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CHINA'S OVERSEAS LENDING

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ABSTRACT

Compared with China's pre-eminent status in world trade, its role in global finance is poorly understood. This paper studies the size, characteristics, and determinants of China's capital exports building a new database of 5000 loans and grants to 152 countries, 1949-2017. We find that 50% of China's lending to developing countries is not reported to the IMF or World Bank. These "hidden debts" distort policy surveillance, risk pricing, and debt sustainability analyses. Since China's overseas lending is almost entirely official (state-controlled), the standard "push" and "pull" drivers of private cross-border flows do not apply in the same way.

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1. Introduction

While China's dominant footprint in world trade and global output is well known, its expanding role in international finance is poorly understood. Apart from its massive scale, the most notable feature of China's capital exports is its opacity. Data is scarce and the process of lending is not transparent. This helps to explain why relatively little work exists on China's large-scale cross-border investments. In this paper, we study the surge in China's capital exports to the rest of the world during the past two decades by building an encompassing new database. We document the size, destination, and characteristics of China's overseas lending systematically and estimate the drivers of Chinese cross-border flows using established empirical models. A main insight from the data is that about half of China's lending to developing countries is not picked up by the "gold standard" databases of international finance. The "hidden debts" owed to China are consequential for debt sustainability in recipient countries and pose serious challenges for macroeconomic surveillance work and the market pricing of sovereign risk.

Unlike other major economies, almost all of China's external lending and portfolio investment is official, meaning that it is undertaken by the Chinese government, state-owned companies, or the state-controlled central bank. China does not report on its official international lending and there is no comprehensive standardized data on Chinese overseas debt stocks and flows. Debt restructuring agreements between China and debtor countries that would constitute a "credit event" are largely off the radar screen of the credit rating agencies. Moody's and Standard and Poor's, like other rating agencies, monitor sovereign borrowing from private creditors (banks, bondholders, or others); official lending to sovereigns is not a regular part of their menu of activities. The Paris Club tracks sovereign borrowing from official bilateral creditors (i.e. other sovereigns), which in principle, should cover most of China's overseas lending. However, China is not a member of the Paris Club and therefore has not been subject to the standard disclosure requirements. In addition, China does not divulge data on its official flows with the OECD's Creditor Reporting System, and it is not part of the OECD Export Credit Group, which provides data on long- and short-term trade credit flows. As such, documentation of China's international lending has literally fallen through the cracks.

Adding to the data scarcity, commercial providers such as Bloomberg or Thomson Reuters (which primarily report on bond offerings) do not keep track of China's official overseas loans, and such lending is missed even by the most ambitious recent attempts to measure international capital flows (e.g. Coppola et al. 2019). The People's Bank of China (PBoC) does not publish its asset purchases or the composition of its portfolio. Similarly, China does not provide details on the direct lending activities of its "Belt and Road" initiative. With regard to cross-border banking, China recently joined the list of countries reporting to the Bank for International Settlements (BIS), but the data are not made publicly available on a bilateral basis. Taken together, these data limitations make it very challenging to trace and quantify China's expanding network of cross-border financial

transactions, let alone analyze empirically China's capital exports and its potential impacts on the rest of the world.

The entry of China in the international financial system about two decades ago has created a significant gap in the academic literature on global finance. There is relatively little research on the consequences of China's "finance shock," that is the natural counterpart to the pioneering work on China's "trade shock" (see Autor, Dorn, Hanson, Song 2014, for instance). While trade issues have been the subject of a flourishing body of research (see the survey of Autor, Dorn, and Hanson, 2016), there is no comparable body of work on China in international finance.

The literature on a "global financial cycle," for example, is concerned with the measurement of international financial spillovers from the United States (Obstfeld 2015, Rey 2015, Miranda-Agripino and Rey 2015, Jordá, Schularick, and Taylor 2018, Kalemli-Ozcan 2019). Few, if any papers, study the potential for financial spillovers from China. Relatedly, the broader literature on international capital flows emphasizes US financial conditions and a related set of well-known "push" and "pull" factors (Calvo, Leiderman and Reinhart 1993, Forbes and Warnock 2012, Fratzscher 2012, Bruno and Shin 2014).²

As we show in this paper, the empirical approach in this literature is not well suited to describe China's massive official capital outflows. Models of private investors' portfolio decisions are of limited use for understanding official capital flows, such as China's state-driven lending overseas. In a historical context, for example, few would assert, that the vast post-WWII Marshall Plan lending by the US government was driven by the search for yield. As shown in the 200-year study by Horn, Reinhart, and Trebesch (forthcoming), rising economic powers have recurrently used government loans to tap into new markets abroad, to secure commodity imports, and to further their global ambitions. Our analysis on China's capital exports is an attempt to consider factors usually excluded from the empirical literature on capital flow drivers. We find that variables linked to Chinese domestic activity do best in explaining the time-variation in China's state-led investments abroad. Further work that incorporates geopolitical objectives of the Chinese government would seem a clear next step.

Another obstacle to understanding China's role in international finance today is that various strands of relevant research have remained largely disconnected. Some papers have studied "uphill" capital flows from emerging markets to advanced countries (e.g. Song, Storesletten, and Zilibotti 2011, Alfaro, Kalemli-Ozcan and Volosovych 2014, Gourinchas and Jeanne 2013). In that work, China's central bank features prominently as a buyer of advanced country bonds, but this particular type of capital exports is not studied in tandem with China's other forms of investing overseas ("south-to-

² See also the literature on global imbalances (Caballero, Farhi and Gourinchas 2008, Mendoza, Quadrini and Ríos-Rull 2009, Gourinchas and Rey 2014).

south” lending). There are papers that have explored Chinese FDI and equity investments in advanced countries (e.g. Fuest, Hugger Sultan, and Xing 2019), or China’s capital flows to developing countries, in particular via aid, grants and loans (see e.g. Brautigam 2009, Dreher and Fuchs 2016, Dreher, Fuchs, Parks, Strange, and Tierney 2018, Hurley, Morris and Portelance 2018).³ Yet another line of work is interested in the role of China’s currency in the international monetary system, but without a connection to the role of capital flows (Prasad 2016, Farhi and Maggiori 2019, Ilzetzki, Reinhart, and Rogoff 2019). While these studies provide valuable insights on various aspects of China’s official capital outflow surge, they do not present an encompassing picture of the country’s international capital exports, which range from portfolio investment and asset purchases (primarily in middle and high income countries) to official loans to the governments of some of the world’s poorest countries.

Here, we take a first step at providing that encompassing picture of China’s overseas capital exports. In light of the acute data shortcomings, our first step is to compile a new “consensus” database of Chinese loans to the rest of the world and construct corresponding debt flow and stock estimates. Our new dataset spans more than six decades from 1949, when the People’s Republic was established, until 2017, and covers a total of 1,974 Chinese loans and 2,947 Chinese grants to 152 emerging or developing countries, with total commitments of 520 billion US\$. “Consensus” refers to the approach adopted, which attempts to reconcile what multiple sources record about the same bilateral lending transaction. The data is granular and was gathered from a variety of sources including international treaties, debt contracts, policy reports, as well as the work of academics. Whenever possible, we also gathered loan-level information on the interest rates, currency denomination, and the repayment terms of Chinese lending and check what part of the debt is publicly reported and how much is “hidden”, in the sense that it is not picked up by official statistics, in particular by the World Bank or BIS.

We find that the People’s Republic has always been an active international lender, even in the 1950s and 1960s, when it lent substantial amounts to Communist brother states. That is, official Chinese lending has always had a strategic element. What has made China such a dominant global creditor in the recent 20 years is the drastic increase of China’s GDP, combined with China’s “Going Global Strategy” to foster Chinese investment abroad, which was initiated in 1999. Chinese loans have helped to finance large-scale investments in infrastructure, energy and mining in developing and emerging market countries, with potentially large positive effects for growth and prosperity.

At the same time, however, the large lending flows resulted in the build-up of high debt servicing burdens. For the 50 most indebted recipients of Chinese direct lending, the average stock of debt owed to China has increased from less than 1% of GDP in 2005 to more than 15% of debtor

³ There is some research on the growth spillovers from China to other emerging markets, but this work offers little connection to financial aspects.

country GDP in 2017, at least according to our lower bound estimates. For these countries, debt to China now accounts to close to 40% of total reported external debt, on average. In addition, China's state-driven lending abroad typically involves relatively high interest rates and short maturities, in contrast to the mostly concessional lending terms of other official lenders such as the World Bank or OECD governments.

More importantly, using unpublished data from the World Bank's Debtor Reporting System, we find that a substantial portion of China's overseas lending goes unreported and that the volume of "hidden" lending has grown to more than 200 billion USD as of 2016. The problem of "hidden" Chinese debts is particularly severe in two dozen developing countries and has important implications. Debt sustainability analyses are hampered if a country's true debt service burden remains unknown and if part of the debt is excluded from the published aggregates (Alfaro and Kanczuk 2019). For private investors, this opacity makes asset pricing difficult. Moreover, it is an obstacle to crisis resolution, because information on the size and composition of a country's debt is crucial to assure fair burden sharing and orderly crisis management.

The remainder of the paper is structured as follows. Section 2 opens by presenting an overview of China's external lending and introduces our new "consensus" database; we highlight the key features that emerge from the data. Section 3 focuses on country exposure to Chinese loans and the related problem of underreporting and estimates the size of "hidden" debts to China. Section 4 reassesses debt burdens and debt dynamics from the perspective of recipient countries and explores the consequences for debt sustainability. The next section focuses on China's lending to advanced countries with particular focus on the scale of portfolio holdings by the Chinese central bank. Section 6 combines the different types of capital flows and presents an encompassing view of China's financial role in the global economy. The question of what factors drive China's overseas lending is taken up in 7, while the last section concludes.

2. Chinese overseas lending: an encompassing database

2.1. Overview

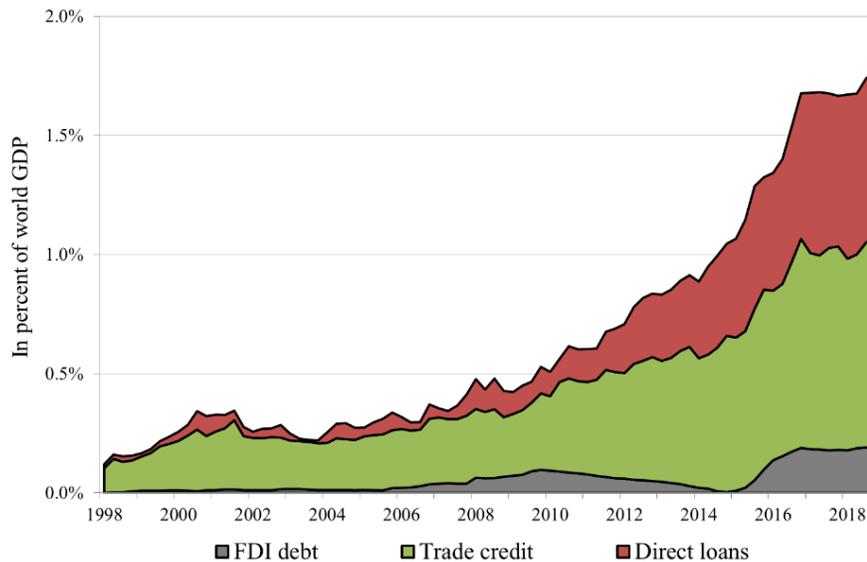
Figure 1 uses aggregate data from China's balance of payments (BoP) statistics. China's direct loans and trade credits have climbed from almost zero in 1998 to 1.6 trillion USD, or close to 2 % of world GDP in 2018.⁴ These loans mostly go to low- and middle-income countries. In total, estimates suggest that the Chinese state now accounts for a quarter of total bank lending to emerging markets.⁵ This has transformed China into the largest *official* creditor, easily surpassing

⁴ The numbers include debt claims from China's FDI. FDI debt claims arise if there is inter-company lending between a direct investor and a non-resident entity, over which the foreign direct investor has significant control.

⁵ This number includes flows via offshore financial centers (Cerutti et al. 2018).

the IMF or the World Bank (the largest overall creditor remains the United States). Beyond that, however, there is no official data on the destination and characteristics of China’s loans. Among our tasks is to identify these borrowers.

Figure 1. China’s overseas lending boom



Note: The figure represent a subset of outstanding Chinese overseas debt claims as reported in China’s BoP Statistics. Trade credit includes short- and long-term trade credits and advances. Portfolio debt is excluded (see Figure 2). *Sources:* PBoC and IMF.

In light of the acute data shortcomings, our first step is to compile a new consensus database of Chinese loans to the rest of the world and construct corresponding debt flow and stock estimates. Our new dataset covers a total of 1,974 Chinese loans and 2,947 Chinese grants to 152 emerging or developing countries from 1949 to 2017. We dub our approach “consensus,” because it attempts to reconcile what multiple sources record about the same bilateral lending transaction.⁶

Our newly assembled database of Chinese lending abroad spans more than six decades from 1949, when the People’s Republic was established. The data is granular and was gathered from a variety of sources, including international treaties, debt contracts, policy reports, as well as the work of academics such as the AidData team at William and Mary (Dreher et al. 2017). Overall, we collated details on almost 5000 loans and grants extended by the Chinese government and state-owned creditor agencies to more than 150 countries worldwide, with total commitments of 520 billion US\$. Whenever possible, we collected loan-level information on the interest rates, currency

⁶ This approach has antecedents in the capital flow literature. Studies quantifying capital flight via trade mis-invoicing (Chang et al. 1997, for instance) also reconcile multiple data sources. The typical exercise compared what a country recorded as exports (imports) versus what its trading partners posted on their books.

denomination, and the repayment terms of Chinese lending and check what part of the debt is publicly reported and how much is not picked up by official statistics.

We find that the People's Republic has always been an active international lender, even in the 1950s and 1960s, when it lent substantial amounts to other Communist states—it would appear official Chinese lending has always had a strategic element. What has made China such a dominant global creditor in the last 20 years is the dramatic increase of China's GDP, combined with China's "Going Global Strategy", which was initiated in 1999.

Chinese loans have helped to finance large-scale investments in infrastructure, energy, and mining in more than 100 developing and emerging market countries, with potentially large positive effects for growth and prosperity. At the same time, the large lending flows have resulted in the build-up of debt servicing burdens. For the 50 most indebted recipients of Chinese direct lending, the average stock of debt owed to China has increased from less than 1% of GDP in 2005 to more than 15% of debtor country GDP in 2017, according to our estimates. For these countries, debt to China now accounts for close to 40% of reported external debt, on average.

An additional concern is that we find that about 50% of China's committed lending is unreported. We show this by comparing our estimates to unpublished data from the World Bank's Debtor Reporting System, which is the key building block underlying the International Debt Statistics as well as related public databases at the IMF. According to our estimates, these "hidden" loans have grown to around 200 billion USD as of 2016, with important implications for country surveillance, risk assessment, and debt sustainability in recipient countries. When aggregated, our granular estimates by country at most account for about 62% of the lending reported in the Chinese balance of payments statistics, which suggests that the extent of indebtedness may possibly be greater or more geographically widespread than our calculations indicate.

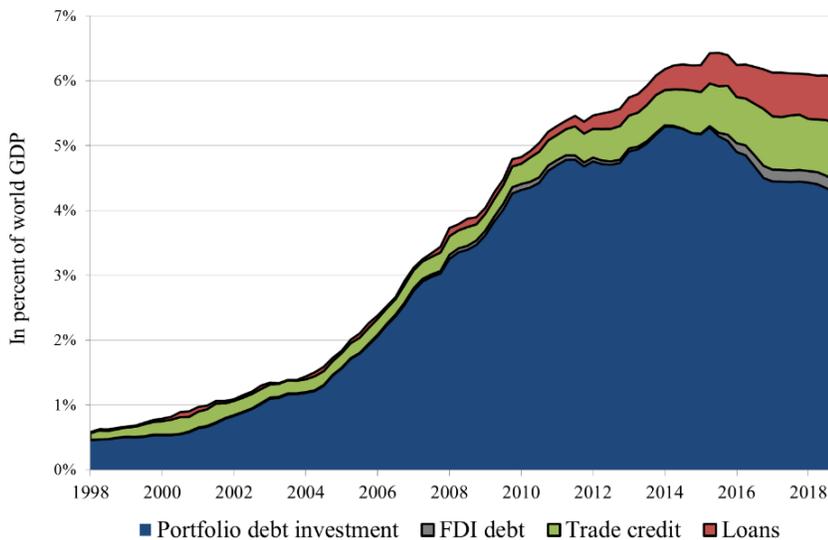
The underreporting problem is exacerbated by the fact that China usually lends at relatively high interest rates, at short maturities, and partly with collateral clauses that secure repayment through commodity export proceeds, in particular from oil. This approach differs from other official lenders such as the World Bank or OECD creditor governments that typically extend loans to developing countries at concessionary terms with long maturities and low interest rates. The collateralization of China's lending helps to establish a comparatively high level of seniority among other international creditors (see Schlegl et al. 2019). These practices have a historical analogue. Indeed, China's overseas loans share many features with French, German and British 19th century foreign lending, which also tended to be market based, partially collateralized by commodity income, and characterized by a close link of political and commercial interests (Feis 1930, Borchartd 1951).

Another historical analogue of interest is the lending boom of the 1970s, when resource-rich, low-income countries received large amounts of syndicated bank loans while commodity prices boomed. The Chinese lending flows during 2008 to 2015 in particular share similarities with the 1970s lending cycle, which did not end well once commodity prices, export revenues, and

economic growth slumped across the countries that had gone on a borrowing spree. After 1982, dozens of sovereigns went into default, resulting in a “lost decade” in Latin America and elsewhere. The sharp increase in the incidence of sovereign debt restructurings of Chinese debt since 2011 suggests a new wave of debt overhangs. We show that debt sustainability concerns are largest in developing countries that have received the most Chinese loans, several of which had benefitted from the HIPC debt relief initiative. Debt levels and the debt service burdens in about two dozen developing countries are much higher than previously thought.

China tailors its overseas lending by recipient. Rather than direct loans, most advanced and higher middle-income countries receive portfolio investments, usually via sovereign bond purchases of the People’s Bank of China. As a result, many advanced countries are highly indebted to the Chinese government. Most famously, China’s purchases of US Treasury securities (and other US fixed income assets) soared since the early 2000s and reached a peak in 2011 at 1.6 trillion USD or 10 % of US GDP. The US Treasury’s data on foreign purchases of US assets facilitates tracking that type of bilateral lending. However, in the past decade the PBoC has also escalated its purchases of other countries’ sovereign bonds, and these asset purchases, as we discuss, are more challenging to track. Other types of state-driven finance, in particular officially guaranteed trade credits as well as equity and FDI flows to advanced countries have also grown markedly. China has also built a global network of central bank swap lines, meaning standing lines of credit with the PBoC and foreign central banks, including most advanced economies. The total sum of these official swap line drawing rights exceeds 500 billion USD.

Figure 2. Total Chinese debt claims on the rest of the world



Note: Portfolio debt investment summarizes claims on non-residents from PBoC holdings of debt instruments (reserve assets) and from holdings of non-reserve asset portfolio debt. Trade credits include short- and long-term credits and advances. *Sources:* PBoC and IMF World Economic Outlook.

Figure 2 shows that, as of 2018, the government of China holds more than five trillion USD of debt claims towards the rest of the world (6% of world GDP), up from less than 500 billion in the early 2000s (1% of world GDP). The main difference to Figure 1 is that we now add portfolio debt holdings (blue area) and combine these with the direct loans and trade credits shown before. If we also add foreign equity and direct investments (not shown), China's total financial claims abroad amount to more than 8% of world GDP in 2017. This dramatic increase in Chinese official lending and investment is almost unprecedented in peacetime history, being only comparable to the rise of US lending in the wake of WWI and WWII (Horn, Reinhart, and Trebesch, forthcoming).

2.2. Why China's overseas lending is opaque

As noted, a key challenge in quantifying China's official lending is the opacity of the process and dearth of systematic reporting by the Chinese government.

On the debtor side, the data coverage of loans from China is not much better. One reason is the way in which the Chinese government lends abroad. The credits are rarely borrowed bilaterally, i.e. government-to-government. Instead, almost all of China's overseas lending is extended via Chinese state-owned entities and the recipients also tend to be state-owned enterprises. This type of company-to-company lending is often not collected by the statistical offices of developing countries so that international debt statistics suffer from chronic underreporting. According to the IMF, fewer than one in ten low-income countries report debts of public corporations that are outside the general government (IMF 2018). As a result, the debtor countries themselves have an incomplete picture on how much they have borrowed from China and under which conditions.

The financial industry, as discussed, does not monitor China's state-driven cross-border lending flows. The data provided by the BIS locational banking statistics do not help either. China started to report to the BIS in 2015, but the government has not agreed to publicly release the bilateral (country-by-country) claims data, as many other BIS reporting countries do. Only aggregate Chinese claims are available, and only back to 2015. Nevertheless, in Appendix I.5, we describe a way to infer the size of Chinese claims from BIS data as of end-2015 and find evidence for reporting gaps, most apparently with regard to loans extended to high-risk countries.

One potential explanation for some of the reporting gaps, including to the BIS, is that China uses a "circular" lending strategy that minimizes the risk of default on its loans. For risky debtors, China's state-owned policy banks often choose not to transfer any money to accounts controlled by the recipient government. Instead, the loans are disbursed directly to the Chinese contractor firm that implements the construction project abroad – a closed circle.⁷ The loans thus remain within the Chinese financial system, making it harder for recipient countries to misuse the money. Because this type of overseas loan is not actually transferred abroad, there is no cross-order flow to report,

⁷ Bräutigam (2009) calls this strategy the "Eximbank Cycle".

resulting in incomplete data. To be clear, these loans still represent an obligation from the debtor country to a Chinese official entity.

Appendix Figure A1 summarizes why we know so little about China's overseas lending. In the remainder of this section we address the lack of transparency, by creating a new consensus database of Chinese overseas lending and summarize its main characteristics.

2.3. A database of flows and stocks

A key contribution of this paper is to create a new consensus database of Chinese overseas lending (loans and grants) spanning seven decades (1949-2017) that builds on a broad range of existing data sources, historical archives and the existing literature. We then use the loan-level data to compute debt stock and debt servicing profiles for each country, focusing on the period 2000-2017.

Data sources and merging approach: Appendix I describes our approach and the sources in detail. For the modern period, our main source is AidData's Chinese Official Finance database (Dreher et al. 2017), which encompasses more than 1,200 loans and 2,300 grants to 140 recipient countries during 2000-2014 and was coded from hundreds of primary sources. We complement and cross-check this rich source with various region- and sector-specific databases that have excellent coverage for subsets of China's foreign lending and which allow us to extend our dataset until 2017. These sources are summarized in Table 1 below and in Appendix I. To go further back in time, we collected a large number of historical sources, most importantly a set of recently declassified CIA reports that contain rich transaction-level details on China's international grants and loans in the post-WWII era. We cross-check and complement the information from this source with multiple other archival documents and sources on Chinese lending going back to 1949, when the People's Republic was founded.

To generate a consensus database, (one grounded on time series) we compare each loan or grant across all sources in case of overlaps, filter out duplicates, identify missing data points and, in case of conflicting information, consult additional primary sources. Our final, unified dataset covers 1974 loans and 2947 grants by different Chinese official and state-owned creditors to more than 150 countries and spans the entire history of the People's Republic from 1949 to 2017, with total recorded lending commitments of 520 billion USD.

Table 1. Data sources on Chinese foreign lending, 1950 - 2018

Institution	Dataset / source	Geographic coverage	Time coverage	Type	Total commitment
AidData at William & Mary	China's Official Finance Database China's Public Diplomacy Dataset	Global East Asia & Oceania	2000 - 2014 2000 - 2016	Loans and grants Loans and grants	279 bn 38 bn
Boston University GDPC	China's Global Energy Finance	Global	2000 - 2018	Energy finance	250 bn
Inter-American Dialogue	China - LA Finance Database	Latin America	2005 - 2018	Loans	136 bn
Johns Hopkins CARI	Chinese Loans to Africa	Africa	2000 - 2017	Loans	146 bn
Lowy Institute	Chinese Aid in the Pacific	Pacific Islands	2002 - 2018	Loans and grants	6 bn
US Export Import Bank	Competitiveness Reports	Global	2013 - 2017	Export credits	50 bn
CIA	Reports on Communist Aid	Global	1950 - 1983	Loans and grants	5.9 bn
Bartke (1989)	Chinese Aid Projects	Global	1950 - 1988	Aid projects	n.a.
Lin (1993)	Foreign Aid of the PRC	Global	1950 - 1992	Loans and grants	n.a.
Copper (2016)	China's Foreign Aid & Investment	Global	1950 - 2015	Country case studies	n.a.
Our merged database	Horn, Reinhart, Trebesch (2019)	Global	1950 - 2017	Loans and grants	520 bn

Note: A complete list of sources and the respective references are provided in the appendix. Commitments are in current USD.

From flows to stocks: To calculate debt stocks from the loan-level (flows) data we estimated repayment histories for each loan and then aggregate these at the country-year level. This procedure requires reliable data on the repayment terms of the loans, which is best available for the period 2000-2017. For about one third of all loans in this period, we know all necessary details from the existing datasets. For an additional 45 % of loans we can approximate the repayment terms by making use of the fact that Chinese lending practices are highly standardized, i.e. largely predetermined by who lends (creditor agency). We first created a typology of creditor-specific Chinese lending terms by combining qualitative and quantitative information and cross-checking our results with existing literature (see Appendix I for details). In a nutshell, Chinese foreign loans fall into three broad categories: (i) interest-free loans, (ii) other concessional loans by the China Export Import Bank and (iii) commercial loans extended by a variety of state-owned banks and enterprises. Taken together, this approach gives us detailed lending terms for around 75 % of loans in our database. For the remaining 25 %, we make the conservative assumption that loans are extended at concessional (low interest and long maturity) terms. The result is a new annual time series database of debt stocks owed to China, and the associated interest and amortization payments. The dataset starts in 2000 and covers 107 recipient countries of Chinese direct lending that have received loans of at least 1 % of GDP (Table A2 provides the country list).

Appendix I discusses a number of issues that arise in constructing estimates of debt stocks: most importantly, our methodology on the treatment of late payments (“arrears”) and on the mapping of commitments to disbursements (much of our loan-level data is based on commitment amounts).

Relatedly, Section 2.4. shows robustness checks, focusing on lagged loan disbursement. The section also compares our estimated debt stocks to official aggregates whenever such data is available, including at the level of individual Chinese creditor banks (further comparisons are shown in Appendix I.2).

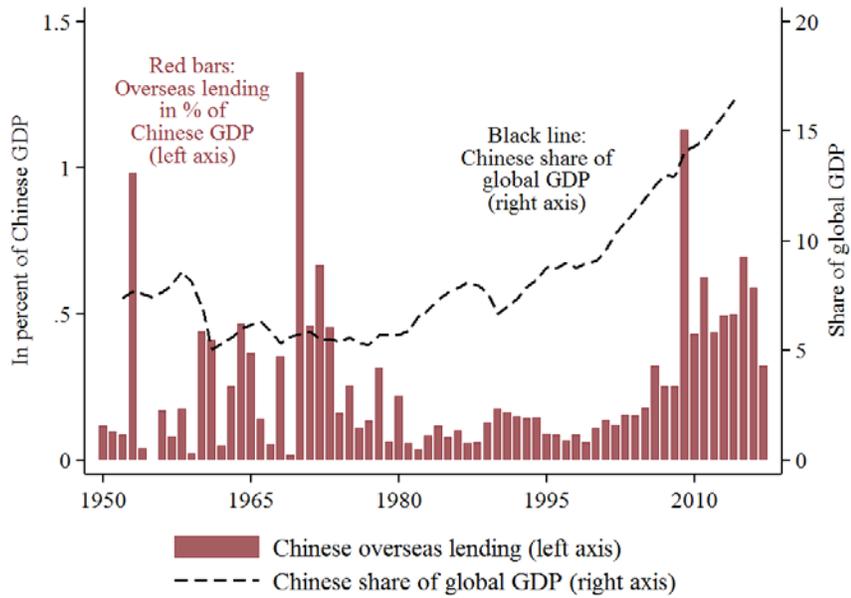
2.3. China's overseas lending 1950-2017: overview and recipient countries

A first insight from our dataset is that the People's Republic of China has been an active international lender for much of its history. Figure 3 shows Chinese bilateral commitments in the form of loans and grants as a share of Chinese GDP since 1949. During the 1950s and 1960s, China extended sizeable bilateral loans and grants to selected communist allies, even though the country was going through severe hardship and famines (Meng et al. 2015). Overseas lending was much lower in the 1980s and 1990s, and starts rising again in the early 2000s in the wake of China's "going-out" policy. This coincides with China's economic boom and its increasing share of world GDP, which is illustrated with the black dotted line. Now that China represents more than 15 % of global GDP on a purchasing power parity basis, the financial ramifications of its overseas lending are larger than ever before.

Along with the much larger outflow amounts, the geographic scope of China's lending has also increased notably. The share of countries receiving Chinese official grants or loans has increased to almost 80% as of 2017 (Figure 4). With almost full global coverage, US official lending is still further-reaching than Chinese official finance, but the gap is narrowing.

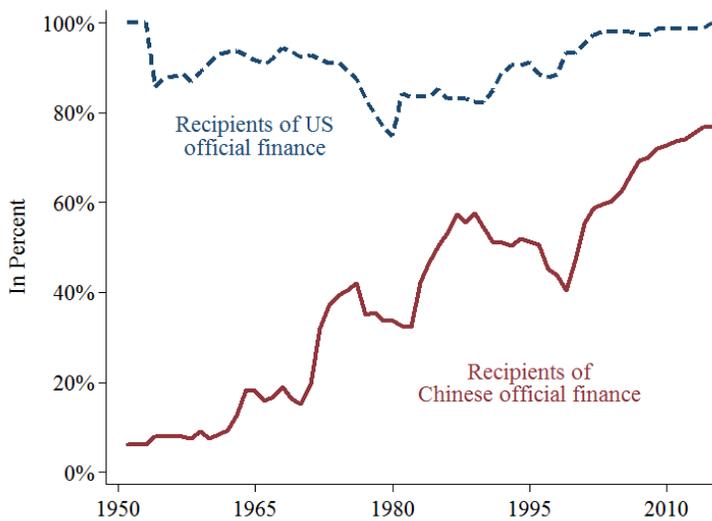
The overseas lending boom has transformed China into one of the major official creditors worldwide. The footprint of China is particularly large among low-income countries, where Chinese lending flows have surpassed total capital flows from multilateral creditors such as the IMF or the World Bank, as well as flows from private creditors (Figure 5). Figure A4 in the Appendix shows a similar comparison of China versus other creditors, using outstanding debts.

Figure 3. China has always been an active international lender, 1949 - 2017



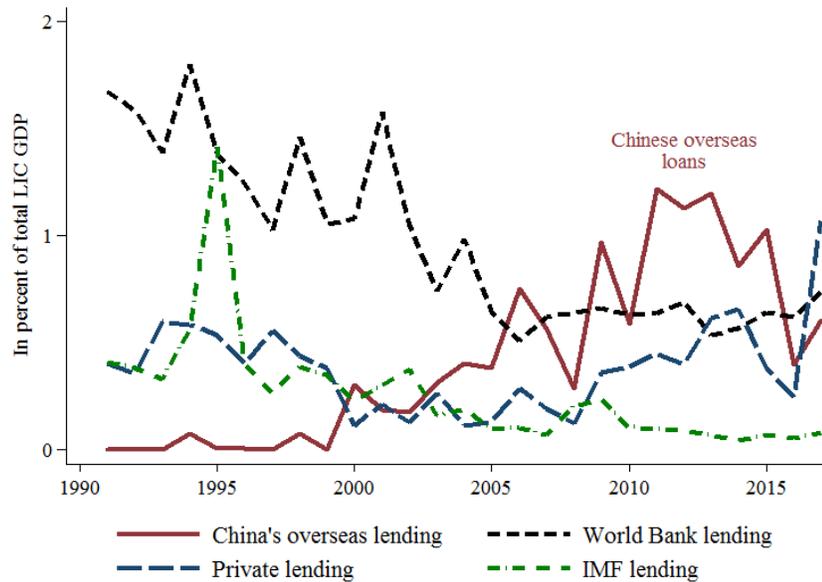
Sources: Chinese overseas lending from our database (Appendix I). Chinese share of global GDP on a purchasing power parity basis from the Penn World Tables.

Figure 4. China vs the US – global reach of direct lending



Note: Share of developing and emerging countries that have received Chinese or US official funds during the past five years. The data on US official lending is from the USAID Greenbook.

Figure 5. Capital flows to low-income developing countries 1990 - 2017

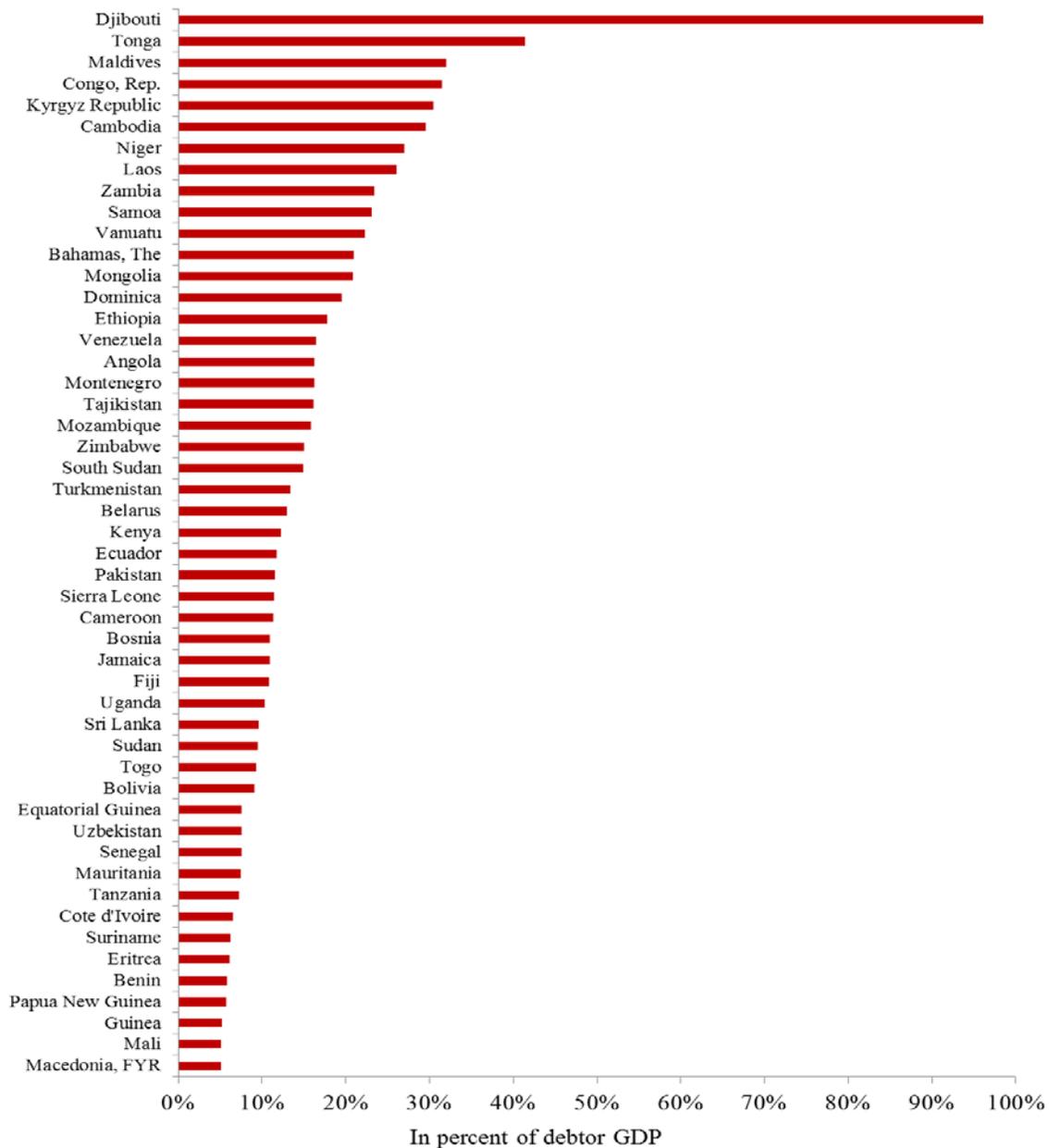


Notes: Country classification from World Economic Outlook 2018. Series exclude loans to private borrowers. *Sources:* HRT database (Appendix I) and World Bank's IDS/WDI Database.

The flipside of China's large-scale lending flows is an increasing debt stock and growing annual debt service obligations in many recipient countries. Figure 6 ranks countries that are most indebted to China according to our estimates. The debt stock estimates include both loans to public borrowers (public and publicly guaranteed debt) as well as to private borrowers in recipient countries. As mentioned earlier, the large bulk of China's state-driven lending goes to public entities, while loans to private entities account for less than 10% of total (we drop private borrowing in parts of our analysis below).

More than two dozen countries now owe more than 10% of their GDP to the Chinese government. On average, for the top 50 most indebted recipients of Chinese direct loans, debt to China has increased to more than 15% of GDP in 2017. Chinese official lending now also trumps that by other major official creditor nations. Developing and emerging countries are now much more indebted to China than to all other major creditor governments combined: According to our estimates, developing and emerging market sovereigns owe 370 billion USD to China compared to 246 billion USD in debt owed to the group of 22 Paris Club member governments (see also Appendix I.4).

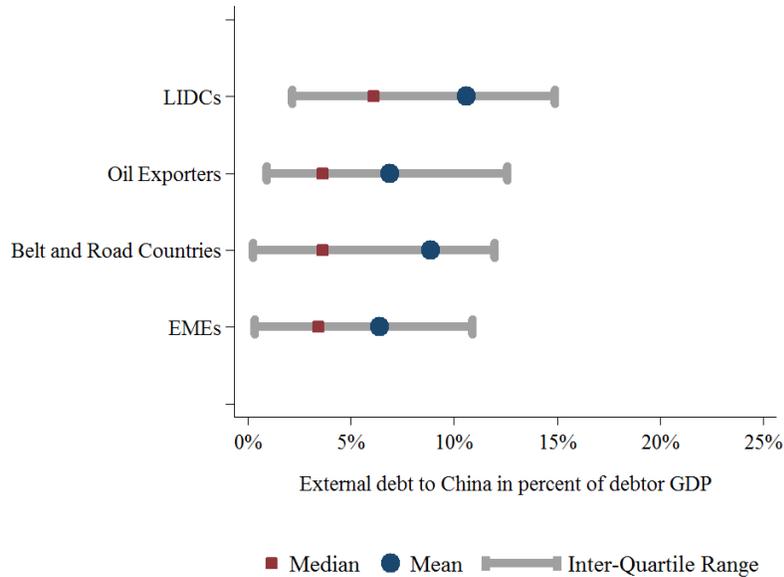
Figure 6. External debt to China (estimated debt stock as share of GDP) – top 50 recipients



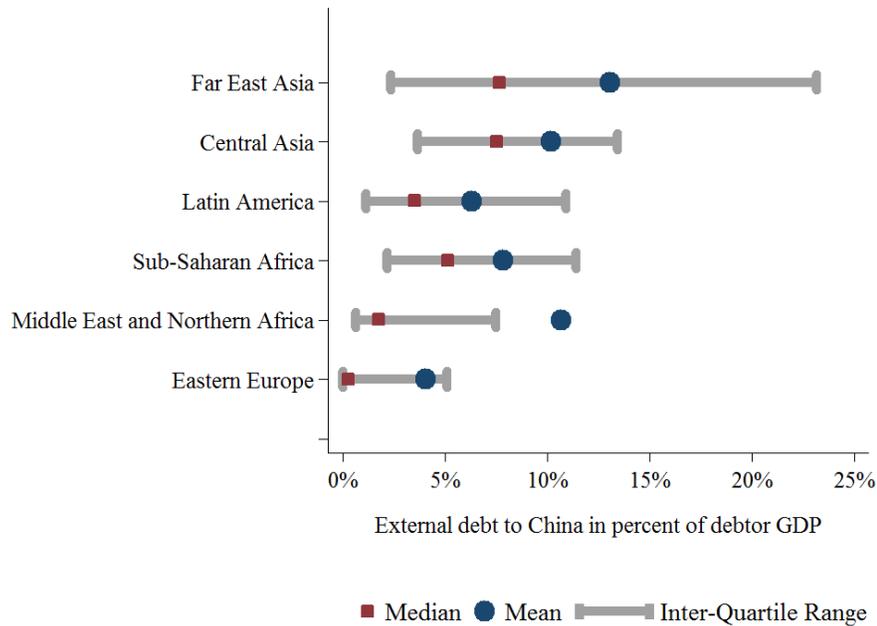
Note: Estimated stock of total external debt from direct loans owed to China as of 2017. Data is shown for the 50 countries that are most indebted to China. Total debt includes loans to public borrowers (PPG debt) as well as private borrowers. Chinese portfolio debt holdings and short-term trade debt are excluded from these estimates. *Sources:* HRT database (see Appendix I) and World Economic Outlook.

Figure 7. External debt to China by region and functional groups (as of 2017, share of GDP)

Panel A. Debt to China by country group



Panel B. Debt to China by region

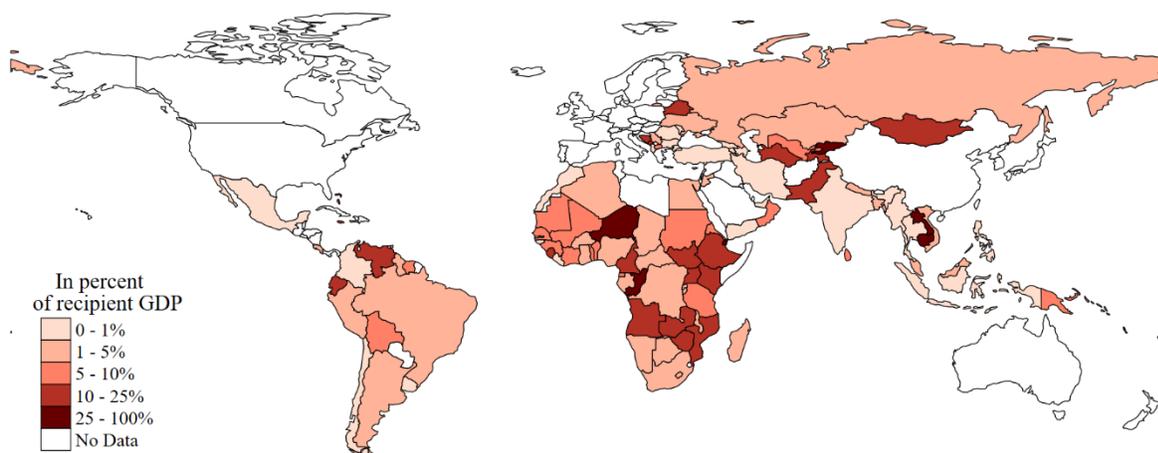


Note: Debt estimates are based on loan-level data (see text and Appendix I) and include loans to public borrowers (PPG debt) as well as to private borrowers. Chinese portfolio debt and short-term trade debt are excluded. GDP and country classifications from IMF WEO, LIDCs stands for Low Income Developing Countries. See Appendix I for the list of countries in our sample.

The country group most exposed to China are low income developing countries (LIDCs), many of whom are commodity exporters and some are former highly-indebted poor countries (HIPCs) who benefitted from large-scale official debt relief in the 1990s and 2000s. This can be seen in Figure 7 (Panel A), which shows that the average LIDC indebtedness to China was 10.6% of GDP as of 2017. In comparison, emerging market (EME) countries owed 6.4% of GDP in debt to China, on average, using our sample and database. Another highly exposed group include oil-exporting countries, such as Angola, Ecuador, Niger, or Venezuela, as well as countries that are commonly associated with China’s “Belt and Road” initiative (listed in World Bank 2018). For the BRI countries, the median in our data is comparatively low (3.6% debt to GDP), while the average is more than twice as high (8.8% debt to GDP). This reflects the fact that some BRI countries have already borrowed heavily from China (pushing up the average), while others have only recently joined and are not as highly indebted as of 2017, such as countries in Eastern Europe and the Middle East.

The regions most indebted to China are Far East Asia and Central Asia, including highly exposed, small economies that are in geographic proximity to China, such as Laos, Cambodia, and the Kyrgyz Republic (see Panel B of Figure 7). Next come Sub-Saharan Africa and Latin America, as well as some parts of the MENA (Middle East and North Africa) region. The debt flows to Eastern Europe are smaller, when measured as a share of debtor country GDP, but the amounts of credit to Europe have been growing substantially over the past five years. Figure 8 shows a world map on the scale of indebtedness towards China, measured as a share of debtor country GDP. The map only includes direct loans, but excludes portfolio debt, short-term trade credits, and equity investments.

Figure 8. World map of external debt to China (as of 2017, direct loans only)



Note: The debt estimates are based on loan-level data (see text and Appendix I). They exclude Chinese portfolio debt holdings and short-term trade debt. GDP data is from the IMF World Economic Outlook.

2.4. Sensitivity analysis of debt stock estimates: sluggish disbursements, aggregate comparisons

In this section we present robustness checks regarding our estimated debt stocks owed to China. First, we conduct a sensitivity analysis that accounts for sluggish loan disbursement. Second, we compare our estimated aggregate debt stocks to data made available by Chinese authorities and banks. Third, we combine the two approaches and benchmark our aggregates to Chinese balance of payments data over time, differentiating between full and sluggish disbursements. The results indicate that we are likely to underestimate the true extent of China's lending worldwide.

Commitments vs. disbursements: Potentially our debt stock estimates could be biased upwards if loan disbursements fall short or are more gradually spaced than commitments. In this section, we check the relevance of this concern, by assuming delayed disbursements for all loans in our dataset. Furthermore, we refer to Appendix I.2 for our approach to clean the database of loans that are committed but not disbursed.

To learn about the time lag between commitment and disbursement of Chinese loans, we evaluated micro-level data for around 200 Chinese projects. We found that most projects are implemented within 3 to 4 years and that, by the end of year 5, more than 85% of projects had been completed. One can thus assume that the average delay between commitment and full loan disbursement is also between 3 to 4 years. This number is roughly in line with the median grace period of 5 years on Chinese loans in our dataset.

For the purpose of this sensitivity analysis, we therefore assume that commitment amounts are disbursed linearly over the course of each loan's grace period. For example, take a loan signed and committed on January 1st, 2016 with a 5-year grace period. Two years later, in end-December 2017, we assume that only 2/5th (40%) have been disbursed. Our estimated debt stocks for end-2017 would thus include only 40% of a loan committed in early 2016.

This analysis shows that delayed disbursements yield lower debt stock estimates, but not by much. In the sample of the top 50 most indebted recipients, the estimated debt disbursed and outstanding decreases by an average of 20% in comparison to the benchmark estimate in 2017. This corresponds to an average decrease in the debt to GDP ratio by 3.4 % of GDP. There are only few countries, for which the introduction of sluggish disbursements makes a significant difference. This includes small countries such as Djibouti, Papua New Guinea or the Maldives that have received large Chinese commitments for infrastructure projects recently.

Benchmarking our data to aggregate numbers and bank-level balance sheets: With estimated debt stocks on hand, a plausible cross-check is to compare our estimates with available aggregate balance-of-payments data for China and bank-level balance sheets. Our estimates on debt stocks suggest that, in the full sample, developing countries owe around 400 billion USD to China at the end of 2017. This number is considerably smaller than the debts reported in China's International

Investment Position, which shows a total of 637 billion of outstanding loans.⁸ Another piece of evidence is provided by Cerutti et al. (2018) who, based on confidential data reported to the BIS, report a stock of 919 billion USD in Chinese bank claims towards emerging market debtors at the end of 2018. This estimate is more than twice the amount of 400 billion USD we were able to trace down for developing and emerging markets as of 2017.⁹ They further show that two thirds of total Chinese bank lending to EMEs is channeled through offshore financial centers and foreign affiliates of Chinese banks. These offshore flows are often hardest to track, as emphasized by Zucman (2013) or Coppola et al. (2019).

The granular nature of our data also allows to compare our debt stock estimates at the level of individual creditor banks. For this purpose, we searched for publicly available balance sheet data and annual reports that show at least partially disaggregated data, focusing on the big Chinese creditor banks that are most active in the country's overseas lending. This exercise suggests that we may be underestimating Chinese claims abroad. One example is China Development Bank (CDB), one of the largest Chinese overseas lenders (see Appendix III). In its annual report of 2015, CDB reports total outstanding overseas loans of 210 billion USD (only this aggregate number is available, but no breakdown by destination country). In comparison, our dataset identifies a stock of 127 billion in outstanding overseas loans of CDB towards developing countries in 2015, about 60 % of the aggregate reported number. Two other examples are Bank of China (BoC) and the Industrial and Commercial Bank of China (ICBC), two of China's four large state-owned commercial banks, for which the gap is even larger. In its 2017 annual report, Bank of China reports to have extended credits totaling 100 billion USD to Belt and Road countries since 2015. In comparison, we only capture around 9 billion USD in BoC loans as of 2017. Similarly, ICBC reports to have extended 94.5 billion USD in overseas credit facilities by 2017, of which we capture only 27 billion USD.

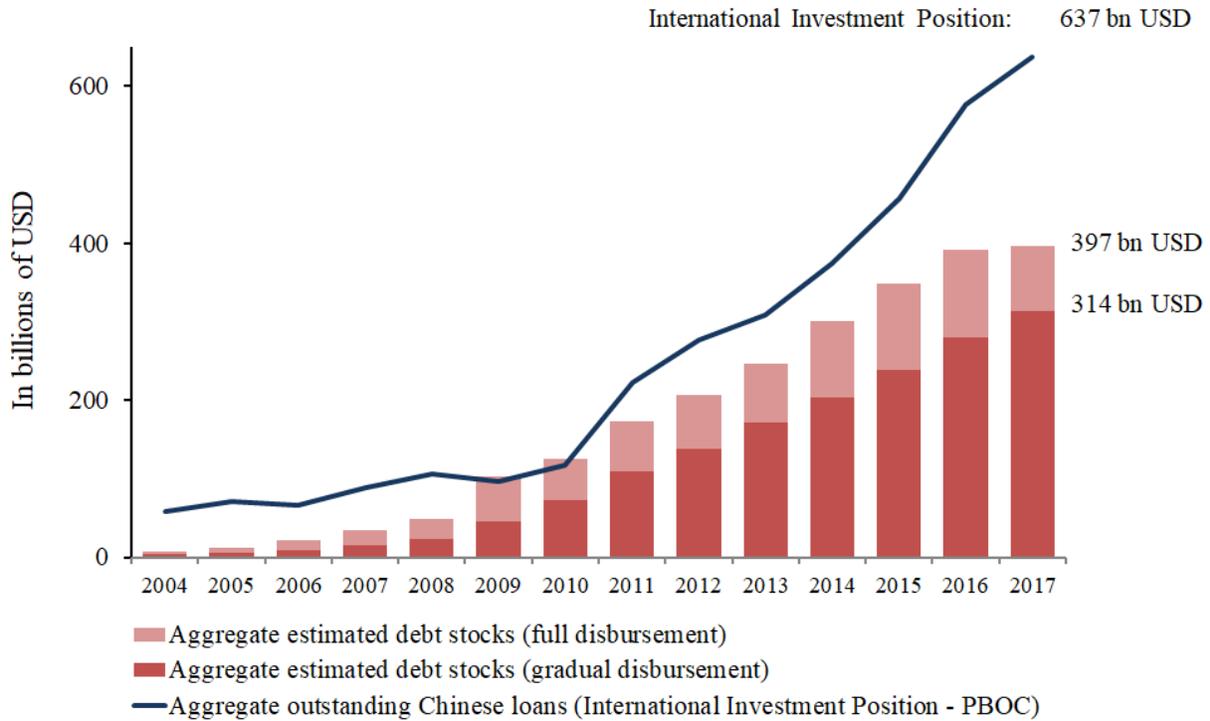
Benchmarking over time: We have mentioned that, in aggregate, the estimated external debt stock in our dataset decreases by 20% when assuming sluggish disbursement. This amounts to 83 billion USD when using the main comparison year (2017), as a benchmark. Figure 9 makes a more systematic comparison, by showing our aggregated estimates on debt to China with and without sluggish disbursement over time (dark red and light red bars, respectively) as well as PBoC data on the evolution of Chinese loans outstanding, as reported in the country's International Investment Position (IIP, blue line). Maybe the most important insight of this graph is the wide gap between our estimated aggregate debts owed to China and the IIP data on Chinese overseas loan claims. Importantly, the gap gets even wider once we use the debt estimates with sluggish disbursements. Indeed, for 2017 that estimate is less than half the IIP number.

⁸ The 400 billion USD figure builds on our main sample of 107 developing and emerging countries, but the full sample figure is almost the same. Nevertheless, part of the discrepancy to the IIP value might be explained by direct lending to advanced countries, for which no rigorous data collection exists.

⁹ The gap to the BIS data might partly be explained by overseas deposits and holdings of portfolio debt that we do not aim to capture at this point.

Taken together, the comparison of both aggregate and bank-level data suggests that, despite our best efforts to gather data from as many sources as possible, *we capture only about 50-65% of total Chinese overseas loans*. The debt stocks we report can therefore be regarded as a lower bound, at least in aggregate.

Figure 9. Aggregate external debt stocks to China with and without sluggish disbursement



Note: This figure compares our estimated aggregate debts stocks per year (red bars, baseline) with estimates assuming sluggish disbursement (dark red bars, see sensitivity analysis above). The blue bold line shows total Chinese overseas loans (on non-residents) as published by the PBoC in its International Investment Position.

2.5. China’s loans: are these official or commercial flows?

China’s overseas lending has unique characteristics when compared to the post-WWII lending of other major economies. First and foremost, China’s capital outflows are almost *exclusively official lending* and thus controlled by the Chinese government. Privately-owned banks play a minor role.

Specifically, two banks have dominated China’s overseas lending universe: the Chinese Export-Import Bank and China Development Bank. Together, they account for more than 75% of all direct cross-border lending between 2000 and 2017 in our data, while government entities such as the Ministry of Commerce play only a subordinated role (see also Figure A8 in Appendix III showing the share of each creditor per year). The two banks are both owned by and subordinated to the

Chinese State council, as shown in the overview chart in Appendix III. Against this backdrop, it is evident that the Chinese government could add transparency on much of its overseas lending activities by publishing balance sheet and claims data from just these two banks.

At the same time, the terms and characteristics of China's state-driven overseas loans look in many ways like commercial lending. Most of China's overseas loans are denominated in US dollars and lending is at interest rates that reflect a risk premia and contractual characteristics that resemble private bank loans. In low income countries, China's loans are generally repayable at interest rates of 2 to 3 %, in contrast to the interest-free loans and grants LIDCs usually receive from most other bilateral and multilateral creditors. As to emerging markets and middle-income countries, most loans are extended at market terms, meaning with interest rates that are comparable to those prevailing in private bond or loan markets. For example, Ecuador in 2010 borrowed 1.7 billion USD from China Export-Import Bank at 7 % interest over 15 years. Similarly, over a period of 10 years, Angola borrowed a total of \$20US billion from Chinese state banks at an average interest rate of 6 % and with maturities ranging from 12 to 17 years.

Moreover, the loans enjoy a comparatively high degree of seniority, since they are often backed by collateral and because debt stocks and repayment flows are not public information. Most importantly, the interest and principal repayments are often secured, either in the form of commodities (e.g. export proceeds of raw materials and agricultural products) or by giving the creditor the right to attach the profits of state-owned enterprises. To our knowledge, no other official lender collateralizes its international loans in this way, at least not this systematically.

The institutional and legal characteristics of China's loans also have commercial rather than official characteristics. The loans are extended by a variety of creditors, including more than a dozen public banks and public enterprises that act like private entities. In addition, the lending contracts often look like commercial loans, with secrecy and arbitration clauses, so that repayment amounts, or any default or restructuring details are kept outside of the public domain.

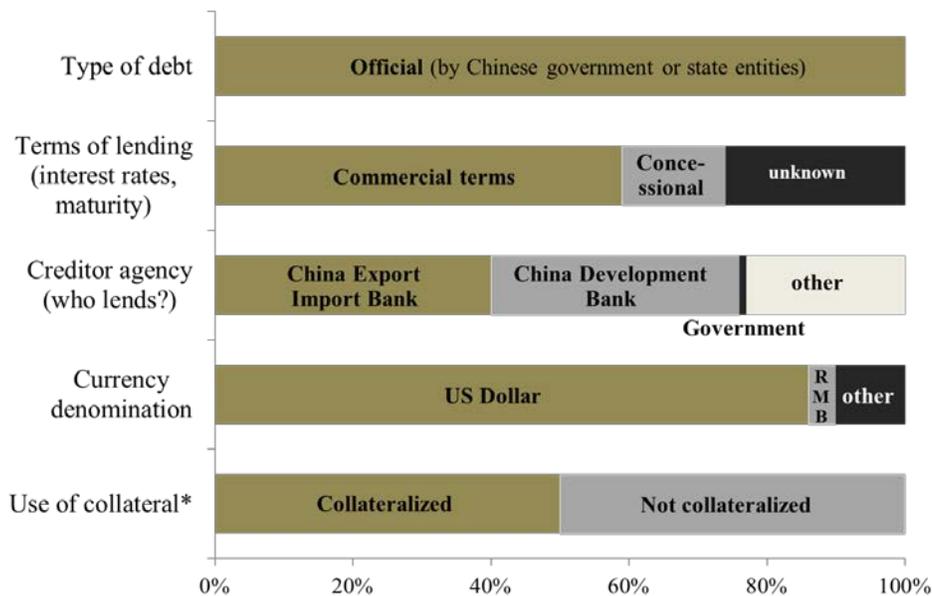
All of these features are unusual for official lending as extended by OECD governments and Paris Club member countries during the post-WWII era. Around 70 % of Paris Club claims on low-income and emerging countries are in the form of Official Development Assistance as defined by the OECD, i.e. are concessional in character and have a grant element of at least 25 %. The United States government, for example, typically extends funds for military and economic cooperation in the form of grants rather than loans. The same is true for official creditors in Europe, where the European Stability Mechanism, ESM, lent with maturities of up to 30 years and at almost no risk premia (Corsetti et al. 2018).

China's official lending overseas is thus not comparable to the lending activities by most other creditor governments, in particular, those organized in the OECD and Paris Club (see Kraay 2014 or Horn, Reinhart, and Trebesch forthcoming).

To provide more details, Figure 10 shows a compact overview of the characteristics of China’s overseas lending, based on all loans from our consensus database between 2000 and 2017, and weighted by commitment amounts. More than half of total lending was extended at commercial terms, compared to 15% at concessionary terms. These shares were rather stable over time, as shown in Appendix I, which summarizes the lending terms in each year since 2000.

Figure 10 also shows that most of China’s overseas loans are denominated in foreign currencies. Around 85 % of loans in our sample are contracted in US dollars, while Renminbi denominated loans play a minor role. Furthermore, we depict numbers by Bräutigam and Gallagher (2014), who estimate that around 50 % of Chinese overseas lending is collateralized.

Figure 10. Characteristics of Chinese overseas loans



Note: Loans as commitment-weighted shares in our sample of Chinese loan commitments since 2000. The share of collateralized loans (*) is taken from estimates of Bräutigam and Gallagher (2014) based on Chinese loans to South America and Africa.

3. Hidden debts: how large is the underreporting problem?

As noted, there is severe potential underreporting of external debt stocks (primarily public and publicly-guaranteed). This is especially true in the developing world, which has received the bulk of China’s direct loans. Here, we quantify the degree of “hidden” Chinese debt flows and stocks with a focus on more than 100 debtor countries. Most importantly, we benchmark our loan-by-loan data, aggregated on the country and year level, to the debtor-reported aggregates of official statistics by the World Bank. For this purpose, we follow, as closely as possible, the definition of

public and publicly guaranteed debt used by the World Bank and also focus on loan commitment amounts, which facilitates a clean comparison of estimated aggregates.¹⁰

To assess the scope of underreporting of Chinese claims in the debt statistics published by the IMF and World Bank, we use non-public data on debt commitments made by China from the so-called Debtor Reporting System (DRS), to which developing debtor countries report on a regular basis. The World Bank publishes the aggregates from the DRS in its International Debt Statistics, but bilateral (country to country) claims are not publicly released. Here, we use an unpublished, bilateral data extract on Chinese loan commitments by country and year (loans to public and publicly guaranteed entities). The DRS data is used as an input to our calculations but not divulged here or elsewhere, for reasons of confidentiality.

Based on this bilateral data, we can assess the size of missing debt commitments by China. For the comparison we synchronize our data of Chinese loans to match the exact definition of the DRS extract. Specifically, our subset of the DRS data aggregates all loans extended by China to public and publicly guaranteed recipients, including the central government. These claims do not include loans by China's state-owned but commercial creditor banks, such as the Bank of China or ICBC, so that we purge these from our data in this comparison exercise. We also drop the (few) Chinese loans extended to private borrowers abroad.

A large share of these unreported commitments is taken up by state-owned enterprises, government agencies and public-private partnerships in the energy and infrastructure sector. Due to the confidential nature of almost all of the underlying agreements, it is difficult to know whether explicit state guarantees have been granted for the loans and project contracts or not. But even in the absence of explicit sovereign guarantees, unreported loans to state-owned enterprises and special purpose vehicles can lead to the build-up of contingent liabilities, which often migrate to the central government's balance sheet. This problem is aggravated, if the loans are collateralized by commodity exports, in particular from oil, since such collateralization can reduce future public sector revenues.

The main insight from this exercise is that 50% of Chinese overseas lending commitments are not recorded by the World Bank and thus do not enter officially reported debt statistics. As of end-2016, the amount of "missing" Chinese loans to developing countries has reached more than 200

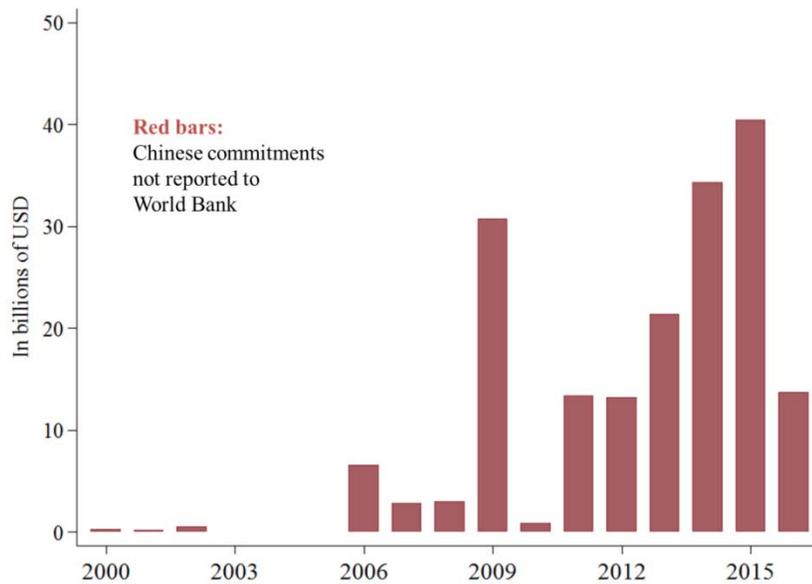
¹⁰ In Appendix I.6 we also compare our debt stock estimates to data on Chinese debt claims extracted from the BIS banking statistics. That comparison is complicated by the fact that China, unlike other BIS members, has not agreed to publicly release a bilateral (country by country) data break-down. We can however exploit a structural break in the aggregate time series right after China joined the BIS data reporting system. The result is a "snapshot" of Chinese claims for two quarters, as no time series is possible. There are significant discrepancies between our estimates and the BIS-implied snapshot and the gaps are especially large for high-risk countries. Of course, it is well known that the quality of the general economic data is also questionable for those countries.

billion USD in total. Compared to the early-and mid-2000s, the yearly amounts of missing Chinese debt outflows have increased substantially in recent years (see Figure 11).

We turn to our estimates of “hidden” public external debt stocks across developing countries. We focus, in particular, on the top 50 recipient countries most indebted to China (see Figure 6). For this group, debt stocks owed to China on average soared to more than 15 % of GDP in 2016 (Panel A of Figure 12). Of these debts, on average, around 6% of GDP is not reported in the official statistics of debtor countries.

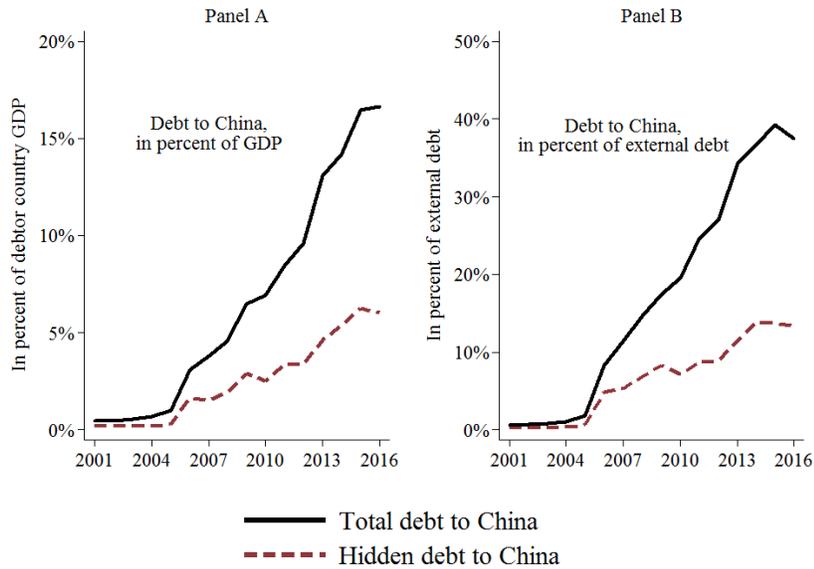
The averages in Figure 12 conceal the large heterogeneity in the hidden debts owed to China. Figure 13 presents frequency distributions for our sample of the 50 most indebted recipients. The left panel shows that, for around one half of the sample, hidden debt levels are low. But for the other half, the hidden liabilities to China exceed 5 % of GDP and for 12 of them exceed 10 % of GDP. To put these magnitudes in perspective, the right panel of Figure 13 shows hidden liabilities as a share of total external liabilities. As before, hidden liabilities are modest for about half of the sample, but for about two dozen countries the underreporting problem is severe. In these countries, hidden liabilities amount to more than 10 % and in a few countries to even more than 50% of the total, officially reported external debt stock.

Figure 11. “Hidden” Chinese loans to the developing world: total non-reported flows



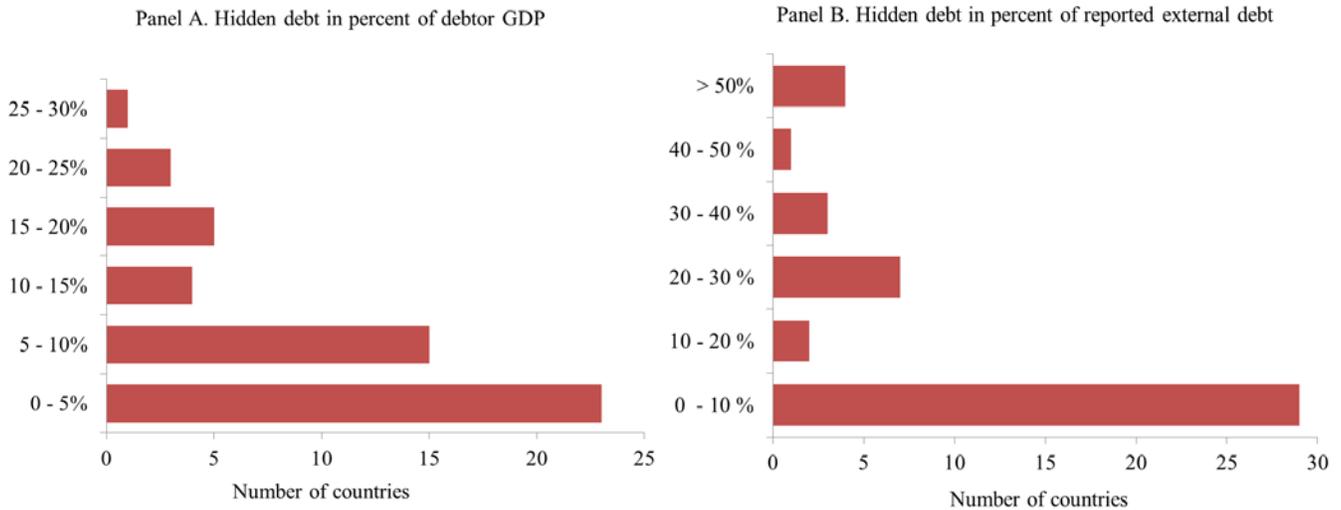
Note: “Hidden” Chinese lending flows connected to public and publicly guaranteed debt (PPG). We compare aggregated flows from our loan-level dataset to the aggregate commitments in the World Bank’s DRS database.

Figure 12. Debt to China, total and “hidden” parts, 2001-2016, top 50 recipients



Note: The figures show averages for public and publicly guaranteed debt for the top 50 developing countries most indebted to China. “Hidden” debt to China by the same country group is based on missing commitments, (i.e. Chinese loan commitments not reported to the World Bank’s DRS). *Sources:* HRT database and World Bank.

Figure 13. Scale of hidden debts to China - histograms



Note: Data shown is for the top 50 developing countries that are most indebted to China.

4. Looking ahead: Will China’s overseas lending boom end in a debt crisis?

In this section, we focus on the implications of China’s overseas lending boom for financial stability and debt sustainability in debtor countries. For many countries, the economic environment has decidedly taken a turn for the worse since 2015, when commodity prices crashed and capital flows from China began to slow. We focus on the implications of the debt cycle for debtor countries rather than for the global financial system at large. Many of China’s debtors, as has been discussed, figure among the poorest countries in the world. As such, a crisis there (even a severe and protracted one) may not produce any systemic aftershocks in global capital markets.

We first re-examine the debt dynamics and the debt servicing burden of developing countries after taking into account the large amounts of “hidden” Chinese debts. We then compare the ongoing Chinese lending cycle with historical counterparts. In particular, we draw parallels to the 1970s syndicated loan boom, in which Western banks (led by a handful of US institutions) channeled large amounts of foreign capital to poor, resource rich countries in Africa, Asia, and Latin America. That boom ended in a wave of financial crises and economic depressions in the early 1980s and was associated with a string of sovereign defaults, most of which were resolved only a decade later.

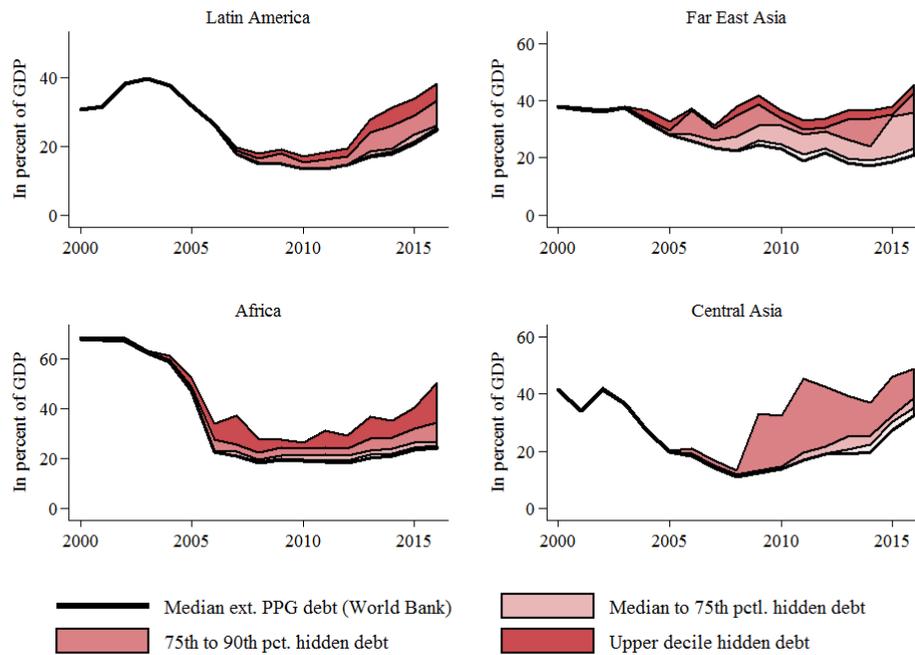
4.1. Reassessing external debt dynamics in the developing world

The hidden Chinese lending calls for a reassessment of external debt trends in the developing world. To do so, we start with the reported debt/GDP series by the World Bank and then add the “hidden” liabilities to China using our estimates. Figure 14 shows the evolution of external sovereign debt (public and publicly guaranteed) to GDP for developing and emerging countries in four different regions since 2000.

Once we account for “hidden” Chinese debts, the debt dynamics for a few dozen countries change markedly (red areas). This is particularly true for Asian countries that are in geographic proximity to China as well as resource-rich African countries. The median debt levels do not change much, because Chinese lending and its “hidden” parts are heavily concentrated in around two dozen countries. But for this group of countries, which borrows heavily from China, external debt to GDP levels have risen much more strongly over the past 15 years than is generally known.

It is notable that many of the main recipients of Chinese loans are low-income countries that not long ago had been in default since the aforementioned crisis of the 1980s. Indeed, several of the heavy borrowers from China have benefited from the HIPC and MDRI debt relief initiatives of the 2000s. They have quickly re-leveraged and are on course to reach pre-HIPC era debt levels.

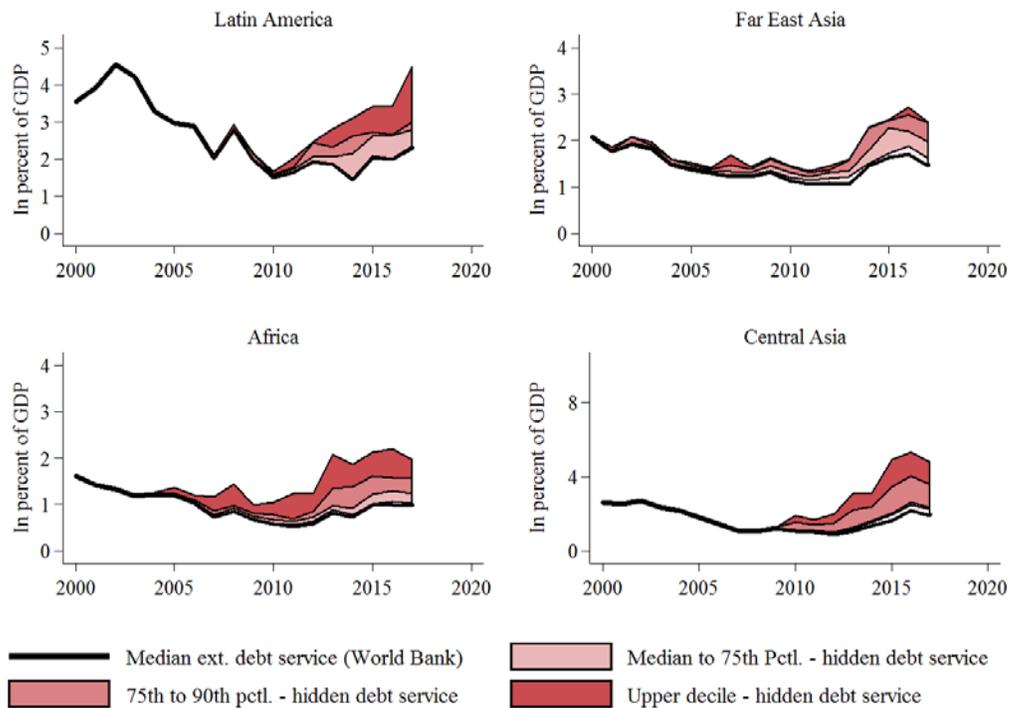
Figure 14. External debt trends and “hidden” debt to China



Note: The black line shows median external, public and publicly guaranteed debt to GDP according to the World Bank’s widely used International Debt Statistics. We add hidden debts to China (red areas), focusing on the most exposed countries (median, upper quartile and upper decile hidden debt level by region).

Turning to “hidden” debt service payments, the picture changes even more. Figure 15 shows the evolution of debt servicing costs to GDP as published by the World Bank (black line) and adds the hidden debt service to China. The numbers capture both interest rate and amortization payments on the country’s public and publicly guaranteed, external debt per year. For China, we use the debt stock and debt servicing estimates constructed from loan-level data (see Section 2.2) to derive both total and hidden interest and amortization flows. It is evident that the rebound in external debt levels in Figure 14 above has been accompanied by a more than proportional increase in debt service payment in Figure 15.

Figure 15. “Hidden” debt service payments to China



Notes: The black line shows median external PPG debt service payments to GDP according to the World Bank’s IDS. Estimates of hidden debt service based on loan-level and creditor-level data (see Appendix I).

The main explanation for the marked increase in debt servicing costs is that China tends to lend at market terms (which can imply a substantial risk premia for most of these countries). These interest rates are significantly higher than those paid to the other main creditors, in particular the low, concessionary rates on World Bank loans or on bilateral loans by OECD governments. In addition, the maturity and grace periods of Chinese loans tend to be shorter than those on the remainder of the debt, which increases the annual debt service burden (see Section 2.4).

In sum, despite benign global conditions and record-low US and other advanced economy interest rates, debt service payments by low-income and emerging market countries have been on the rise, as debt stocks climbed. A subgroup of low-income countries is close to reaching the pre-HIPC levels, with Chinese lending being one of the main drivers.

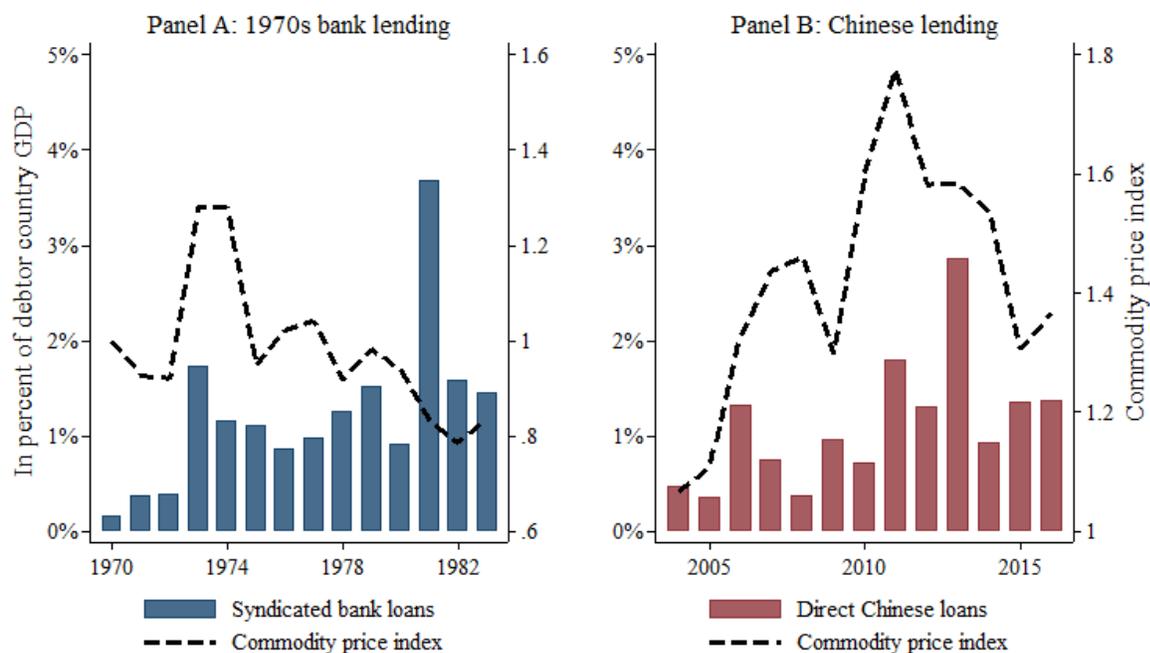
4.2. A historical analogue: the developing country lending boom of the 1970s

China’s overseas lending boom shares many characteristics with earlier lending booms to periphery countries. The parallels are particularly striking with regard to the 1970s syndicated bank lending boom (see Cline 1995 and Rieffel 2003 for a review of this episode). The main borrowers at the time were developing and resource-rich countries, many of which had not been able to access international capital markets for decades. From the early 1970s on, however, these countries quickly started to receive large debt inflows in the form of bank loans, typically from a syndicate of

10 or more Western Banks from the US, Europe and Japan. The lending recipients were the central government or public companies and the loan's purpose was often to improve the country's infrastructure, its resource extracting industries, or to finance other potentially growth-enhancing projects. The bulk of the lending was in US Dollars, maturities were rather short, typically between three and seven years, and interest rates implied risk premia, mostly between 1-2% above LIBOR or more. Moreover, much of the lending was not picked up by official statistics so debtor countries and the IMF and the World Bank also had an incomplete picture on the resulting debt flows and debt sustainability risks at that time.

Almost all of these characteristics apply to the ongoing Chinese overseas lending boom as well. Many of the recipients are the very same countries, lending is again bank-based rather than bond-based, many of the loans are issued in USD at market terms, and a lack of data and oversight is a major problem. The two lending booms can largely be seen as “twins.”

Figure 16. Two international lending booms: 1970s (blue) vs this century (red)



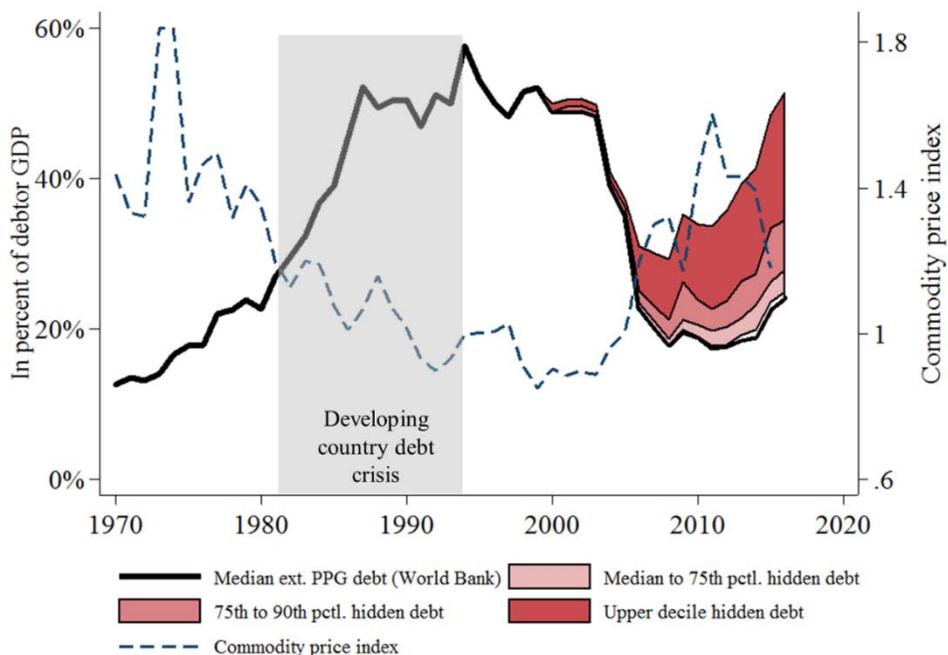
Note: The bars show average yearly loan commitments by Western commercial banks and by Chinese official creditors for 58 low-income developing countries. Sources: Boughton (1991), HRT dataset, IMF, Stallings (1987), and World Bank.

Figure 16 compares the lending booms more systematically, by focusing on debt flows to all 58 low-income countries, a group that received large-scale lending both now and then. The bars represent the average yearly bank loan inflows in % of debtor country GDP, while the dotted line is an index for global commodity prices taken from Boughton (1991) and Reinhart, Reinhart, and Trebesch (2016 and 2018). The loan-level data from the 1970s comes from World Bank reports of

the time, complemented with data from Stallings (1987), while the lending data from China is based on our loan-level data described above.

The duration and size of the two booms are roughly comparable from a low-income developing country (LIDCs) perspective. Both now and then, average yearly inflows exceed 1% of debtor GDP in a spell of about 10 years. Moreover, both booms were accompanied by a large boom-bust cycle in commodity prices. The more recent commodity-price boom was even more pronounced than the one of the 1970s (see Reinhart et al. 2018). After 1982, after US interest rates had spiked and with commodity prices decreasing further, bank lending to the developing world quickly dried up. Mexico’s debt default in August 1982 was only the most visible sign of distress. Today, it is difficult to say whether the Chinese overseas lending boom has ended or is simply slowing. Total lending amounts have decreased in 2016 and 2017, but lending to LICs remains relatively high. Whether or not lending will continue on the same scale or even increase further, will depend among other factors, on China’s GDP growth as we show in Section 7.

Figure 17. Long-run debt and commodity price trends in developing and emerging countries



Notes: Data for 95 developing and emerging countries. Sources: Boughton (1991), HRT database, IMF, World Bank. We include all countries in our sample that are in the IDS database, i.e. that report to the World Bank.

Figure 17 combines the two time spells, the 1970s and the 2010s, into a longer-run picture. The black line shows median external debt to GDP levels (PPG debt) of 95 developing countries across five decades. On top, we again add our estimate of hidden debt to China and illustrate the changing debt dynamics. The main take away from Figure 17 is that today’s debt levels in the developing

world look dangerously close to their level in 1981, just before the so called “Third World Debt Crisis” broke out (even without internalizing hidden debts to China). After this added layer of external indebtedness, the situation has a decided element of frailty. The countries most exposed to China saw their debt burdens grow particularly fast, to levels comparable to the early 1980s. These insights only strengthen the debt sustainability concerns raised by the IMF.¹¹

4.3. “Missing defaults” on Chinese overseas loans

In their 200-year history of capital flows, Reinhart, Reinhart, and Trebesch (2016 and 2017) document that the global economy has been subject to a “double bust” since 2012, with a collapse in commodity prices and stark decline in capital inflows (and in some cases, outflows). Yet, unlike prior episodes of similar adverse shocks over the long horizon they study, the worldwide incidence of sovereign defaults has risen only modestly. Compared to prior historical episodes, there should have been an additional 15 to 20 defaults in the latest post-2012 double bust. These are what they dub the “missing defaults.”

Fully explaining the missing default puzzle is beyond the scope of this paper, but part of the answer lies in the fact that the international credit rating agencies do not record credit events involving official creditors. The increasing number of defaults and debt restructurings on Chinese loans is a part of the missing default puzzle in recent years. As is the case for the lending data, there is no publicly available dataset of defaults and restructuring operations on Chinese loans. It is, however, possible to generate an (incomplete) picture using the information on defaults and debt restructurings from AidData, Hurley et al. (2018) and from a recent report by Kratz et al. (2019). We can then compare the number of restructurings of Chinese overseas loans to restructurings with other foreign creditors, in particular commercial loans and bonds. For the latter, we use data on external sovereign debt restructurings with private creditors (banks and bondholders) from Cruces and Trebesch (2012) and Meyer et al. (2019). Appendix AI.6 shows a time profile of credit events (restructurings) on debts owed to China compared to private restructurings.

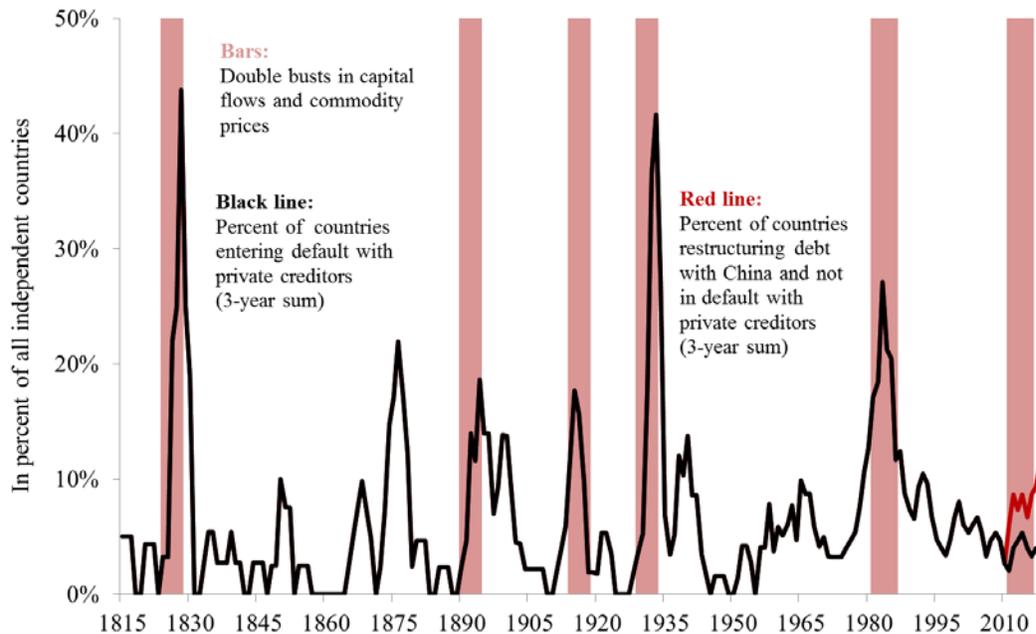
Our China “credit event database” identifies 140 external debt restructurings and debt write offs with governments and public entities of developing and emerging countries. In the early 2000s, many documented cases are linked to the HIPC initiative and involve debt relief on older Chinese development loans. In contrast, the more recent wave of restructurings (since around 2011) mostly involve distressed debt exchanges on loans granted since the early 2000s and with sovereign debtors that faced liquidity or solvency problems. As with the number of loans, it is probable that our tally still misses some restructuring episodes.

Remarkably, the number of credit events on Chinese international loans has clearly surpassed the number of restructurings towards foreign bondholders and banks (Appendix Figure A7). This

¹¹ See Speech by Lagarde “Managing Debt Vulnerabilities in Low-Income Countries”, September 13, 2018.

illustrates how important it is to move beyond the traditional approach to measure sovereign default as credit events on debt to private creditors only, as typically done by credit rating agencies such as Moody’s (for a more detailed discussion see Reinhart and Trebesch 2016, Schlegl et al. 2019, Horn et al. forthcoming).

Figure 18. The curious case of the missing defaults – adding Chinese restructurings



Note: Restructuring and default data from Reinhart and Rogoff (2009) and Meyer et al. (2019). Data on Chinese credit events since 2011 from AidData (2017), Hurley et al. (2018) and Kratz et al. (2019). Double bust events from Reinhart, Reinhart, and Trebesch (2016 and 2017).

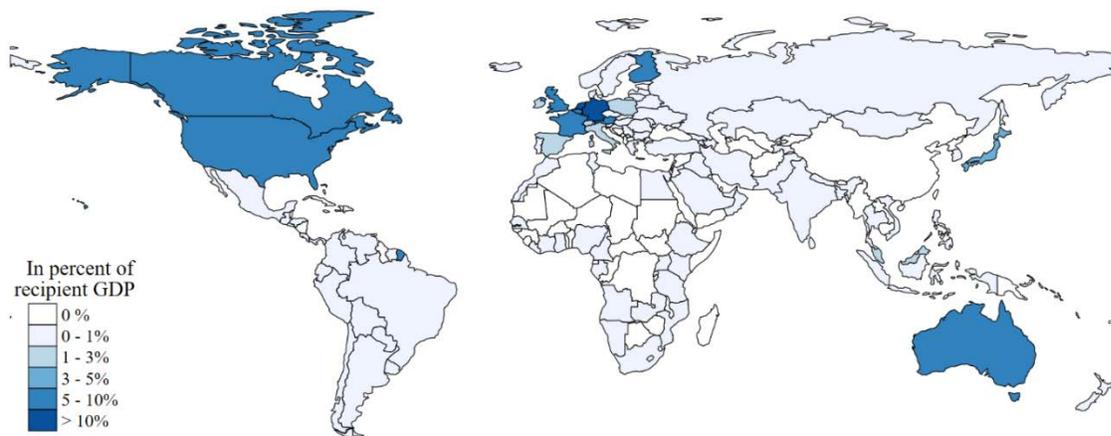
Adding the “missing defaults” on official debt to China yields a more complete picture on the frequency of sovereign default in developing countries and emerging markets over the past decade. This is evident from Figure 18 which builds on Reinhart, Reinhart, and Trebesch (2016 and 2017) and shows the share of independent countries that entered default with private creditors over the past 200 years. The red line adds to this the share of countries that restructured their debt with China since 2011, but that were not in default on private creditors. Once we account for sovereign credit events with China, the number of countries in default more than doubles, to more than 10% globally in 2016.

5. Lending to advanced economies (portfolio investments, trade credit and central bank swap lines)

So far, our analysis focused on direct loans, China’s main instrument to lend to developing and emerging market countries. This section moves to advanced countries and takes into account other types of debt instruments and claims, which account for a large share of China’s capital exports.

Figure 2, in the introduction, shows the dominance of official portfolio investments, which are almost entirely due to asset purchases of foreign sovereign bonds by the People’s Bank of China. By end-2017 PBoC holdings of foreign sovereign bonds amounted to more than 3,000 billion USD and the large majority of these are advanced country bonds, such as US Treasuries, German Bunds or UK Gilts. This figure is more than four times larger than the total claims from direct loans (710 billion as of 2018). Put differently, China’s claims toward the rest of the world mostly take the form of sovereign bonds that were acquired on global markets by China’s central bank.

Figure 19. External debt owed to China through portfolio holdings
(incl. sovereign bond holdings of PBoC)



Notes: Chinese holdings of foreign sovereign bonds, in percent of debtor GDP. The approach to estimate the composition of China’s portfolio holdings follows Arslanalp and Tsuda (2012) (see Appendix II for details).

As mentioned earlier, the PBoC itself does not release data on the composition and characteristics of its portfolio of assets, in particular its purchases of foreign sovereign bonds. It is nevertheless possible to get reasonably precise estimates on the PBoC’s holdings and, thus, the geography of China’s portfolio debt claims toward the rest of the world. Specifically, we build on the methodology of Arslanalp and Tsuda (2012) and make use of a large variety of data sources, as explained in detail in Appendix II.¹² In a nutshell, we start our estimate with data on US portfolio debt that is published by the US treasury (TIC).¹³ As the US is by far the largest recipient of Chinese portfolio investments, this allows us to identify around half of total Chinese debt holdings.

¹² In addition to debt securities held as foreign exchange reserves, China’s International Investment Position reports portfolio holdings outside of the central bank (194 billion USD in 2017). The bulk of this foreign portfolio debt is held by state-owned banks such as the Bank of China, the Agricultural Bank of China, the China Construction Bank and the Industrial and Commercial Bank of China. For recent years the geographic composition of these investments can be inferred from China’s report to the IMF’s Coordinated Portfolio Investment Survey. As of 2017, more than half of these holdings were bonds issued by the US and other advanced countries, 23 % were issued by offshore financial centers, 15 % by Hong Kong and Macao and 5 % are debt securities of developing and emerging markets.

¹³ See <https://www.treasury.gov/resource-center/data-chart-center/tic/Pages/ticsec2.aspx>

For the remaining half, or roughly 1.5 trillion USD of Chinese portfolio investments, we make use of the IMF's Composition of Foreign Exchange Reserve (COFER) database as well as its Coordinated Portfolio Investment Survey (CPIS) and assume that China's portfolio allocation follows global averages. Given that Chinese reserves represent one third of global reserves, this is a plausible assumption (see Appendix II), at least until recently.

The resulting estimates suggest that China holds at least 1.4 trillion USD of US Treasury, agency and corporate bonds (equivalent to 7% of US GDP), 370 billion USD of German bonds (10% of German GDP) as well as 190 billion USD of UK bonds (7% of UK GDP).¹⁴ For the Eurozone as a whole, China holds 850 billion USD of bonds, an amount equivalent to seven percent of Eurozone GDP. The large majority of these bonds are likely to be sovereign bonds. When calculated as a share of total outstanding sovereign bonds, China is estimated to hold around six percent of all US Treasury bonds, 17% of all German government bonds, and around six percent of all UK sovereign bonds. Furthermore, China holds approximately 30 billion USD of bonds issued by emerging markets, in particular by Brazil, Indonesia, Malaysia, Mexico, Poland and South Africa. This amount is a small share of China's total reserves, but it is substantial from the perspective of these debtor countries.

Another important category of China's lending are short-term trade credits. China's trade credits are extended by a large variety of state-owned and private corporations, mostly in the form of advances to foreign importers of Chinese goods. A substantial share of these loans is insured by China's state-owned export credit agencies, in particular Sinosure. As a result, much of the trade credits are official debts, with the final claimant being the Chinese government. Specifically, Sinosure provides short-term coverage for more than 17 % of total Chinese exports, in total insuring 412 billion USD of credits during 2017. In comparison, short-term export credits insured by the German government (via Euler-Hermes) or the US government (via the US Export-Import Bank) amount to less than 5% of what China insures per year. The Chinese state is thus a major player in the global market for trade credits, with large amounts lent to advanced economies.

Furthermore, advanced countries often receive Chinese credits that are coupled with FDI investments, as discussed above. In total, Chinese FDI debt claims abroad amounted to 250 billion USD at the end of 2017, which corresponds to 15 % of total Chinese outward FDI. The geographic distribution of these FDI debt claims is not reported by China, but most recipient countries do publish the debt-equity composition of their inward FDI stocks by counterparty in the context of the IMF's Coordinated Direct Investment Survey. This way we can identify Chinese FDI debt claims vis-à-vis 102 recipient countries and use an approximation approach for the remainder of countries.

¹⁴ US TIC data on non-resident holdings of US securities is collected on a custodial basis. Our estimate therefore does not incorporate Chinese holdings of US securities outside China. Setser (2018), for example, suggests that China holds 60 billion USD in treasuries through a Belgian custodian.

Arguably, the least-known instrument of China’s foreign lending are the large-scale swap lines arranged between the People’s Bank of China and foreign central banks. Swap lines are standing lines of credit between central banks and thus another form of official finance. Of course, this does not alter cross border flows unless the line is activated. After the global financial crisis of 2008, the PBoC has strongly extended its swap line network, first with advanced country central banks and then moving on to selected emerging and developing countries. In total, as of 2018, China has signed swap agreements with more than 40 foreign central banks and for drawing rights amounting to 550 billion USD in total. In terms of geographical reach, this is by far the largest swap network of any central bank worldwide (Horn et al. forthcoming).

The PBoC does not publish detailed data on the usage of its swap lines, but we do know the countries and years of the agreements. Figure 20 uses this information to give a geographic overview of China’s swap line network as of 2018. In addition, we can infer outstanding claims of swap lines by inspecting recipient central banks’ balance sheets. This exercise indicates that, since 2013, Pakistan, Argentina, Mongolia, Russia, and Turkey have all made use of their standing lines with the PBOC to curb market pressures and to address liquidity needs.¹⁵ The most recent data suggest that, at the end of 2018, China still had outstanding claims towards three of these countries: In Argentina, swap debt to the PBOC stood at 18.9 billion USD (3 % of GDP). In Pakistan, the swap line liabilities were 3 billion USD (1 % of GDP), while in Mongolia outstanding swap debt to the PBOC amounted to 1.75 billion USD (around 15 % of GDP).

Figure 20. Countries with access to standing credit line at China’s central bank (swap line network of the PBoC)



Note: This figure shows outstanding swap line agreements between China’s central bank (PBoC) and foreign central banks. Dark shaded countries have a standing credit line agreement with the PBoC as of 2017. In total, China has agreements with more than 40 foreign central banks for drawing rights of 550 billion USD. The figure also considers the multilateral swap agreements within the so called Chiang Mai initiative and within the Contingent Reserve Arrangement of BRICS countries.

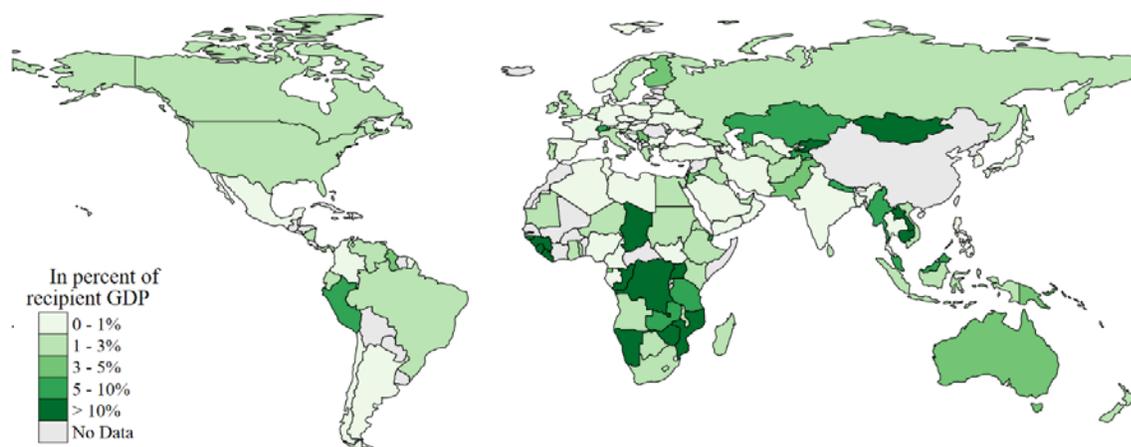
¹⁵ Press releases suggest that recipient central banks have exchanged RMB into USD upon drawing on the swap lines in order to service foreign currency debt and bolster foreign exchange reserves.

6. The big picture: China's tailored approach to overseas lending and investment

This section integrates the preceding analysis of Chinese overseas lending into a bigger picture of global investment. We explore another type of capital exports: equity investments, in particular China's outbound FDI flows and Chinese portfolio holdings of foreign equity. Regarding FDI outflows, the official statistics published by the Ministry of Commerce do not adequately capture China's large FDI flows through offshore financial centers, in particular via Hong Kong. We therefore draw on the most complete collection of micro data on this topic, namely the "Chinese investment dataset" by the American Enterprise Institute and Heritage Foundation (see Appendix II for details). To this dataset, we add China's portfolio holdings of equity instruments. Specifically, we infer the geographic distribution of portfolio equity holdings from the IMF's Coordinated Portfolio Investment Survey.

Figure 21 is the resulting world map, which shows that Chinese equity investments are directed both to developing and advanced economies. Among the main recipients of Chinese outbound FDI are the crisis countries of periphery Europe (e.g. Italy, Greece), Scandinavia, Germany, the UK, as well as a variety of African, Asian and Latin American countries. For the developing world, there is a high correlation in the direction of FDI flows on the one hand and direct lending flows on the other. These two types of flows mostly tend to be directed to the same set of countries.

Figure 21. China's overseas equity investments, 2017

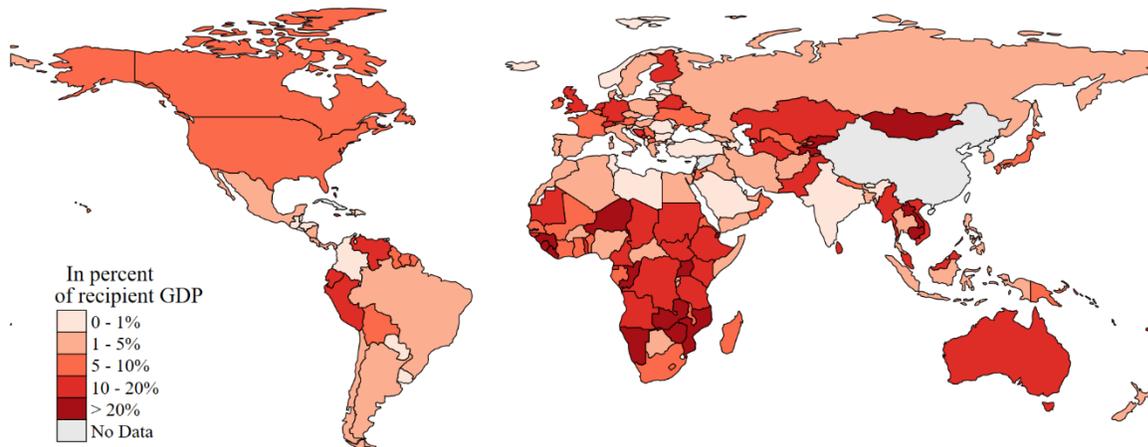


Note: This figure shows the geographic allocation of Chinese equity investments, consisting of foreign direct investment and Chinese portfolio holdings of equity instruments issued by non-residents.
Sources: American Enterprise Institute and IMF's Coordinated Portfolio Investment Survey (CIPS).

Figure 22 shows the world map of total Chinese debt and equity claims in percent of recipient country GDP in 2017. The figure combines the equity flow data presented above with the data on direct lending, the data on portfolio debt holdings (bond purchases), as well as lending via trade credits covered in previous sections. It is clear that China's capital exports span the globe and that

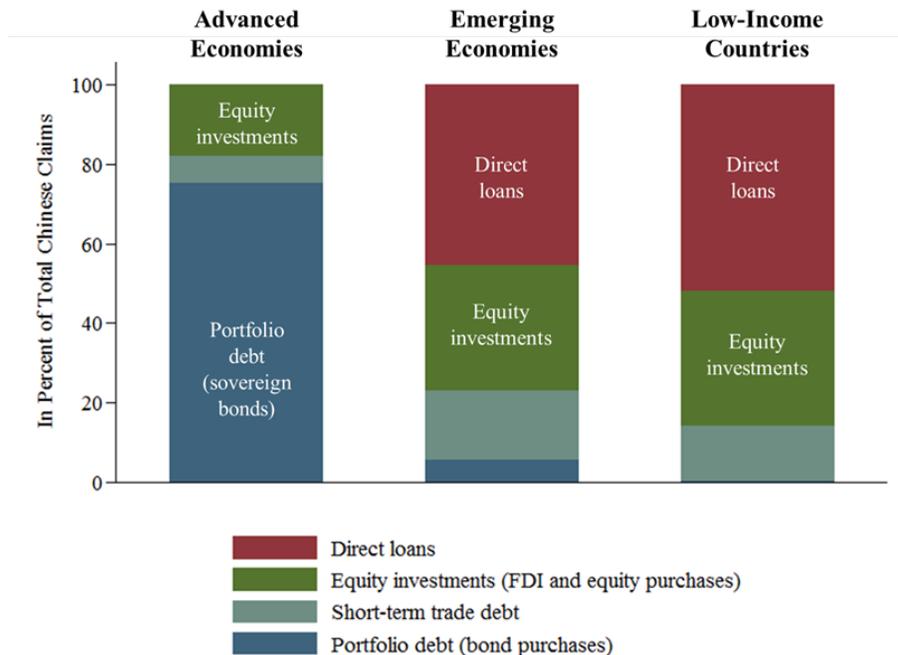
the concentration of claims is particularly large in a few dozen countries, which encompass rich and poor economies alike.

Figure 22. Total Chinese claims (total debt plus equity)



Note: Includes debt claims from direct lending, trade advances, FDI debt instruments and portfolio holdings of foreign bonds and equity claims from foreign direct investment and portfolio holdings of foreign equity instruments. Sources: Appendices I and II.

Figure 23. China’s tailored approach of exporting capital: country groups



Sources: Data on Chinese claims is based on numerous data sources (see Appendices I and II). Country classification into income groups follows the IMF World Economic Outlook database.

The combined data illustrate how China’s capital exports differ across country groups. Figure 23 shows that the outstanding Chinese claims towards advanced economies are dominated by sovereign bond holdings and equity investments. In contrast, direct lending is the main investment vehicle towards emerging and low-income countries, followed by FDI and trade credits. The various tiers of Chinese capital exports are presented in a stylized way in Appendix Table A3.

7. What drives official Chinese capital flows?

This section presents a first pass at assessing the determinants of Chinese official capital outflows to the rest of the world. We build on the extensive literature on “push” and “pull” factors of international capital flows. As “push” factors of capital outflows and “search for yield” abroad, we consider global monetary and financial conditions following an established literature (Calvo, Leiderman, and Reinhart 1993, Obstfeld 2015, Rey 2015, Miranda-Agrippino and Rey 2015, Forbes and Warnock 2012, Fratzscher 2012, Bruno and Shin 2015). Like some of these papers, we focus on the implied volatility of S&P 500 index options – the VIX - as a measure of global risk aversion. We also include US short-term interest rates, building on the widely-used “shadow rate” of Wu and Xia (2016), which captures both nominal interest rates as well as the Fed’s unconventional monetary policy measures. Both the VIX and US interest rates have been shown to drive the “global financial cycle,” i.e. synchronized risk premia and capital flows to and from industrialized countries.

To explore the role of China-specific “push” factors, we focus on Chinese real GDP growth and the PBoC’s monetary policy stance as well as an index of China’s import commodity prices. A variety of measurement problems need to be addressed. For Chinese real GDP growth, we use a quarterly time series from China’s National Bureau of Statistics as well as other measures of Chinese real economic activity that are possibly less prone to mismeasurement. Quantifying China’s monetary policy stance is similarly challenging, given that the tools of Chinese monetary policy have evolved considerably over the past two decades. Here, we make use of a narrative, composite index on China’s overall monetary policy from Sun (2018) that combines information from PBoC press releases and monetary policy reports. The index ranks monetary policy stances on a scale from minus two to plus two, with higher values indicating tighter monetary policy. This measure is deemed superior to using China’s largely invariant short-term benchmark rate or to using the growth rates of monetary aggregates inked to the PBoC’s foreign asset purchases and foreign exchange interventions. As to the measurement of a price index for Chinese commodity imports, we build on a dataset from Gruss and Kebhaj (2019) who match prices of 45 global commodities with country-level data on commodity-level exports and imports. The result is a weighted index capturing price changes in China’s commodity imports.

The starting point is an OLS regression of Chinese gross capital outflows on the array of “push” factors plus a dummy for the financial crisis year 2008. The dependent variable is gross capital outflows as reported by the PBoC over 76 quarters from 2000 to 2018 scaled by Chinese GDP

(Columns 1-3). The China-specific “push” factors are all significantly correlated with Chinese capital outflows and jointly explain around 75% of their overall variation (Column 1). In comparison, US-centered “push” have less explanatory power. The VIX is not statistically significant and the R^2 value in Column 2 is 0.18. This result is supported by the joint model shown in Column 3. Only the Chinese real GDP growth rate and China’s monetary policy stance remain significant and adding the VIX and US interest rates does little in increasing explanatory power in comparison to the specification in Column 1 that focuses exclusively on China-specific push factors. The results are largely replicated when Chinese capital outflows scaled by world GDP as a dependent variable (columns 4-6). The main takeaway is that Chinese “push” factors are significant and have greater explanatory power than the global financial factors. Beyond statistical significance, the coefficients suggest Chinese push factors have sizeable effects from an economic point of view: In the baseline specification, a one percentage point increase in China’s real GDP growth rate is associated with an increase in capital outflows of 1.7 % of Chinese GDP.

An important limitation of the basic OLS approach is that it does not adequately capture the dynamic structure of the variables of interest. Furthermore, given China’s size, the assumption that commodity prices are an appropriate regressor is also questionable. To address these concerns we explored recursive vector autoregressions VARs. We follow an established approach in the capital flows literature (see e.g. Rey 2015 and Bruno and Shin 2015).

We identify impulse responses of Chinese capital outflows to push factor shocks by imposing Cholesky restrictions on the contemporaneous responses of our variables (see e.g. Sims 1980 and Stock and Watson 2001). Specifically, we write our system of vector autoregressions in the following recursive form:

$$A(L)y_t = \varepsilon_t$$

where y_t is a vector of our data series and $A(L)$ is a matrix of polynomial in the lag operator L . We identify ε_t , the vector of orthogonalized disturbances, through Cholesky restrictions on the matrix A , which is lower triangular. Cholesky restrictions imply that the variable that enters the system first cannot respond to shocks in any other variable within the same quarter. The variable that enters the system second can contemporaneously respond to shocks in the first variable, but only responds to shocks in other variables with a lag of one quarter. More generally, our recursive set-up implies that variables can respond to contemporaneous shocks in variables that enter matrix A above, but not to contemporaneous shocks that enter the matrix below.

Given the limited number of available observations (76 quarters) we opt for a parsimonious VAR with five variables in the following order: (1) Chinese real GDP growth, (2) the Chinese monetary policy index, (3) Chinese gross capital outflows in % of Chinese GDP, (4) the growth rate of

Chinese commodity import prices and (5) the log of VIX.¹⁶ This ordering implies that, fast-moving variables such as the VIX and commodity prices are allowed to instantaneously respond to shocks in other variables, whereas relatively inertial variables such as real GDP only respond with a lag to movements in the other variables. In line with Rey (2015) and Bruno and Shin (2015), capital outflows, our main variable of interest, is ordered in an intermediate position. In this set-up, Chinese capital exports can respond immediately to changes in real GDP and the Chinese monetary policy stance, but only respond to movements in commodity prices and the VIX with a lag of one quarter.

Table 3. Drivers of Chinese gross capital outflows – OLS estimates

	Dependent Variable: Gross Chinese Capital Outflows					
	in percent of Chinese GDP			in percent of World GDP		
Chinese push factors						
Real GDP growth rate	1.71*** (0.17)		1.78*** (0.20)	0.01*** (0.00)		0.02*** (0.00)
China MP index	0.91*** (0.31)		0.69* (0.38)	0.02** (0.01)		0.01 (0.01)
China commodity TOT	3.80* (2.21)		3.94 (2.48)	0.14** (0.06)		0.18*** (0.06)
Global / US push factors						
VIX		-2.15 (1.91)	-1.89 (1.28)		-0.06* (0.03)	-0.06** (0.03)
US short term interest rate*		0.92*** (0.25)	-0.01 (0.13)		-0.00 (0.00)	-0.02*** (0.00)
2008 financial crisis	7.31*** (1.09)	2.57 (2.19)	9.16*** (1.59)	0.12*** (0.03)	0.06 (0.04)	0.20*** (0.04)
Constant	-8.03*** (1.46)	12.82** (5.49)	-3.32 (3.12)	0.02 (0.04)	0.32*** (0.09)	0.11 (0.08)
Sample	2000 - 2018	2000 - 2018	2000 - 2018	2000 - 2018	2000 - 2018	2000 - 2018
Observations	76	76	76	76	76	76
R-squared	0.757	0.184	0.767	0.372	0.035	0.524

Notes: Heteroscedasticity and auto-correlation robust standard errors in parentheses; * p < 0.1, ** p < 0.05, *** p < 0.01.

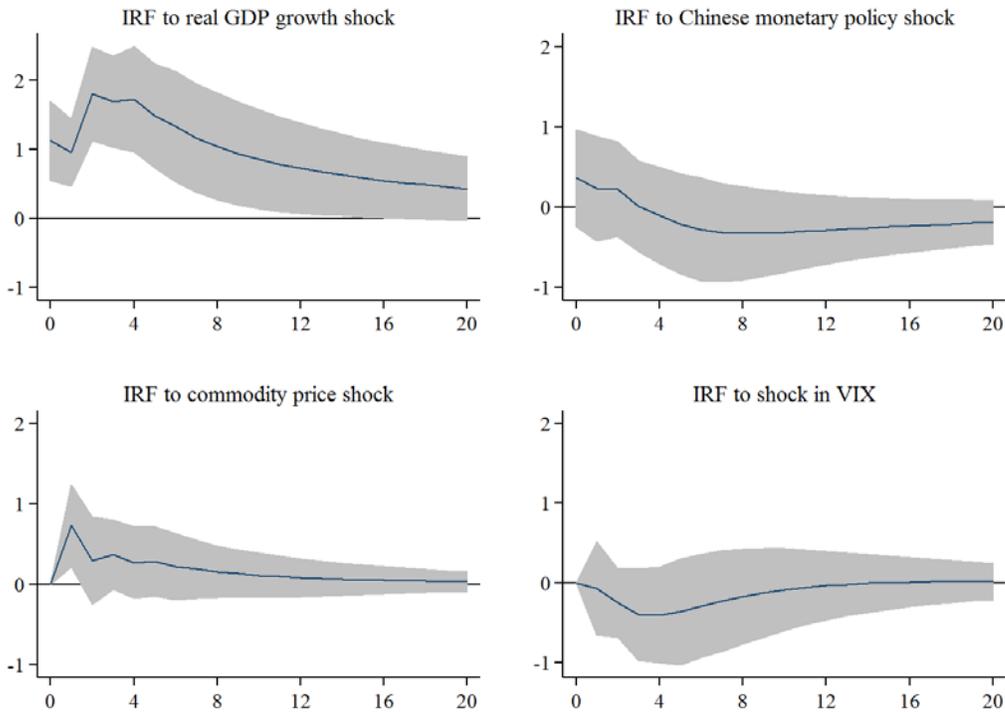
The VAR is estimated with two lags. While standard information criteria (Akaike, Schwarz, Hannan and Quinn) recommend only one lag, a Lagrange multiplier test suggests that one lag is not sufficient to eliminate the auto-correlation in the residuals of the VAR. The VAR model is stable in the sense that all eigenvalues lie inside the unit circle. In the results displayed below, we

¹⁶ Our main results are robust to alternative ordering schemes.

further show bootstrapped confidence intervals based on 1000 replications with a small-sample degrees-of-freedom adjustment for the error variance-covariance matrix (see Kilian 1999).

Figure 24 shows the impulse responses of gross Chinese capital outflows estimated from the VAR. Gross Chinese capital outflows show a strong and statistically significant response to shocks in Chinese real GDP growth. Specifically, a one standard deviation increase in China’s real GDP growth rate results in an increase of Chinese capital outflows of around 1.5 % of Chinese GDP after a year. The effect remains positive and significant for around three years. Chinese import commodity prices also drive capital outflows, although the effect is short-lived and smaller in size. In contrast, a one standard deviation shock in the VIX causes a slightly negative, but statistically insignificant impulse response in Chinese capital exports. Likewise, we find no significant response to Chinese monetary policy shocks.¹⁷

Figure 24. Impulse response functions of gross Chinese capital outflows



Notes: The shaded areas represent 90% confidence intervals based on bootstrapped standard errors and small sample degree-of-freedom adjustments for the error variance-covariance matrix. The full set of impulse response functions are presented in Appendix IV.

¹⁷ In an additional exercise, we replace the VIX by US short term interest rates and find results that are only marginally significant for this variable. While not our main focus in this exercise, our expectation that global commodity prices are endogenous here is borne out by the strong positive impulse response estimate of Chinese GDP growth on the global commodity price index (Figure A10 in the Appendix).

Table 4. Forecast error variance decomposition of Chinese capital outflows

	Chinese real GDP growth rate	Chinese monetary policy stance	Comodity price index	VIX
Forecast horizon				
1 year	0.46	0.01	0.04	0.01
3 years	0.59	0.03	0.03	0.02
5 years	0.60	0.03	0.03	0.02

The importance of Chinese real GDP growth as a push factor is further confirmed in a variance decomposition exercise. Table 4 summarizes the share of the structural variance in Chinese capital outflows that is explained by the four main explanatory variables of interest at different forecast horizons. Innovations in the Chinese real GDP growth rate explain around 50 percent of the forecast error variance in gross Chinese capital outflows. The other variables explain only a small fraction (less than 5 percent) of the structural variance.

Taken together, these results suggest that the dynamics of Chinese capital outflows differ from those of other financial centers, where private flows dominate. While further research is warranted, particularly to capture the possible influence of geopolitical considerations, Chinese official outflows do not appear to be well explained by the portfolio rebalancing effects and search-for-yield motives of private investors. In particular, the findings suggest that global financial conditions play a less important role. A likely explanation is the official character of Chinese overseas lending: As we describe in detail above and in Appendix III, Chinese capital flows are mostly extended by state-controlled entities. The largest part of gross Chinese capital outflows are the portfolio investments of China’s central bank. These are directly linked to China’s fixed exchange rate regime. The remaining investments, in particular loans and trade advances, as well as FDI flows are mostly administered by state-owned enterprises and public banks. These entities differ from the representative investors in Bruno and Shin (2014), where capital flows are driven by private, international banks that seek profits abroad and manage their balance sheet accordingly.

8. Conclusion

Over the past two decades, China has become a dominant player in the international financial system. We document the size, nature, and direction of China’s capital exports to the rest of the world. Our estimates suggest that about one half of China’s lending to developing countries is not recorded in the main international databases used by researchers and practitioners alike. These “hidden” debts pose serious challenges for country risk analysis and bond pricing for the affected countries. Furthermore, the mismeasurement of external debt has potentially significant

consequences for those developing countries that borrowed heavily from China since the early 2000s. Private investors may also not appreciate the extent to which they are junior to the Chinese government.

We find that the standard push factors identified in the academic capital flow literature have limited explanatory power for the size and time-variation of Chinese gross capital exports. China-specific push factors, in particular China's economic growth, emerge as the most important drivers. Against this backdrop, the future of China's overseas lending and international capital flows are likely to depend on China's growth performance. An implication of our analysis is that the unfolding slow-down in China's growth rate would, other things equal, translate into a decrease in its overseas loans. In the extreme, for developing countries with high debt-service obligations to China, a slow-down in Chinese lending might evolve into a sudden stop with potentially adverse ramifications for debt sustainability and growth.

More generally, this paper has provided evidence that the global financial landscape has changed markedly in the past two decades, as China has emerged as a global economic power. In the Bretton Woods era, global capital flows were largely dominated by official flows from the United States, as capital controls kept a tight lid on private financial cross border activity. The dismantling of capital account restrictions in advanced economies following the breakdown of Bretton Woods gave rise to a new era of private capital flows in international finance; the 1970s and 1980s was importantly shaped by international syndicated bank lending, until portfolio bond and equity flows displaced bank loans from the 1990s until today. The academic literature that emerged during these past decades has almost entirely focused on understanding the drivers, nature and economic effects of private cross-border flows.

Our work suggests that the surge of official Chinese overseas lending has swung the pendulum back, albeit partially. To develop an informed understanding of global capital flows and external indebtedness it is now necessary to supplement the analysis of private sector flows in Western capital markets to incorporate a relatively new but systemically important creditor - China. The drivers and consequences of this shift in international finance offer fertile ground for academic and policy research.

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Appendix I – Dataset on Chinese overseas lending: sources and methods

In this appendix section, we explain the sources and methods used to build a dataset on Chinese overseas lending through direct loans and grants. As a starting point, Figure A1 summarizes why we know so little about Chinese overseas lending from official sources.

Figure A1. Why we know so little about Chinese overseas lending

Organisation	What data they collect & share		Why data on China's lending is incomplete
IMF / World Bank	International debt statistics		Data reported by debtor country. Gaps if recipient is public company (<u>50% of Chinese lending missed</u>).
Paris Club / OECD	Data on official-to-official debts and restructurings		China is not a member (<u>China does not share data on its official lending and debt abroad</u>).
Rating agencies/ Investment banks	Risk ratings and analysis on private-to-private and private-to-official debts		China's overseas lending is official-to-official (<u>not covered by rating agencies and analysts</u>).
Trade Credit Agencies (Berne Union, OECD)	Data on private and official export credits		China does not report to the OECD. Berne Union does not share data. (<u>no data on Chinese trade credits</u>).
People's Bank of China	Asset purchases, bond holdings, details on BoP		Only aggregates publicly shared (<u>no data on China's central bank bond holdings or asset purchases</u>).
BIS	Data on international bank claims and liabilities		China reports to the BIS since 2015, but bilateral data not public (<u>moreover, reporting gaps</u>).

AI.1 Compiling the dataset on Chinese overseas loans, 1950-2017

We obtain a comprehensive, micro-level dataset of Chinese overseas lending since 1950 by drawing on dozens of primary and secondary data sources.

Sources for 2000-2017: The starting point of our data collection is AidData's Chinese Official Finance database, the most comprehensive, publicly available source on Chinese foreign official finance (Dreher et al. 2017). It is based on hundreds of primary sources such as creditor and debtor annual reports, embassy press releases, news sources, debtor aid management systems and the academic literature to identify Chinese foreign loans and grants to 140 recipient countries between 2000 and 2014. Transactions only enter the final dataset after an extensive data triangulation. This

way AidData identifies 1200 Chinese loans and more than 2300 grants amounting to a total of 280 billion USD in Chinese official commitments.¹⁸

One draw-back of this database is that it ends in 2014 and thus misses much of the lending flows associated with the Belt and Road Initiative, which was unveiled in end-2013.¹⁹ Moreover, there is no data prior to 2000, which makes it difficult to study China's evolution as an international creditor. Moreover, the coverage is incomplete for a few countries and sectors, in particular regarding loans from China's state-owned commercial creditors.

We therefore expand on AidData by combining it with a number of region- and sector-specific databases that have excellent coverage for subsets of China's foreign lending and that therefore allow us to fill gaps and carefully cross-check with AidData. We also identify a variety of old and new sources that allow us to expand the time coverage on Chinese overseas lending for the years pre-2000 and post-2014.

The China-Latin America Finance Database by Gallagher and Myers (2019) from the Inter-American Dialogue provides loan-level data on 141 billion USD in Chinese loans to 15 Latin American and Caribbean sovereigns and their state-owned enterprises between 2005 and 2018. The China-Africa Research Initiative at John Hopkins University (SAIS-CARI) provides data on 143 billion USD in Chinese official loans to 55 African countries since 2000. For Oceania, the Lowy Institute released the Chinese Aid in the Pacific Database as well as the Pacific Aid Map, which together traces 6 billion USD in Chinese official financial flows to 14 countries since 2002.

In addition to these region-specific data sources, we make use of the China Global Energy Finance Database at Boston University (Gallagher 2019), which tracks 238 projects in the fossil fuel, nuclear power and renewable energy sector around the world and since 2000, with total financing amounts of 250 billion USD, extended by either the China Export-Import Bank or the China Development Bank. We also draw on the China Export Credit Agency Project database that is regularly updated by the US Export-Import Bank and which covers medium and long-term export loans extended by China's Export-Import Bank since 2013.

Whenever available, we additionally make use of debtor-specific resources such as national debt management systems. As we explained in Section 3, the coverage of debtor country statistics regarding Chinese lending is often imperfect, to say the least. Nevertheless, national debt management systems are useful to cross-check amounts and lending terms from other sources and to expand the coverage for more recent years and selected countries, especially when no other loan-level data is available.

¹⁸ We exclude from our dataset all transactions linked to technical assistance, debt relief, scholarships, or training.

¹⁹ For the countries of Far East Asia and Oceania an AidData update is available that includes years 2015 and 2016 (see Custer et al. 2018 and the associated dataset).

Historical sources: To obtain a long-run perspective on Chinese foreign lending, we go back all the way to the foundation of the People’s Republic of China in 1949. For this purpose, we again build on a broad array of different sources. An excellent overview of early Chinese lending is provided by historic CIA reports that were compiled from the end of World War II until the late 1980s. The confidential reports were recently declassified and contain rich transaction-level details on China’s international grants and loans. We cross-check the information from this source with the work of political scientists and historians, such as a collection of international Chinese treaties by Bartke (1992) and early work on Chinese foreign aid by Eckstein (1966), Law (1984) and Lin (1993). We again reconcile conflicting information and supplement the coverage of the CIA reports in cases of incomplete documentation.

The 1990s are a more challenging period to identify Chinese overseas lending. No CIA reports have been made public and the modern databases described above only start tracing Chinese flows in the early 2000s. Our data collection for this period builds on the three-volume work of John Copper (2016), which documents Chinese economic and military aid to dozens of developing countries in the form of country case studies. We carefully examine these case studies and code Chinese foreign loans and grant commitments amounting to a total of 13 billion USD from 1990 to 1999.

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for each year. Table “New Loans approved by Parliament during FY” and “Status of Pipeline loan Projects” (downloadable from <https://finance.go.ug/publication/reports-public-debt-guarantees-other-financial-liabilities-and-grants-financial-years>, accessed 24.05.2019)

Final database: To bring all these different data sources together, we embark on an extensive merging and cleaning process. First, we carefully examine the details of more than 5000 loans and grants and compare the entries across all sources in case of overlaps. We then filter out duplicates and identify missing data points, e.g. the interest rate or maturity of individual loans. To reconcile conflicting information between databases, we move beyond the above listed databases whenever possible and consult the primary sources ourselves. This was particularly important for the data provided in the annual competitiveness reports of the US Export-Import Bank. Unlike the other databases, the US Export-Import Bank does not undertake a rigorous verification procedure so that this source contains both confirmed and unconfirmed Chinese loans. To avoid noise and double counting we thus only consider those Chinese commitments that are confirmed by official sources on either the recipient of the creditor side, resulting in a coverage of 90 transactions or a total of 50 billion USD since 2013 from this source.

Our final, unified data source covers 1974 loans and 2947 grants by different Chinese official and state-owned creditors to more than 150 countries and spans the entire history of the People’s Republic from 1949 to 2017, with total recorded commitments amounting to 520 billion USD.

Terms of Chinese Lending: For about one third of all loans in our dataset, we know all necessary details on interest rates and repayment terms, in particular grace period and maturity, mainly using the entries from AidData and the national debt management systems listed above.

For an additional 45 percent of loans we approximate the repayment terms using information on the Chinese creditor agency and the type of lending instrument. We thus make use of the fact that Chinese lending practices are standardized and largely predetermined by who lends. In a first step, we therefore created a typology of creditor-specific lending terms, complementing the quantitative patterns we see in the data with qualitative information from the websites and annual reports of the most important Chinese creditor agencies. As shown in Table A1 below, Chinese foreign loans fall into three broad categories:

- (i) Interest-free, highly concessional loans with zero interest rate and 20-year maturity and 5-year grace period, by China’s central government, usually represented by the Ministry of Commerce that oversees China’s foreign aid program. These loans make up a very small share of overall Chinese foreign lending (just 0.2 percent of commitments in our database).
- (ii) Concessional loans by the China Export-Import Bank: These loans have concessional terms with an interest rate of 2-3%, 20-year maturity and a 5-year grace period. Concessional loans by the Export-Import Bank account for about 16% of all commitments.

- (iii) Commercial terms on loans by the China Export-Import Bank, the China Development Bank and by a variety of other state-owned banks/enterprises. The exact terms in this bucket of commercial lenders vary mainly by creditor agency and debtor country, so knowing these gives us sufficient information for our purposes. On average, the interest rate in this category is 5% and the maturity is 13 years. Almost 60% of all commitments fall in this group.

We cross-checked and complemented our approximation approach and the lending typologies with the existing literature, in particular the summary of lending terms and the background information on Chinese lending strategies in Bräutigam (2009) and Bräutigam and Gallagher (2014). Taken together, this approach gives us detailed lending terms for around 75 percent of loans in our database. For the remaining 25 percent, we make the conservative assumption that they are extended at concessional terms, thus under-estimating debt service payments to China. This allows us to map the flow data into estimated debt stocks and debt repayments.

Table A1. Terms of Direct Chinese Loans by Creditor Agency and Type of Loan

Loan Type	Creditor	Approximate Terms	Other Features	Sample Share
Interest-Free	Ministry of Commerce	0 % interest rate 20 year maturity 5 year grace period	Partially tied to Chinese Exports	0.20%
Concessional	China Export-Import Bank	2-3 % interest rate 20 year maturity 5 year grace period	Partially tied to Chinese Exports; Potentially collateralized by commodities or profits	15.80%
Commercial	China Export-Import Bank China Development Bank State-Owned Commercial Banks State-Owned Enterprises	Libor plus spread 13 year maturity 0 - 5 year grace	Partially tied to Chinese Exports; Potentially collateralized by commodities or profits	59.60%

Note: Sample shares are weighted by commitment amounts. Sources: Bräutigam (2009), Bräutigam and Gallagher (2012), Chinese State Council (2011), Dreher et al. (2017), Gallagher et al. (2012), various debtor- and creditor-specific sources, own calculations.

AI.2 From flows to stocks: Estimating debt stocks owed to China, 2000-2017

The above mentioned sources all report Chinese lending flows, but not outstanding debt stocks, for example as a share of debtor country GDP. The lack of data on debt stocks owed to China is an important gap in the existing literature. One exception is the work by Hurley et al. (2018) from the Center for Global Development, who estimate a snapshot on the size of debt stocks for a subsample of 23 countries participating in the Belt and Road Initiative in the year 2016. Here, we estimate debt stocks owed to China for 106 developing and emerging countries that have received more than one percent of GDP in Chinese loans for each year from 2000 until 2017.

Our estimates of outstanding debt stocks build on the loan-level data, in particular the data on amounts, currency and repayment terms that we have assembled. To transform the flow data into debt stock and debt servicing burdens by country and year we computed repayment histories for each loan. We then aggregate the loan-level cash flow streams to estimate total outstanding debt stocks as well as the interest and amortization payments on a country-year level. Table A2 below shows the sample of countries, for which we compute debt stock estimates in our database.

Treatment of late payments: One potential source of (*downward*) bias in our debt stock estimates is that we do not know whether payments have been made on schedule or not. Specifically, we have no systematic information on late payments (arrears), even though press reports regularly report that developing countries delay or miss their debt servicing obligations towards China. Given the lack of data, we assume that all repayments have been made on schedule when estimating debt stocks, so we assume zero arrears towards China. This assumption is likely to result in an underestimation of debt stocks, because arrears that build up over time result in increasing debt stocks (see Schlegl et al. 2019) and this increase is not reflected in our estimates.

Commitments versus disbursements: Another important challenge for estimating debt stocks is that much of our loan-level data is based on commitment amounts. This could result in an *upward* bias in estimated debt levels in countries where loans are disbursed with delay, or not at all (note that this concern does not apply in the same way for the benchmarking exercises involving World Bank data, for which we compare commitments to commitments, see below).

To deal with the lack of disbursement data, we drop a large number of projects from the sample, for which the full disbursement of committed amounts is unlikely. Specifically, we exclude all loans of projects that have been canceled or suspended at some point. We further exclude all loans that as of the end of 2017 remained in an initial “pledge phase”, i.e. projects, for which only an initial Memorandum of Understanding has been signed, but for which there is no evidence that the loan has been formalized and paid out. Moreover, we drop all umbrella or framework agreements that represent general credit lines between China and the recipient countries without specifying actual projects.

Table A2. Country sample for debt stock estimation from direct loans

Low Income Developing Countries

Bangladesh	Ghana	Nigeria
Benin	Guinea	Papua New Guinea
Bolivia	Kenya	Rwanda
Burkina Faso	Kyrgyz Republic	Senegal
Burundi	Loas	Sierra Leone
Cambodia	Lesotho	South Sudan
Cameroon	Liberia	Sudan
Central African Republic	Madagascar	Tajikistan
Chad	Malawi	Tanzania
Comoros	Mali	Togo
Congo, Dem. Rep.	Mauritania	Uganda
Congo, Rep.	Mongolia	Uzbekistan
Cote D'Ivoire	Mozambique	Vietnam
Djibouti	Myanmar	Yemen, Rep.
Eritrea	Nepal	Zambia
Ethiopia	Niger	Zimbabwe

Emerging Market Economies

Albania	Equatorial Guinea	Peru
Algeria	Fiji	Philippines
Angola	Gabon	Romania
Argentina	Guyana	Russia
Armenia	India	Samoa
Azerbaijan	Indonesia	Serbia
Bahamas, The	Iran	Seychelles
Barbados	Jamaica	South Africa
Belarus	Jordan	Sri Lanka
Bosnia and Herzegovina	Kazakhstan	Suriname
Botswana	Lebanon	Tonga
Brazil	Macedonia, FYR	Trinidad and Tobago
Bulgaria	Malaysia	Turkey
Cabo Verde	Maldives	Turkmenistan
Chile	Mexico	Ukraine
Colombia	Montenegro	United Arab Emirates
Costa Rica	Morocco	Uruguay
Dominica	Namibia	Vanautu
Ecuador	Oman	Venezuela
Egypt	Pakistan	

Despite these adjustments and checks, we might still overestimate debt to China for some countries or years, in particular when disbursements fall considerably short of promised commitment amounts and there is no evidence in the data that this was the case. To assess the scope of this potential bias, we next compare our data to other available data sources and aggregates. The results are reassuring in that we are likely to underestimate rather than overestimate the true extent of China's lending worldwide:

Comparison of our data to aggregate numbers and bank-level balance sheets: Our estimates on debt stocks suggest that, in the full sample, developing countries owe around 400 billion USD to China at the end of 2017. This number is considerably smaller than the debts reported in China's International Investment Position, which shows a total of 637 billion of outstanding loans. Another piece of evidence is provided by Cerutti et al. (2018) who, based on confidential data reported to the BIS, report a stock of 919 billion USD in Chinese bank claims towards emerging market debtors at the end of 2018. This estimate is more than twice the amount of 400 billion USD we were able to trace down for developing and emerging markets as of 2017. They further show that two thirds of total Chinese bank lending to EMEs is channeled through offshore financial centers and foreign affiliates of Chinese banks. These offshore flows are often hardest to track, as emphasized by Zucman (2013) or Coppola et al. (2019).

The granular nature of our data also allows to compare our debt stock estimates at the level of individual creditor banks. To benchmark our own lending numbers at the creditor-level we searched for publicly available balance sheet data and annual reports that show at least partially disaggregated data, focusing on the big Chinese creditor banks that are most active in the country's overseas lending. This exercise provides further assurance that we are not overestimating Chinese claims abroad, but quite the contrary. One example is China Development Bank (CDB), the largest Chinese overseas lender (see Appendix III). In its annual report of 2015, CDB reports total outstanding overseas loans of 210 billion USD (only this aggregate number is available, but no breakdown by destination country). In comparison, our dataset identifies a stock of only 127 billion in outstanding loans of CDB towards developing countries in 2015, about 60 percent of the officially reported number. Two other examples are Bank of China and the Industrial and Commercial Bank of China (ICBC), two of China's four large state-owned commercial banks, for which our coverage is even lower. In its 2017 annual report, Bank of China reports to have extended credits totaling 100 billion USD to Belt and Road countries since 2015. In comparison, we only capture around 9 billion USD in loans as of 2017. Similarly, ICBC reports to have extended 94.5 billion USD in credit facilities by 2017, while we capture only 21 billion USD.

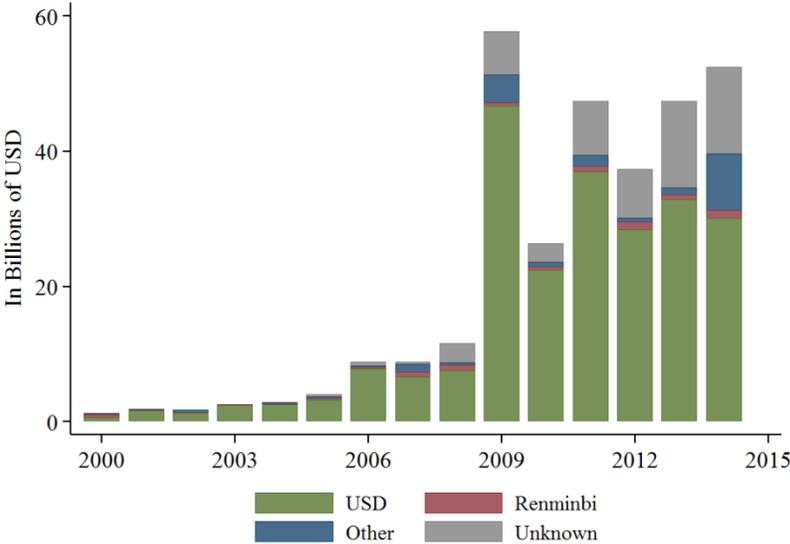
For a comparison of loan flows rather than stocks (aggregate commitments), we can also refer to a recent World Bank report, which is based on a survey on China's Belt and Road investment projects (Bandiera and Tsiropoulos, 2019). The report identifies around 500 billion USD in Chinese investments to 50 developing countries between 2013 and 2018. Of this amount, around 300 billion USD are estimated to have been financed via public and publicly guaranteed debt. For

the same 50 BRI countries and a slightly shorter time span (2013 to 2017), we identify only 105 USD billion in Chinese loan commitments. Our data thus covers only a third of their aggregate loan commitment estimate.

AI.3 Characteristics of Chinese lending: time trends

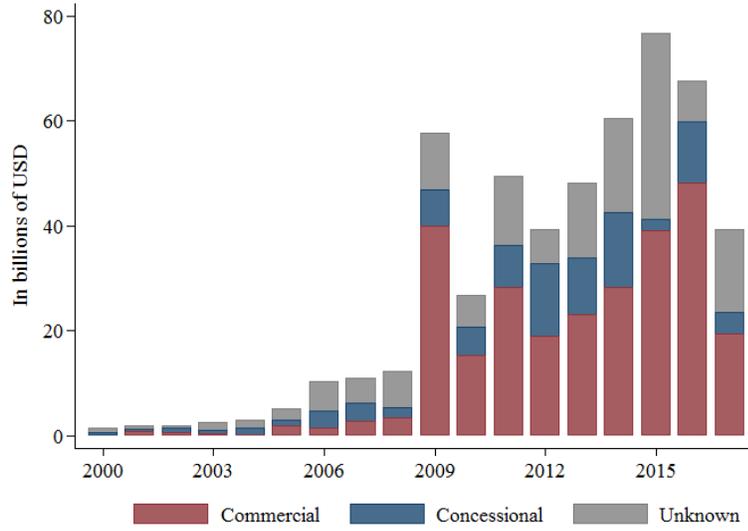
The data show that the terms and characteristics of Chinese loans have been remarkably stable over the course of the past two decades. Figure A2 demonstrates this with respect to currency denomination and Figure A3 with respect to the dominance of commercial loans.

Figure A2. Currency denomination of Chinese overseas lending 2000 - 2014



Note: This figure shows the currency denomination of Chinese overseas lending in our database. The data on currency denomination are largely from AidData’s Chinese Official Finance database.

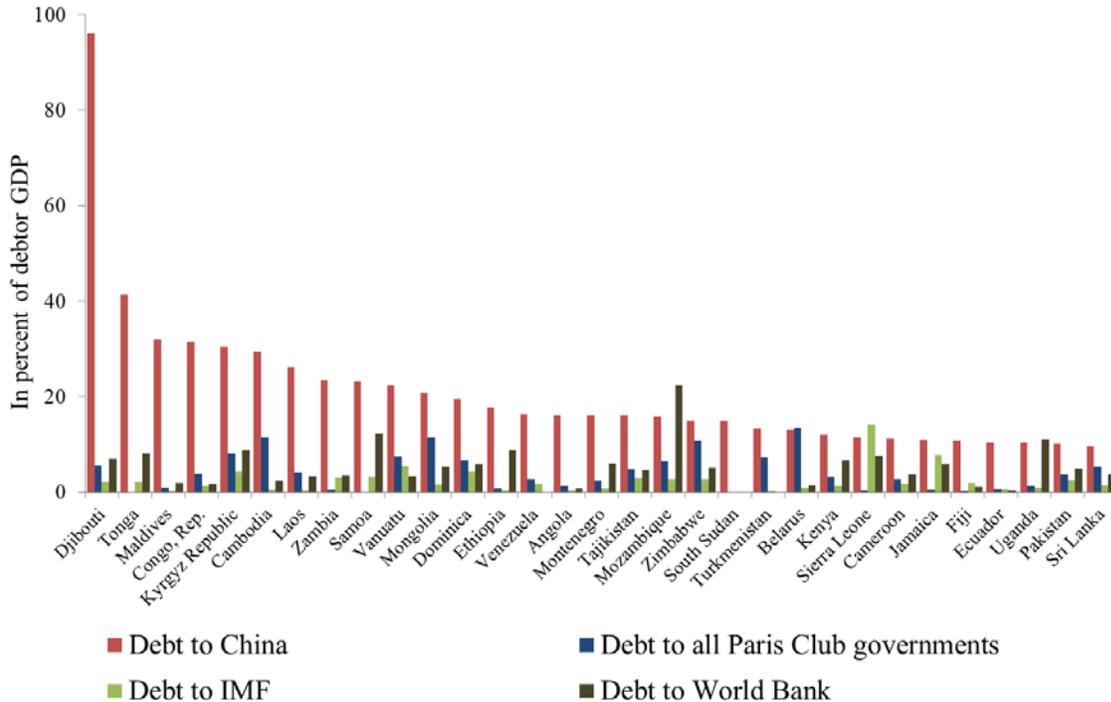
Figure A3. Terms of Chinese overseas lending 2000 - 2017



Note: This figure shows the evolution of Chinese lending terms over time. All loans with interest rates larger than 3.5 percent, loans classified as “Other Official Flows” and loans extended by commercial creditors (see Table 4) are considered commercial loans. Concessional flows include grants and loans with interest rates lower than 3.5 percent.

AI.4 Debt to China vs. debt owed to other official creditors (IMF, WB, Paris Club)

Figure A4. Debt owed to China versus debt owed to other official creditors



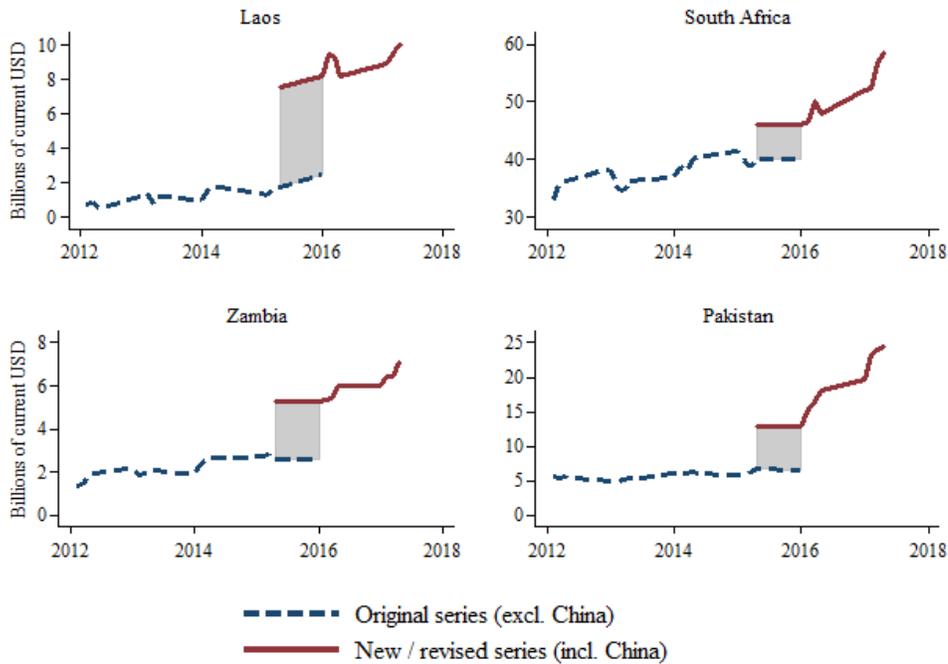
Note: This figure shows public and publicly guaranteed debt to China (red bars) for the 30 developing countries most indebted to China as of 2017 (in terms of debtor country GDP). Similarly, the blue bars show debt levels owed to the 22 governments organized in the Paris Club; the green bars show indebtedness to the IMF; the brown bars show indebtedness to the World Bank Group (including IDA and IBRD). Data on China is based on our loan-level estimates (Appendix I), data on Paris Club debt is from the Paris Club website and data on debt to IMF and World Bank is taken from the World Bank’s WDI database. Unlike in Figure 6 in the main text we only consider PPG debt, to make the stocks comparable to those of the Paris Club, the World Bank and of the IMF. We thus exclude Chinese overseas loans extended to private borrowers abroad (these are generally low, but in a few selected countries total debt to China decreases as a result).

AI.5 Comparison of loan-level debt estimates to BIS banking statistics

A secondary approach to benchmark our loan-level debt estimates builds on recently released BIS data. This approach, however, does not allow for time-series comparisons and only shows a snapshot for one year (2016). China (along with Russia) started reporting its cross-border bank claims to the BIS Locational Banking Statistics in 2016, and these claims are dominated by state-owned banks that lend overseas. The BIS is not authorized to publish data on bilateral (country to country) Chinese claims, but we can exploit the structural break in total reported claims after China joined the locational banking statistics (following the approach of Cerutti and Zhou 2018). Specifically, we focus on the fourth quarter of 2015 and the first quarter of 2016. In the original BIS time series,

the claims of China or Russia were not included. But in 2016 the series were revised backward to include total claims to all reporting countries, including the recently joined ones, and the old and new series are both publicly available. More specifically, we downloaded the new, revised series (which includes China and Russia) in February 2019 and compare it to the original series (without claims by China and Russia), which we hand-coded from the BIS Statistical Bulletins for 2015 and 2016.

Figure A5. Aggregate bank claims towards selected debtor countries (BIS)



Note: This figure shows aggregate bank claims in billions of USD towards various debtor countries (all currencies, all instruments, all sectors). We compare the BIS time series on total bank claims (dotted blue line) to a revised series that also contains bank claims by China and Russia (red line). The break in the series occurred because China and Russia started to report to the BIS in end-2015. The difference between red line and dotted blue line thus represents claims by China and Russia, i.e. the size of external debt stocks owed to the banks resident in these two creditor countries.

This procedure yields aggregate claims toward each country *with and without* China. Subtracting one series from another gives us an estimate of bilateral Chinese bank claims around the world. Figure A5 illustrates this procedure for four countries that heavily borrowed from China, namely Laos, South Africa, Zambia, and Pakistan. In each case, total claims increase substantially and the dynamics of the time series changes markedly after claims to China (and Russia) are included.

The obvious confounder here is that Russia’s bank claims were added to the BIS at the same point in time. Russia’s overseas lending, however, is much smaller and concentrated on a few regions only. Russia’s banks mostly lend to countries of the former Soviet Union, plus a few advanced countries and to offshore havens. The rest of the world, however, especially countries of Africa, East Asia and Latin America receive little if any bank loans from Russia (Cerutti and Zhou 2018).

For most countries in the sample, the approach of comparing old and new BIS series will thus generate a useful proxy of total bank claims by banks resident in mainland China. We then compare the BIS-based estimates of total Chinese claims to our own debt stock estimates. To make both estimates comparable, we drop from our estimates all debt to non-bank Chinese creditors.

As expected, the two estimates are highly correlated for the majority of countries and a scatter plot of the two sources (using end-2015 data) reveals only small deviations for the majority of countries. We do, however, find a number of anomalies that point towards under-reporting of Chinese lending in some parts of the world. In particular, our estimates significantly exceed BIS implied debt stocks for some of the riskiest and most volatile debtor countries worldwide, such as Angola, Equatorial Guinea, Venezuela or Zimbabwe.

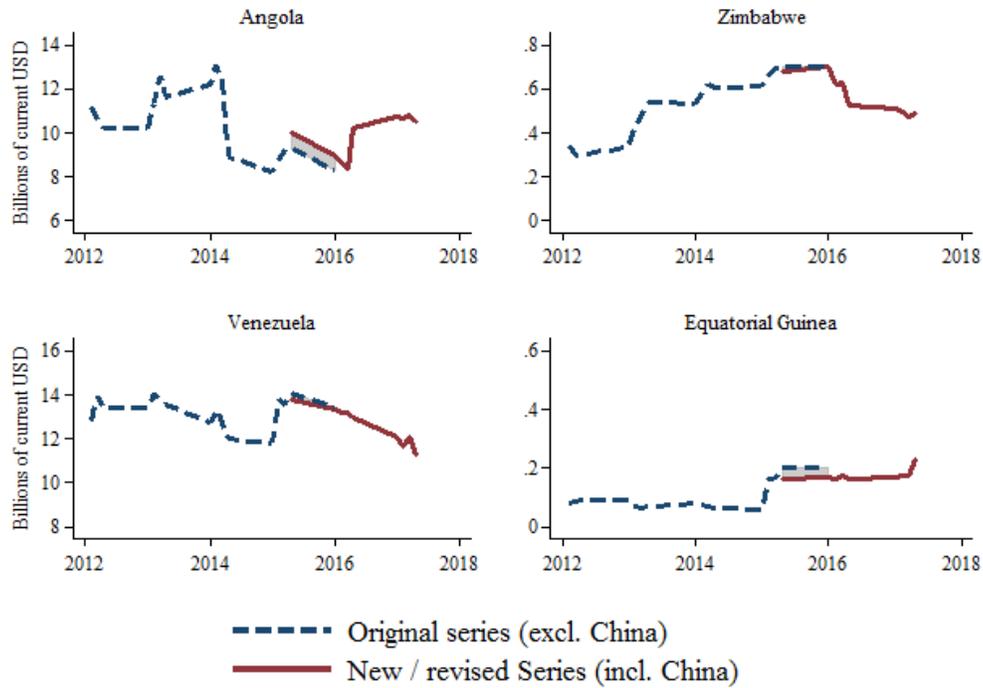
All four countries have received large amounts of Chinese bank loans, but these loans do not show up in the reported BIS banking claims. Figure A6 (Panel A) shows that the old series (without China) is very close to the new series (with China) in each case, suggesting that banks in mainland China have barely any outstanding claims towards these countries. Our loan-level dataset, however, shows that Chinese banks lent extensively to each country and our numbers are more in line with those reported in the financial press.²⁰ The scope of the discrepancies is evident in Panel B of Figure A6, which compares BIS claims by China to our own debt stock estimates for the four countries, shown as a share of debtor country GDP. As of end-2015, our bank debt estimate for Zimbabwe is 2.6 billion USD, compared to no debt in the BIS data. The gap is similarly large for the other countries, with discrepancies of 1.2 billion USD, 14 billion USD and 33 billion USD in Equatorial Guinea, Angola and Venezuela, respectively. As a share of output, the underreported claims range from 9% of GDP in Equatorial Guinea to almost 16% of GDP in Zimbabwe.²¹

²⁰ For example, the Financial Times recently reported that “At the end of 2017, Angola’s debt to China amounted to \$21.5bn” (FT, June 13, 2018, “Angola’s debt reliance on China may leave it short-changed”). Our own estimate is exactly that: 21.5 billion US Dollar as of 2017, but the BIS implied stock is almost zero.

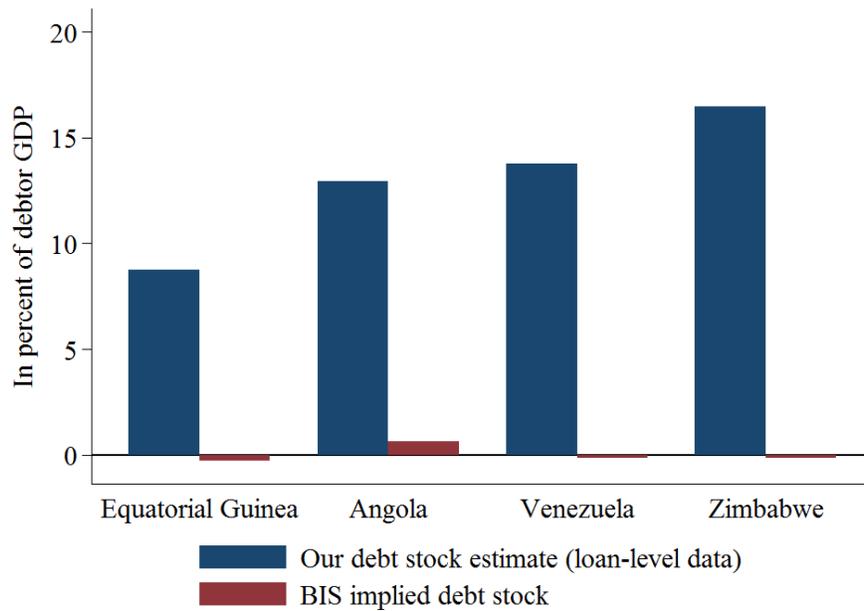
²¹ Note that hidden bank claims in the BIS Locational Banking Statistics (a source based on reporting by creditor countries) do not necessarily imply that there is also hidden debt in the World Bank’s International Debt Statistics (a source that is based on debtor country reporting).

Figure A6. Comparison to BIS data – discrepancies in crisis countries

Panel A: BIS reported debt stocks



Panel B: BIS implied debt stocks vs. our own estimates



Note: Panel A is analogous to Figure A5 above but for a different set of countries. It compares the BIS time series on total bank claims (dotted blue line) to a revised series that also contains bank claims by China and Russia (red line). The grey shaded area between these two series captures claims by China and Russia, i.e. the

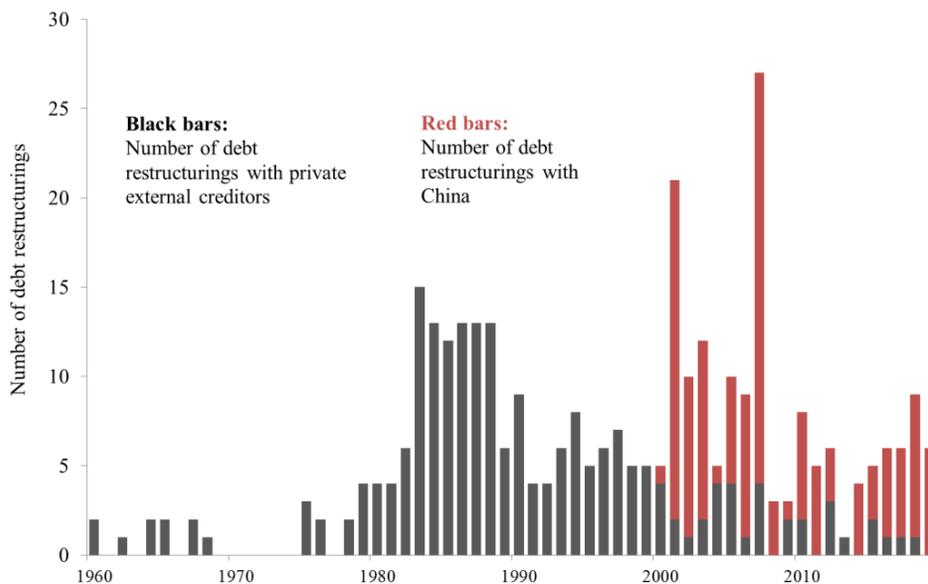
size of external debt stocks owed to banks resident in these two creditor countries. Panel B then compares the BIS-implied estimate of debts owed to China (red bars) to our own debt stock estimates (blue bars), both shown as percent of debtor country GDP (in 2015).

One potential explanation for the seeming underreporting in crisis countries is that China uses “circular lending” strategies to minimize the risk of default on its overseas loans, as described above. With loans directly disbursed to Chinese contractors and special-purpose vehicles, no cross-border transfers occur and there is no claim to report, possibly resulting in the observed data gaps. With regard to the BIS data, another potential explanation is that Chinese banks partly lend abroad through foreign affiliates and off-shore centers (Cerutti et al. 2018). In such a case, banks in mainland China would not hold direct claims against the foreign country, but their claims might instead appear elsewhere in the BIS Locational Banking Statistics. However, for high-risk countries, such as those included in Figure A6, lending through foreign affiliates cannot explain the observed gaps. Indeed, our estimates of Chinese debts owed by Angola, Equatorial Guinea, Venezuela and Zimbabwe (and other similar countries) are higher than the *total* aggregate bank claims reported in the BIS (i.e. higher than the sum reported by all BIS members combined).²²

AI.6 – Time profile of Chinese restructurings and debt write offs

Figure A7 shows the number of “missing defaults” to China by year (red bars), measured as events of debt cancelation or restructuring with China’s government or its state-owned banks and enterprises. The dark bars represent restructurings towards private external creditors, which are events typically covered by credit rating agencies and the international press.

Figure A7. Restructurings and debt write offs: Chinese overseas loans vs. private external debt



²² In addition, the patterns in Panel B of Figure A6 do not significantly change, when we take into account lending by banks from Hong Kong, the main off-shore center for Chinese banks.

Note: This figure shows the number of sovereign debt restructurings and debt write-offs with foreign banks and bondholders (black bars) using data from Cruces and Trebesch (2013) and from Meyer et al. (2019). In addition, we show restructurings and debt write-offs on outstanding debt with Chinese official creditors (red bars) using data from AidData (2017), Hurley et al. (2018) and Kratz et al. (2019); data starts in 2000.

Appendix II – Data and sources on other types of capital exports (Portfolio investments, trade debt, FDI debt, swap lines)

This appendix section moves beyond direct loans to developing countries and provides the background and data sources on other types of Chinese capital exports, in particular trade credits, FDI and PBoC portfolio holdings, which account for the large bulk of Chinese overseas claims. As a starting point, Table A3 shows a typology of Chinese capital exports by country group.

Table A3. China’s tailored approach of overseas lending and investing: a typology

<i>Country group</i>	Main instruments	Special characteristics
Low-income countries	<ul style="list-style-type: none"> ○ Direct loans ○ FDI in commodity producing industries, transport and energy 	<ul style="list-style-type: none"> ○ Official loans (by the government and state-owned companies) ○ High opacity of lending ○ Repayments often backed by collateral (e.g. oil, copper, corporate profits) ○ “Circular lending” between Chinese banks and Chinese contractors abroad (to avoid loan disbursement to debtor country government)
Middle-income and emerging markets	<ul style="list-style-type: none"> ○ Direct loans ○ Sovereign bond purchases of selected EMEs ○ Swap lines with selected EMEs ○ FDI, mainly in energy and transport 	<ul style="list-style-type: none"> ○ Official loans that are extended at market interest rates (with risk premia) ○ High opacity of lending ○ Repayments sometimes backed by collateral (e.g. oil, copper, corporate profits)
Advanced economies	<ul style="list-style-type: none"> ○ Large-scale sovereign bond purchases (especially of US, Eurozone, UK, Japan) 	<ul style="list-style-type: none"> ○ Opacity of central bank holdings ○ State-directed FDI

	<ul style="list-style-type: none"> ○ Central bank swap lines with most advanced economies (not the US) ○ FDI, in high-tech, finance, energy and transport 	
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Debt portfolio investments (PBoC asset purchases)

Reserve asset portfolio investment: As Figure 2 in the main text shows, official portfolio investments, i.e. purchases of foreign, sovereign bonds by the People’s Bank of China, account for the bulk of Chinese overseas lending. These holdings reflect China’s accumulation of large foreign exchange reserves during years of sustained and sizeable current account surpluses. The composition of foreign reserve assets is confidential and therefore no official Chinese data exists. We can, however, obtain reasonably precise estimates of Chinese exposure to different countries by using a large number of different debt sources and international statistics and by following an approach introduced by Arslanalp and Tsuda (2012).

Our starting point is given by total reserve assets as published by SAFE. We subtract from total reserves the amount of reserves held in the form of gold, in foreign bank deposits or in the form of foreign equity securities, and obtain the market value of all debt instruments held as reserve assets by the Chinese central bank. While we can obtain data on gold holdings and deposits from the PBOC and from the IMF’s International Reserve and Foreign Currency Liquidity Template, no official data exists on the share of reserves held as equity. Instead, we use an estimate based on the share of equity securities in total Chinese holdings of US securities as given by the US TIC data. This estimate suggests that around 10 percent of Chinese holdings were in the form of debt. Making these adjustments, we arrive at estimated Chinese official holdings of foreign debt securities of 2.8 trillion USD at the end of 2017.

We decompose this total into security holdings for single issuer countries by following an approach introduced by Arslanalp and Tsuda (2012). We start by using US TIC data to identify Chinese holdings of US treasury, agency and corporate debt securities and thereby identify a total of 1.3 trillion USD or close to 50% of total Chinese foreign security holdings.²³ To estimate the country allocation of the remaining 1.5 trillion USD, we work under the assumption that Chinese reserve investments are proportional to the average global reserve asset allocation and use the IMF’s Composition of Foreign Exchange Reserves (COFER) database and Table 9 of the IMF’s

²³ Given that US TIC data collects information on non-resident holders on a custodial basis, these estimates are likely to underestimate China’s security holdings. Brad Setser (2018), for example, argues that around 60 billion USD of Chinese US treasury holdings are invested through a Belgian custodian.

Coordinated Portfolio Investment Survey to assign Chinese debt security holdings to specific debtor countries (see Arslanalp and Tsuda 2012 for details).

Note that these estimates only give us the total amount of debt securities issued by a specific country and held by China. In order to additionally identify Chinese holdings of *sovereign* (central government) debt, we assume that 85% of debt securities held by China are issued by sovereigns. This assumption follows from US TIC data that shows that 85% of Chinese holdings of US debt securities are in the form of US Treasury bonds.

Non-reserve asset debt investment: In addition to debt securities held as reserve assets, China's International Investment Position reports debt securities not held as part of official reserves of 194 billion USD at the end of 2017. This sum likely represents the portfolio holdings of large state-owned banks such as the Bank of China, the Agricultural Bank of China, the China Construction Bank and the Industrial and Commercial Bank of China. For recent years the geographic composition of these investments can be inferred from China's report to the IMF's Coordinated Portfolio Investment Survey. At the end of 2017, more than half of non-reserve asset portfolio investments were held in debt securities issued by the US or other advanced country residents, 23 percent were invested in debt securities issued by offshore financial centers and 15 percent in securities issued by Hong Kong and Macao. The remaining 5 percent were invested in debt securities of developing and emerging market countries. These numbers include so called panda bonds, debt securities denominated in RMB and issued in the Chinese onshore market by non-Chinese residents. Since 2015, panda bonds have gained the interest of foreign sovereigns, with Korea, the Philippines, Hungary and Poland tapping the market and Italy recently announcing its first panda bond issue.

Portfolio equity investments

China's non-reserve portfolio equity investments amounted to 310 billion USD in the end of 2017. As in the case of non-reserve portfolio debt investments, China has reported the geographic allocation of these claims to the IMF's Coordinated Portfolio Investment Survey (CPIS). CPIS data reveals that the large majority of Chinese portfolio equity is invested in advanced economies and offshore financial centers. Around 40 % of total portfolio equity claims are held against Hong Kong residents, followed by 25% of equity claims against US residents.

Foreign direct investment

Total FDI: The statistics on FDI outflows published by China's Ministry do not capture the large amounts of Chinese outward investment channeled through offshore financial centers such as Hong Kong. As an alternative, we therefore rely on the widely used data on Chinese FDI that was hand-collected by the American Enterprise Institute and Heritage Foundation. Their "Chinese investment dataset" codes publicly known Chinese foreign investment transactions that exceed 100 million

USD since 2005 and with global coverage. We aggregate these investments into stocks of outward Chinese FDI positions and scale them by GDP.

FDI debt instruments: For China, the international investment position reveals that around 15 percent of outward direct investment is in the form of debt instruments.²⁴ The overall debt claims from direct investment therefore amounted to 232 billion USD at the end of 2017. Chinese official statistics do not reveal the geographic distribution of these claims, but a large number of recipient countries do publish the debt-equity composition of their inward FDI stocks by counterparty in the context of the IMF's Coordinated Direct Investment Survey. This way we can identify Chinese FDI debt claims vis-à-vis a total of 102 recipient countries. To arrive at an estimate for the remaining countries that do not report to the CDIS, we assume that their FDI debt to China amounts to 15 percent of the total Chinese inward FDI stock, in line with global averages.

Short-term trade debt

A substantial share of Chinese debt claims further exists in the form of trade credit. These advances to foreign importers of Chinese goods are likely to be short-term in nature and held by a large variety of Chinese state-owned and private corporations. It is reported that a substantial share of these claims is insured by China's state-owned export credit agencies (Skarp 2015). Sinosure, China's leading ECA, is reported to have provided short-term coverage for 17 percent of total Chinese exports or an equivalent of 413 billion USD in 2017 (US Ex-Im Bank 2018). While Sinosure shares data on the geographic allocation of these claims within the context of the Berne Union, no data on bilateral exposures is publicly available. In the absence of better information, we assume that short-term trade credit insurance is proportional to Chinese exports. From a recipient country perspective, this implies an outstanding stock of short-term liabilities to Chinese ECAs amounting to 17 percent of annual imports from China (short-term trade credit has maturities of one year or less).

PBOC swap lines

A final form of direct Chinese lending is given through bilateral swap lines between the PBOC and foreign central banks. Over the course of the past 10 years, the PBOC has signed swap agreements with more than 40 foreign central banks for drawing rights amounting to 550 billion USD. We collect data on the amount of outstanding drawing rights and on signature and expiration dates from press releases by the PBOC and recipient central bank balance sheets.

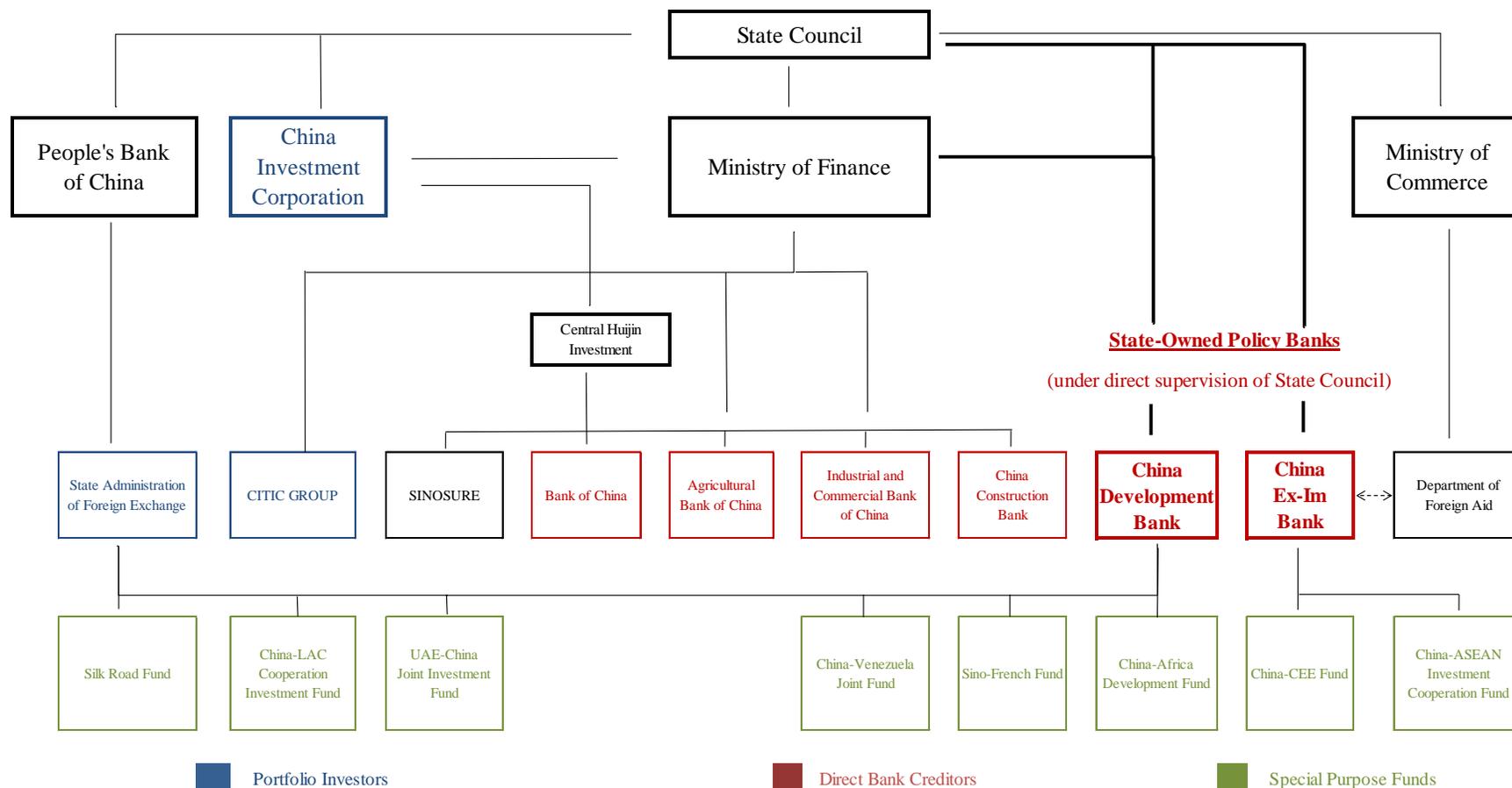
²⁴ This order of magnitude is similar to the share of debt instruments in the outward foreign direct investment of most OECD countries.

List of sources on other types of capital flows

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Appendix III – Institutional background – China’s overseas lending agencies

Figure A8. The universe of Chinese official creditors



Note: This figure shows a stylized overview of China’s main official creditor agencies (distinguishing between direct bank creditors, portfolio investors and special purpose funds) and their link to China’s political authorities. Black lines reflect ownership. Data is from annual reports and company websites.

Figure A8 gives a stylized overview on the universe of Chinese official creditor agencies. We also show the links and ownership structures between banks, portfolio investors, special purpose funds, and China's political authorities.

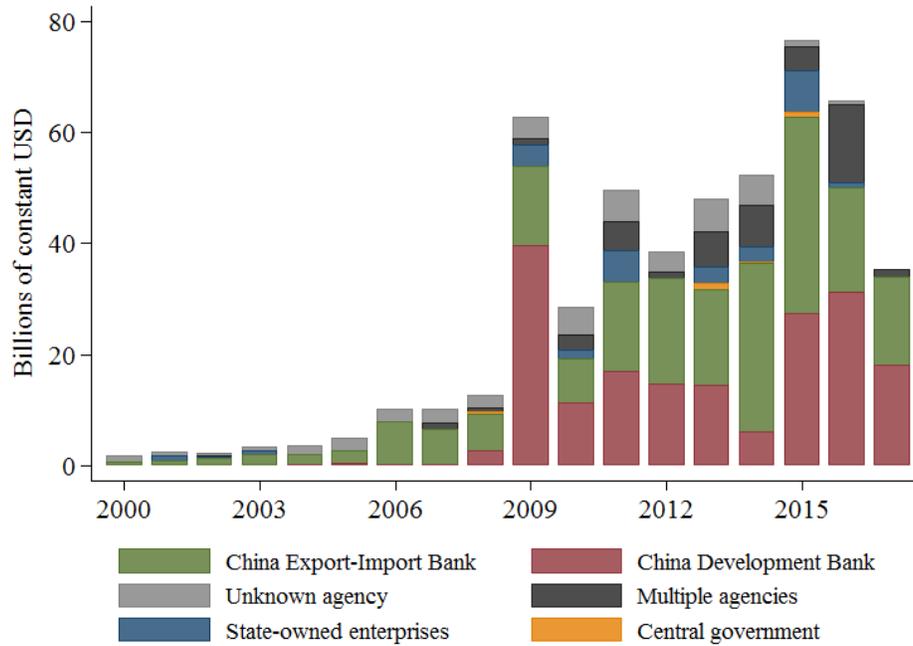
The two most important overseas creditors, by a large margin, are China's two state-owned policy banks: China Export-Import Bank and China Development Bank. Both operate under direct ownership and supervision of the Ministry of Finance and the State Council. Figure A9 below shows that the two banks have dominated Chinese foreign credit extension over the past decade.

In recent years, China's four main state-owned commercial banks have also started to engage more actively in overseas lending: the Bank of China, the Agricultural Bank of China, the Industrial and Commercial Bank of China and the China Construction Bank. They are the world's largest four banks as measured by total assets and offer a broad variety of traditional financial services. At the same time, these banks emphasize their role in furthering China's national interest, e.g. by promoting Renminbi internationalization and by acting as the "financial artery" of the Belt and Road Initiative (see for example the annual reports of the Bank of China). Over the course of the past decade, their foreign asset holdings have risen rapidly, largely driven by lending through Hong Kong and other foreign affiliates. The four banks are likely to hold a substantial part of China's 919 billion USD of bank claims on other emerging market economies (Cerutti et al. 2018).

China's foreign portfolio investments are primarily carried out by three funds. First, the State Administration of Foreign Exchange (SAFE), a subdivision of the People's Bank of China, which is in charge of managing China's official foreign exchange reserves. Second, CITIC Group and, third, the China Investment Corporation (CIC), China's official sovereign wealth fund that was established to diversify China's foreign exchange reserve holdings. Both the CITIC and CIC funds now hold broad and diversified international portfolios. Through a subsidiary, Central Huijin Investment, CIC also holds majority stakes in Sinosure, China's main Export Credit Agency, and in China's four largest commercial banks.

Finally, China Ex-Im Bank and China Development Bank manage a diverse group of special purpose funds, each with a narrower geographic mandate. Most of these funds were set up in cooperation with recipient countries and invest in foreign corporations via equity flows. Traditionally, these special funds focused on developing and middle-income countries, but in the past five years have increasingly been set up in advanced countries.

Figure A9. Composition of Chinese overseas lending by creditor agency 2000 - 2017



Notes: This figure classifies China’s overseas lending by the type of creditor, i.e. by which state-owned agencies extended the loans. The data are volume weighted using billions of constant 2015 USD. Loans by “multiple agencies” refer to package deals: these usually include concessional lending by the Chinese government or policy banks and commercial loans by state-owned enterprises and banks.

Appendix IV - Additional estimation results and robustness checks

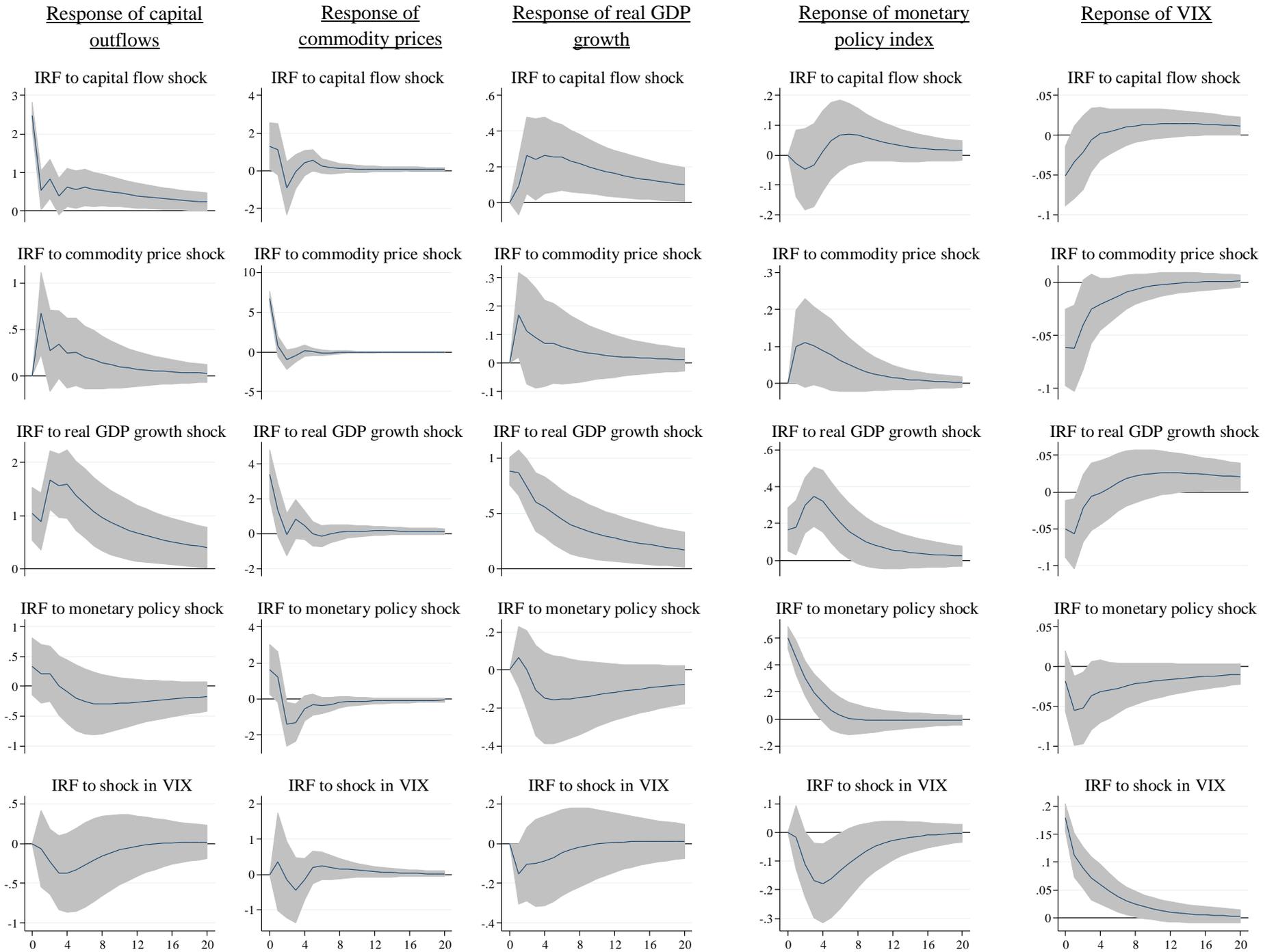
In this section, we present additional empirical results from our VAR analysis as well as a robustness check using an alternative measure of Chinese output growth.

A4.I Full VAR results

Figure A10 presents the full set of impulse response functions derived from the recursive VAR introduced in the main text above. More precisely, the figure shows the impulse functions of each of the five included variables in response to one standard deviation shocks in Chinese import commodity prices, in the Chinese real GDP growth rate, in the Chinese monetary policy index, and in the VIX. Grey shaded areas represent 90% confidence intervals based on bootstrapped standard errors and small sample degree-of-freedom adjustments for the error variance-covariance matrix.

It is reassuring that the full set of estimated impulse responses align with standard economic theory and the empirical findings of other studies. Commodity prices show a strong and positive reaction to a shock in Chinese real GDP growth. Chinese real GDP growth responds negatively (albeit not significantly) to a monetary tightening shock and responds negatively and significantly to an increase in global risk aversion, i.e. a shock in the VIX. China's monetary policy index increases (a tightening of monetary policy) in response to a positive GDP growth shock and decreases (an expansion of monetary policy) in response to a shock in the VIX. The VIX displays significant, negative impulse responses (a decrease in global risk aversion) to shocks in global commodity prices and in Chinese real GDP growth.

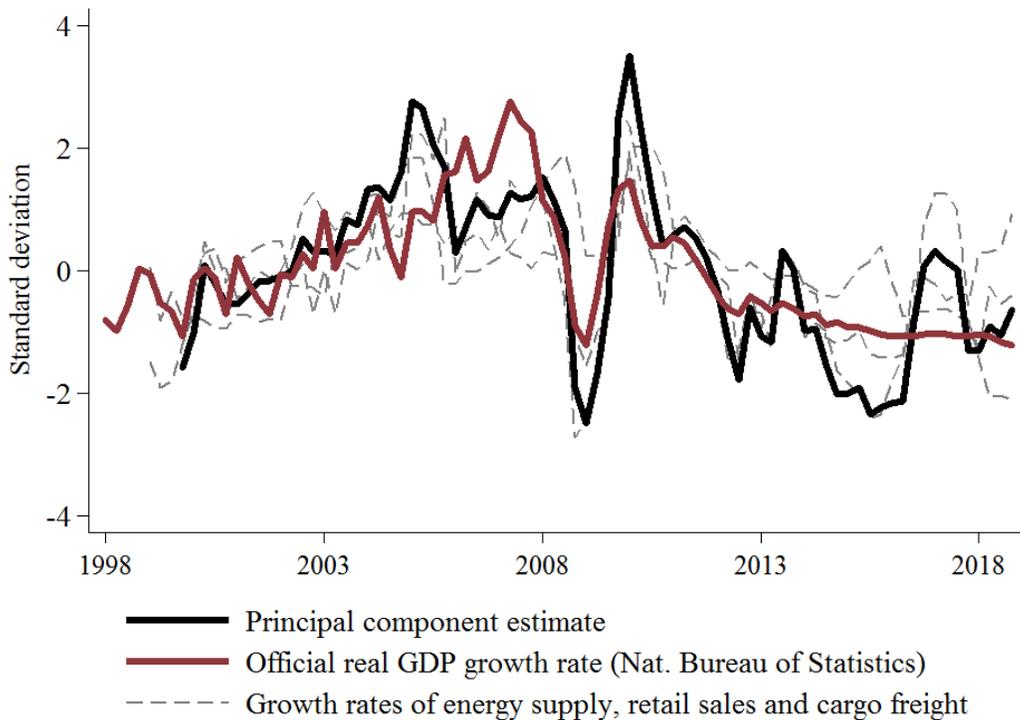
Figure A10. Full set of impulse response functions from recursive VAR



A4.II Alternative measures for Chinese real GDP growth

A growing academic literature documents statistical short-comings of Chinese official output data (see for instance Fernald et al. 2015 and Chen et al. 2019). As explained in Chen et al. (2019), Chinese official output figures are based on data collected by local authorities that face politically prescribed growth targets and thus have strong incentives to systematically over-report economic activity. A preferable indicator of growth in real Chinese economic activity might therefore be given by extracting the principal component of a variety of economic indicators that are less prone to manipulation. We implement this strategy by following Fernald et al. (2015) and construct a proxy of Chinese real economic output growth as the first principal component of the growth rates of Chinese electricity production in kilowatt hours, railway freight traffic in tons, and retail spending in billions of RMB. Figure A11 shows this estimate and compares it to the official real GDP growth rate published by the National Bureau of Statistics.

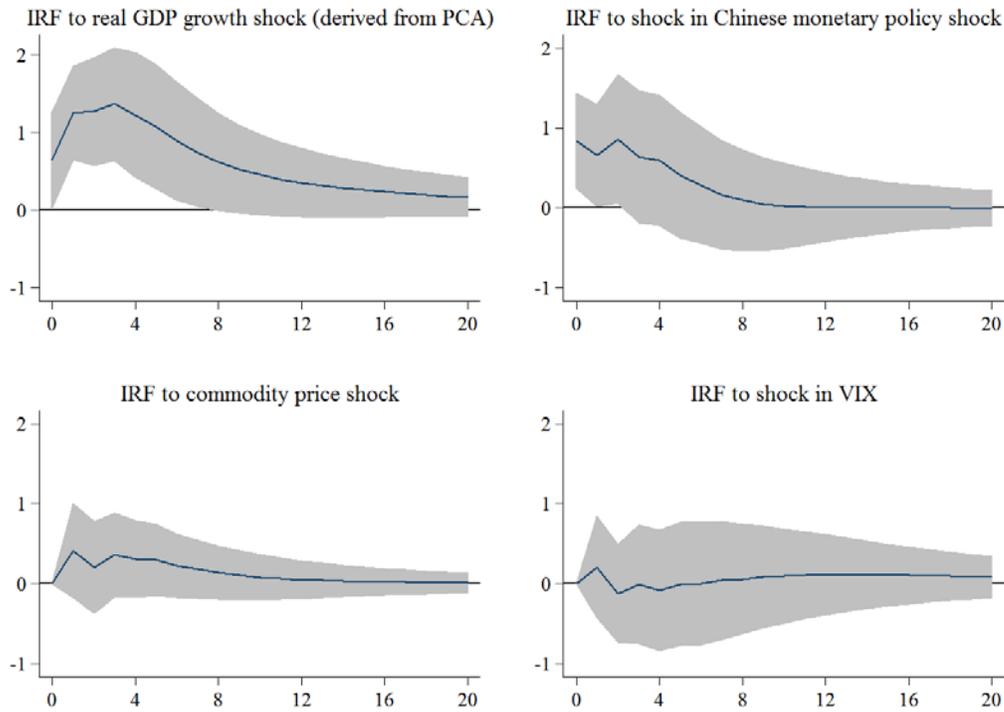
Figure A11. Principal component estimate of Chinese real GDP growth



Note: This figure compares the official Chinese real GDP growth rate as published by the Chinese National Bureau of Statistics (red line) to an estimated real GDP growth rate (black line) obtained as the principal component of the growth rates of Chinese energy supply, retail sales and cargo freight (obtained from CEIC Data).

Figure A12 below shows that the impulse response functions are similar to the benchmark result presented in the main text when replacing the official GDP growth rate with our principal component estimate.

Figure A12. Impulse response of gross Chinese capital flows – with alternative GDP measure



Note: This figure presents the impulse response functions of gross Chinese capital outflows in percent of Chinese GDP to one-standard deviation shocks in the variables shown. In contrast to our benchmark specification, Chinese real GDP growth is now estimated as the principal component of energy supply, railway freight and retail sales. Grey shaded areas represent 90% confidence intervals based on bootstrapped standard errors and small sample degree-of-freedom adjustments for the error variance-covariance matrix.

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