility $\sigma(r_s)$	0.8	0.8	0.9	1.1
$\rho(r_s, y)$	-0.8	-0.8	-0.8	-0.8

The first two column report moments from the permanent arrangement of multilateral loans analysis while the last two columns report when consumption in default is set to $c = y - g$. The first and the third columns report when multilateral debt is long-term while the second and the fourth columns report when multilateral debt is one-period. The Standard deviation of a variable is denoted by σ, and the coefficient correlation between variables is denoted by ρ. Consumption and income are reported by natural logs.

A Appendix

A.1 Data sources

A.1.1 Refinitiv Bond data

We obtain data for sovereign bond issuances[22] between 1970 and 2019 bond-by-bond for 73 countries from Refinitiv Eikon. The initial dataset contains 24,559 domestic and foreign bonds with more than one year of maturity. We drop all domestic bonds from our sample. We classify bonds as domestic using the following information: (i) market of issue, (ii) governing law[23], (iii) the ISIN, and (iv) the country of issue. If more than two of those are domestic, we code a bond as domestic.[24] Omitting the domestic bonds leaves us with 1,791 foreign bonds issued by 61 governments.

A.1.2 The HRT China loan dataset

We base our estimates on principal and interest payments of debtor countries to China for the period 2000 to 2017 on the loan-level dataset provided by Horn et al. (2021). In contrast to HRT, which assigns uniform values to missing observations for the interest rate, the maturity, and the grace period by loan and lender type, we adopt a four-step procedure. If one of the critical variables is missing, we subsequently replace it with (i) the average of the non-missing observations in the respective country-year-loan type group, (ii) the average of the non-missing observations in the country-loan type group, (iii) (if the loan type is missing) with the average of the non-missing observations in the country-year group. Values that are still missings are filled under the convention adopted in HRT.

The first extensive dataset on restructurings of Chinese debt was published in Horn et al. (2021). In the meanwhile, the dataset was updated and refined. The recent version was published along Horn et al. (2022). The updated version entails more relevant information that allows us to analyze the heterogeneity in debt restructurings. The paper distinguishes between "distressed" restructurings that often treat bank and SOE debt, "symbolic" debt restructurings, and restructurings associated with the DSSI initiative launched in 2020 at the outset of the COVID pandemic. The authors define "symbolic" as debt relief frequently granted as part of a development aid program. Relief was usually announced during official visits to the respective countries, and they are rather independent of the current economic situation in the debtor country. The drawback of the new dataset is that it only provides information about Chinese restructurings after 2000, while the 2021 database also contains a few restructurings in the 1970s and 1980s. In addition, we obtain information about the amount of debt owed to official Chinese creditors from Beers et al. (2020) and the counterparty-level data section in World Bank (2022a).

We use these data to code default variables based on outstanding arrears. In particular, we code the first year with positive amounts of total outstanding debt in arrears vis-à-vis Chinese creditors as the entry into the default episode and the last year with positive amounts as the

[22] Sovereign includes bonds issued by the central government and the central bank.

[23] In some cases, a bond is administered under multiple governing laws, primarily the domestic one and an international one. We code it as foreign if the international one is either United States (New York) or the United Kingdom.

[24] In most cases, all four variables meet the criteria. Loosening the threshold to two of them ensures that we capture all domestic bonds for which up to two variables are missing.

exit year for each database. Thus, we obtain four different default datasets with information about defaults on Chinese debt. Different to Horn et al. (2021) and Horn et al. (2022), deriving the default variable from outstanding arrears allows us to code the start of the default episodes. In contrast, the former two datasets only code completed restructuring, which often marks the end of an episode. However, as Horn et al. (2022) notes, relying purely on the arrears datasets to obtain default episodes would likely underestimate the number of default spells we would omit preemptive restructurings. In addition, due to transparency issues in reporting, we would likely miss distressed episodes altogether.

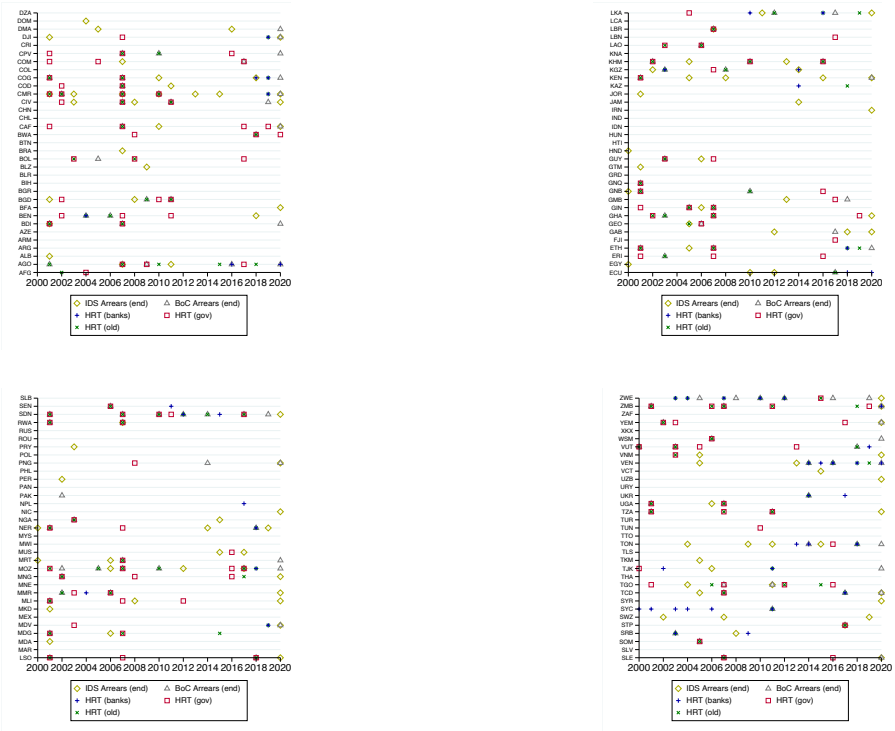
Comparisons The most crucial methodological difference between the arrears data sets is that the World Bank IDS statistics are based on reports of the debtor countries to the World Bank via the Debt Reporting System (DRS). In contrast, the BoC-BoE Database relies on similar academic sources as HRT and extent the data with country reports by the World Bank, the IMF, and other publicly available media. Thus, we expect the BoC-BoE database to be closer to the restructuring datasets provided in HRT (2021, 2022).

We first compare the coverage of the datasets for the period 2000 up to 2020 and conduct a robustness check to see if systematic differences exist in the main variables that might be caused by either the difference in coverage or the coding approach. Figure 10 displays the full set of countries and default variables from 2000 to 2020. Importantly, arrears-based variables are set at the end of the arrear episode, i.e., the last period with positive outstanding arrears on debt owed to Chinese official creditors[25], to make it consistent with the coding in Horn et al. (2022) and Horn et al. (2021). Indeed we find that the end of the default episodes identified with the IDS database lags the restructuring episodes or stands alone. We rarely find that the restructuring years coincide with the years in which arrears are dissolved. A reason could be that either no restructuring agreement has been reached or not all arrears have been treated in the restructuring process. We also find that a large fraction of the restructurings captured in the first version of the HRT database (2021) were related to the cancellation of government-to-government debt, thus, rather symbolic. This fact especially concerns those cases in the early 2000s related to the HIPC initiative.

[25] Official creditors include the government and state-owned entities such as the ExIm bank.

B Additional Tables and Figures

Figure 10: Comparison of default resolutions identified in the databases



Notes: Figure 10 displays the time series of arrears and restructuring events defined as the last year with outstanding arrears or the completion of the restructuring.

Table 8: Summary statistics of Chinese loan-level data

Loan type	variable	mean	std. dev	median	min	max	Vol. nonmissing	N loans / % volume nonmissing
Commercial	Volume	624.6	1,671.7	114.9	2.0	20,000.0	346,029.7	554 / 100%
Concessional	Volume	154.3	268.9	74.9	1.0	4,001.0	67,577.5	438 / 100%
Zero-Interest	Volume	20.7	50.2	8.0	1.0	429.0	1,569.8	76 / 100%
Unknown	Volume	212.8	358.1	91.2	0.5	2,700.0	74,903.7	352 / 100%
Commercial	Interest rate	5.2	1.5	5.0	0.0	7.1	96,374.8	232 / 27.8%
Concessional	Interest rate	2.1	0.5	2.0	0.0	4.0	52,872.7	299 / 78.2%
Zero-Interest	Interest rate	0.0	0.0	0.0	0.0	0.0	1,569.8	80 / 100%
Unknown	Interest rate							0 / 0%
Commercial	Maturity	11.5	4.7	15.0	2.0	27.0	160,272.7	257 / 46.3%
Concessional	Maturity	19.3	3.8	20.0	8.0	40.0	50,433.3	304 / 74.6%
Zero-Interest	Maturity	16.8	6.1	20.0	10.0	30.0	110.9	15 / 7.0%
Unknown	Maturity	17.2	4.4	20.0	10.0	30.0	6,567.8	34 / 8.7%
Commercial	Grace period	3.7	1.3	4.0	1.0	8.0	114,287.1	219 / 33.0%
Concessional	Grace period	6.0	1.6	5.0	0.0	11.0	42,017.2	262 / 62.1%
Zero-Interest	Grace period	9.2	1.9	10.5	6.0	11.0	67.4	10 / 4.2%
Unknown	Grace period	4.6	0.7	5.0	3.0	6.0	4,457.7	29 / 5.9%

Notes: Table 8 documents summary statistics of the Chinese loans based on the Chinese loan database by Horn et al. (2021). Summary statistics are computed based on all available data points for the respective variable. The category "Unknown" represents all observations for which no information about the loan type is available. The column "No.miss. total" gives the total volume of overall observations for which data for the variable is available. N refers to the number of available observations. "volume nonmissing" refers to the percent of the total volume for which information is available by loan type. The total number of observations is 1,443. Volumes are in mln. Interest rates are in annual percent. Maturity and grace periods are expressed in years.

Table 9: China loans vs private debt

2000-2019	Grace Period, years	Maturity, years	Interest Rate, %
China loans			
Commercial	3.72	11.50	5.21
Concessional	5.95	19.30	2.10
Zero-Interest	9.19	16.77	0.00
Total	4.32	13.37	4.07
Private debt	3.84	12.30	4.76
Official debt	5.89	24.12	2.18
US 3-year rate			2.34
EMBI Global			4.13
1970-1999			
Private debt	2.16	9.43	8.01
Official debt	6.44	25.89	4.2
US 3-year rate			7.83

Notes: Table 9 documents summary statistics of the Chinese loans based on the Chinese loan database by Horn et al. (2021). Summary statistics are computed based on all available data points for the respective variable. Private and official loan terms are calculated using simple averages across debtor countries in the International Debt Statistics of the World Bank. Interest rates are in annual percent. Maturity and grace periods are expressed in years. US 3-year rate refers to the average Treasury rate for the given maturity during the corresponding period. See Appendix for a detailed description of the data sources.

Table 10: Major sovereign borrowers, 2000-2019

Country	Default rate		σ_y	σ_c	$\sigma_{TB/y}$	σ_c/σ_y	ρ_y	$corr(c,y)$	$corr(TB/y,y)$	Debt to GDP			Interest rate		Maturity		EMBI Spread	$\Delta y_{t:D_t=1}$		$y^c_{t:D_{t+1}=1}$	
	Private	China								Private	China	Total	Private	China	Private	China		private	China	private	China
Major borrowers of private debt																					
Argentina	10.0	0.0	9.4	10.6	4.1	1.12	0.78	0.87	-0.42	21.9	0.4	29.6	6.5	3.5	12.6	13.7	6.9	-4.2		-4.2	
Brazil	0.0	0.0	5.9	4.5	1.8	0.76	0.78	0.91	-0.45	6.8	0.3	9.6	6.0	4.0	11.6	12.0	4.2				
Colombia	0.0	0.0	4.6	3.3	1.6	0.71	0.85	0.69	0.11	10.8		18.4	6.5		13.9		3.1				
Egypt, Arab Rep.	0.0	0.0	3.1	3.4	2.2	1.12	0.80	0.53	-0.26	2.9	0.3	22.9	4.0	4.1	10.7	7.6	3.2				
Mexico	0.0	0.0	2.4	3.2	0.7	1.31	0.72	0.82	-0.40	14.1		16.4	4.4		21.8		2.4				
Philippines	0.0	0.0	1.8	1.9	2.8	1.07	0.68	0.61	-0.21	10.6	0.1	23.4	5.5	2.3	14.2	17.9	2.7				
Turkey	0.0	0.0	4.6	4.4	2.9	0.96	0.60	0.94	-0.70	11.2	0.0	14.9	5.9	3.8	10.9	8.6	3.8				
Mean	1.429	0.000	0.045	0.045	2.303	1.008	0.745	0.768	-0.332	11.190	0.226	19.321	5.471	3.547	13.743	11.982					
Mean ex ARG	0.0	0.0	3.7	3.5	2.0	0.99	0.74	0.75	-0.32	9.4	0.2	17.6	5.4	3.6	13.9	11.5	3.2				
Major borrowers of China loans																					
Angola	0.0	5.0	14.9	12.2	10.9	0.82	0.97	0.30	0.46	23.6	7.1	39.5	5.1	3.9	8.6	13.9	6.4		-5.8		-4.5
Cameroon	0.0	5.0	4.3	3.1	1.9	0.73	0.89	0.93	0.70	1.3	2.7	28.5	3.5	2.2	9.6	18.2			0.8		5.3
Ecuador	5.0	5.0	5.4	4.8	2.4	0.89	0.80	0.81	-0.09	15.1	2.4	30.5	6.2	5.3	9.6	12.1	8.5	4.6	-0.5	-0.1	-1.9
Ethiopia	0.0	5.0	6.4	7.2	3.3	1.12	0.74	0.78	0.22	4.9	3.0	36.6	3.5	2.3	12.2	18.2			4.9		0.8
Sri Lanka	0.0	10.0	4.0	3.2	2.4	0.78	0.87	0.54	-0.58	8.6	2.7	38.4	5.0	3.0	9.1	18.2	5.1		5.3		1.1
Mozambique	15.0	5.0	1.7	5.5	11.0	3.24	0.27	0.66	-0.25	4.9	4.5	48.6	2.2	1.8	16.1	19.4		3.0	0.5	2.0	-2.0
Senegal	0.0	5.0	2.8	2.4	2.4	0.87	0.65	0.37	-0.11	4.0	2.1	35.6	5.4	1.8	11.5	19.7	4.7		-1.4		-0.4
Mean	3.750	5.625	0.070	0.062	6.530	1.140	0.821	0.604	0.163	8.310	3.222	35.976	4.341	2.738	11.448	17.271					

Notes: Debt levels, interest rates, and maturities were computed based on the sample 2000-2019 for all countries in the group. The sum of private and China debt may differ from total debt since the total includes other debt components such as official bilateral and multilateral loans. Interest rates and maturities of country-year pairs in which no borrowing from the respective creditor took place were excluded. Interest rates and maturities refer to newly disbursed debt. y, c are log-quadratically detrended GDP and consumption, and TB/y is the trade balance. σ denotes standard deviation and $corr()$ the correlation. Default rates are computed as the share of years in which countries sought to restructure their outstanding debt. We use JPMorgan's EMBI+ Index to compute the spreads during non-restructuring years- all years in which a country does not negotiate a debt restructuring. Columns $\Delta y_{t:D_t=1}$ displays the contraction in real per capita GDP in the year a country seeks a restructuring. Columns $y^c_{t:D_{t+1}=1}$ display the percent deviation from the trend in a country in the year before it sought to restructure its debt. It reflects the position in the business cycle. All indicators that refer to restructuring episodes specifically are averaged over all episodes for which data is available if a country restructured its debt multiple times during the sample period.

Table 11: Major sovereign borrowers, 1975-1999

Country	Default rate		σ_y	σ_c	$\sigma_{TB/y}$	σ_c/σ_y	ρ_y	$corr(c,y)$	$corr(TB/y,y)$	Debt to GDP			Interest rate		Maturity		Spread	$\Delta y_{t:D_t=1}$		$y^c_{t:D_{t+1}=1}$	
	Private	China								Private	China	Total	Private	China	Private	China		private	China	private	China
Major borrowers of private debt																					
Argentina	12.0		6.6	7.2	3.0	1.09	0.78	0.85	-0.63	19.6	0.0	25.1	9.5	0.0	8.9	0.5	5.9	-3.9		0.7	
Brazil	20.0		4.8	6.4	2.7	1.32	0.78	0.64	0.21	16.6		22.1	10.1		8.4		7.9	0.6		1.2	
Colombia	0.0		3.5	4.9	3.7	1.40	0.85	0.59	-0.34	9.6		21.7	9.0		9.7		4.5				
Egypt, Arab Rep.	0.0		5.1	3.0	3.3	0.59	0.80	0.80	-0.29	8.0	0.2	62.7	7.5		11.1	21.1					
Mexico	20.0		5.8	5.2	3.6	0.90	0.72	0.52	0.05	21.5	0.0	27.1	8.8	8.9	7.7	1.9	5.2	-1.6		2.5	
Philippines	16.0		6.3	2.9	3.0	0.45	0.68	0.48	-0.23	13.5	0.0	33.2	9.0	7.5	11.0	24.7	4.3	1.1		1.4	
Turkey	8.0		4.4	8.2	2.1	1.86	0.60	0.72	-0.18	11.7	0.0	23.7	8.3	7.3	8.0	9.7	5.0	5.2		-3.8	
Mean	10.9		5.2	5.4	3.1	1.09	0.74	0.66	-0.20	14.3	0.1	30.8	8.9	5.9	9.3	11.6	5.5	0.3		0.4	
Mean ex ARG	10.7		5.0	5.1	3.1	1.09	0.74	0.62	-0.13	13.5	0.1	31.8	8.8	7.9	9.3	14.3	5.4	1.3		0.3	
Major borrowers of China loans																					
Angola	0.0		10.5	15.1	6.7	1.45	0.97	0.46	-0.36	90.0	0.4	122.9	7.2	6.0	5.5	5.0					
Cameroon	4.0		19.2	17.4	2.9	0.91	0.89	0.97	-0.22	8.5	0.9	44.2	9.8		9.1	20.5		4.7		24.8	
Ecuador	20.0		2.8	3.9	3.0	1.42	0.80	0.39	-0.04	27.8	0.0	44.2	9.7		7.6	20.0	8.7	-2.1		2.5	
Ethiopia	4.0		9.9	8.8	1.8	0.89	0.74	0.94	-0.03	5.0	0.5	77.9	7.1	1.7	9.7	16.6		-0.9		11.6	
Sri Lanka	0.0		2.4	2.2	5.1	0.93	0.87	0.87	-0.46	6.7	0.5	45.8	8.2	3.1	11.2	21.9					
Mozambique	4.0		8.2	5.6	6.3	0.68	0.27	0.76	0.85	3.6	0.6	144.0	7.0	1.1	11.5	20.6					
Senegal	16.0		4.0	5.7	3.7	1.43	0.65	0.84	-0.32	4.4	0.6	39.7	8.9	3.6	7.0	19.9		-0.7		1.2	
Mean	6.9		8.1	8.4	4.2	1.10	0.74	0.75	-0.08	20.8	0.5	74.1	8.3	3.1	8.8	17.8	8.7	0.3		10.0	

Notes: Debt levels, interest rates, and maturities were computed based on the sample 1975-1999 for all countries in the group. The sum of private and China debt may differ from total debt since the total includes other debt components such as official bilateral and multilateral loans. Interest rates and maturities of country-year pairs in which no borrowing from the respective creditor took place were excluded. Interest rates and maturities refer to newly disbursed debt. y, c are log-quadratically detrended real per capita GDP and consumption, and TB/y is the trade balance. σ denotes the standard deviation and $corr()$ the correlation. Default rates are computed as the share of years in which countries sought to restructure their outstanding debt. We use JPMorgan's EMBI+ Index to compute the spreads during non-restructuring years- all years in which a country does not negotiate a debt restructuring. Columns $\Delta y_{t:D_t=1}$ displays the contraction in real per capita GDP in the year a country seeks a restructuring. Columns $y^c_{t:D_{t+1}=1}$ display the percent deviation from the trend in a country in the year before it sought to restructure its debt. It reflects the position in the business cycle. All indicators that refer to restructuring episodes specifically are averaged over all episodes for which data is available if a country restructured its debt multiple times during the sample period.

Table 12: Private creditor and Chinese bank debt restructurings

Private creditors, 1975-2019

Country	Number of restructurings 1975-2019	Probability of Default All Years	Probability of Default Years not in default
Congo, Dem. Rep.	7	0.156	0.184
Jamaica	7	0.156	0.184
Nicaragua	6	0.133	0.154
Nigeria	6	0.133	0.154
Ecuador	6	0.133	0.154
Brazil	5	0.111	0.125
Uruguay	5	0.135	0.156
Argentina	5	0.111	0.125
Mexico	5	0.111	0.125
Ukraine	4	0.089	0.098
Philippines	4	0.089	0.098
Chile	4	0.108	0.121
Mozambique	4	0.089	0.098
Madagascar	4	0.089	0.098
Senegal	4	0.089	0.098
Peru	4	0.089	0.098
Mean	5	0.114	0.129

Chinese banks and SOEs, 2000-2019

Country	Number of restructurings 2000-2019	Probability of Default All Years	Probability of Default Years not in default
Seychelles	6	0.429	0.750
Zimbabwe	5	0.250	0.333
Venezuela, RB	4	0.200	0.250
Tonga	3	0.150	0.176
Ukraine	2	0.100	0.111
Sudan	2	0.100	0.111
Serbia	2	0.100	0.111
Congo, Rep.	2	0.100	0.111
Sri Lanka	2	0.100	0.111
Tajikistan	2	0.100	0.111
Kyrgyz Republic	2	0.100	0.111
Mean	2.909	0.157	0.208

Notes: Ten countries with the highest number of restructurings.