

Banking on the Belt and Road: Insights from a new global dataset of 13,427 Chinese development projects

Ammar A. Malik, Bradley Parks, Brooke Russell, Joyce Jiahui Lin,
Katherine Walsh, Kyra Solomon, Sheng Zhang,
Thai-Binh Elston, and Seth Goodman

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Abstract

Over the last two decades, China has provided record amounts of international development finance and established itself as a financier of first resort for many low- and middle-income countries (LMICs); however, its grant-giving and lending activities remain shrouded in secrecy. Our paper introduces a uniquely comprehensive and granular dataset of international development finance from China. It captures 13,427 projects worth \$843 billion across 165 countries in every major world region over an 18-year period. Five key insights emerge from the dataset. First, we document an extraordinary expansion in China's overseas development finance program during the first two decades of the 21st century. With annual international development finance commitments hovering around \$85 billion a year, China now outspends the U.S. and other major powers on a 2-to-1 basis or more. It is doing so with semi-concessional and non-concessional debt rather than aid: since the introduction of the Belt and Road Initiative (BRI), China has maintained a 31-to-1 ratio of loans to grants and a 9-to-1 ratio of OOF to ODA. Second, China's state-owned commercial banks have assumed an increasingly important role during the BRI era by organizing lending syndicates and other co-financing arrangements that make it possible to undertake bigger-ticket infrastructure projects. The number of "mega-projects"—financed with loans worth \$500 million or more—being approved each year tripled during the first five years of BRI implementation. Third, increasing levels of credit risk have created pressure for stronger repayment safeguards. Chief among these safeguards is collateralization, which has become the linchpin of China's implementation of a high-risk, high-reward credit allocation strategy. In the interest of securing energy and natural resources that it lacks in sufficient quantities at home and maximizing investment returns on surplus dollars and euros, China has rapidly scaled up the provision of foreign currency-denominated loans to resource-rich countries that suffer from high levels of corruption. These loans are collateralized against future commodity export receipts to minimize repayment and fiduciary risk and priced at relatively high interest rates (nearly 6%). Fourth, although the implementation of the BRI has not prompted any major changes to the sectoral or geographical composition of the country's overseas development finance program, it has marked an important transition in how China bankrolls infrastructure projects. The majority of its overseas lending was directed to sovereign borrowers (i.e., central government institutions) during the pre-BRI era, but nearly 70% is now directed to state-owned companies, state-owned banks, special purpose vehicles, joint ventures, and private sector institutions. These debts, for the most part, do not appear on government balance sheets in LMICs. However, most of them benefit from explicit or implicit forms of host government liability protection, which has blurred the distinction between private and public debt and introduced major public financial management challenges for LMICs. We find that Chinese debt burdens are substantially larger than research institutions, credit rating agencies, or intergovernmental organizations with surveillance responsibilities previously understood: 42 LMICs now have levels of debt exposure to China in excess of 10% of GDP. These debts are systematically underreported to the World Bank's Debtor Reporting System (DRS) because, in many cases, central government institutions in LMICs are not the primary borrowers responsible for repayment. We estimate that the average LMIC government is underreporting its actual and potential repayment obligations to China by an amount that is equivalent to 5.8% of its GDP. Collectively, these underreported debts are worth approximately \$385 billion. Fifth, we find that 35% of the BRI infrastructure project portfolio has encountered major implementation problems—such as corruption scandals, labor violations, environmental hazards, and public protests—but the Chinese government's infrastructure project portfolio *outside* of the BRI has encountered fewer implementation problems. We also find that BRI infrastructure projects are less likely to face problems during implementation when they are undertaken by host country organizations (or organizations that are neither from China nor host countries).

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This study draws selectively upon evidence, argumentation, and prose from our joint work with Axel Dreher, Andreas Fuchs, Austin Strange, and Michael Tierney for a new book publication entitled *Banking on Beijing: The Aims and Impacts of China's Overseas Development Program* (Dreher et al. forthcoming). Over the last ten years, an even larger group of coauthors and collaborators—including Ariel BenYishay, Samantha Custer, Sebastian Horn, Anna Gelpern, Christoph Trebesch, Scott Morris, Alysha Gardner, Richard Bluhm, Paul Raschky, Roland Hodler, Daniel Nielson, Daniel Runfola, Rachel Trichler, Lukas Wellner, and Edwin Muchapondwa—has helped refine and expand the dataset upon which this study is based by piloting coding procedures, recommending new sources and methods, and scrutinizing preliminary project records.

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1. Introduction

After eight years of implementation, China's Belt and Road Initiative (BRI) stands at a crossroads. With 140 participating countries, nearly a thousand projects underway, and hundreds of billions of dollars committed, the ambition of Beijing's flagship infrastructure program is extraordinary and without precedent. However, it is also facing major implementation challenges on the ground in host countries. Xi Jinping has described the BRI as the "project of the century" and "a road for peace, prosperity, opening-up, and innovation, connecting different civilizations" that will "build a broad community of shared interests." He has also framed it as "a new option for other countries and nations who want to speed up their development while preserving their independence."¹ Beijing's narrative of "South-South cooperation" emphasizes solidarity with the Global South and the opportunity for low- and middle-income countries (LMICs) to pursue an alternative model of development that is free from the dictates of foreign powers. As the world's largest developing country, China describes participation in the BRI as an opportunity for other countries in the Global South to learn from its experience with pulling hundreds of millions of people out of poverty. In juxtaposition to a Western model of development that has traditionally emphasized "software" investments and reforming policies and institutions, Beijing has put forward a model that focuses on "hardware" investments to ease infrastructure bottlenecks, crowd-in private capital, and drive sustainable and equitable economic growth.²

When China initially launched the BRI in 2013, countries from every corner of the globe were eager to participate. However, with the passage of time, enthusiasm has waned. There is a growing appreciation for the fact that, while Chinese infrastructure projects often generate short-term economic benefits, their long-term risks need to be carefully managed.³ Many foreign leaders continue to lavish praise upon Beijing for addressing unmet infrastructure needs (lest they alienate a uniquely important patron), but China is facing "BRI backlash" in a growing number of countries across Africa, Asia, Latin America, and Central and Eastern Europe.⁴ Some LMIC policymakers have cancelled or mothballed high-profile BRI projects because major changes in public sentiment have made it difficult to maintain close relations with China. Others, with concerns of their own, have decided to take a second look at whether the benefits of BRI participation outweigh the risks. The COVID-19 pandemic has also put Beijing on its back foot, as many BRI projects have encountered implementation challenges and a growing number of borrowers have struggled to repay their Chinese debts.⁵

China's political leadership is seemingly aware of the fact that it will need to address the concerns of host countries to sustain elite and public support for its flagship infrastructure initiative. One of the first signs that Beijing knew that a course correction was necessary came in September 2018 when Xi Jinping announced that BRI funds were "not to be spent on any vanity projects but in places where they count the most."⁶ Around the same time, the Chinese authorities recalibrated their public messaging, emphasizing that the BRI of the future would be "cleaner" and "greener." However, strategists in Beijing are still grappling with the question of how to take the global connectivity initiative forward. They could: (1) try and win to over general public in BRI participant countries and hope that their efforts will result in electoral success of pro-Beijing political parties; (2) curry favor with incumbent leaders and bank on their loyalty to Beijing and political survival; or (3) take an entirely different tack and "multilateralize" the BRI by co-financing,

¹ President Xi Jinping delivered this speech at The Belt and Road Forum for International Cooperation in 2017. See http://www.xinhuanet.com/english/2017-05/14/c_136282982.htm.

² Another important feature of China's model is its "portfolio approach." Chin and Gallagher (2019: 256) explain that "[w]hereas Western-backed [development finance institutions] and [multilateral development banks] conduct individual project financing, China's policy banks, at home and abroad, take a ... portfolio approach and finance what they refer to as 'strategic credit spaces' where bundles of loans or lines of credit are issued for an array of coordinated and corresponding projects." Coordinated public investment strategies have a rich intellectual history related to "big push" theory (Rosenstein-Rodan 1943) and "growth pole" theory (Perroux 1950; Hirschman 1958). According to Chin and Gallagher (2019: 251), "[s]ome in the senior ranks of the Chinese state policy banks have drawn inspiration from ['big push' theory], including the former chief economist at the China Development Bank [CDB], Lixing Zou, who saw CDB as having played such a coordinating role within the Chinese growth miracle."

³ For studies that measure the socioeconomic impacts of Chinese development projects, see Bluhm et al. (2018), Martorano et al. (2020), and Dreher et al. (2021a, 2021b, forthcoming). For studies that measure the negative, unintended impacts of Chinese development projects, see Brazys et al. (2017), Dreher et al. (2019, forthcoming), Isaksson and Kotsadam (2018a, 2018b), Isaksson (2020), and Iacoella et al. (2021).

⁴ See Aamir (2018), Balding (2018), Mundy and Hille (2019), Rolland (2019), and Parks (2019).

⁵ At least 28 countries that have recently sought or secured debt relief from their official creditors in China. See <http://www.sais-cari.org/debt-relief>

⁶ This quote is drawn from Shepherd and Blanchard (2018).

co-designing, and co-implementing infrastructure projects with OECD-DAC and multilateral development finance institutions and subjecting these projects to international standards and safeguards.⁷

Until recently, Beijing did not have much reason to worry about competition in the global infrastructure finance market. However, with new leadership in White House and strong bipartisan support in Congress, the U.S. government and its allies in the industrialized world are seeking to develop a viable alternative to the BRI. Under the auspices of the Build Back Better World (B3W) initiative that the G7 announced in June 2021, an effort is now underway to create a separate, global infrastructure initiative that is guided by the principles of sustainable and transparent financing, good governance, public sector mobilization of private capital, consultation and partnership with local communities, and strict adherence to social and environmental safeguards.⁸

For countries in the developing world that face multi-billion-dollar deficits and fiscal crises due to pandemic-induced revenue shortfalls, strategic competition between China and the G7 could create an extraordinary opportunity to address unmet financing needs in several key infrastructure sectors. However, it is unlikely that the benefits of participation in B3W and BRI will accrue evenly across LMICs. Countries with weak environmental standards, labor protections, and anti-corruption institutions are probably less well-positioned to benefit from a “golden era” of global infrastructure financing.⁹

In this pivotal moment, it is more important than ever that G7, Chinese, and host country policymakers base their decisions upon hard evidence rather than opinions and conjecture. AidData’s team of more than 135 faculty, professional staff, and research assistants has sought to establish a stronger evidentiary foundation for analysis and decision-making by painstakingly assembling a comprehensive dataset of Chinese government-financed development projects. The purpose of this paper is to introduce AidData’s Global Chinese Development Finance Dataset (Version 2.0) and highlight the ways that it can be put to productive use.

Section 2 provides an overview of the dataset’s most important features and how it has evolved over time to accommodate changes in the nature, scale, composition, and geographical distribution of Chinese development finance that have taken place since the BRI was introduced. In Section 3 of the paper, we use the 2.0 dataset to answer the following questions:

- What is the true scale, scope, and composition of China’s overseas development finance program? Which countries and sectors has Beijing prioritized? Are Chinese development projects primarily financed with aid (ODA) or debt (OOF)? How does the concessionality of China’s overseas lending compare to the concessionality of lending from other official creditors?
- How has the BRI altered China’s overseas development finance program? How much financing and what types of financing does Beijing provide to BRI participants? What does Chinese development finance look like in countries that opt out of BRI?
- What are the specific terms and conditions that govern official sector loans from China? How do Chinese state-owned lenders minimize repayment risk? How do they balance risk and reward?

Then, in Section 4, we use the 2.0 dataset to answer a set of questions about Chinese debt:

- How much debt have LMIC governments accumulated from Chinese state-owned lenders? What is the scale of the so-called “hidden debt” problem? Which countries have the highest levels of sovereign debt exposure and hidden debt exposure to China?

⁷ One of the first signs that China was considering a course correction came when Xi Jinping announced in 2017 that “[w]e will [...] strengthen international cooperation on anticorruption in order to build the Belt and Road Initiative with integrity” (quoted in Abi-Habib 2018). Then, in 2018, he gave a speech at the Second Belt and Road Forum for International Cooperation where he announced that China would “adopt widely accepted rules and standards and encourage participating companies to follow general international rules and standards in project development, operation, procurement and tendering and bidding (Xi 2019)

⁸ B3W will also focus specifically on infrastructure investments that support climate change mitigation and adaptation, global health, digital technology, and gender equity and equality. See <https://www.whitehouse.gov/briefing-room/statements-releases/2021/06/12/fact-sheet-president-biden-and-g7-leaders-launch-build-back-better-world-b3w-partnership/>

⁹ Such countries will most likely find it difficult to participate in B3W. They may not have difficulty participating in the BRI but evaluating whether the rewards of BRI participation outweigh the risks will likely be a significant challenge. While some LMIC government agencies lack the capacity to evaluate these risks, others have incentives to maximize short-term rewards and discount long-run risks.

- Are LMIC governments fully disclosing their actual and potential repayment obligations to China via official reporting systems—like the World Bank’s Debtor Reporting System (DRS)? If not, why not?
- When and how do Chinese state-owned lenders provide debt relief to borrowers who cannot meet their repayment obligations?

In Section 5, we use the 2.0 dataset to answer a set of questions about the implementation of BRI infrastructure projects:

- What types of problems do BRI infrastructure projects most frequently—and least frequently—encounter during implementation? Corruption scandals, labor strikes, environmental disasters, defaults, bankruptcies, public protests?
- How are BRI infrastructure projects different from other Chinese government-financed infrastructure projects? How do these two types of projects fare during implementation?
- When Chinese state-owned lenders enter into co-financing arrangements, do BRI infrastructure projects perform any differently?
- Which organizations are responsible for implementing BRI infrastructure projects? Do these projects fare any better or worse during implementation when they are undertaken exclusively by host country organizations? What if they are jointly implemented by Chinese organizations and host country organizations? Which organizational characteristics correlate with better project performance?

Finally, in Section 6, we conclude by highlighting several new and improved features of the 2.0 dataset that may be particularly useful to analysts and decision-makers.

2. AidData's Global Chinese Development Finance Dataset, Version 2.0

2.1 The evolution of AidData's research program on Chinese development finance since 2013

Over the last two decades, China has provided record amounts of international development finance and established itself as a financier of first resort for many low-income and middle-income countries (LMICs); however, its grant-giving and lending activities remain shrouded in secrecy. Beijing's reluctance to disclose detailed information about its overseas development finance portfolio has made it difficult for LMICs to objectively weigh the costs and benefits of BRI participation. This informational void has also made it difficult for bilateral aid agencies and multilateral development banks to determine how they can confront and compete—or coordinate and collaborate—with Chinese government institutions. As the G7 rolls out the B3W initiative, access to timely, reliable, and comprehensive information about Chinese development projects will be essential for evidence-based decision making.

Since 2013, AidData has led a far-reaching effort to shed light on official financial transfers from China by developing a transparent, systematic, and replicable methodology—called Tracking Underreported Financial Flows (TUFF)—that enables the collection of detailed financial, operational, and locational information about Chinese government-financed development projects. The application of the TUFF methodology initially resulted in several region-specific datasets, which were published between 2013 and 2017 (Muchapondwa et al. 2016; BenYishay et al. 2016; Strange et al. 2017; Bluhm et al. 2018; Dreher et al. 2018, 2019).¹⁰ Then, in October 2017, AidData released the first global version of its dataset which captured 4,300 projects worth \$350 billion across 138 countries (Dreher et al. 2021, forthcoming).¹¹ The earlier versions of this dataset were used in over 250 research publications that were cited over 4,000 times. It was also used more than 450 times in international media outlets like the Financial Times, the New York Times, the Wall Street Journal, the Washington Post, the Economist, and BBC World Service. The China-specific sections of AidData's website, featuring thousands of project webpages, have now been viewed over 1.3 million times by visitors from more than 180 countries, which reflects the high level of demand that exists for reliable information about China's overseas development program.

2.2 Key features of AidData's Global Chinese Development Finance Dataset, Version 2.0

AidData's objective is to facilitate rigorous analysis and support evidence-based decision-making by providing comprehensive, reliable, and granular data on China's overseas development finance program. To this end, we have re-engineered the TUFF methodology to make more extensive use of official sources, such as grant and loan agreements published in government registers and gazettes, official records extracted from the aid and debt information management systems of host countries, annual reports published by Chinese state-owned banks, Chinese Embassy and Ministry of Commerce websites, reports published by parliamentary oversight institutions in host countries, and our own direct correspondence with finance ministry officials in developing countries.¹² The latest (2.0) version of our dataset captures 13,427 projects in 145 countries supported by financial and in-kind transfers from official sector institutions in China. It covers every low-income, lower-middle income, and upper-middle income country and territory across every major world region, including Africa, Asia, Oceania, the Middle East, Latin America and the Caribbean, and Central and Eastern Europe (including 20 *additional* countries where systematic searches were undertaken but no

¹⁰ Version 1.1 of AidData's Chinese Official Finance to Africa Dataset was released in April 2013. Version 1.2 of AidData's Chinese Official Finance to Africa Dataset was released in September 2015. A subnationally georeferenced iteration of Version 1.2 was released in January 2017. At the same time, we released a subnationally georeferenced dataset of Chinese development projects in the Tropical Andes of South America, the Great Lakes of Africa, and the Mekong Delta of Southeast Asia.

¹¹ At the time of its release, AidData referred to this dataset as the Global Chinese Official Finance Dataset (Version 1.0). We will refer to future versions of the dataset as AidData's Global Chinese Development Finance Dataset.

¹² Custer et al. (2021)

Chinese government-financed projects were identified).¹³ With respect to temporal coverage, the dataset tracks projects over eighteen commitment years (2000-2017), with details on the timing of project implementation over a 22-year period (2000-2021).¹⁴ 10,849 of the 13,427 records in the dataset are formally approved, active, and completed projects. These projects are collectively worth \$843.1 billion. The remaining 2,577 projects in the 2.0 dataset are (i) projects that secured official financial or in-kind commitments from China but were subsequently suspended or cancelled, (ii) projects that secured pledges of financial or in-kind support from official sector institutions in China but never reached the formal approval (official commitment) stage; and (iii) so-called “umbrella” projects that are designed to support multiple, subsidiary projects.¹⁵

One of the most important features of the dataset is its comprehensive scope. It covers all regions, all sectors, and all sources and types of financial and in-kind transfers from government and state-owned institutions in China. There are other datasets that capture official financial transfers from China to a single sector (e.g., energy) or region (e.g., Latin America), or that only track certain types of financial flows (e.g. loans) and funding sources (e.g. China’s policy banks).¹⁶ However, 2.0 version of AidData’s dataset is unique in that it captures the full range of projects that align with the OECD definitions of Official Development Assistance (ODA) and Other Official Flows (OOF). Any project that benefits from financial or in-kind support from any official sector institution in China is included. The projects in the 2.0 dataset are supported by 334 unique official sector institutions in China, including central government agencies (like the Ministry of Commerce, the Ministry of Foreign Affairs, and the Ministry of Agriculture), regional and local government agencies (like Chongqing Municipal Health Commission and Tianjin Municipal Government), state-owned enterprises (like China National Petroleum Corporation, China National Aero-Technology Import & Export Corporation, and China Machinery Engineering Corporation), state-owned policy banks (like China Development Bank and China Eximbank), state-owned commercial banks (like Bank of China, China Construction Bank, and the Industrial and Commercial Bank of China), state-owned funds (like the Silk Road Fund), and non-profit government organizations (like Hanban and the China Foundation for Poverty Alleviation). For a comparison of the 2.0 dataset to other Chinese development finance datasets, see Table A-1 in the Appendix.

The scale, diversity, quality, and transparency of the sourcing that underpins the 2.0 dataset also sets it apart from others. We assembled the dataset with 91,356 sources (including 63,464 unique sources in more than a dozen languages, of which 34,075 are official sources).¹⁷ Whereas the average project record in the 1.0 dataset was based upon 3.6 sources, the average project record in the 2.0 dataset is based upon 6.8 sources. Perhaps most importantly, 89% of the project records in the 2.0 version of our dataset are underpinned by at least 1 official source (compared to 62% of the project records in the 1.0 dataset). Another new feature of the 2.0 dataset is the inclusion of a “staff comments” field in which we identify the assumptions, logic, and evidence that we used to address challenging coding and categorization determinations. In the interest of exposing our coding and categorization determinations to public

¹³ We used the 2.0 version of the TUFF methodology to systematically search for projects supported by official financial and in-kind transfers from China across 165 countries and territories. We identified Chinese government-financed projects in 145 countries and territories and no such projects in 20 countries and territories. For more details, see Table A-2 in the Appendix. The dataset provides comprehensive coverage across low-income, lower-middle income, and upper-middle income countries and territories. 11 high-income countries and territories are also included in the 2.0 dataset to help ensure comprehensive coverage in every major world region to the extent possible.

¹⁴ The 2.0 dataset includes three different “year” variables: a project’s official commitment year, its implementation start year, and its completion year. As such, it captures variation in project implementation over a twenty-one-year period (2000-2021).

¹⁵ For analysis that requires the aggregation of projects supported by official financial and in-kind commitments from China, we recommend using the *Recommended_for_Aggregates* marker variable to isolate formally approved, active, and completed projects (and avoid double-counting projects and monetary amounts). For analysis of suspended projects, cancelled projects, and projects backed by informal pledges, we do not recommend using the *Recommended_for_Aggregates* filter.

¹⁶ For a comparison of the 2.0 dataset to other Chinese development finance datasets, see Table A-1 in the Appendix.

¹⁷ In many cases, official sources provide information about multiple projects, which is one of the main reasons why the total number of unique sources is 63,464 but the total number of sources is 91,356. The 2.0 version of AidData’s Global Chinese Development Finance Dataset relies primarily upon Chinese-, English-, Spanish-, French-, Portuguese-, Russian-, and Arabic-language sources. However, for certain countries, it uses other local language sources (e.g., Farsi sources in Iran, Dutch sources in Suriname, Vietnamese sources in Vietnam).

scrutiny and promoting replicable research findings, we disclose all the sources that were used to construct the dataset at the project level.¹⁸

These sourcing improvements have enabled AidData to (1) capture financial and in-kind transfers from an expanded pool of official donors and lenders, (2) document more of the terms and conditions that govern financial agreements with LMICs, (3) track the implementation of projects over time and geographic space with higher levels of measurement precision, and (4) construct detailed narrative descriptions that explain *how* Chinese development projects are being designed, implemented, monitored, and evaluated in practice. The 2.0 dataset includes 70 variables and fields, which not only provide granular details about individual projects but also make it possible to compare Chinese development finance with other sources of development finance, including members of the OECD-DAC and multilateral institutions. These variables and fields fall into several categories:

- **Basic Project Information:** The 2.0 dataset provides foundational information about each project, including its title in English, Chinese, and host country languages, a unique and stable project identification number, the date of the official commitment, the monetary value of the official commitment, the currency in which the official commitment was denominated, the identity of the funder and recipient, the primary purpose of the project, and URLs for all of the sources that supported the creation of the project record.¹⁹
- **Transactional Details:** The 2.0 dataset identifies the nature of the financial or in-kind transfer (e.g., grant, loan, technical assistance, export buyer's credit, export seller's credit, supplier's credit, debt forgiveness, debt rescheduling, scholarship/training) supporting each project in the dataset. Whenever applicable, it documents loan and export credit pricing details (interest rate, maturity, grace period, management fee, commitment fee); levels of financial concessionality, as measured by the OECD-DAC's grant element calculator; the monetary value and timing of disbursements and repayments; the use of credit enhancements, including guarantees, insurance, and collateral; the establishment of special purpose vehicles, subsidiary on-lending arrangements, and escrow/proceeds/revenue/special accounts; and the monetary value and timing of underlying commercial contracts. The dataset also provides stable URLs to a large number of unredacted grant, loan, export credit, debt forgiveness, and debt rescheduling agreements whenever they have been successfully retrieved. AidData published a subset of these financing agreements at the time of the release of the "How China Lends" study (Gelpern et al. 2021). However, the 2.0 dataset provides the full set of agreements retrieved by AidData.
- **Development Finance and Sector Categorization:** To facilitate comparisons to other international sources of development finance, the 2.0 dataset categorizes projects as Official Development Assistance (ODA) or Other Official Flows (OOF) based on measurement of the project's primary intent and the concessionality level of the financing provided for the project (see Box 2 for more details). AidData adheres to OECD-DAC reporting directives that define specific eligibility criteria for ODA and OOF. The 2.0 dataset also assigns 3-digit OECD sector codes and names to all projects using OECD-DAC classification criteria, which again enables comparisons to other bilateral and multilateral sources of international development finance that use the same criteria. In a new book entitled *Banking on Beijing: The Aims and Impacts of China's Overseas Development Program*, our longtime collaborators from Heidelberg University, the University of Göttingen, the University of Hong Kong, and William & Mary argue that the failure to use common definitions and consistent

¹⁸ To provide users with an objective way to evaluate the sourcing that underpins individual project records, we also provide two project-level metrics. The Source Quality metric varies on a scale of 1 to 5, with 1 indicating exclusive reliance upon unofficial sources (e.g., media reports) and 5 indicating reliance upon multiple, official sources. The Data Completeness metric varies on a scale of 1 to 5, with 5 indicating that the foundational fields of the project record are complete. The "threshold" for a score of 5 is similar to key fields from OECD Official Finance data (firm commitment year, transaction amount, flow type/flow class, funding agency, and implementing or receiving agency). For more information on the criteria used to construct these metrics, see Custer et al. (2021).

¹⁹ AidData's 2.0 dataset is different from other Chinese development finance datasets in that it measures financial commitments in constant (i.e., inflation-adjusted) U.S. dollars (USD). It does so by capturing official financial commitments in their original currencies of denomination, converting these financial amounts into nominal USD values at the average exchange rates that were in effect during the commitment years, and subsequently converting the nominal USD values to constant 2017 USD values using the OECD's deflation methodology (to adjust for inflation and ensure comparability over time and geographic space). For a broader comparison of the 2.0 dataset to other Chinese development finance datasets, see Table A-1 in the Appendix.

measurements of international development finance has led to misleading and inaccurate comparisons, which have confused rather than informed decision-makers (Dreher et al. forthcoming).²⁰

- **Stakeholder Organizations:** The 2.0 dataset provides detailed information about the organizations that are involved in Chinese government-financed development projects. Specifically, it provides information about five different types of organizations for each project: (1) the official sector institution in China that is responsible for providing funding and/or in-kind support for the project; (2) the co-financing institutions from inside and outside of China that are supporting the same project; (3) the recipient institutions that are responsible for managing incoming funds and in-kind transfers; (4) the contractors and subcontractors that are responsible for project implementation, and (5) the third-parties that provide repayment guarantees, credit insurance policies, and collateral which can be seized in the event of default. Each of these organizations is categorized by type (i.e., Government Agency, State-Owned Bank, State-Owned Company, State-Owned Fund, Intergovernmental Organization, Special Purpose Vehicle/Joint Venture, Private Sector, NGO/CSO/Foundation) and country of origin (i.e., China, Recipient Country, or Other).²¹ The dataset identifies 334 official sector institutions in China that provide funding and/or in-kind support, 460 co-financing institutions (some of which are traditional bilateral and multilateral agencies that have chosen to participate in syndicated loans or other types of consortia with Chinese counterparts), 2,450 recipient institutions, 3,523 implementing institutions, and 227 third-parties (“accountable agencies”) that provide repayment guarantees, credit insurance policies, and collateral which can be seized in the event of default.
- **Spatio-Temporal Rollout of Project Implementation:** The 2.0 dataset provides an unprecedented level of detail on project implementation start dates, project completion dates, and the precise geographical locations where projects take place. AidData was able to identify precise implementation start dates for 5,539 projects and precise project completion dates for 6,061 projects. The 2.0 dataset also provides data on the originally scheduled project implementation start dates and completion dates, so that users can determine if projects have been implemented on schedule, behind schedule, or ahead of schedule. Additionally, for 3,285 projects that have physical footprints or involve specific locations, the 2.0 dataset extracts point, polygon, and line vector data via OpenStreetMap URLs and provides a corresponding set of GeoJSON files. In Section 6 of this paper, we explain how these data on the spatio-temporal rollout of project implementation can be used to measure the intended and unintended impacts of Chinese development projects.
- **Project Risks, Setbacks, Achievements, and Failures:** The 2.0 dataset provides a suite of variables and fields that allow users to track projects over their full life cycles. Each project is assigned to one of six “Status” categories: Pipeline: Pledge, Pipeline: Commitment, Implementation, Completed, Suspended, or Cancelled.²² The 2.0 dataset also provides detailed project narratives that “tell the story” of each project (in the “Description” field). The narratives document the various risks and challenges that arose during project design and implementation (e.g., protests, scandals, and public health restrictions) and how funding, receiving, implementing, and accountable institutions responded to these risks and challenges. They also capture project achievements and failures, contractor performance vis-à-vis deadlines and deliverables, and findings from project audits and evaluations. The average length of each project narrative in the 2.0 dataset is 144 words,

²⁰ The definition and measurement of “aid” is a case in point. There is an internationally accepted definition and standard for measuring aid that is called Official Development Assistance (ODA). However, to the best of our knowledge, there is no organization other than AidData that uses the formal definition of ODA to determine which Chinese government-financed activities qualify as aid in the strict sense of the term. Consequently, some analysts claim that China’s aid giving rivals that of other major donors, while others claim that China is a relatively small player in the aid market. These disagreements are rooted in basic definitional and methodological differences (Strange et al. 2017; Dreher et al. 2018, forthcoming)

²¹ Over half (58%) of the implementing institutions in the 2.0 dataset are from China, with another 35% from host countries. The remaining 8% consists of organizations outside China and the host country (e.g., intergovernmental organizations).

²² A project assigned to the “Pipeline: Pledge” category is one that an official sector institution in China indicated it was interested in supporting (or willing to consider supporting) but did not result in an official commitment. Projects assigned to this category include those that are identified in letters of intent, term sheets, memoranda of understanding, and non-binding announcements. All projects given a status designation of Pipeline: Commitment, Implementation, Completed, Suspended, or Cancelled reached the official commitment stage (i.e., a binding, written agreement that governs the provision of financial or in-kind support for a specific project/purpose was signed by an official sector donor or lender in China and an entity in a recipient country). A project assigned to the “Pipeline: Commitment” category is one that is backed by an official commitment but has not yet entered implementation. A project assigned to the “Implementation” category is one that is backed by an official commitment and has begun implementation with financial or in-kind support from the source of the commitment. A project assigned to the “Completion” category is one that is backed by an official commitment and that reached completion with financial or in-kind support from the sources of the commitment. Projects assigned to the “Suspended” and “Cancelled” categories are those that were backed by an official commitment but subsequently suspended or cancelled. The coding of the “Status” field in the 2.0 dataset is based on sources that were available as late as August 2021.

and when all the narratives are stitched together, they are as long as 19 full-length books (1.93 million words).²³ Additionally, AidData has created individual webpages (with stable URLs) for each project—and project narrative—on the aiddata.org website.

In the next section of this paper, we use the 2.0 dataset to explore the nature, scale, and geographical distribution of China's overseas development finance program. We also explore whether the rollout of the BRI has coincided with any major changes in China's overseas development finance program.

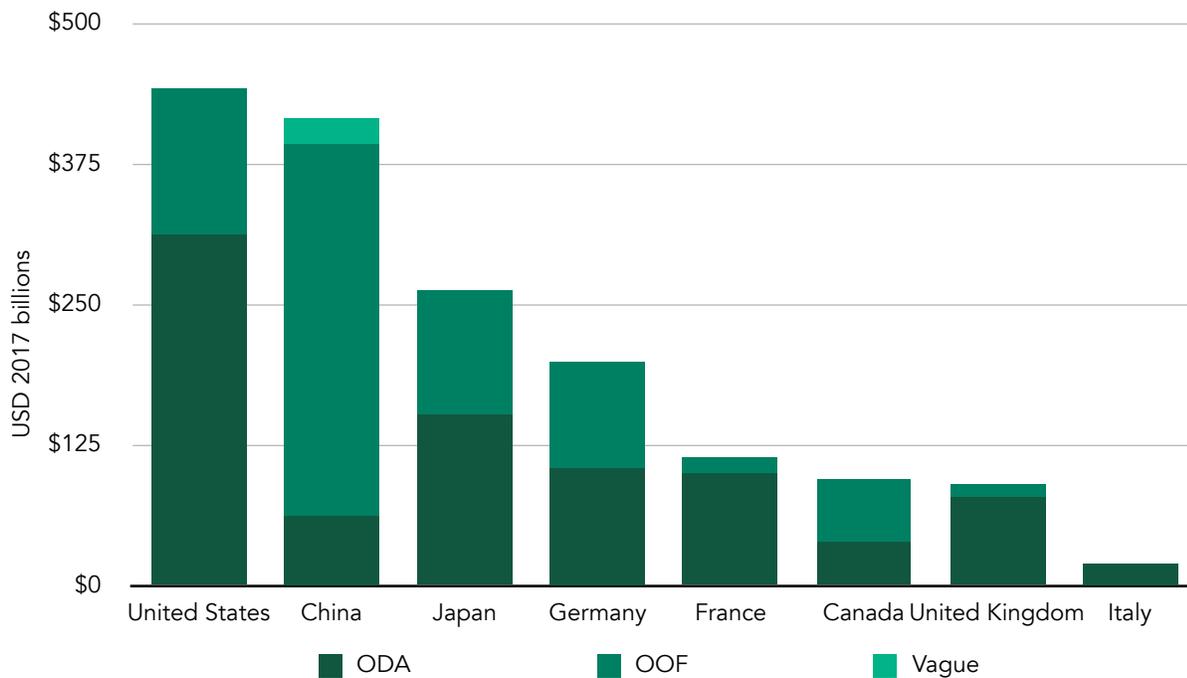
²³ A typical, full-length book includes 100,000 words.

3. The changing nature, scale, composition, and distribution of Beijing's overseas development finance program

3.1 How much is China spending—and where is the money going?

Figure 1 demonstrates that, during the first thirteen years of the 21st century (2000-2012), China and the United States were overseas spending rivals: average annual development finance commitments from China amounted to \$32 billion and average annual development finance commitments from the U.S. were roughly on par (nearly \$34 billion). However, during the first five years of BRI implementation (2013-2017), China's overseas development finance program underwent a dramatic expansion, with Beijing outspending Washington on a more than two-to-one basis (see Figure 2).²⁴ China spent \$85.4 billion a year (on average) and the U.S. spent \$37 billion a year (on average) during this period.²⁵

Figure 1: International development finance from China and the G7, 2000-2012

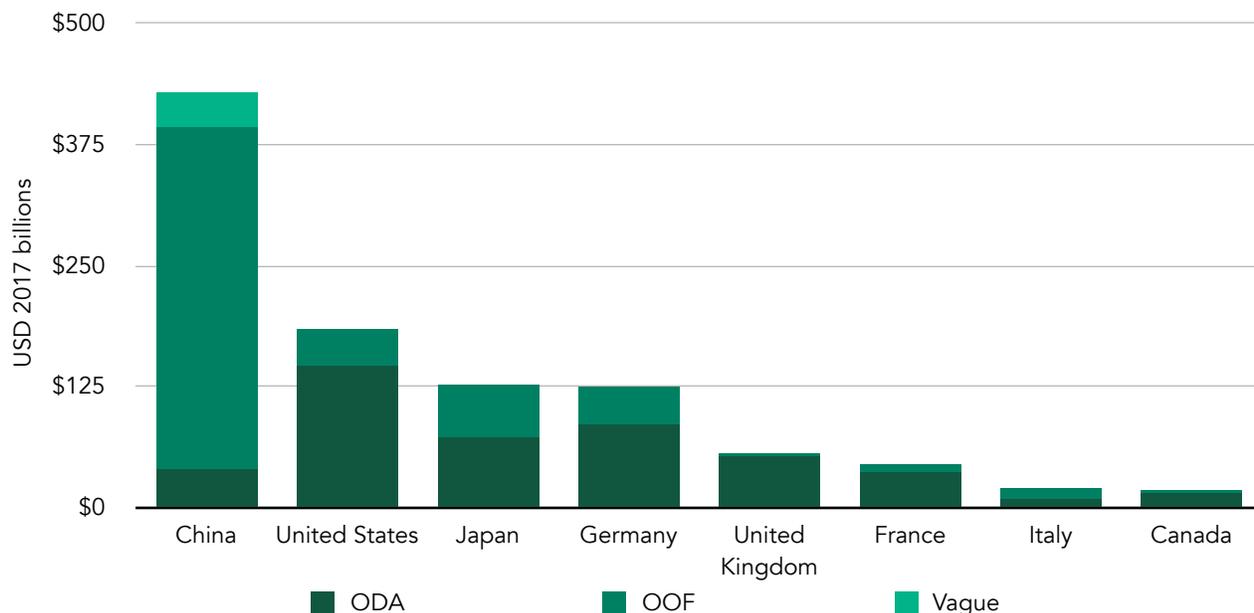


Source: OECD-DAC and AidData.

²⁴ By the fourth year (2016) of BRI implementation, China was outspending the U.S. on a 3.6-to-one basis (see Figure 3, below).

²⁵ These estimates are based on Figure 2.

Figure 2: International development finance from China and the G7, 2013-2017



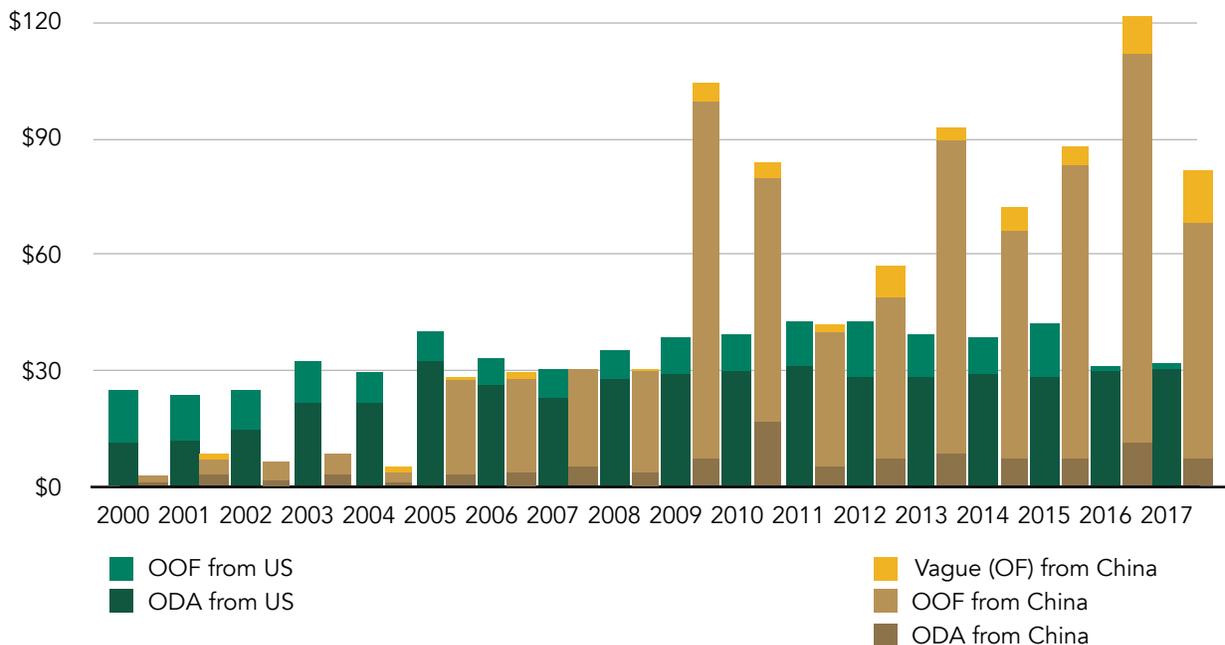
Source: OECD-DAC and AidData.

The 2.0 dataset also reveals that Beijing and Washington are delivering very different types of overseas development finance (see Figure 3). Whereas the U.S. provided 73% of its international development finance via grants and highly concessional loans (or “ODA” as defined by the OECD-DAC and described in Box 1) between 2000 and 2017, China only provided only 12% of its international development finance via ODA during the same period. Beijing financed the lion’s share (81%) of its international development finance portfolio with semi-concessional and non-concessional loans and export credits (or “OOF” as defined by the OECD-DAC and described in Box 1).²⁶ Figure 4 also demonstrates that the overseas spending behavior of other members of the G7 (Canada, France, Germany, Italy, Japan, the United Kingdom) more closely resembles that of the U.S. than China: most of their international development finance commitments were provided as ODA rather than OOF between 2000 and 2017.²⁷

²⁶ While 81% of China’s overseas development finance portfolio was provided via OOF-like commitments and 12% was provided via ODA-like commitments between 2000 and 2017, the remaining 7% consisted of “Vague (Official Finance)” commitments that were backed by an official commitment from China but could not be reliably categorized as ODA or OOF because of insufficiently detailed information. Projects in this residual category primarily consist of (a) those with an unspecified “Flow Type” (i.e., values of “Vague TBD”); and (b) those financed with loans for which AidData lacks the borrowing terms (interest rates, grace periods, or maturity dates) needed to make financial concessionality determinations.

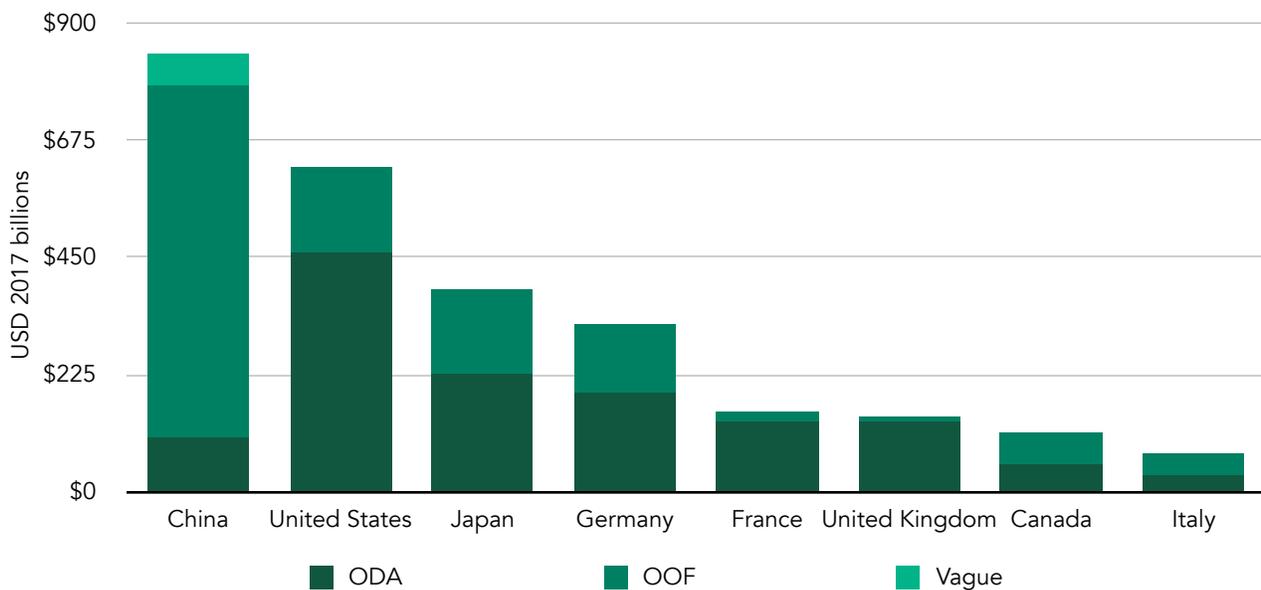
²⁷ However, there is significant variation within the G7. According to Figure 4, between 2000 and 2017, more than 73% of official financing from the U.S., 90% of official financing from the United Kingdom, and 87% of official financing from France was provided via ODA. The composition of official financing was more evenly distributed between ODA and OOF in Germany, Japan, Canada, and Italy during this period.

Figure 3: Official Development Assistance (ODA) and Other Official Flows (OOF) from the U.S. and China, 2000-2017



Source: OECD-DAC and AidData.

Figure 4: China's ODA and OOF portfolio compared to G7 countries, 2000-2017



Source: OECD-DAC and AidData.

Box 1: How AidData measures financial concessionality and project intent

As part of its data collection and classification system, AidData designates each project as Official Development Assistance (ODA) or Other Official Flows (OOF) based on measurement of (a) the concessionality level of the financing provided for a project, and (b) the intent of the project. This is a unique feature of the 2.0 dataset that sets it apart from other publicly available datasets that measure Chinese development finance (see Table A-1 in the Appendix). It is especially useful for analysts and policymakers who wish to compare or benchmark Chinese development finance against other international sources of development finance.

For loans and export credits, AidData uses the OECD-DAC concessionality calculator to determine the “grant element” of the financial transfer. This measure, which varies from 0 percent to 100 percent, captures the generosity of a loan/export credit or the extent to which it is priced below-market rates.²⁸ Loans and export credits provided on market terms have a grant element of 0 percent. Pure grants have a grant element of 100 percent. To calculate the grant element of a loan/export credit that is provided on below-market (concessional) terms, one needs to calculate the discounted cost (or “net present value”) of the future debt service payments that will be made by the borrower. This calculation requires information about the face value, maturity length, grace period, and interest rate of the loan/export credit.

AidData also codes the intent of each project in its dataset. Projects with “development intent” are those that are primarily oriented towards the promotion of economic development and welfare in the recipient country. Projects with “commercial intent” are those that primarily seek to promote the commercial interests of the country from which the financial transfer has originated (e.g., encouraging the export of Chinese goods and services). Projects with “representational intent” are those that primarily seek to promote a bilateral relationship with another country or otherwise promote the language, culture, or values of the country from which the financial transfer has originated (e.g., the establishment of a Confucius Institute or Chinese cultural center). Projects with “military intent” are those that seek to promote the security interests of the country from which the financial transfer originates or strengthen the lethal force capabilities of military institutions in the recipient country.

The OECD defines Official Development Assistance (ODA) activities as those provided on highly concessional terms (with a minimum grant element of 25 percent) and with development intent. It defines Other Official Flows (OOF) as activities provided on less concessional terms (with a grant element below 25 percent) and/or activities without development intent. ODA projects are widely considered to be “development aid” in the strict sense of the term. The sum of ODA and OOF is sometimes referred to as Official Financing (OF) or Overseas Development Finance (ODF).

Beijing’s adoption of the “Going Out” strategy in 1999 was a watershed moment that dramatically altered the scale, scope, and composition of China’s overseas development finance program. It was the point at which Beijing tasked its state-owned “policy banks”—China Eximbank and China Development Bank—with helping Chinese firms gain a foothold in overseas markets. The strategy came into existence because of several challenges that the country faced at

²⁸ In theory, grant element calculators can generate values above 100 or below 0. However, in the 2.0 dataset, we bound grant element values so that loans cannot assume negative values (since negative values imply lending terms that are “less favorable than market terms,” which is nonsensical if market terms are risk-adjusted prices agreed by willing buyers and sellers of credit) or values in excess of 100%.

²⁹ We address this measurement issue at greater length in Morris et al. (2020).

³⁰ It also requires actual or assumed information about discount rates, loan repayment profiles, and the number of repayments made each year. AidData relies upon the following assumptions in its grant elements calculations: a fixed, 10% discount rate, equal principal repayments, and two repayments per year. If grace period is not provided, the grant element calculator assumes no grace period is provided. Grant element calculators can also incorporate commitment fees and management fees. However, AidData has not yet adapted its grant element calculations to account for such fees.

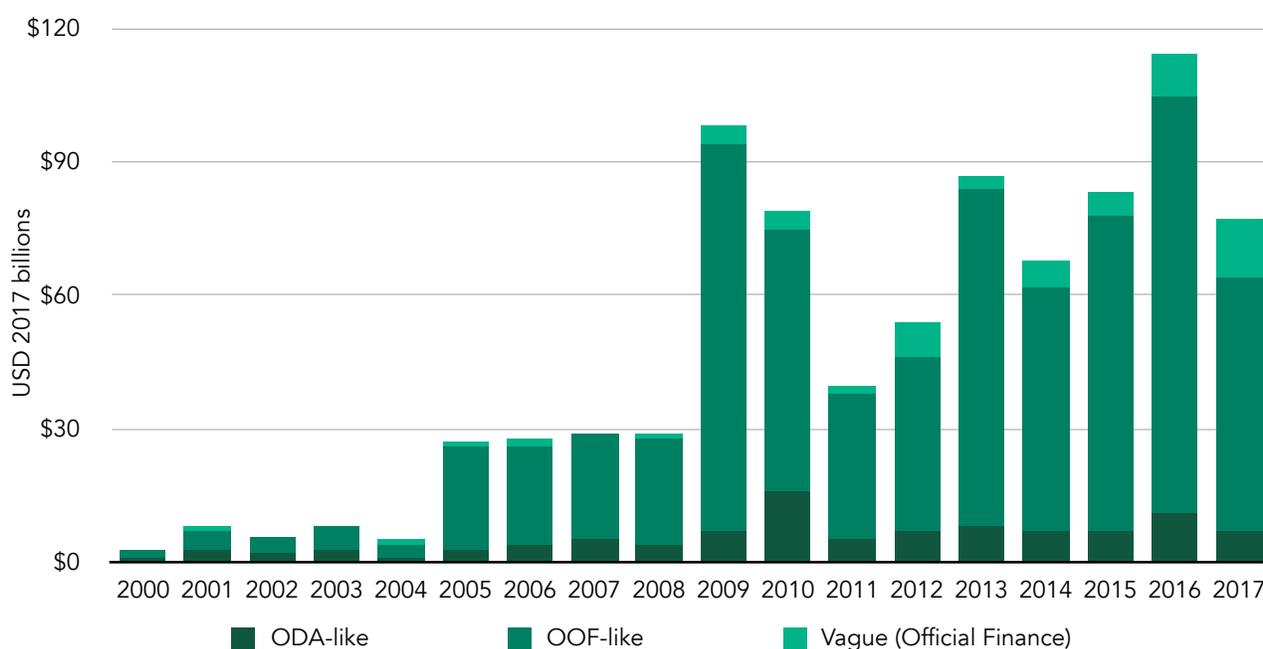
³¹ As we describe at greater length in Section 6 of this paper, AidData now provides data on projects with military intent that are backed by official financial flows from China.

³² The OECD is phasing in a tiered system to measure financial concessionality with different grant element thresholds (and discount rates) for countries at different income levels. However, to ensure consistency and comparability across the 18-year period in our dataset, AidData uses a unified 25 percent grant element threshold (and a fixed, 10% discount rate) to make financial concessionality determinations.

home. First, the country suffered from a domestic industrial overproduction problem because its state-owned steel, iron, cement, glass, aluminum, and timber companies were over-leveraged, inefficient, and unprofitable. Beijing viewed domestic industrial overproduction as a threat to the country's long-term growth prospects and a potential source of social unrest and political instability. It wanted to reduce domestic supply (through the offshoring of industrial input production facilities) and increase international demand (by encouraging foreign buyers to purchase more industrial inputs from China). Second, Beijing faced a foreign exchange oversupply problem: annual trade surpluses facilitated a rapid expansion in foreign exchange reserves, and the country risked macroeconomic instability (inflation or a currency revaluation) if it allowed these reserves to enter the domestic economy, so the authorities decided to instead look for productive overseas outlets where they could park their excess dollars and euros.³³ Third, Beijing recognized that to sustain high levels of domestic economic growth it would need to scour the globe for those natural resources that it lacked in sufficient quantities at home.

To address these three challenges, the Chinese government enlisted the support of its policy banks. They were given a mandate to support overseas projects focused on infrastructure, industrial production, and natural resource acquisition and facilitate the participation of Chinese firms in these projects. China Eximbank and China Development Bank responded in three ways: they increased foreign currency-denominated lending at or near market rates; contractually obligated overseas borrowers to source project inputs (such as steel and cement) from China; and made it easier for countries to secure and repay loans with the money that they earned from natural resource exports to China (Dreher et al. forthcoming). Consequently, in the eighteen-year period following Beijing's adoption of the "Going Out" strategy, China's overseas development spending skyrocketed—from \$3.6 billion per year in 2000 to \$77 billion per year in 2017 (see Figure 5).

Figure 5: Official development finance commitments from China, 2000-2017



Source: AidData.

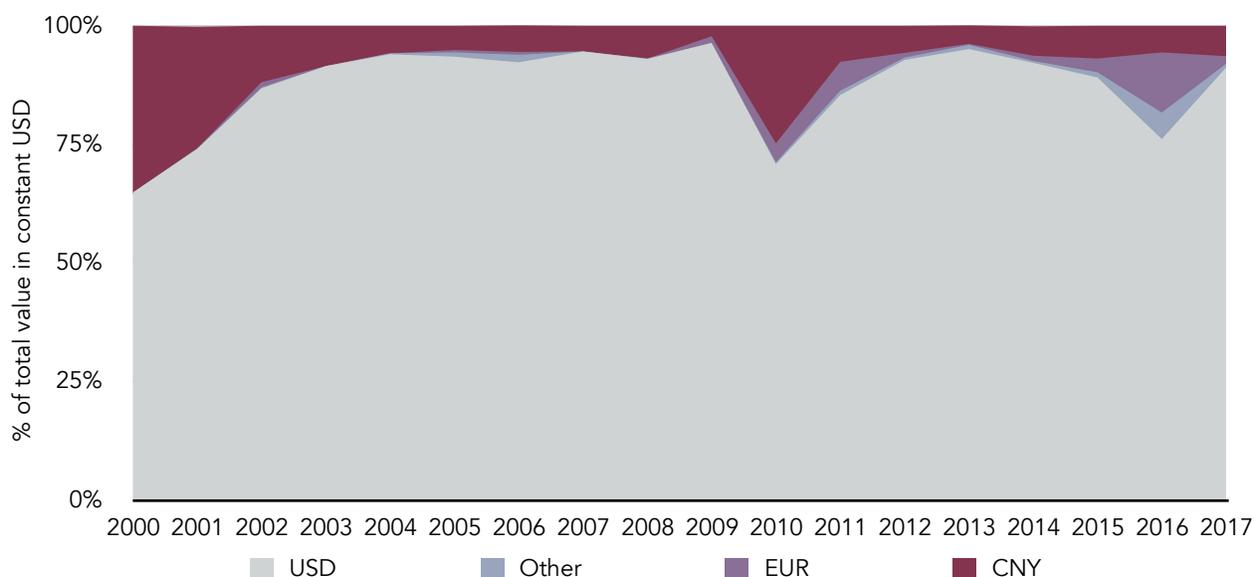
During the second half of the 20th century, the Chinese government managed a relatively small portfolio of overseas development projects and its Ministry of Commerce (MOFCOM) financed most of these projects with renminbi-denominated grants and interest-free loans (i.e., highly concessional development finance). A small percentage of the portfolio consisted of bankable, revenue-generating projects. Beijing instead prioritized projects—like the construction of presidential palaces and parliamentary complexes—that would help cultivate and cement diplomatic ties and political alliances with other countries. However, during the first two decades of the 21st century, China's foreign

³³ The country's foreign exchange reserves increased from roughly \$200 billion in 2000 to \$4 trillion in 2014 (Park 2016).

exchange reserves soared to record levels and domestic industrial overproduction became a major problem, which gave China a stronger incentive to invest in overseas assets via foreign currency denominated lending.³⁴

Beijing's pivot towards less concessional and more commercially-oriented lending—denominated in dollars and euros rather than renminbi—is clearly evident in AidData's 2.0 dataset. In the eight-year period between the adoption of the "Going Out" strategy and the 2008 Global Financial Crisis, Beijing ramped up foreign currency-denominated lending and dialed down renminbi-denominated lending (see Figure 6). It also began to behave more like a banker and less like a benefactor: whereas Beijing issued 1.7 dollars of OOF for every dollar of ODA in 2000, it issued 5.6 dollars of OOF for every dollar of ODA in 2007.

Figure 6: Composition of loan portfolio by currency of denomination, 2000-2017



Source: AidData.

Another key inflexion point came in 2008. The overall size of China's overseas development program nearly quadrupled between 2008 and 2009—from \$28 billion to \$98 billion a year—in the immediate aftermath of the 2008 Global Financial Crisis. The sharp and sudden drop in international asset prices super-charged Beijing's benefactor-to-banker transition.³⁵ Prior to 2008, Beijing parked most of its excess foreign exchange reserves in U.S. Treasury bonds. However, when quantitative easing by the U.S. Federal Reserve weakened the U.S. dollar, Beijing decided to invest its excess foreign exchange reserves in higher-yield (undervalued) overseas assets.³⁶ It entrusted its surplus dollars and euros to the country's state-owned banks and tasked them with the pursuit of higher investment returns via foreign currency-denominated international lending (Dreher et al. 2021a).³⁷ As Figure 5(see above) demonstrates, the rate of

³⁴ In joint work with a group of longtime collaborators from Heidelberg University, the University of Göttingen, the University of Hong Kong, and William & Mary, we have statistically modeled the relationship between the overall size of China's overseas development finance program and the severity of its foreign exchange oversupply problem in any given year. We estimate that a one-standard-deviation-increase in China's foreign exchange reserves increases the overall size of its overseas development finance program by 170 to 476 percent. Likewise, we have modeled the relationship between the overall size of China's overseas development finance program and its level of domestic industrial production in any given year. We estimate that a one-standard-deviation-increase in industrial input production leads to an increase in the overall size of China's overseas development program by 176 to 461 percent (Dreher et al. forthcoming).

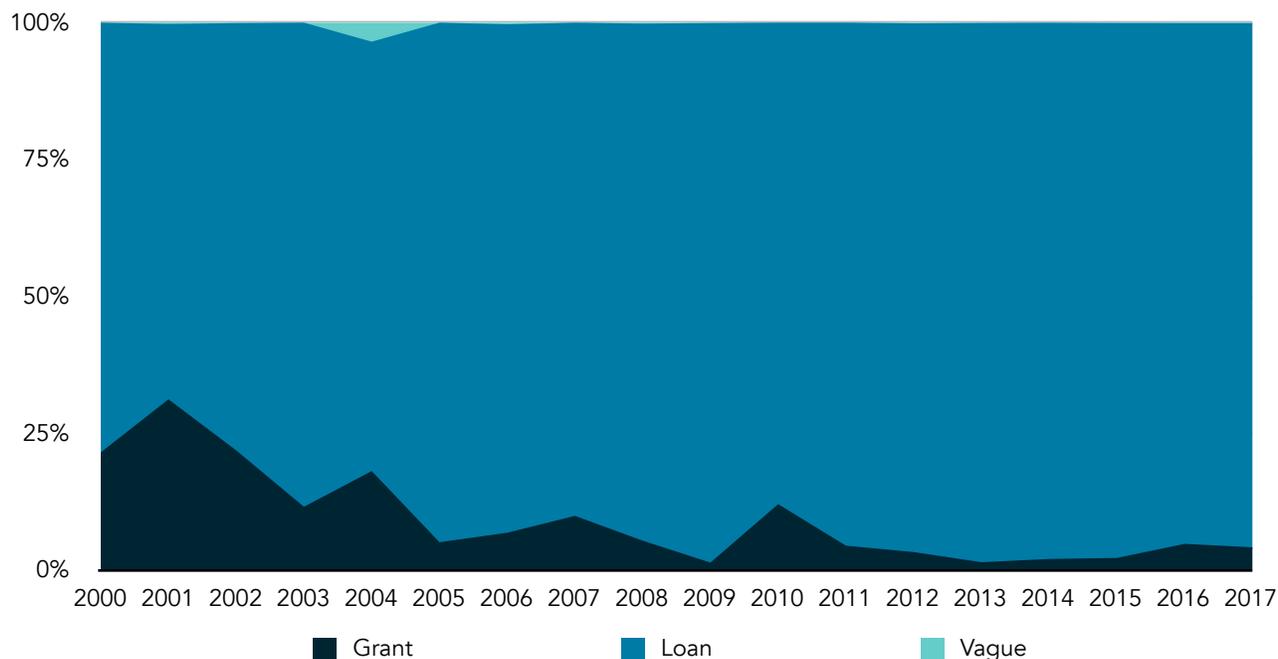
³⁵ Dreher et al. (forthcoming) discuss this 21st century transition from benefactor to banker at greater length.

³⁶ With the country's foreign exchange reserves yielding an estimated 3% annual return at home, Beijing had an incentive to price its foreign currency-denominated loans to overseas borrowers above this reference rate (Kong and Gallagher 2016).

³⁷ By 2009, the country's leadership tacitly acknowledged that its motivation for engaging in large-scale overseas lending was related to its surplus of foreign exchange reserves. Wen Jiabao, the then-Premier of the State Council, stated that "We should hasten the implementation of our 'going out' strategy and combine the utilization of foreign exchange reserves with the 'going out' of our enterprises" (Anderlini 2009).

growth in the provision of Chinese OOF was nearly double that of Chinese ODA between 2008 and 2013.³⁸ By the first year of BRI implementation, Beijing was issuing more than 9.25 dollars of OOF for every dollar of ODA. Beijing also reduced the proportion of its international development finance program financed via grants to 1.5% by 2013 (from a high of 31% in 2001).³⁹ Then, during the first five years of BRI implementation, China solidified its position as the world's largest official creditor to the developing world.⁴⁰ It maintained a 9-to-1 ratio of OOF to ODA and a 31-to-1 ratio of loans to grants between 2013 and 2017.⁴¹

Figure 7: Grant-loan composition of China's official development finance portfolio, 2000-2017



Source: AidData.

Note: All grant-like transfers (grants, technical assistance, scholarships/training activities, and debt forgiveness) are collapsed into a single "Grant" category. All loans, export buyer's credits, and supplier's credits/exports seller's credits are collapsed into a single "Loan" category. A residual "Vague" category captures projects with unidentifiable flow types.

AidData's 2.0 dataset also provides a unique opportunity to identify the regions and countries that have received the most—and least—Chinese development finance. According to Table 1, development finance commitments from official sector institutions in China were broadly distributed between 2000 and 2017 across Asia (29%), Africa (23%), Latin America and the Caribbean (24%), Eastern and Central Europe (18%), the Middle East (4%), and Oceania (1%). However, the overall picture looks different when these official sector financial transfers are disaggregated into ODA and OOF. According to Table 2, African countries received 42% of all Chinese ODA between 2000 and 2017, which is consistent with Beijing's official position that the most of its foreign aid budget is earmarked for Africa.⁴² The 2.0

³⁸ Over time, Washington has moved in the opposite direction of Beijing. Whereas 46% of U.S. development finance commitments were provided via ODA in 2000, this figure skyrocketed to 95% in 2017. By contrast, the proportion of Chinese development finance commitments provided via ODA shrank from 15% in 2000 to 9% in 2017 (see Figure 3 above).

³⁹ Figure 7 demonstrates that China increased the proportion of its international development finance program financed via loans to 98% (from 69% in 2001).

⁴⁰ Horn et al. (2019: 14) provide evidence that China became the world's largest official creditor to the developing world, surpassing both the World Bank and the IMF, in 2011.

⁴¹ Over the entire 18-year period of measurement in AidData's 2.0 dataset, China's global OOF portfolio exploded in size, increasing 24-fold. China's ODA portfolio also expanded, but to a much lesser extent. It increased roughly 4-fold between 2000 and 2017.

⁴² State Council (2011, 2014, 2021). According to China's latest white paper, 44.65% of the country's foreign aid portfolio was earmarked for Africa between 2013 and 2018 (State Council 2021).

dataset indicates that the biggest African recipients of Chinese ODA are Ethiopia, the Republic of Congo, Sudan, Ghana, Zambia, Kenya, Cameroon, Senegal, Mali, and Cote d'Ivoire (see Table 3). It also indicates that, over the same 18-year period, Asia was the second largest regional recipient of Chinese ODA (see Table 2).⁴³ It received 38% of all Chinese ODA between 2000 and 2017.⁴⁴ The biggest Asian beneficiary of Chinese ODA was North Korea. It secured approximately \$7.17 billion between 2000 and 2017 primarily via large-scale food and fuel donations (see Table 3 and Table A-3b).

Table 1: Chinese official finance by region, 2000-2017

Region	Project count	% of project count	Total USD 2017 billions	% of USD 2017 billions
Africa	5,152	47%	207.4	25%
America	1,284	12%	192.3	23%
Asia	2,801	26%	245.7	29%
Europe	521	5%	150.2	18%
Middle East	340	3%	36.2	4%
Multi-region	25	0.2%	0.1	0.01%
Oceania	726	7%	11.1	1%
Total	10,849	100%	843	100%

Table 2: Chinese ODA and OOF by region, 2000-2017

Flow class	Region	Project count	% of project count	Total USD 2017 billions	% of USD 2017 billions
ODA	Africa	4,056	54%	41.7	42%
	Asia	1,767	23%	38.0	38%
	Middle East	243	3%	9.2	9%
	America	679	9%	8.1	8%
	Oceania	628	8%	2.4	2%
	Europe	173	2%	1.0	1%
	Multi-region	21	0%	0.1	0%
	Total	7,567	100%	101	100%
OOF	Asia	913	33%	197.4	29%
	America	514	18%	174.0	26%

⁴³ The 2.0 dataset indicates that North Korea is the largest Chinese ODA recipient in Asia. It secured more than \$7 billion of Chinese ODA between 2000 and 2017 (see Table 3).

⁴⁴ According to China's latest white paper, 36.82% of the country's foreign aid portfolio was earmarked for Asia between 2013 and 2018 (State Council 2021).

OOF	Europe	320	12%	145.8	21%
	Africa	853	31%	135.9	20%
	Middle East	83	3%	20.4	3%
	Oceania	95	3%	8.7	1%
	Multi-region	4	0%	-	0%
	Total	2,782	100%	682.1	100%

Table 3: Top 25 recipients of Chinese ODA and OOF, 2000-2017

Top 25 recipients of Chinese ODA, 2000-2017		Top 25 recipients of Chinese OOF, 2000-2017	
Recipient	USD 2017 billions	Recipient	USD 2017 billions
Iraq	8.15	Russia	125.38
DPRK	7.17	Venezuela	85.54
Ethiopia	6.57	Angola	40.65
Indonesia	4.42	Brazil	39.08
Congo	4.24	Kazakhstan	39.01
Pakistan	4.18	Indonesia	29.96
Sri Lanka	4.17	Pakistan	27.84
Cuba	3.35	Viet Nam	16.35
Bangladesh	2.95	Ecuador	15.92
Myanmar	2.72	Laos	12.36
Sudan	2.57	Peru	10.51
Uzbekistan	2.24	Iran	10.42
Ghana	2.22	Malaysia	9.67
Cambodia	2.20	Ethiopia	8.90
Zambia	2.10	Argentina	8.55
Kenya	2.03	Turkmenistan	8.52
North Korea	1.71	Sudan	7.85
Cameroon	1.46	Cambodia	7.76
Mozambique	1.40	Sri Lanka	7.69
Viet Nam	1.37	Kenya	7.02
Senegal	1.27	Bangladesh	6.88
Nepal	1.08	Nigeria	6.82
Mali	1.06	Belarus	6.73

Ecuador	1.05	India	6.65
Cote d'Ivoire	0.92	Myanmar	6.63

China's provision of OOF, which almost exclusively consists of loans and export credits priced at or near market rates, reflects a very different set of priorities (see Table 2 above). Russia is by far Beijing's largest OOF recipient, securing 107 loans and export credits worth \$125 billion from official sector institutions in China between 2000 and 2017. Most of these debts were contracted by Russian state-owned enterprises in the oil and gas sector, priced at LIBOR or EURIBOR plus a margin, and collateralized with the proceeds from oil and gas sales to China.⁴⁵ Venezuela is Beijing's second largest OOF recipient. It secured \$86 billion of non-concessional and semi-concessional debt—mostly via loans collateralized against future oil export receipts—from China's state-owned policy banks and commercial banks. However, Asia was the most popular regional destination for Chinese OOF transfers between 2000 and 2017.⁴⁶ Kazakhstan, Indonesia, Pakistan, Vietnam, Laos, Malaysia, Turkmenistan, Cambodia, Sri Lanka, Bangladesh, India, and Myanmar were among the largest Asian recipients of Chinese OOF during this period (see Table 3 above). Significant shares of China's global OOF portfolio were also earmarked for Latin America and the Caribbean, Eastern and Central Europe, and Africa.⁴⁷ Yet, for every dollar that China lent to Asia between 2000 and 2017 at or near market rates, it only lent \$0.88 to Latin America and the Caribbean, \$0.74 to Eastern and Central Europe, \$0.69 to Africa, \$0.10 to the Middle East, and \$0.04 to Oceania (see Table 2 above).

The 2.0 dataset can also be used to evaluate the *risk profile* of China's overseas lending portfolio.⁴⁸ According to Table 4, 89% of official sector lending from China between 2000 and 2017 supported countries that scored below the global median on the WGI Control of Corruption Index.⁴⁹ We also find evidence of concentrated effort in countries that pose especially high levels of fiduciary risk: 65% of official sector lending from China between 2000 and 2017 supported countries within the bottom quartile of the WGI Control of Corruption Index. A separate, but related, insight from the dataset is that Beijing disproportionately lends to countries that perform poorly on conventional measures of creditworthiness. According to Table 5, approximately 69% of official sector lending from China between 2000 and 2017 supported countries that scored below the global median on a popular measure of repayment risk (based on average sovereign credit ratings from Moody's, Standard & Poor's, and Fitch Ratings).⁵⁰ Beijing's willingness to pursue large-scale lending operations in high-risk LMICs sets it apart from members of the OECD-DAC. In a book that will soon be published by Cambridge University Press, we and our longtime collaborators from Heidelberg University, the University of Göttingen, the University of Hong Kong, and William & Mary show that OECD-DAC members neither favor nor disfavor LMICs which pose high levels of fiduciary risk and repayment risk (Dreher et al. forthcoming).

Table 4: Chinese official sector lending and corruption, before and after BRI

% of official sector lending from China			
Control of corruption (year - 1)	All years	2008-2012 (pre-BRI)	2013-2017 (BRI)

⁴⁵ See, for example, Project ID#85211, 66689, 43069, 43012, and 67166.

⁴⁶ 29% of non-concessional and semi-concessional lending (i.e., OOF) from official sector institutions in China supported Asian borrowers between 2000 and 2017 (see Table 2 above).

⁴⁷ 26% of Chinese OOF was directed to Latin America and the Caribbean between 2000 and 2017, while 21% was directed to Eastern and Central Europe and 20% was directed to Africa during the same period (see Table 2 above).

⁴⁸ In this study, we use the terms "official sector lending" and "overseas lending" from China to refer to loans and export credits issued by Chinese government institutions and Chinese state-owned institutions.

⁴⁹ To calculate this summary statistic, we first measure the percentage of official sector lending from China in each year of the period of measurement (2000-2017) that was directed to countries which performed below the global median on the Control of Corruption index in the preceding year. We then calculate the average annual percentage over the eighteen-year period. We rely on the Control of Corruption index from the Worldwide Governance Indicators (WGI) Dataset, which is available via www.govindicators.org.

⁵⁰ To calculate this summary statistic, we first measure the percentage of official sector lending from China in each year of the period of measurement (2000-2017) that was directed to countries which performed below the global median on the "sovrates" index from Kose et al. (2017) in the preceding year. We then calculate the average annual percentage over the eighteen-year period. The resulting figure is based on the set of countries for which average sovereign credit ratings from Moody's, Standard & Poor's, and Fitch Ratings are available. In any given year, the sovrates index from Kose et al. (2017) is unavailable for approximately 15% of the countries in the 2.0 dataset. The sovrates index varies from 0 to 21, with high scores indicating lower levels of sovereign credit (i.e., repayment) risk.

Above median	11%	12%	10%
Below median	89%	88%	90%
Top 3 quartiles	35%	29%	43%
Bottom quartile	65%	71%	57%

Note: The percentages reported in this table are based on the set of countries for which WGI Control of Corruption scores are available

Table 5: Chinese official sector lending and repayment risk, before and after BRI

% of official sector lending from China			
Repayment risk (year - 1)	All years	2008-2012 (pre-BRI)	2013-2017 (BRI)
Above median	31%	36%	32%
Below median	69%	64%	68%
Top 3 quartiles	64%	60%	65%
Bottom quartile	36%	40%	35%

Note: The percentages reported in this table are based on the set of countries for which average sovereign credit ratings from Moody's, Standard & Poor's, and Fitch Ratings are available

3.2 How has China's overseas development finance program changed during the BRI era?

For many journalists and policymakers, the Belt and Road Initiative (BRI) is synonymous with China's overseas development finance program. However, it is important to remember how Beijing has defined the purpose and scope of the initiative. When Xi Jinping first launched the BRI in 2013, he referred to it as the "One Belt, One Road" (OBOR) initiative. It was described at that time as a "Belt" of road, rail, port, and pipeline projects that would create an infrastructure corridor from China to Central Asia and Europe and a "Maritime Silk Road" that would link China to South and Southeast Asia, the Middle East, and Africa through a series of deep-water ports along the littoral areas of the Indian Ocean (Perlez and Huang 2017; Mauk 2019).⁵¹ The Chinese authorities subsequently expanded the definition of the BRI to include "five connectivities" (see Box 2), but there is little question that the core focus of the initiative is *infrastructure connectivity*.⁵²

⁵¹ Initially, the "Belt" was expected to consist of six overland corridors: China–Mongolia–Russia Economic Corridor, the New Eurasian Land Bridge, the China–Central Asia–West Asia Economic Corridor, the China–Indochina Peninsula Economic Corridor, the China–Pakistan Economic Corridor, and the Bangladesh–China–India–Myanmar Economic Corridor (World Bank 2019). However, it was later expanded to include various corridors in Sub-Saharan Africa and Latin America and the Caribbean.

⁵² In his keynote address at the 2017 Belt and Road Forum for International Cooperation, President Xi Jinping emphasized that "[i]nfrastructure connectivity is the foundation of development through cooperation. We should promote land, maritime, air and cyberspace connectivity, concentrate our efforts on key passageways, cities and projects and connect networks of highways, railways and seaports ..." (Xi 2017).

Box 2: The “Five Connectivities” of the BRI

In a widely cited September 2013 speech at Kazakhstan’s Nazarbayev University, President Xi Jinping shared his vision for the establishment of an overland economic corridor between China and Europe called the “Silk Road Economic Belt.” Then, in October 2013, he gave a speech to Indonesia’s Parliament in which he outlined a separate but related vision for the establishment of a sea route from China to Europe (via South and Southeast Asia, Oceania, East Africa, and the Middle East) called the “Maritime Silk Road.” In order to implement the “One Belt, One Road” (OBOR) initiative, Xi indicated that China would work with partner countries to build five “connectivities” or “links”: (1) physical connectivity via infrastructure-building; (2) policy coordination; (3) unimpeded trade; (4) financial integration; and (5) people-to-people exchanges.⁵³ The goal of OBOR, which later became known as the BRI, was to improve interconnectivity within Eurasia, a longstanding ambition of Chinese grand strategy (State Council 2016).

During his speech at Nazarbayev University, Xi also outlined a set of guiding principles for the initiative. He reaffirmed that China would “never intervene in [the] internal affairs” of partner countries and it would strive for “peaceful coexistence” by forging partnerships characterized by “mutual benefits.” He also signaled an “openness” to include any willing country in the initiative, which paved the way for the BRI’s expansion beyond Eurasia.

Participation in the BRI has increased over time (see Figure 8a below and Table A-17 in the Appendix). An initial group of 31 countries—primarily from Europe and Asia—joined the initiative between 2013 and 2016. Then, in 2017 and 2018, the BRI’s geographical scope expanded dramatically to 120 countries, including large swathes of Africa, Latin America and the Caribbean, the Middle East, and Oceania. The list of participants in the initiative grew even further—to 140 countries—between 2019 and 2021.

⁵³ According to Rolland (2017), President Xi’s vision for a Eurasian continent that is integrated around China is a “grand strategy” that all key components of the Chinese state have adopted.

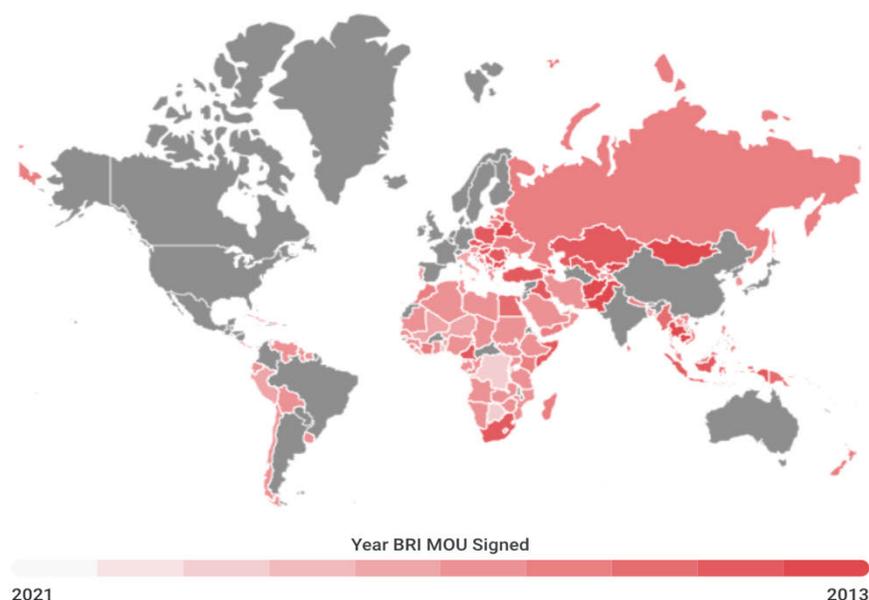
⁵⁴ In China’s geostrategic worldview, the BRI is a manifestation of the country’s emergence as a global economic powerhouse driven by sustained domestic economic growth over multiple decades.

⁵⁵ Xi Jinping motivated these remarks by invoking two millennia of Chinese trade and cultural relations with Central Asia (Xi 2013).

⁵⁶ For this analysis, we measure the year in which a country “joined the BRI” as the first year in which it signed a BRI cooperation agreement or a formal BRI memorandum of understanding (MOU) with China. We used the “Official BRI participants by year of joining” dataset made available by the Council of Foreign Relations (CFR) in March 2021 as a baseline (Sacks 2021; Hillman and Sacks 2021). For countries where CFR designated the year as “unknown,” we conducted desk research to confirm the first year in which a BRI cooperation agreement or MOU was signed between China and that country.

⁵⁷ The additional countries that joined the initiative between 2019 and 2021 primarily came from Africa, Latin America and the Caribbean, the Middle East, and Oceania. However, there is still considerable uncertainty about the exact nature, scale, and scope of the BRI. According to the *New York Times*, “China has never released any official map of Belt and Road routes nor any list of approved projects, and it provides no [...] guidelines on what it means to be a participant” (Mauk 2019).

Figure 8a: BRI signatories by year of signing, 2013-2021



Source: AidData.

The BRI is very much an extension and expansion of the “Going Out” strategy, which was adopted by Jiang Zemin in 1999 and reaffirmed by Hu Jintao during his time in office (2002-2012).⁵⁸ In order to manage the country’s domestic industrial overproduction problem and foreign exchange oversupply problem, the Chinese government has rapidly scaled up the provision of loans and export credits to foreign borrowers that are denominated in (domestically oversupplied) dollars and euros and priced at or near market rates. The projects financed with these loans and export credits usually require construction inputs—like steel, cement, timber, and glass—that are oversupplied in China and contractually obligate borrowers to import these inputs on a preferential basis.⁵⁹ The BRI has therefore been described as “Xi Jinping’s branding of his predecessors’ ‘going global’ strategy” (Brautigam 2019).⁶⁰

Yet, it is still possible that the introduction of the BRI has altered the scale and geographical distribution of Chinese development finance. The comprehensive nature of AidData’s 2.0 dataset—during the BRI era and the pre-BRI era—provides a unique opportunity to test whether and to what extent participation in the BRI influences the *overall size* of the financial envelope that Beijing makes available to individual countries. To do so, we take advantage of the BRI’s staggered rollout and calculate the average, annual monetary value of official financial commitments from China to each BRI participant country before and after it joined the global infrastructure initiative. Our findings suggest that, on average, official financial commitments from China increase by 63% after a country officially joins the BRI (see Table A-21 in the Appendix).⁶¹ However, a significant increase in funding from Beijing would have likely taken place in these countries even if they chose not to participate in BRI. As a point of comparison, we calculate the average increase in

⁵⁸ The “Going Out” strategy is also known as the “Going Global” strategy.

⁵⁹ Dreher et al. (forthcoming) provide a more detailed explanation of how this strategy is implemented in practice.

⁶⁰ Brautigam (2019) attributes the durability of this strategy—under Jiang Zemin, Hu Jintao, and Xi Jinping—to the fact that “China has excess foreign exchange, construction capacity, and mid-level manufacturing and needs to send all of these overseas.”

⁶¹ This analysis is based on the five-year period before and after the BRI was announced (2008-2017). For each country that joined the BRI, we calculate the rate of increase between (a) the average annual official commitment amount from China between 2008 and the year before the country joined the BRI, and (b) the average annual official commitment amount from China between the year in which the country joined the BRI and 2017. We then calculate a weighted average across all BRI participant countries, which indicates that the average annual official commitment increase after a country signs a BRI MOU with China is 63%. We exclude Russia from the analysis because its pre-BRI funding includes a significant outlier—a single \$32 billion oil prepayment facility (the largest project in the 2.0 dataset).

official financial commitments from China among countries that chose not to join the BRI over the same time period.⁶² The average increase within this cohort (47%) suggests that a large portion of the 64% funding increase experienced by BRI participant countries would have likely materialized even if they formally opted out of Beijing's flagship infrastructure initiative. This finding underscores a broader point: China has made significant efforts to position the BRI as something new, but it is part and parcel of the "Going Out" strategy that was adopted more than two decades ago.

As further evidence that the BRI represents an effort to double down on the "Going Out" strategy, consider how the "color of the money" from Beijing to countries around the globe has changed since 2013. During the thirteen-year period preceding the BRI (2000-2012), China spent 5.3 dollars of OOF for every dollar of ODA. However, during the first five years of BRI implementation (2013-2017), China spent 9.1 dollars of OOF for every dollar of ODA. AidData's 2.0 dataset also indicates that, in all but two regions of the world, Beijing moved away from ODA and towards OOF during the BRI era (see Table 6). In the Middle East, the composition of China's international development finance portfolio became substantially less concessional and more commercially oriented. From 2000 to 2012, every ODA dollar that Beijing spent on development projects in the Middle East was matched by a dollar of OOF. However, during the first five years of BRI implementation (2013-2017), the Chinese ODA-to-OOF ratio in the Middle East fell precipitously, with each ODA dollar being matched by 31.5 dollars of OOF. Official financial commitments from China to Eastern and Central Europe, Africa, Asia, and Latin America and the Caribbean have also become less concessional and more commercially oriented over time. Between 2000 and 2012, every ODA dollar that Beijing spent on development projects in Eastern and Central Europe was matched by 106.4 dollars of OOF. However, during the first five years of BRI implementation (2013-2017), Eastern and Central Europe received 216.8 dollars of Chinese OOF for every dollar of Chinese ODA. Similarly, Africa and Asia witnessed significant declines in their Chinese ODA-to-OOF ratios since the BRI was introduced.⁶³ Oceania and Latin America and the Caribbean were the only two regions of the world where Beijing's ODA-to-OOF ratio increased during the BRI era. For every ODA dollar that Beijing gave to Oceania between 2000 and 2012, it lent more than 35 dollars at semi-concessional or commercial rates (OOF). However, during the first five years of BRI implementation (2013-2017), Beijing pivoted towards more grant-giving and high concessional lending in Oceania, with each dollar of ODA being matched by 15 dollars of OOF. A similar pivot took place in Latin America and the Caribbean.⁶⁴

Table 6: Ratio of Chinese ODA to OOF commitments

Region	ODA to OOF ratio		
	2000-2017	2000-2012	2013-2017
Africa	1 : 3.3	1 : 2.4	1 : 4.6
America	1 : 21.5	1 : 35.4	1 : 15.3
Asia	1 : 5.2	1 : 4.1	1 : 6.7
Europe	1 : 144	1 : 106.4	1 : 216.8
Middle East	1 : 2.2	1 : 1	1 : 31.5
Oceania	1 : 3.6	1 : 3.7	1 : 3.4

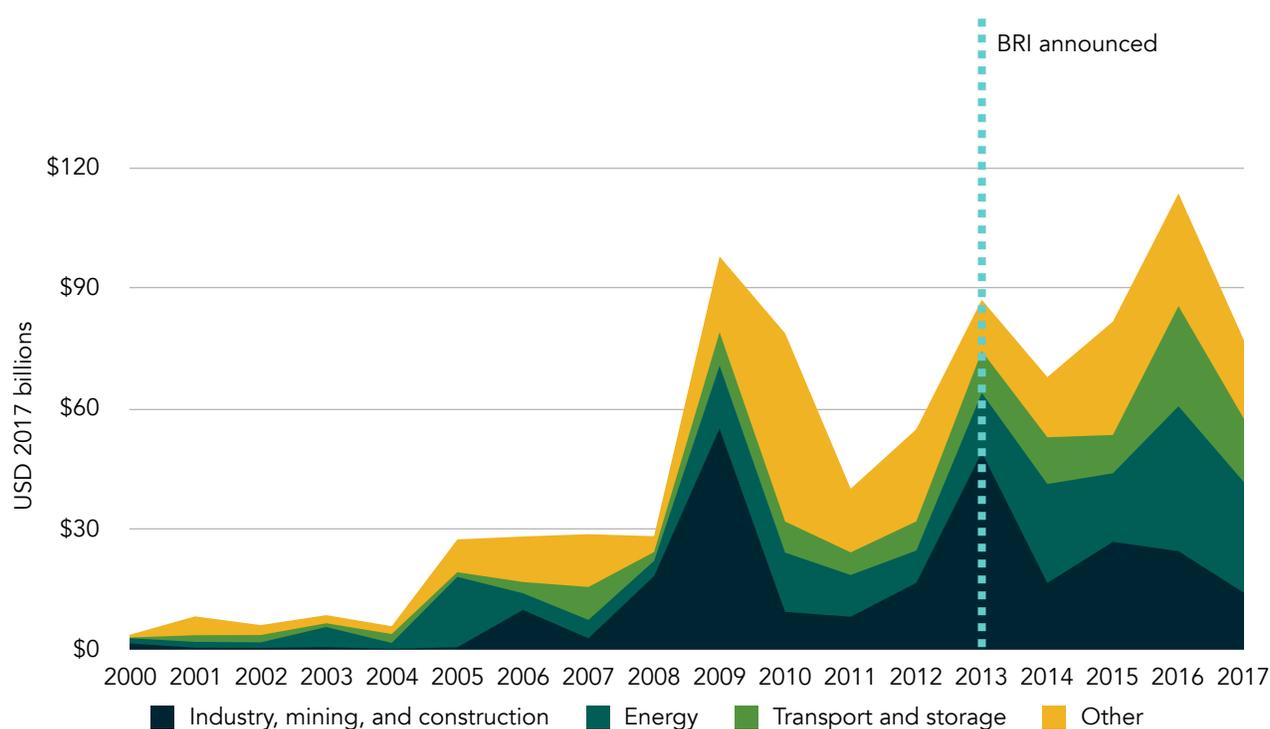
⁶² More specifically, we calculate the average annual increase in official commitments from China for non-BRI countries (i.e., those who have never signed a BRI MOU as well as those who had not signed one by the end of 2017) between 2013 and 2017. The weighted average increase across all non-BRI countries is 47%.

⁶³ According to Table 6, every ODA dollar that Beijing spent on development projects in Africa was matched by 2.43 dollars of OOF between 2000 and 2012. However, during the first five years of BRI implementation (2013-2017), Africa received 4.6 dollars of Chinese OOF for every dollar of Chinese ODA. Between 2000 and 2012, every ODA dollar that Beijing spent on development projects in Asia was matched by 4.1 dollars of OOF. However, during the first five years of BRI implementation (2013-2017), Asia received 6.7 dollars of Chinese OOF for every dollar of Chinese ODA.

⁶⁴ According to Table 6, every ODA dollar that Beijing spent on development projects in Latin America and the Caribbean was matched by 35.4 dollars of OOF between 2000 and 2012. However, during the first five years of BRI implementation (2013-2017), Latin America and the Caribbean received 15.3 dollars of Chinese OOF for every dollar of Chinese ODA.

Another unique aspect of the 2.0 dataset is that every project is assigned a single, 3-digit OECD sector code using an internationally accepted set of classification criteria. This feature enables cross-donor and cross-lender comparisons—at global, regional, national, and subnational scales—since most official sources of international development finance (including all the members of the OECD-DAC and the most multilateral institutions) use the same criteria. It also facilitates analysis of sectoral patterns and trends over space and time. One question that naturally arises about the BRI is whether its introduction has changed the sectoral composition of China’s overseas development finance portfolio. When the global infrastructure initiative was first launched, the Chinese Government signaled that it would prioritize investments in “hardware” sectors, like construction, industry, mining, energy, and transportation. Figure 8b demonstrates that there was a modest shift in this direction after the introduction of the BRI, but Beijing already assigned a high level of priority to these sectors before the initiative was announced. In the thirteen-year period (2000–2012) preceding the BRI, 63% of China’s overseas development finance portfolio was dedicated to three “hardware” sectors (Energy; Industry, Mining, and Construction; and Transport and Storage). Then, during the first five years of BRI implementation, this figure increased to 76%.⁶⁵

Figure 8b: Chinese development finance commitments by sector, 2000–2017



Source: AidData.

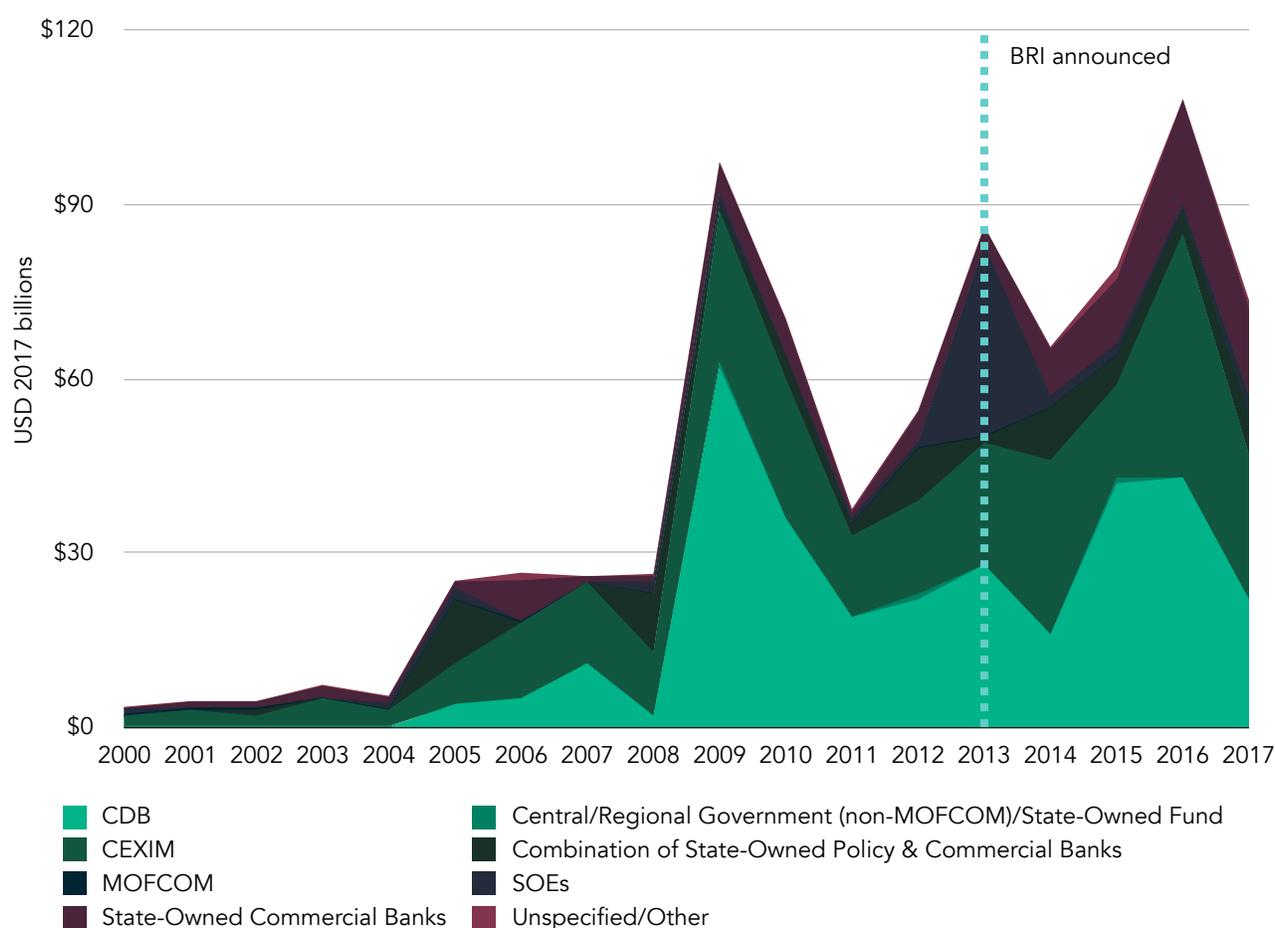
Although the BRI did not bring about a major change in the sectoral composition of China’s international lending and grant-giving program, it did mark an important transition in *how* China finances big-ticket infrastructure projects. Prior to 2013, Beijing primarily lent through its policy banks—China Eximbank and China Development Bank—to government agencies and state-owned enterprises in low-income and middle-income countries (see Section 3.1, Figure 9 and Figure 10). However, shortly after the BRI was announced in 2013, China’s state-owned commercial banks⁶⁶—including Bank of China, ICBC, China Construction Bank, and Bank of Communications—assumed more

⁶⁵ During the first five years of BRI implementation, the energy sector experienced more growth—in absolute terms—than any other sector. Total official development finance commitments from China for energy sector projects soared from \$15 billion in 2013 to \$28 billion in 2017 (see Figure 8b and Figure A-1 in the Appendix).

⁶⁶ AidData classifies the following institutions as Chinese state-owned commercial banks: China Construction Bank Corporation (CCB), Industrial and Commercial Bank of China (ICBC), Bank of China (BOC), China Bank of Communications (BoCom or BoComm), Agricultural Bank of China, Postal Savings Bank of China (PSBC), China Bohai Bank, Bank of Shanghai, China CITIC Bank, China Merchants Bank, Huaxia Bank Co., Ltd., and China Everbright Bank Co., Ltd. This group of banks includes so-called shareholding commercial banks that are subsidiaries of state-owned enterprises (e.g., China CITIC Bank) and city commercial banks (i.e., Bank of Shanghai).

prominent roles in the country's overseas lending program.⁶⁷ They did so at the behest of the central government (Zhou et al. 2018). Figure 9 indicates that, during the pre-BRI era, these institutions collectively lent \$2.39 billion per year on average to the countries and territories captured in our dataset, but during the first five years of BRI they collectively lent \$11.06 billion per year on average. That's close to a five-fold increase. By 2017, the overseas lending activities of China's state-owned commercial banks (worth \$15 billion) made them the third largest (collective) source of official sector lending from China.⁶⁸ This shift calls attention to the *increasingly commercial orientation of Chinese development finance* because China's state-owned commercial banks price their loans on substantially less concessional terms than the loans offered by other Chinese government lending institutions like China Eximbank and China's Ministry of Commerce (see Table 7).⁶⁹

Figure 9: China's official lending portfolio by funding agency type, 2000-2017



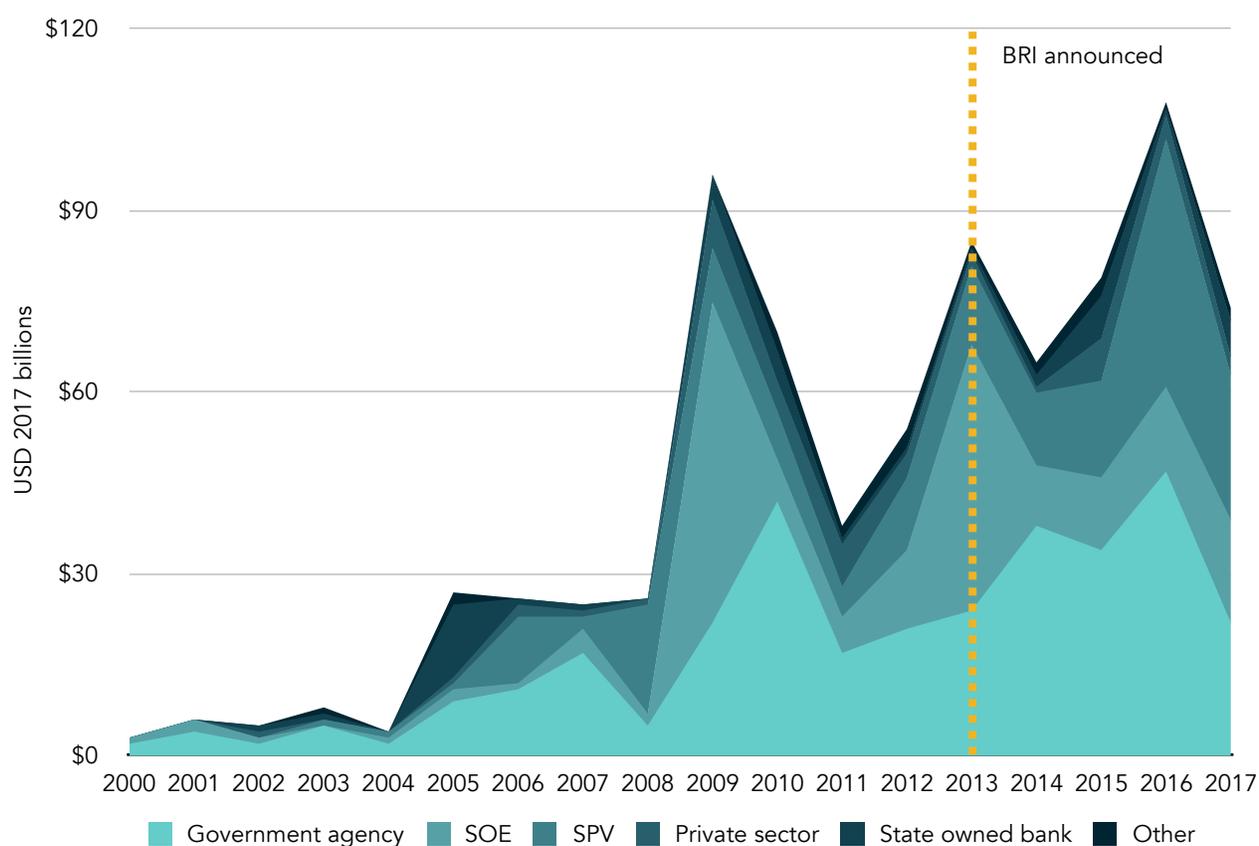
Source: AidData.

⁶⁷ In all subsequent summary statistics and figures that refer to official sector lending from China, we combine all of the projects in the 2.0 dataset that were financed with loans, export buyer's credits, and supplier's credits/export seller's credits.

⁶⁸ CDB and China Eximbank are the two largest sources of official sector funding from China identified in the 2.0 dataset (see Figure 9).

⁶⁹ Rather than issuing loans and export credits with fixed and subsidized (i.e., below-market) interest rates, China's state-owned commercial banks usually tether the pricing of their overseas loans to floating market interest rates like LIBOR or EURIBOR plus a margin to account for borrower-specific risk and repayment capacity.

Figure 10: China's official lending portfolio by borrower type, 2000-2017



Source: AidData.

Table 7: Average lending terms by funding agency type

Funding agency	Grant element (%)	Interest rate (%)	Grace period (years)	Maturity (years)
MOFCOM	74.7%	0.0%	8.6	19.7
CEXIM	41.5%	3.2%	2.9	17.0
CDB	18.1%	5.3%	1.2	11.5
State-owned commercial banks	22.0%	4.3%	1.0	10.1
Combination of state-owned policy & commercial banks	24.6%	4.9%	2.2	12.2
SOEs	20.0%	2.9%	0.3	9.1

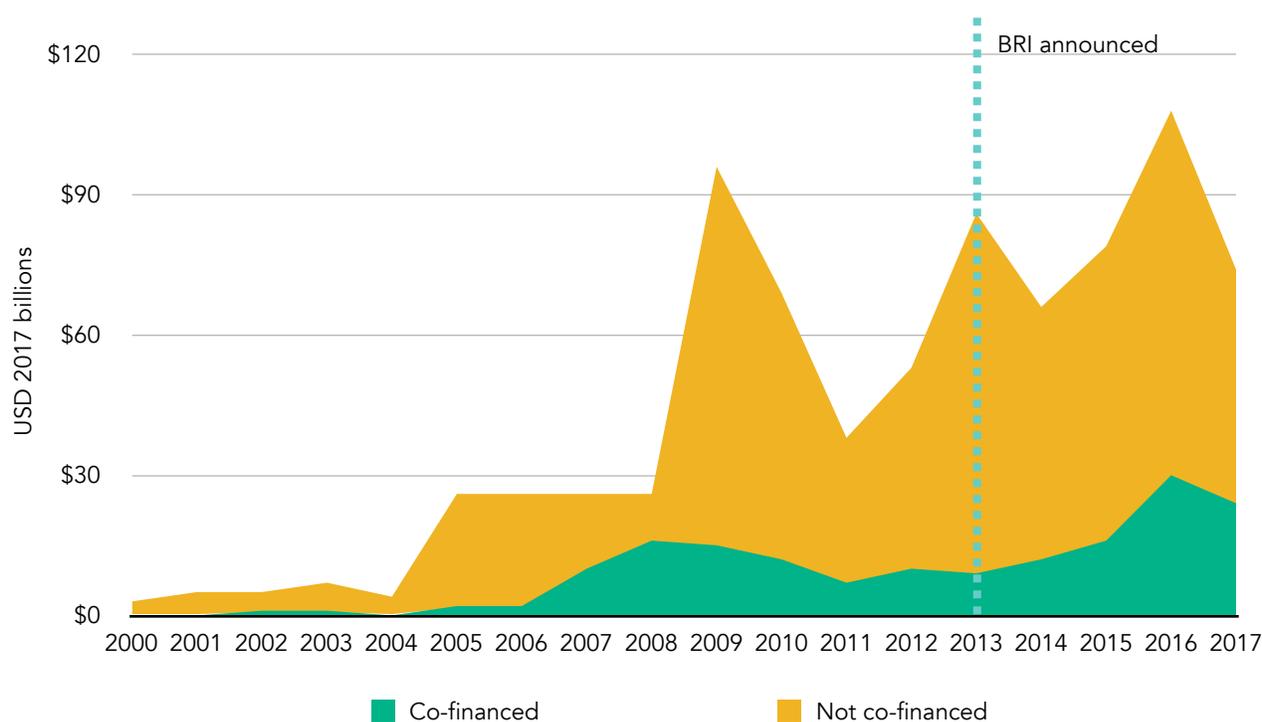
Note: All interest rates, maturities, grace periods, and grant elements are reported as weighted averages. They are weighted according to the monetary values of loans (and export credits) in constant 2017 USD.

Another core feature of the BRI is the scale of the projects being financed. The 2.0 dataset demonstrates that the average monetary value of a loan from an official sector institution in China increased by 27% during the first five years

of the BRI (2013-2017).⁷⁰ Whereas the average monetary value of a loan during the pre-BRI era (2000-2012) was \$258 million, it was \$328 million during the first five years of the BRI (2013-2017).⁷¹ Chinese state-owned lenders have also ramped up the provision of credit for “mega-projects.” In an average year during the 13-year period preceding the BRI (2000-2012), Beijing approved 11 loans worth more than \$500 million. By contrast, in an average year during the first five years of BRI implementation (2013-2017), Beijing green-lit 36 loans worth more than \$500 million.⁷²

Larger loans present larger risks. Therefore, Chinese state-owned banks have pursued a variety of measures to mitigate these risks. One of these measures is co-financing. The 2.0 dataset demonstrates that official sector debt from China is increasingly being issued via large, syndicated loans that are backed by multiple Chinese state-owned banks.⁷³ Figure 11 shows a significant increase in the percentage of China’s overseas lending portfolio being co-financed between 2000 and 2017. At the beginning of the period of measurement (2000), no official sector lending from China was co-financed. However, by 2017, 32% was co-financed. A good example of this trend is the 485MW Hussein Combined-Cycle Gas Turbine Project in Jordan, which was co-financed in 2016 by two Chinese state-owned banks (China Construction Bank and the Industrial and Commercial Bank of China) and a group of Arab and multilateral development finance institutions (the European Bank for Reconstruction and Development, the International Finance Corporation, Europe Arab Bank, and the OPEC Fund for International Development) through a \$350 million syndicated loan agreement.⁷⁴

Figure 11: Official sector lending from China that is co-financed, 2000-2017



Source: AidData.

⁷⁰ The median monetary value of a loan from an official sector institution in China increased by 41% during the first five years of the BRI (2013-2017).

⁷¹ Between 2000 and 2017, the average monetary value of a loan from an official sector institution in China increased by 340% (from \$60 million to \$264 million).

⁷² In an average year during the 13-year period preceding the BRI (2000-2012), Beijing approved 5 loans worth more than \$1 billion. However, in an average year during the first five years of BRI implementation (2013-2017), Beijing green-lit 16 loans worth more than \$1 billion.

⁷³ Banks typically use syndicated loans—that is, loans issued jointly by a group (“syndicate”) of banks—to share credit risk and finance projects that they would not otherwise finance on their own.

⁷⁴ See Project ID#72504 and #64473 in the 2.0 dataset for more details.

Table 8 highlights a separate but related insight from the 2.0 version of AidData's dataset: the fact that the average monetary value of a loan issued by a syndicate of Chinese state-owned banks is \$1.292 billion, which far exceeds the average value of "bilateral" loans issued by China Development Bank (\$575 million), China Eximbank (\$198 million), and the country's state-owned commercial banks (\$234 million). Illustrative transactions from the 2.0 dataset include the \$2 billion syndicated buyer's credit loan that China Development Bank, China Construction Bank, Bank of China, the Industrial and Commercial Bank of China, and the Bank of Communications issued in 2016 for the 1980MW Vinh Tan 3 Coal-Fired Power Plant Construction Project in Vietnam and the \$1.4 billion loan that China Eximbank and the Industrial and Commercial Bank of China jointly issued in 2017 for the 870MW Suki Kinari Hydropower Project in Pakistan.⁷⁵

Table 8: Official sector lending from China by funding agency and type of borrower

Borrower type	Funding agency						Average loan size (millions USD 2017)
	CEXIM	CDB	State-owned commercial banks	Combination of state-owned policy & commercial banks	MOFCOM	SOEs	
Government agency	63.1%	37.1%	22.6%	5.8%	99.2%	12.0%	210.4
SPV	20.4%	14.3%	37.0%	55.0%	0.0%	5.4%	438.9
SOE	9.5%	31.0%	23.1%	7.9%	0.5%	80.9%	572.0
Private sector	1.4%	8.0%	10.0%	9.8%	0.0%	1.2%	194.7
State-owned bank	2.8%	7.2%	4.6%	17.5%	0.3%	0.0%	282.7
Average loan size (USD millions 2017)	198.0	575.0	234.3	1,292.2	19.2	576.5	

Although Chinese state-owned lenders are approving bigger loans and taking on more credit risk during the BRI era, there are *some* indications that steps are being undertaken to mitigate risk. Table 9 suggests that when China's state-owned policy banks and state-owned commercial banks pursue co-financing and syndicated loan arrangements, they are less likely to support projects in countries that pose high levels of repayment risk.⁷⁶ However, we do not find that they are less likely to support projects in countries that pose high levels of fiduciary risk (see Table 10 Figure). In Section 5, we explore a related question: whether projects backed by multiple financiers encounter fewer risks and problems during implementation.⁷⁷

⁷⁵ See Project ID#39014 and #65742 in the 2.0 dataset for more details.

⁷⁶ According to Table 9, 47% of the debt issued for projects co-financed by China's state-owned policy banks and commercial banks has supported countries performing above the global median on a popular measure of repayment risk (based on average sovereign credit ratings from Moody's, Standard & Poor's, and Fitch Ratings). However, this percentage is considerably lower for projects bilaterally financed by MOFCOM (11%), China Eximbank (16%), CDB (30%), and individual state-owned commercial banks (27%)

⁷⁷ When projects are co-financed through a syndicated loan or otherwise, the co-financiers often coalesce around a common set of due diligence procedures and standards that will guide the design and implementation of the project.

Table 9: Chinese official sector lending and repayment risk, by funding agency

% of official sector lending from China by funding agency						
Repayment risk (year - 1)	CEXIM	CDB	State-owned commercial banks	Combination of state-owned policy & commercial banks	SOEs	MOFCOM
Above median	16%	30%	27%	47%	87%	11%
Below median	84%	70%	73%	53%	13%	89%
Top 3 quartiles	54%	62%	68%	80%	89%	20%
Bottom quartile	46%	38%	32%	20%	11%	80%

Note: The percentages reported in this table are based on the set of countries for which average sovereign credit ratings from Moody's, Standard & Poor's, and Fitch Ratings are available

Table 10: Chinese official sector lending and corruption, by funding agency

% of official sector lending from China by funding agency						
Control of corruption (year - 1)	CEXIM	CDB	State-owned commercial banks	Combination of state-owned policy & commercial banks	SOEs	MOFCOM
Above median	11%	10%	15%	12%	6%	18%
Below median	89%	90%	85%	88%	94%	82%
Top 3 Quartiles	40%	31%	43%	45%	19%	52%
Bottom Quartile	59%	69%	57%	55%	81%	48%

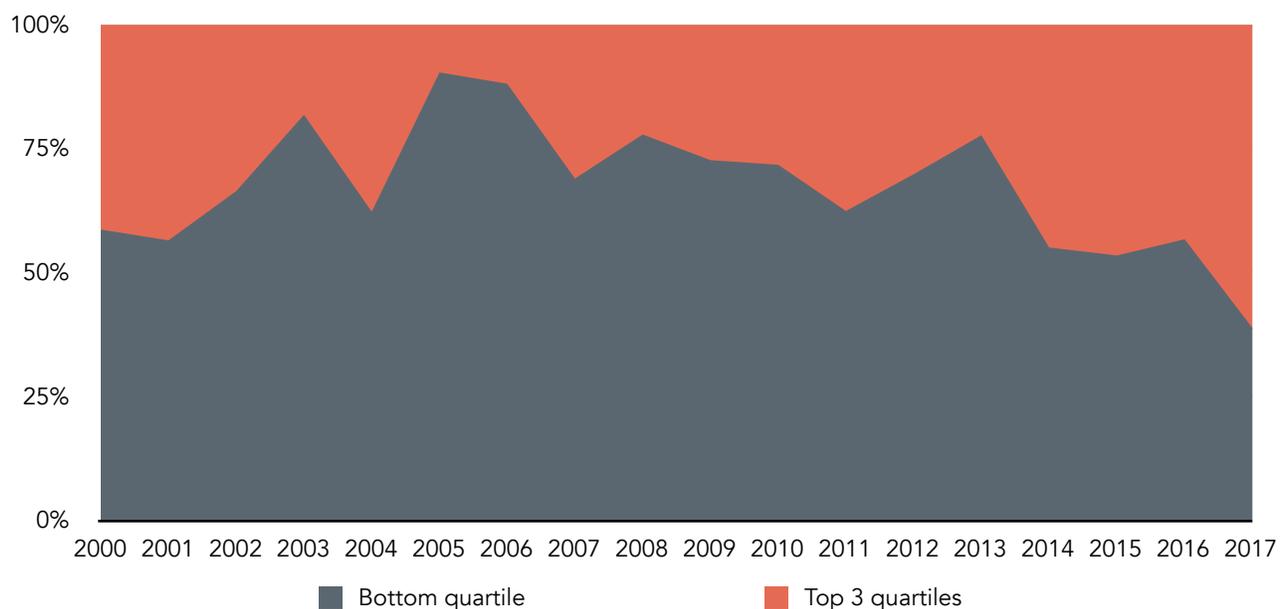
Note: The percentages reported in this table are based on the set of countries for which WGI Control of Corruption scores are available

There are also some indications that, over time, China has rebalanced the risk profile of its overseas lending portfolio. Figure 12 documents a decline, since the introduction of the BRI, in the percentage of official sector lending from China supporting countries that score within the bottom quartile of the WGI Control of Corruption Index—from 78% in 2013 to 39% in 2017.⁷⁸ Figure 13 also provides evidence of a downward trend during the 21st century in the percentage of official sector lending from China supporting countries below the global median on a popular measure of repayment risk (based on average sovereign credit ratings from Moody's, Standard & Poor's, and Fitch Ratings).⁷⁹ This rebalancing of risk in Beijing's overseas lending portfolio is related to China's state-owned commercial banks, which are responsible for a growing percentage of official sector lending from China but have lower levels of risk appetite than the country's state-owned policy banks (see Figure 9, Table 10, and Table 9). Nevertheless, an important caveat is that there are still *high baseline levels of risk* in the borrower country composition of China's overseas lending portfolio, so while it is true that Beijing is gradually ratcheting down the percentage of its lending portfolio that supports countries posing the highest levels of fiduciary risk and repayment risk, these countries are still among the most important borrowers in its overseas lending portfolio.

⁷⁸ To calculate these summary statistics, we follow the same procedures that are described in footnote 50. However, instead of calculating an annual average over the entire eighteen-year period, we report each annual estimate.

⁷⁹ To calculate these summary statistics, we follow the same procedures that are described in footnote 51. However, instead of calculating an annual average over the entire eighteen-year period, we report each annual estimate.

Figure 12: Official sector lending from China by level of corruption risk, 2000-2017



Source: AidData.

Figure 13: Official sector lending from China by level of repayment risk, 2000-2017

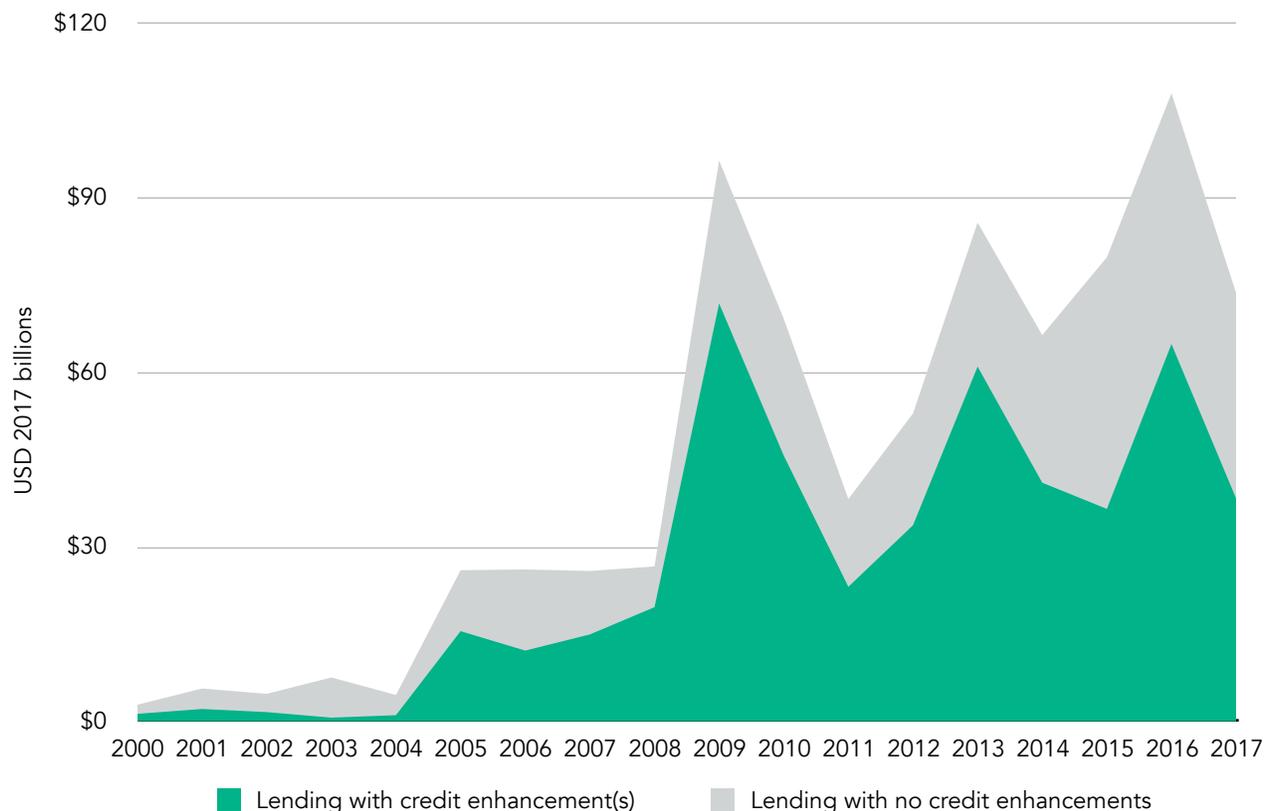


Source: AidData.

As Chinese state-owned lenders have taken on bigger projects and sought to manage credit risk more effectively, they have also ratcheted up their use of so-called "credit enhancements." Across the full 2.0 dataset, we find that at least 61% of China's official sector lending has benefited from a direct or indirect pledge of collateral, a repayment guarantee (usually from the host government), and/or credit insurance (usually purchased by the borrower from

Sinosure).⁸⁰ This ratio has fluctuated significantly from year-to-year, but generally trended upward over time (see Figure 14). During the first four years of measurement in the 2.0 dataset (2000-2003), 31% of official sector lending from China benefited from one or more credit enhancements. By 2017, this ratio increased to 52%. The average ratio during the first five years of BRI implementation (2013-2017) was 58%.

Figure 14: Chinese official sector lending with credit enhancements



Source: AidData.

Among these credit enhancements, we find that collateralization is the most popular tool among Chinese state-owned lenders.⁸¹ The 2.0 dataset indicates that at least 44% of official sector lending from China is collateralized, while at least 17% is backed by a repayment guarantee and at least 13% is insured.⁸² It also demonstrates that levels of collateralization vary considerably across Chinese state-owned lenders and over time. According to Table 11, just under a third of China Eximbank's overseas lending portfolio is collateralized and more than two-thirds of CDB's overseas

⁸⁰ Sinosure is the shorthand term for the China Export & Credit Insurance Corporation. It provides short-term, medium-term, and long-term buyer's credit and seller's credit insurance products. It also provides overseas investment (debt and equity) insurance.

⁸¹ The 2.0 dataset includes a Yes/No marker called "Collateralized/Securitized," which indicates if it is known that one or more sources of collateral/security can be seized in the event the borrower defaults on its repayment obligations. It is set to "Yes" when (i) a loan/export credit is collateralized through a formal lien or security interest; (ii) a borrower is required to deposit project-related revenues or unrelated revenues in a special account, escrow account, proceeds account, or revenue account that can be accessed (and debited) by the lender; and/or (iii) a security agent is appointed (to enforce rights against the collateral in the event that the borrower defaults on its repayment obligations). AidData also codes all pre-export finance (PXF) facilities as collateralized since they are almost always secured by an assignment of rights by the producer under an 'offtake contract' (i.e., a sale and purchase contract between the producer and a buyer of that producer of goods or commodities), and a collection account charge over a bank account into which proceeds due to the producer from the buyer of the goods or commodities under the offtake contract are credited.

⁸² We use the "at least" qualifier because AidData only codes loans and export credits as being collateralized, guaranteed, or insured when it has evidence that one of these credit enhancements was issued. However, there are almost certainly collateralized, guaranteed, or insured transactions in the 2.0 dataset that are not identified as such because no such evidence was identifiable.

lending portfolio is collateralized.⁸³ These ratios have not changed much since the BRI was introduced. However, the 2.0 dataset calls attention to a significant increase in collateralization during the BRI era among Chinese state-owned commercial banks: whereas 27% of the overseas lending from Chinese state-owned commercial banks was collateralized between 2008 and 2012, 44% was collateralized during the first five years of BRI implementation (2013-2017).⁸⁴ This trend is notable since much of the *growth* in China's overseas lending portfolio between 2013 and 2017 took place among its state-owned commercial banks (see Figure 9 above).

Table 11: Percent of lending collateralized by funding agency, 2008-2012 and 2013-2017

Funding agency	% lending collateralized (2008-2012)	% lending collateralized (2013-2017)
CEXIM	30%	29%
CDB	67%	70%
State-owned commercial banks	27%	44%
Combination of state-owned policy & commercial banks	76%	68%
SOEs	50%	71%
MOFCOM	0%	0%

Another insight from the 2.0 dataset is that Chinese state-owned lenders favor collateralization when the stakes are especially high: at least 40 of the 50 largest loans (worth \$254.4 billion) in the 2.0 dataset are collateralized (see Table A-3a in the Appendix). As additional evidence that Chinese state-owned lenders use the tool of collateralization strategically and selectively, consider Table 12, which shows that 83% of collateralized lending from official sector institutions in China between 2000 and 2017 supported countries scoring within the bottom quartile of the WGI Control of Corruption Index.⁸⁵ Table 13 also provides evidence that Chinese state-owned lenders are more likely to collateralize loans to countries which pose higher levels of repayment risk: whereas 62% of collateralized lending from official sector institutions in China between 2000 and 2017 supported countries that score below the global median on a popular measure of repayment risk (based on average sovereign credit ratings from Moody's, Standard & Poor's, and Fitch Ratings), only 38% supported countries falling at or above the global median.⁸⁶ In Table 14, we identify the ten countries—Venezuela, Peru, Turkmenistan, Equatorial Guinea, Russia, Uganda, DRC, Congo-Brazzaville, Ecuador, and Angola—in the 2.0 dataset that have contracted the highest levels of collateralized debt from Chinese state-owned lenders. Seven of these countries rank below the global median on the previously mentioned measure of repayment

⁸³ In previous work with a group of collaborators from the Center for Global Development, the Peterson Institute for International Economics, and the Kiel Institute for the World Economy, we analyzed a sample of 100 loan contracts that were issued by official Chinese creditors between 2000 and 2020. We found that 29% of the loans in that smaller sample were collateralized. 75% of the CDB loans and 22% of the China Eximbank loans in that sample were collateralized (Gelpern et al. 2021).

⁸⁴ We use the 5-year period immediately preceding the BRI (2008-2012) as a baseline for comparison because most of China's high-risk, high-reward overseas lending began after the 2008 Global Financial Crisis. Table 11 identifies a similar BRI era increase in collateralization among Chinese SOE lenders: from 50% between 2008-2012 to 71% between 2013-2017.

⁸⁵ We find that 94% of collateralized lending from official sector institutions in China between 2000 and 2017 supported countries scoring below the global median on the WGI Control of Corruption Index (see Table 12). To calculate this summary statistic, we first categorize all collateralized lending from official sector institutions in China in each year of the period of measurement (2000-2017) that is directed to countries which performed above or below the global median on the Control of Corruption index in the preceding year. We then calculate the average annual percentage over the eighteen-year period. We rely on the Control of Corruption index from the Worldwide Governance Indicators (WGI) Dataset, which is available via www.govindicators.org. We follow an analogous set of procedures to calculate the percentage of collateralized lending from official sector institutions in China supporting countries that score within the bottom quartile of the WGI Control of Corruption Index.

⁸⁶ To calculate these summary statistics, we followed the same procedures that are described in footnote 86 but we restricted our analysis to *collateralized* lending from official sector institutions in China.

risk.⁸⁷ These patterns in the dataset reinforce a key point: Beijing is more willing to bankroll projects in risky countries than other official creditors, but it is also more aggressive than its peers at positioning itself at the front of the repayment line (via collateralization).⁸⁸

Table 12: Chinese official sector lending and corruption, by lending type

% of Chinese lending with and without credit enhancements				
Control of corruption (year - 1)	Collateralized lending	Non-collateralized lending	Lending with credit enhancement (s)	Lending without credit enhancement(s)
Above median	6%	14%	9%	14%
Below median	94%	86%	91%	86%
Top 3 quartiles	17%	49%	27%	48%
Bottom quartile	83%	51%	73%	52%

Note: The percentages reported in this table are based on the set of countries for which WGI Control of Corruption scores are available.

Table 13: Chinese official sector lending and repayment risk, by lending type

% of Chinese lending with and without credit enhancements				
Repayment risk (year - 1)	Collateralized lending	Non-collateralized lending	Lending with credit enhancement (s)	Lending without credit enhancement(s)
Above median	38%	25%	36%	23%
below Median	62%	75%	64%	77%
Top 3 quartiles	64%	64%	63%	66%
Bottom quartile	36%	36%	37%	34%

Note: The percentages reported in this table are based on the set of countries for which average sovereign credit ratings from Moody's, Standard & Poor's, and Fitch Ratings are available.

⁸⁷ Here again, we use the sovrate index from Kose et al (2017). 6 of the 10 countries (Venezuela, Uganda, DRC, Congo-Brazzaville, Ecuador, and Angola) rank in the bottom quartile of this index. 7 of the 10 countries (Russia, Venezuela, Uganda, DRC, Congo, Ecuador, and Angola) rank below the median.

⁸⁸ As Gelper et al. (2021) explain, Chinese state-owned banks have positioned themselves as senior creditors whose loans should be repaid on a priority basis by requiring their borrowers to maintain significant cash balances in lender-controlled bank or escrow accounts. These informal collateral arrangements, which are rarely used by other bilateral and multilateral creditors, effectively put Chinese lenders at the front of the repayment line because they can simply dip into their borrower's accounts to collect unpaid debts.

Table 14: Top 10 borrowers by percent of lending that is collateralized

Borrowers	% collateralized lending
Venezuela	92.5%
Peru	90.0%
Turkmenistan	88.6%
Equatorial Guinea	80.3%
Russia	76.6%
Uganda	74.3%
Democratic Republic of the Congo	67.4%
Congo-Brazzaville	67.3%
Ecuador	59.0%
Angola	56.5%

Note: This table only includes countries that secured more than 10 official sector loans from China between 2000 and 2017.

As Chinese state-owned lenders have sought to bankroll more costly, complex, and risky projects under the auspices of the BRI, they have also prioritized *different types of borrowers*. Figure 10 above demonstrates that Beijing has directed a growing percentage of its overseas lending to project companies—or so-called special purpose vehicles (SPVs).⁸⁹ Whereas 8% of China's official sector lending was directed to these SPVs in 2000, this number soared to 33% by 2017. This trend is part of a larger shift from full-recourse sovereign lending to limited-recourse project finance transactions that began around the time of the 2008 Global Financial Crisis and accelerated during the first five years of BRI implementation.

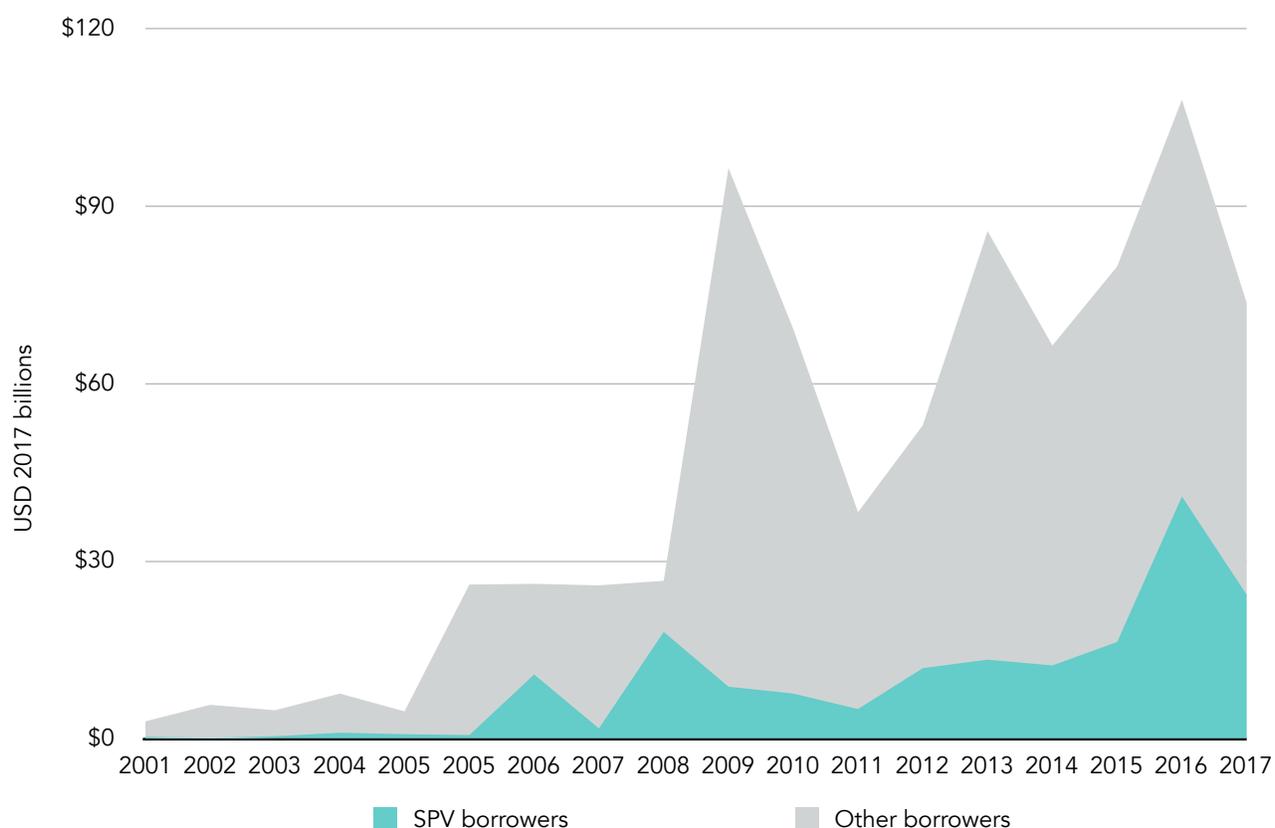
A loan that is directly issued to a government agency is called a full-recourse sovereign loan. The repayment of this type of debt does not depend upon the financial viability of a project or the cash flow generated by any particular asset. The sovereign government borrower guarantees the repayment of the loan, regardless of whether the project supported by the loan generates enough revenue to facilitate repayment. The creditor has a legal right to seize any and all assets of the borrower until the full amount of the debt is recovered (i.e., it has “full recourse” to the assets of the borrowing government). By contrast, when a project is financed with a limited-recourse or no-recourse structure, the loan that is used to finance the acquisition, construction, and/or maintenance of an asset—such as a toll road, a seaport, or an electricity grid—is exclusively repaid with the cash flow generated by the asset (e.g., toll revenue, container fees, or electricity sales), and the creditor either has no claim (“recourse”) or a limited claim to any other assets as a basis for recovering the debt. In a standard, limited-recourse or no-recourse project finance transaction, a creditor lends to an independent legal entity that is established for the express purpose of developing, owning, and operating a specific project. This entity is often called a special purpose vehicle (SPV) because it is only allowed to engage in activities that relate to a specific purpose (project), and it is legally prohibited from incurring debts or obligations that are not related to that purpose (project).⁹⁰

AidData's 2.0 dataset highlights a strong emphasis on lending to SPVs (i.e., limited-recourse and no-recourse project finance transactions) during the BRI era. Figure 10 above and Figure 15 below demonstrate that, during the thirteen-year period preceding the BRI (2000-2012), SPVs accounted for 17% of official sector lending from China. However, during the first five years of BRI implementation (2013-2017), this figure shot up to 26%. In absolute terms, average annual lending to SPVs increased from \$8.2 billion during the 2000-2012 period to \$13.2 billion during the 2013-2017 period. By 2017, *one-third of all official sector lending from China was directed to SPVs*.

⁸⁹ Also see Figure 15 below.

⁹⁰ SPVs are sometimes also referred to as “bankruptcy-remote” entities because they minimize bankruptcy risk.

Figure 15: Official sector lending from China to SPVs, 2000-2017



Source: AidData.

Limited-recourse and no-recourse project finance transactions are often attractive to LMIC governments because they make it possible to finance public infrastructure “off-balance sheet.” But why would Chinese state-owned lenders want to move in this direction? Sovereign loans provide full recourse to the assets of government borrowers in the event of default, so one would think that loans with a no recourse or limited recourse structure would be less attractive to them.

At the same time, it is important to remember that an unprecedented expansion in China’s overseas lending program took place *before* the BRI was launched, and many LMIC governments accumulated substantial amounts of debt between 2000 and 2012 (as we discuss at greater length in Section 4). Consequently, when Beijing announced the “Project of the Century” in 2013, many sovereign borrowers in LICs and MICs did not have a lot of room on their balance sheets to take on more big-ticket loans for large-scale infrastructure projects.⁹¹ This demand-side constraint forced China’s state-owned banks to look for “work-arounds” that would allow them to deliver on Xi Jinping’s signature foreign policy initiative. The most important path that they chose was increased lending to SPVs, and to account for the limited recourse that such lending provides to host government assets, Chinese state-owned lenders doubled down on the use of so-called credit enhancements. In the 2.0 dataset, we find that official creditors from China are nearly three times as likely as to issue loans to SPVs with some type of guarantee, credit insurance, or pledge of collateral as they are loans to government borrowers.⁹²

By the end of the fifth year of BRI implementation, the borrower type composition of China’s overseas lending portfolio looked substantially different than it did at the turn of the century. Whereas 55% of the official sector lending from China was directed to government agencies in 2000, 30% was directed to government agencies in 2017. This decline coincided with an expansion of lending to SPVs, private sector institutions, state-owned banks, and state-owned companies: whereas 31% of China’s official sector lending was directed to these institutions in 2000, this number

⁹¹ At the Belt and Road Forum for International Cooperation in May 2017, Xi Jinping referred to the BRI as the “Project of the Century” (Clover et al. 2017).

⁹² Over an eighteen-year (2000-2017) period, we find that official creditors from China are 2.8 times as likely as to issue loans to SPVs with some type of guarantee, credit insurance, or pledge of collateral as they are loans to government borrowers.

soared to 68% in 2017.⁹³ These changes in the composition of China’s overseas lending portfolio were largely the result of a shift towards limited-recourse project finance transactions. In Section 4, we take a closer look at this shift away from full-recourse sovereign lending and consider the implications for LMIC governments as they relate to “hidden debt” and the management of contingent public sector liabilities.

3.3 A primer on Chinese loan pricing practices

A longstanding question about China’s overseas lending program is whether its loans are more or less concessional than the loans that LMICs can obtain from traditional bilateral and multilateral creditors. According to the 2.0 version of our dataset, the average interest rate of a loan from an official sector institution in China is 4.2%,⁹⁴ while the average maturity length is 9.4 years and the average grace period is 1.8 years.⁹⁵ The internationally-accepted way of measuring a loan’s level of concessionality—i.e., the generosity of a loan or the extent to which it is priced below-market rates—is to calculate its “grant element” (which we discuss in Box 2). AidData calculates the grant element of every loan in its 2.0 dataset (for which the necessary pricing details are available) using OECD-DAC measurement standards.⁹⁶ Analysis of these data indicates that, between 2000 and 2017, the average grant element of a loan issued by an official sector institution in China was 28.4% (see Figure 16 below).⁹⁷ As of 2017, it was 35%. Both figures are considerably lower than the average grant element of loans (64%) issued by OECD-DAC creditors.⁹⁸ Official sector loans from China are also significantly less concessional than loans from the World Bank.⁹⁹ Yet, there is some evidence of progressivity in the ways that Chinese state-owned lenders price their loans. The average grant element of a loan from official sector institutions in China to a borrower in a low-income country is 41%, while the average grant element of loan to a borrower in a lower-middle income country is 37% and the average grant element of a loan to a borrower in an upper-middle income country is 21%.

⁹³ The 2.0 dataset suggests that another area of specialization among Chinese state-owned lenders is borrower type. According to Table 15, in our dataset, 53% of the loans that are provided to government agencies in borrower countries come from China Eximbank. By contrast, CDB specializes in lending to state-owned banks and state-owned enterprises. In our dataset, nearly 50% of the loans issued to state-owned banks in borrower countries come from CDB, and 51% of the loans issued to state-owned enterprises come from CDB. Responsibility for lending to SPVs is more evenly distributed across China’s state-owned policy banks and commercial banks.

⁹⁴ As a point of comparison, across all ODA loans issued by all OECD-DAC members in 2018, the average interest rate was 1.1% and the average maturity length was 28 years (OECD 2020: 5). However, lenders that participate in the OECD’s Creditor Reporting System (CRS) do not voluntarily disclose the pricing of their OOF loans.

⁹⁵ The unweighted (simple) averages are as follows: 3.2% interest rate, 14.6-year maturity length, and 5.2-year grace period. Unless otherwise specified, all of the grant elements, interest rates, maturity lengths, and grace periods that we report for Chinese loans and export credits in this study are weighted according to the monetary values of loans (and export credits) in constant 2017 USD.

⁹⁶ If any loan or export credit in the 2.0 dataset does not specify a grace period, AidData calculates its grant element by assuming that no grace period was extended to the borrower. When Chinese state-owned lenders issue loans and exports without grace periods, they typically only report an interest rate and maturity length.

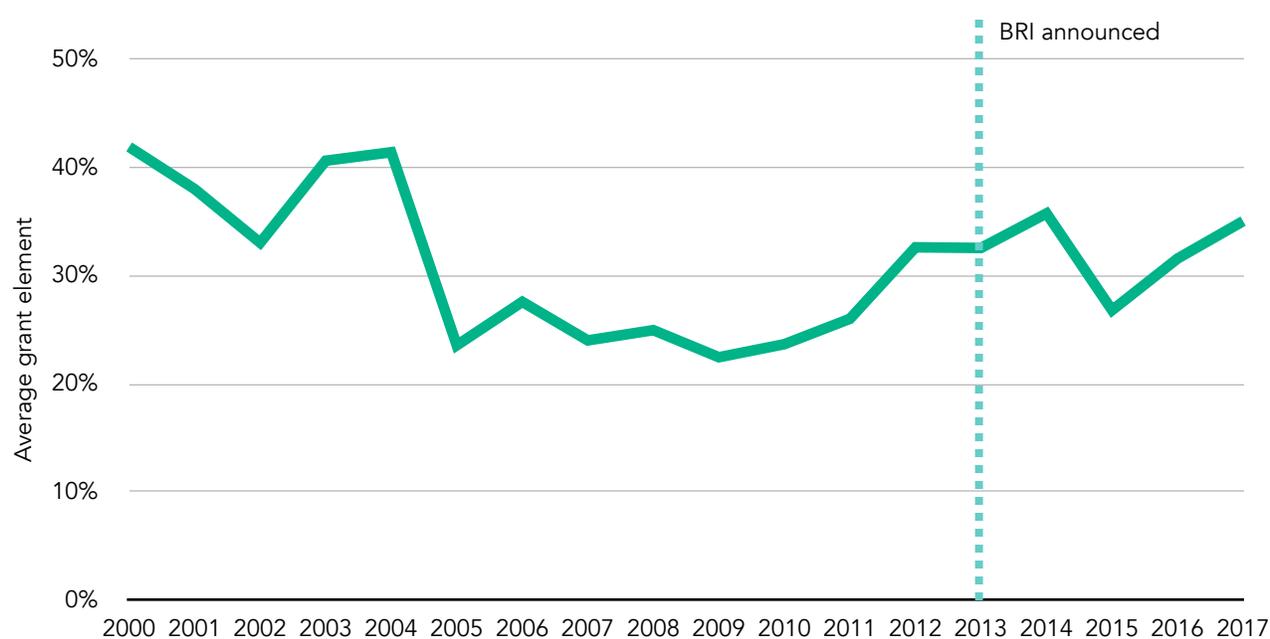
⁹⁷ In Figure 16 and Figure 17, average loan concessionality is calculated as the weighted average grant element for all loans with sufficiently complete information on lending terms (to use the OECD-DAC grant element calculator).

⁹⁸ This benchmark rate is based on all ODA loans issued by OECD-DAC members in 2017 (OECD 2020: 4). Lenders that participate in the OECD’s Creditor Reporting System (CRS) do not voluntarily disclose the pricing of their OOF loans. Therefore, it is currently not possible to generate an average grant element of OOF loans issued by OECD-DAC creditors, but it is important to keep in mind that the vast majority of official financing from OECD-DAC members is provided via ODA.

⁹⁹ The World Bank is a particularly relevant benchmark institution since it provides loans for large-scale infrastructure projects and has two different funding windows—the International Development Association (IDA) and the International Bank for Reconstruction and Development (IBRD)—for the provision of ODA and OOF. In Morris et al. (2020), we demonstrate that the average grant element of a World Bank loan is approximately 17 percentage points higher than the average grant element of an official sector loan from China. World Bank lending terms are more favorable to borrowers than Chinese lending terms because they generally include lower interest rates and longer maturities.

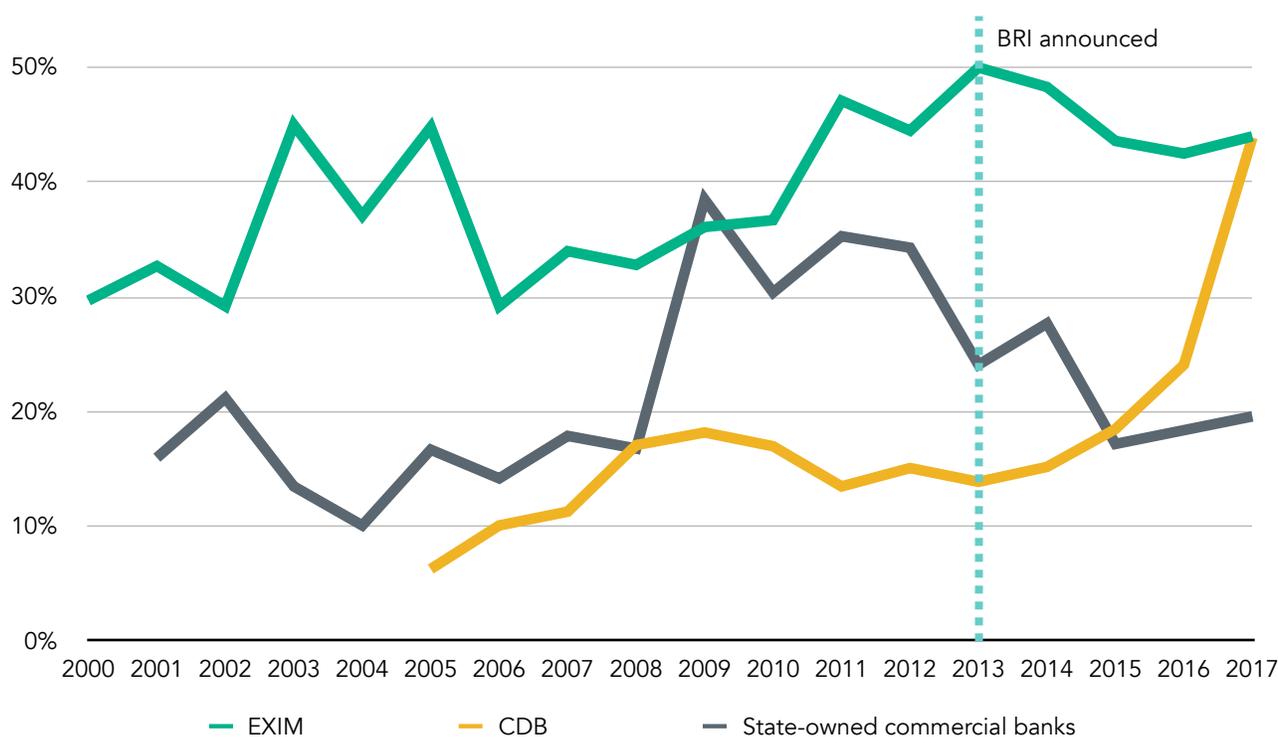
Table 15: Breakdown of borrower type by funding agency

Funding agency	Borrower type				
	Government agency	State-owned bank	Private sector	SOE	SPV
CEXIM	53%	17%	8%	14%	32%
CDB	36%	49%	53%	51%	26%
State-owned commercial bank	6%	9%	18%	11%	18%
Combination of state-owned policy & commercial banks	1%	25%	13%	3%	21%
MOFCOM	1%	0%	0%	0%	0%
SOEs	2%	0%	1%	22%	2%

Figure 16: Annual weighted average of grant element for loans from all funders, 2000-2017

Source: AidData.

Figure 17: Annual weighted average of grant element for loans from select funding agencies, 2000-2017



Source: AidData.

The 2.0 dataset also shows that, during the BRI era, China's official sector lending portfolio has become slightly more concessional. Figure 16 above provides evidence that the average grant element of official sector lending from China increased by 2.5 percentage points—from 32.5% to 35%—between 2013 and 2017. This shift towards more concessional lending might, at first blush, seem inconsistent with the BRI's emphasis on profitable, revenue-generating projects and the growing involvement of state-owned commercial banks in China's overseas lending program.¹⁰⁰

However, to better understand the reason for this modest increase in the grant element of official sector lending from China, one needs to examine differences in concessionality levels and trends across different official creditors in China.¹⁰¹ Table 7 above suggests that, with the passage of time, a division of labor has emerged among the various government and state-owned entities that support China's overseas lending portfolio. As the longtime administrator of the country's interest-free loan program, MOFCOM's Department of Foreign Assistance issues loans on extremely generous terms—with average concessionality rates (i.e. grant elements) that approach 75%—and it usually supports projects that generate diplomatic and geostrategic benefits rather than commercial benefits.¹⁰² Projects financed with MOFCOM loans often support the construction of presidential palaces, parliamentary complexes, theaters, opera houses, convention centers, stadiums and other facilities that cater to governing elites in major urban centers. By contrast, CDB and the country's state-owned commercial banks prioritize revenue-generating projects—like oil refineries, gas pipelines, mines, factories, and power plants—and price their loans at or near market rates. In fact, Table 7 above demonstrates that the average interest rates, maturities, grace periods, and grant elements of loans issued by CDB and state-owned commercial banks are very similar: 10 to 11.5 year maturities, 1 to 1.2 year grace periods, and

¹⁰⁰ In 2016, an official with China's National Development and Reform Commission (NDRC) told the *Financial Times* that "these days we need viable projects and a good return. We don't want to back losers" (*Financial Times* 2016).

¹⁰¹ Here we use the term "official sector lending from China" to capture loans and export credits issued by Chinese government institutions and Chinese state-owned institutions.

¹⁰² In August 2021, China International Development Agency (CIDCA), the Ministry of Commerce (MOFCOM), and the Ministry of Foreign Affairs (MOFA) reviewed and approved a new set of foreign aid administration measures. These measures specify that, as of October 1, 2021, CIDCA will be responsible for all planning, policymaking, regulatory, and supervisory functions that support the country's foreign aid program. MOFCOM will continue to implement foreign aid projects, among other line ministries (including MOFA). See http://www.cidca.gov.cn/2021-08/31/c_1211351312.htm

4.4% to 5.3% interest rates.¹⁰³ The average grant element of a CDB loan is 18.1% and the average grant element of a loan issued by a Chinese state-owned commercial bank is 22.1%. China Eximbank is something of a hybrid institution; it not only offers highly concessional loans with low, fixed interest rates and long repayment schedules and grace periods (like MOFCOM), but also loans at or near market rates with shorter repayment schedules and grace periods (like CDB and the state-owned commercial banks).¹⁰⁴ The compositional diversity in its portfolio is reflected in an average grant element of 41.5%, which is considerably lower than the concessional level of a typical MOFCOM loan but considerably higher than the concessional level of a typical loan issued by CDB or a Chinese state-owned commercial bank.

In Figure 17 above, we take a closer look at why the average level of concessionalism in China's official sector lending portfolio increased modestly during the first five years of BRI implementation. We do so by measuring the average grant element of lending from China's state-owned policy banks (CDB and China Eximbank) and state-owned commercial banks between 2000 and 2017. According to Figure 17 above, there was a decline in the average concessionalism level of lending from China's state-owned commercial banks between 2013 and 2017—from 24% to 20%.¹⁰⁵ This trend is consistent with the increasingly commercial orientation of China's overseas lending activities during the BRI era. There was also a decline in the average concessionalism of lending from China Eximbank (from 50% in 2013 to 44% in 2017), which suggests a shift towards more commercial lending within one of the country's two major policy banks after the BRI was announced.

Yet curiously, the overseas lending portfolio of the country's other major policy bank (CDB) did not become less concessional. In fact, according to Figure 17 above, CDB's loan portfolio became substantially *more* concessional during the BRI era, which is difficult to reconcile with Beijing's assertion that CDB is a commercial bank adhering to commercial lending practices. If we further probe the question of why the average concessionalism level of CDB's loan portfolio increased sharply between 2016 and 2017, we quickly find evidence of the "hidden hand of the state" guiding CDB's lending behavior. Although the institution usually lends at a floating market interest rate (e.g., LIBOR or EURIBOR plus a margin),¹⁰⁶ the sharp increase in CDB loan concessionalism took place (primarily) because the bank deviated from its own loan pricing guidelines for a strategically important mega-infrastructure project in Indonesia.¹⁰⁷

The Jakarta-Bandung High Speed Rail (HSR) Project was originally going to be financed by the Japan International Cooperation Agency (JICA). In January 2014, JICA included the project in its Overseas Development Aid plan for Indonesia and agreed in principle to bankroll 75% of the total cost of the project at a 0.1% interest rate so long as the host government provided a loan repayment guarantee. However, Beijing was determined to win the contract for the HSR project and sought to outcompete Tokyo on several dimensions, including cost, speed of implementation, and level of public liability (Harner 2015; Rachman and Lamboge 2020; Liao and Katada 2021). In early 2015, Indonesian President Joko Jokowi invited China to submit an alternative proposal, and it proposed a lower cost version of the project that could be *fully financed* with a government-guaranteed (CDB) loan at a 2% interest rate and implemented on a shorter timeline (3 years rather than 5 years). Then, in September 2015, when President Jokowi was expected to announce the winning bidder, he surprised everyone by rejecting Beijing's offer and Tokyo's offer and "cancelling" the project. The stated rationale for his decision was that the project would lead to a ballooning of public debt. Tokyo responded by offering a 50% reduction in the amount of debt that would need to be backed by a sovereign guarantee.

¹⁰³ The average loan pricing data in our dataset is largely consistent with the average loan pricing data that CDB has publicly disclosed (at an aggregate level). The CDB's self-reported average interest rate of "loans and advances" was 5.25% in 2015 and 4.40% in 2016 (CDB 2016).

¹⁰⁴ Another apparent area of specialization among Chinese state-owned lenders is borrower type. According to Table 15 above, 53% of the lending in the 2.0 dataset that are issued to government agencies in borrower countries come from China Eximbank. By contrast, CDB seems to specialize in lending to state-owned banks and state-owned enterprises. In our dataset, just over 50% of the loan value issued to state-owned banks in borrower countries come from CDB, and 51% of the lending issued to state-owned enterprises come from CDB. Responsibility for lending to SPVs is more evenly distributed across China's state-owned policy banks and commercial banks.

¹⁰⁵ This trend should be considered in light of another trend that we previously highlighted in Figure 9 above: the fact that a large proportion of the *growth* in China's overseas lending portfolio between 2013 and 2017 took place among its state-owned commercial banks.

¹⁰⁶ According to Chen (2020: 442), "[i]nterviews with CDB loan managers and employees of enterprises that have received CDB loans suggest that ... [the] [i]nterest rates of foreign-currency [CDB] loans are presented in the form of LIBOR + $n \cdot 100$ [basis points]." In the 2.0 dataset, we find that the vast majority of CDB loans are denominated in dollars or euros and priced at LIBOR or EURIBOR plus a margin.

¹⁰⁷ An important caveat is that AidData uses a fixed discount rate rather than country-specific discount rates to calculate levels of loan concessionalism (see Box 2). We do so to minimize complexity and ensure consistency with prevailing international measurement standards. However, our approach does not account for borrower country-specific levels of risks (i.e., different levels of uncertainty about future cash flows across countries). On this point, see Schlegl et al. (2019).

Beijing responded by scrapping the sovereign guarantee requirement altogether and proposing an off-government balance sheet transaction, in which CDB would work around the country's public debt ceiling by extending a loan to an SPV (jointly owned by Chinese and Indonesian state-owned companies) rather than the Government of Indonesia.¹⁰⁸

Beijing's revised offer was sufficiently attractive to seal the deal. On May 14, 2017, China Development Bank (CDB) signed a \$3.9675 billion loan agreement with PT Kereta Cepat Indonesia China—a special purpose vehicle that is jointly owned by a set of Indonesian state-owned enterprises (60% equity stake) and a set of Chinese state-owned enterprises (40% equity stake)—for the Jakarta-Bandung High Speed Rail Project.¹⁰⁹ The loan was issued in two tranches (a USD-denominated tranche worth \$2.3805 billion and an renminbi-denominated tranche worth \$1.587 billion) and priced on exceptionally generous terms. The dollar-denominated tranche (captured via Project ID#61320 in the 2.0 dataset) carried a 40-year maturity, 10-year grace period, and 2% interest rate, while the renminbi-denominated tranche (captured via Project ID#61321 in the 2.0 dataset) carried a 40-year maturity, 10-year grace period, and 3.46% interest rate. As such, the grant element of the dollar-denominated tranche was 69% and the grant element of the renminbi-denominated tranche was 56%—levels of loan concessionality that far surpass the OECD's 25% threshold for Official Development Assistance (ODA) and more closely resemble the levels of concessionality that are observed when MOFCOM's Department of Foreign Assistance issues interest-free loans or China Eximbank issues preferential loans.¹¹⁰

The fact that one of the largest CDB transactions in our global dataset would qualify as foreign aid or ODA under any reasonable standard (set by the OECD or the Chinese Government) belies the claim that CDB is a nothing more than a commercial bank following commercial lending practices.¹¹¹ During a recent debate about which Chinese lenders should be required to participate in the Debt Service Suspension Initiative (DSSI), Beijing took the position that CDB's participation in the DSSI should be optional since only official creditors are expected to participate in the initiative.¹¹² However, the Jakarta-Bandung High Speed Rail Project demonstrates that Beijing is trying to have it both ways: it is content to let the CDB operate on a commercial basis when this approach is consistent with the government's policy objectives, but it is also willing to intervene and direct the bank to lend at below-market rates when it decides that concessional lending will more effectively advance the government's policy objectives.¹¹³

The heavily subsidized nature of CDB lending for the Jakarta-Bandung High Speed Rail (HSR) Project is certainly unusual, but that does not mean that the institution's broader international loan portfolio is shielded from the policy directives of the central government. Quite the opposite. Our analysis of the broader set of CDB-financed projects in the 2.0 dataset suggests that the institution's overseas lending activities are being directed by the central government—even when its loans are priced on commercial rather than concessional terms—and it has been tasked with a “high-risk, high-reward” credit allocation strategy that sets it apart from other Chinese state-owned lenders. CDB, which is the single largest official source of international credit from China (see Figure 9 above), is more willing than its peers to lend to countries that are plagued by high levels of corruption. According to Table 10 above, nearly 70% of CDB's overseas lending between 2000 and 2017 supported countries within the bottom quartile of the WGI Control of Corruption index.¹¹⁴ By way of comparison, 59% of overseas lending from China Eximbank and 57% of the country's

¹⁰⁸ After the Asian Financial Crisis, Indonesia passed fiscal reform legislation, which established an outstanding government debt ceiling of 60% of GDP and a budget deficit ceiling of 3% of GDP.

¹⁰⁹ The purpose of the project is to construct a 142.3 km high-speed railway from the city of Jakarta to Bandung, the capital of West Java. Upon completion, the railway is expected to reduce the travel time between Jakarta and Bandung from more than 3 hours to less than 40 minutes.

¹¹⁰ According to Table 7, CDB's average level of loan concessionality is 18.1%.

¹¹¹ For econometric evidence that political factors significantly influence the allocation of CDB credit, see Ru (2018).

¹¹² In its latest public filing with the Hong Kong Stock Exchange, CDB describes itself in the following manner: “We are a state-owned development finance institution. We report directly to the State Council on important matters relating to our business and operations, and [...] [o]ur operations are subject to the direct leadership of the State Council, in support of the development of key sectors and weak areas in the PRC economy. To anchor our mission of supporting national development and delivering a better life for the people, we align our business focus with China's major medium- and long-term economic development strategies. We are currently wholly owned, directly or indirectly, by the PRC government [...]” (CDB 2020).

¹¹³ During recent policy discussions regarding the DSSI, Beijing has tried to characterize CDB as a commercial bank that should be exempt from the international rules and norms that guide the behavior of official creditors. However, CDB's own statements are inconsistent with this claim. In a public filing with the United States Securities and Exchange Commission (SEC), CDB acknowledged that w[e] generally make hard loans to [borrowers] that, based on our credit evaluation process, are considered to be capable of repaying the debt obligations and are responsible for the construction and operation of the projects being financed”, but “[w]e may select projects for soft loan financing primarily based on the government's policy considerations [...]” (CDB 2005).

¹¹⁴ This figure increases to 89% if one considers the percentage of CDB lending that supported countries below the (global) median on the WGI Control of Corruption index.

state-owned commercial banks between 2000 and 2017 supported countries within the bottom quartile of the WGI Control of Corruption index.¹¹⁵

CDB is also more aggressive about collateralizing its debts than other Chinese state-owned lenders. During the first five years of BRI implementation, 70% of CDB's overseas lending portfolio was collateralized, but substantially smaller percentages of the overseas lending portfolios overseen by China Eximbank (29%) and the country's state-owned commercial banks (44%) were collateralized (see Table 11 above). Collateralization has evidently become a "go-to" risk mitigation tool for CDB when it transacts with countries that pose high levels of corruption risk: 82% of CDB's collateralized lending goes to countries within the bottom (fourth) quartile of the WGI Control of Corruption index, while only 18% goes to countries that fall within the first, second, and third quartiles of the of the WGI Control of Corruption index (see Table 16).¹¹⁶

Table 16: Chinese collateralized lending and corruption, by funding agency

Control of corruption (year - 1)	% of Chinese collateralized lending by funding agency					
	CEXIM	CDB	State-owned commercial banks	Combination of state-owned policy & commercial banks	SOEs	MOFCOM
Top 3 quartiles	20%	18%	28%	21%	5%	0%
Bottom quartile	80%	82%	72%	79%	95%	0%

Note: The percentages reported in this table are based on the set of countries for which WGI Control of Corruption scores are available.

One explanation for this pattern is that the collateralization mechanism is itself a deterrent to financial misappropriation and repayment delinquency. Gelpert et al. (2021) provide contractual evidence that CDB often requires borrowers to deposit a portion of the cash proceeds from their commodity exports into lender-controlled bank accounts, which puts the lender in a position to seize liquid assets (without having to go to court) if borrowers fail to honor their repayment obligations. This arrangement, which has been described as an "agency of restraint," may provide a partial explanation for why the CDB issues such large amounts of debt to resource-rich countries that pose high levels of fiduciary risk (e.g., Venezuela, Angola, Equatorial Guinea, Congo-Brazzaville, Turkmenistan).¹¹⁷

However, another important part of the story is that CDB is a yield-maximizing agent of the state tasked with lending to resource-rich countries that pose especially high levels of fiduciary risk (where there is not much competition from other official creditors) to achieve outsized investment returns. Table 17 provides evidence that when CDB lends to countries that pose especially high levels of fiduciary risk, it attaches higher interest rates to its loans—specifically, weighted average interest rates of 5.8% for countries in that fall within the bottom quartile of the WGI Control of Corruption index and weighted average interest rates of 4% for countries that fall within the top three quartiles of the WGI Control of Corruption index.¹¹⁸ China Eximbank has followed a similar strategy, but it has not done so as aggressively as CDB.

¹¹⁵ These figures increase to 89% and 85%, respectively if one considers the percentage of lending from China Eximbank and the country's state-owned commercial banks that supported countries below the (global) median on the Control of Corruption index.

¹¹⁶ The same can be said of other Chinese state-owned lenders (see Table 16).

¹¹⁷ Brautigam (2011) puts it this way: "[c]ommodity-backed loans are a pre-commitment technique. They allow a government to have public works expenditures today, paying for them with future exports. In weak governments, rather than trying directly to improve the host government's accountability mechanisms, or forcing improvements through conditionality, the Chinese accept that institutional development is a long-term process. They manage their fiduciary responsibility by keeping control over the finances and almost never giving cash. As one African official told me: 'with China you never see that money.'"

¹¹⁸ The grant element metric that we previously discussed can also be used as a gauge of whether and when borrowing terms are more or less favorable to a lender. According to Table 17, the weighted average grant element of a CDB loan that is offered to a country in the bottom (fourth) quartile on the WGI Control of Corruption index is only 15%. It is nearly twice as high (28%) for countries that fall within the top three quartiles on the WGI Control of Corruption index.

Table 17 also indicates that China's state-owned commercial banks are not balancing risk and reward in the same way.¹¹⁹

Table 17: CDB, CEXIM, and state-owned commercial banks' lending terms, by level of fiduciary risk in borrower countries

	CDB		CEXIM		State-owned commercial banks	
	Interest rate	Grant element	Interest rate	Grant element	Interest rate	Grant element
Control of corruption (year – 1)						
Top 3 Quartiles	4.0%	28%	2.9%	44%	4.7%	25%
Bottom Quartile	5.7%	15%	3.4%	40%	4.0%	19%

Note: The percentages reported in this table are based on the set of countries for which WGI Control of Corruption scores are available. All interest rates and grant elements are reported as weighted averages. They are weighted according to the monetary values of loans (and export credits) in constant 2017 USD.

CDB's unique "high-risk, high-reward" credit allocation strategy traces its origins to the 2008 Global Financial Crisis. When international commodity prices plummeted, the Chinese government gave CDB a special assignment: investing the country's excess foreign exchange reserves in undervalued—and potentially high-yield—overseas assets via foreign currency-denominated international lending (Dreher et al. 2021a).¹²⁰ A particularly high level of priority was assigned to overseas assets in the natural resource sector. Chen Yuan, the President of China Development Bank at the time, said that "[e]veryone is saying we should go to the western markets to scoop up [underpriced assets]. ... I think we should not go to America's Wall Street, but should look more to places with natural and energy resources" (Anderlini 2009). That is precisely what happened: CDB's foreign currency-denominated lending to overseas borrowers soared to record levels after 2008 (see Figure 9 above) and the vast majority of its lending was priced on commercial rather than concessional terms, collateralized against commodity exports, and directed to resource-rich countries that pose especially high levels of fiduciary risk. Therefore, the story of how CDB became Beijing's biggest lender to the developing world is the story of a profit-maximizing surrogate of the state making high-risk, high-reward investments in undervalued assets located in poorly-governed countries with large natural resource endowments.

¹¹⁹ Table 17 provides a comparable set of summary statistics for China Eximbank and the country's state-owned commercial banks (the second- and third-largest official sources of international credit from China). It reveals a substantially smaller difference (0.5% as opposed to 1.7% in CDB's case) in the weighted average interest rate of China Eximbank lending to countries that fall within the bottom quartile of the WGI Control of Corruption index (3.4%) and the weighted average interest rates of China Eximbank lending to countries that fall within the top three quartiles of the WGI Control of Corruption index (2.9%). The interest rates attached to China Eximbank loans are also considerably lower than those attached to CDB loans. Table 17 does not suggest that Chinese state-owned commercial banks are pursuing the same "high-risk, high-reward" credit allocation strategy. They attach lower interest rates to countries that pose especially high levels of fiduciary risk and higher interest rates to countries that pose relatively lower levels of fiduciary risk.

¹²⁰ Under a so-called "entrust loan" agreement that was signed in 2008, China's State Administration of Foreign Exchange (SAFE) entrusted a portion of the country's foreign exchange reserves to CDB and directed it to engage in international lending activities on its behalf (Kong and Gallagher 2017).

4. Managing debt risks during the BRI era

4.1 The rise of hidden debt and the fall of sovereign debt

In Section 3, we provided evidence of an extraordinary expansion in China's overseas development finance program during the 21st century, which was initially fueled by non-concessional and semi-concessional loans and exports credits (i.e., OOF rather than ODA) from the country's state-owned policy banks (China Eximbank and CDB). We also demonstrated that, during the BRI era, China's state-owned commercial banks have assumed an increasingly important role—by organizing lending syndicates and other co-financing arrangements that make it possible to undertake more costly and complex infrastructure projects. Over time, larger loans have led to higher levels of credit risk, which has in turn created pressure for stronger repayment safeguards, including collateralization, credit insurance policies, and third-party guarantees.

We now turn our attention to another defining feature of the BRI era: the fact that China has rapidly expanded its lending for infrastructure projects in LMICs while at the same time shrinking the percentage of its overseas loan portfolio that supports sovereign borrowers (i.e., central government institutions) in LMICs. Beijing has attempted to square this circle by ramping up its lending to SPVs, state-owned banks, state-owned companies, and private sector institutions in the developing world. However, it has done so in ways that blur the distinction between private and public debt and create major public financial management challenges for LMICs.

According to the 2.0 dataset, only 31% of China's official sector lending was directed to project companies (SPVs), state-owned companies, state-owned banks, and private sector institutions in 2000. However, by 2017 (the fifth year of BRI implementation), this figure soared to 68% (see Figure 10 in Section 3).¹²¹ This extraordinary increase coincided with a sharp decline in China's official sector lending to government agencies—from 55% in 2000 to 30% in 2017 (see Figure 10 in Section 3). At first blush, one might think that government agencies in LMICs do not have much reason to be concerned about the rapid accumulation of Chinese debt by project companies (SPVs), state-owned companies, state-owned banks, and private sector institutions in their countries. These repayment liabilities, for the most part, do not appear on government balance sheets in LMICs.

However, these off-government balance sheet transactions raise questions and concerns about undisclosed government repayment liabilities in LMICs because Beijing's state-owned banks have relied on hybrid financial arrangements that selectively mix and match elements from full-recourse sovereign lending and elements from limited-recourse project finance. In some cases, they have lent to a private company or SPV but demanded that the host government issue a sovereign guarantee in support of the loan, which means that the loan issued could become a public debt that host country taxpayers are responsible for repaying (if the borrower goes bankrupt or the project in question does not generate sufficient revenue).¹²² In other cases, they have lent to a state-owned enterprise in the host country (or an SPV that is wholly or partially-owned by a state-owned enterprise in the host country) without demanding a sovereign guarantee, thereby creating uncertainty about who will assume responsibility for repayment in the event that the borrower goes bankrupt or defaults on its obligations. Another practice that has become increasingly popular is issuing a loan to an SPV or private sector institution without requiring a formal repayment guarantee from the host government but demanding a guaranteed return on equity from the host government.¹²³ In principle, this type of loan is not a public sector liability since the borrower is an independent legal entity and the host government has no repayment obligation in the event of default. However, in practice, a host government-guaranteed return on equity

¹²¹ This increase was largely driven by the expansion in lending to SPVs, which we documented in Section 3. Also see Figure 15 in Section 3.

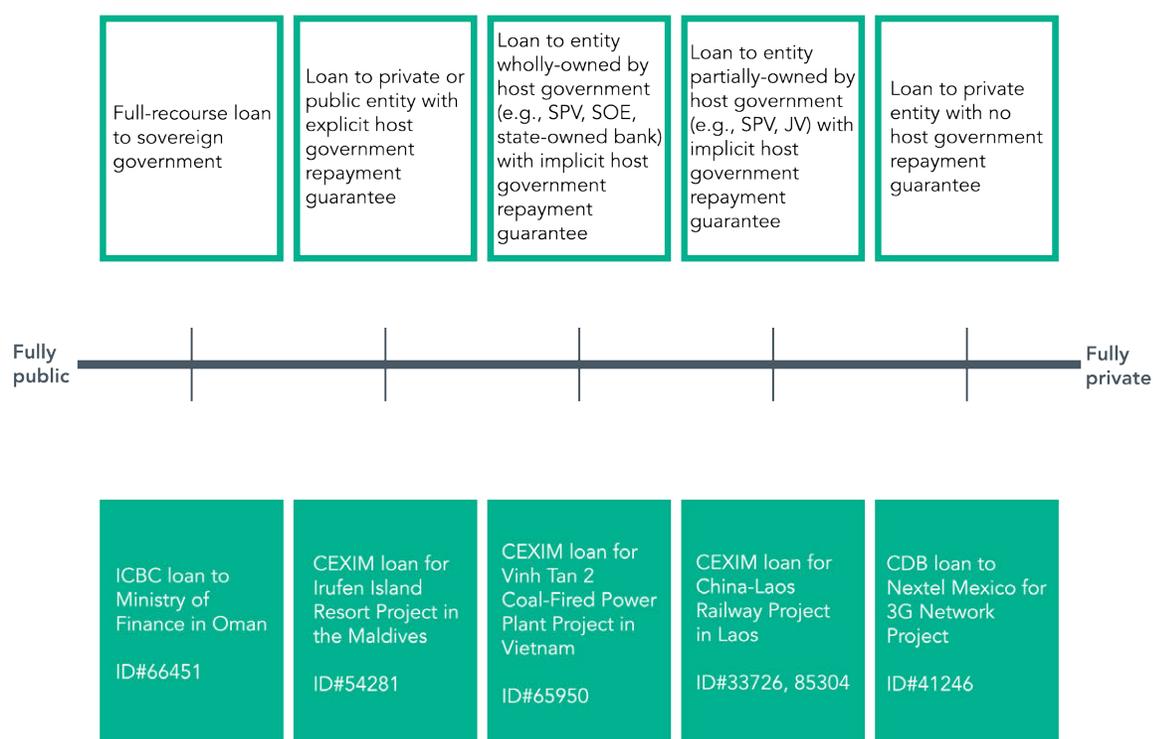
¹²² According to the 2.0 dataset, 36% of official sector lending from China to SPVs, 23% of official sector lending from China to private sector institutions, 34% of official sector lending from China to state-owned banks, and 11% of official sector lending from China to state-owned companies is backed by a formal repayment guarantee.

¹²³ This practice is especially prevalent among independent power projects (IPPs) that are being financed with a mix of Chinese debt and equity under the auspices of the China–Pakistan Economic Corridor (CPEC) initiative. In June 2013, Pakistan's National Electric Power Regulatory Authority (NEPRA) set a 17% return on equity (ROE) "floor" for coal-fired IPPs. Then, to entice Chinese investors and provide additional reassurance to Beijing's state-owned banks, NEPRA increased the ROE floor to 24.5% in June 2014. The Government of Pakistan even went a step further by guaranteeing the payment obligations of the state-owned Central Power Purchasing Agency (CPPA) to the companies (special purpose vehicles) that own and operate independent power plants (Downs 2019). The Government of Pakistan has also issued ROE guarantees and CPPA payment guarantees for Chinese government-financed renewable energy projects (e.g., Arif Habib Corporation Limited 2017).

implies that the borrower will be able to consistently service its Chinese debts, which is tantamount to an explicit loan repayment guarantee that that host government does not need to disclose.¹²⁴

None of these lending practices are intrinsically harmful to the interests of developing countries. However, they raise concerns about “hidden debts” and questions about whether LMIC governments are effectively monitoring and managing their contingent liabilities (World Bank and IMF 2020a; G7 2020, 2021; IMF 2021). Figure 18 arrays the different types of borrowers to which Chinese state-owned banks lend on a “public liability” spectrum. On the far left-hand side of the spectrum is a sovereign debt transaction in which the borrower is the central government institution, and the lender has full recourse to the assets of the borrower. On the far right-hand side of the spectrum is a loan issued to a private entity without a government repayment guarantee.

Figure 18: Official Chinese sector lending on the “public liability” spectrum



We will soon demonstrate that Chinese state-owned banks increasingly lend to borrowers that fall somewhere in the “murky middle” of this spectrum. This type of lending comes in different varieties. One variety—situated left-of-center on the public liability spectrum in Figure 18—is when an official Chinese creditor issues a loan to a private or public sector entity in an LMIC that is backed by an explicit government repayment guarantee (i.e., a “sovereign guarantee”).¹²⁵ Take for example the \$127.5 million loan that China Eximbank issued in 2017 to a private company—

¹²⁴ The World Bank describes the nature of the problem in the following manner: “[a]nother category of contingent liabilities that is growing rapidly and poses a potential risk to the debt portfolio is the guarantees given in the context of public-private partnerships or external liabilities issued through off-shore or off-balance sheet mechanisms by both public and private domestic entities. Governments are often obligated to guarantee above average income streams to attract private investors and the scope of guarantees offered to make PPPs look viable may be substantial, including loan repayments, guaranteed rates of return, minimum income streams, guaranteed currency exchange rates and compensation, should new legislation affect an investment’s profitability. Some of the guarantees associated with PPPs are explicit and stated in contractual agreements but more often they are implicit [contingencies] which may translate into financial obligations: the timing and magnitude depends on the occurrence of a future event outside the control of the government. Measurement problems are compounded by the fact that current account practice permits governments to keep the costs and liabilities associated with PPPs off-balance sheet, thus circumventing budgetary constraints and obfuscating scrutiny by the national legislature.” See <https://datatopics.worldbank.org/debt/QuarterlyBulletin-January2019>

¹²⁵ A sovereign guarantee is a guarantee from a government institution (typically the Ministry of Finance) that a repayment obligation will be satisfied if the primary borrower defaults. When a government institution issues a sovereign guarantee, there is no immediate impact on the liquidity of the government institution, but its assets are put at risk.

called Ahmed Siyam Holdings Pvt Ltd—to support the construction of a luxury resort with 509 rooms on Noonu Atoll in the Maldives (captured via Project ID#54281). The owner of Ahmed Siyam Holdings Pvt Ltd was a member of parliament and a key political ally of the Maldivian president (Abdulla Yameen Abdul Gayyoom) at the time that the loan was contracted.¹²⁶ For reasons that were never disclosed, the Government of the Maldives issued a sovereign guarantee in support of the loan (Auditor General's Office of the Republic of Maldives 2020). Therefore, the private debt contracted by Ahmed Siyam Holdings Pvt Ltd would automatically become a public debt if the resort project was insufficiently profitable, and the borrower defaulted on its repayment obligations. This worst-case scenario nearly came to pass. Due to economic difficulties resulting from the COVID-19 pandemic, Ahmed Siyam Holdings Pvt Ltd failed to meet a \$10 million loan repayment obligation that was due to China Eximbank on July 21, 2020. The very next day, China Eximbank warned the Government of the Maldives that, as the ultimate guarantor of the private debt, it was responsible for the loan repayment obligations of Ahmed Siyam Holdings Pvt Ltd. and failing to meet these obligations would result in a sovereign default, thereby jeopardizing the country's international credit ratings and its macroeconomic stability (Aiham 2020; Mohamed 2020; Macan-Markar 2020).¹²⁷

However, debts and debtors that are located between right-of-center and center on the public liability spectrum in Figure 18 above can create major public financial management problems for LMICs.¹²⁸ Take for example public-private partnership (PPP) projects, which have become increasingly popular among Chinese state-owned lenders during the BRI era. When LMIC governments engage in PPP projects, they can provide *explicit* or *implicit* forms of liability protection to the project companies (SPVs) that own public infrastructure assets. Explicit forms of liability protection are codified in laws and contracts, but implicit forms of liability protection arise when there are expectations that the host government will bail out a project company (SPV) if it cannot repay its debts. Bova et al. (2016) provide evidence that implicit forms of contingency liability protection are especially problematic. They construct a comprehensive dataset of contingent liability realizations in developed and developing countries over a 25-year period and find that “[t]he average fiscal cost of a contingent liability realization is 6 percent of GDP but costs can be as high as 40 percent for major financial sector bailouts.” They also find that more than 80% of all contingent liability realizations result from *implicit forms of liability protection*.

The China-Laos Railway Project, which we discuss at greater length in Box 3, illustrates why implicit forms of liability protection from LMIC governments can be especially problematic. To implement this \$5.9 billion project on a PPP basis, three Chinese state-owned companies and a Lao state-owned enterprise established a joint venture (SPV) called the Laos-China Railway Company Limited (LCRC). The co-owners of the LCRC agreed to provide equity contributions that would cover 40% of the total project cost. The remaining 60% was financed by the LCRC with a \$3.54 billion debt financing package from China Eximbank. The Government of Laos did not issue a sovereign guarantee in support of the debt financing package that was contracted by the LCRC. Therefore, the project is not a contingent liability for the Government of Laos because it provided an explicit form of liability protection to the LCRC. It is a contingent liability for the Government of Laos because it is potentially “too big to fail.” That is to say, if the railway (a public infrastructure asset) is insufficiently profitable, the Laotian authorities may face political, reputational, and/or moral pressures to bail out the LCRC.¹²⁹ However, since the LCRC is jointly owned by three Chinese state-owned companies that hold a 70% equity stake and a Lao state-owned enterprise that holds a 30% equity stake, there is uncertainty about whether the Chinese side or the Lao side would feel more compelled to bail out the LCRC if it became financial distressed and/or it defaulted on its repayment obligations to China Eximbank. In the event that the Chinese side was less willing than the Lao side to abandon the railway, the host government would potentially have no liability at all for the \$3.54 billion debt that was contracted by the LCRC.¹³⁰ However, if the Lao side had less appetite than the Chinese side to let the railway fail, the host government could end up assuming responsibility for the entire \$3.54 billion debt—or more.¹³¹ Herein lies

¹²⁶ President Abdulla Yameen Abdul Gayyoom was eventually jailed on charges related to the leasing of an island for resort development in exchange for bribes worth \$1.17 million (Avas 2020).

¹²⁷ This issue was ultimately resolved when the Maldivian government threatened to exercise its mortgage rights if Ahmed Siyam Holdings Pvt Ltd did not deposit the overdue payment in an escrow account within five business days. However, this case still highlights the blurry nature of the distinction between private and public debts that are owed to Chinese state-owned lenders. See Macan-Markar (2020).

¹²⁸ Here we are referring to the third and fourth categories from the left on the public liability spectrum.

¹²⁹ Even in wealthy, industrialized countries, these types of off-government balance sheet transactions have a checkered history. Take for example the PPP that was established during the late 1990s to refurbish the London Underground (“Tube”). It underperformed financially and the central government eventually had to step into the breach and bail out an SPV that could not manage its debt repayment obligations to the tune of £1.6 billion (Butcher 2012; Schaefer 2018).

¹³⁰ Supalak Ganjanakhundee of the ISEAS–Yusof Ishak Institute argues that “China would not allow Laos to go bankrupt because it could boomerang on Chinese companies and creditors” (Macan-Markar 2021).

¹³¹ The “or more” qualifier is an important one because, as an independent legal entity, the LCRC can assume any number of financial obligations other than the \$3.54 billion debt financing package that it received from China Eximbank.

the core challenge of “hidden debts” that benefit from implicit forms of liability protection: *the problem is less about the host government knowing that it will need to service an undisclosed debt (with a known monetary value) than it is about the host government not knowing the monetary value of debt that it may or may not have to service in the future.*¹³²

Contingent liabilities are especially dangerous in countries with high baseline levels of public indebtedness.¹³³ Laos is again a case in point. Without any consideration of contingent liabilities, its public debt-to-GDP ratio stands somewhere between 55% and 60%, and history suggests that countries with rising public debt-to-GDP ratios in excess of 50–60 percent tend to experience economic growth slowdowns (Chudik et al. 2017). Laos would therefore be in the “danger zone” even if it had no contingent liabilities. But it does. International credit rating agencies estimate that the China-Laos Railway Project and other projects being implemented on a PPP basis may represent *an additional 30% of GDP* (Barney and Souksakoun 2021).¹³⁴ Our own dataset suggests that the Laotian government’s true level of contingent liability due to official sector lending from China may be as high as 35% of GDP (see Table A-4 in the Appendix). These “known unknowns” have real consequences. In August 2020, Moody’s downgraded the country’s international credit rating from B3 to Caa2—one notch above a rating of debt default (Moody’s 2020). Fitch Ratings followed suit in September 2020, citing concerns about contingent liability risk (Fitch Ratings 2020). The limited liability corporation structure of the LCRC (described in Box 3) and the various project companies responsible for other PPP projects has no doubt shielded the Government of Laos from some degree of repayment risk, but it has also heightened concerns about hidden debt and implicit forms of liability protection (i.e., whether the Laotian authorities would bail out the LCRC in a situation of financial distress or default).

¹³² The fact that the LCRC is jointly owned by three Chinese state-owned companies (with a 70% equity stake) and a Lao state-owned enterprise (with a 30% equity stake) does not imply that, in the event of default, the Chinese state-owned companies would legally be responsible for 70% of LCRC’s outstanding debts to China Eximbank. Nor does it imply that the Lao state-owned company would be responsible for 30% of the LCRC’s outstanding debts to China Eximbank. The LCRC is a limited liability corporation, so in the event that it defaults on its repayment obligations to China Eximbank, the equity holders in the LCRC are not legally obligated to assume responsibility for its outstanding debts.

¹³³ According to the World Bank and the IMF, the country faces a high risk of debt distress (World Bank and IMF 2019).

¹³⁴ Most of the other projects being implemented as PPPs in Laos are hydropower projects financed by Chinese state-owned banks (Barney and Souksakoun 2021).

Box 3: Hidden debt in a China Eximbank-financed PPP project in Laos

The Lao-China Railway Company (LCRC) is a special purpose vehicle (i.e., project company) that was established as a limited liability corporation (LLC) to finance, design, construct, and manage a 418 kilometer railway between the Chinese city of Kunming and the Laotian capital of Vientiane on a public-private partnership (PPP) basis (World Bank 2020: 20).¹³⁵ The total cost of the China-Laos Railway Project is \$5.9 billion—equivalent to roughly one-third of Laos' GDP—and it is being financed according to a 60:40 debt-to-equity ratio (\$3.54 billion of debt and \$2.36 billion of equity). LCRC directly secured \$3.54 billion of debt financing from China Eximbank, and the Government of Laos and the Chinese Government contributed \$730 million and \$1.63 billion of equity financing, respectively. In order to make its \$730 million equity contribution to the project, the Government of Laos secured a \$480 million loan from China Eximbank and it agreed to provide \$250 million of its own funding (in annual instalments).¹³⁶ The \$3.54 billion debt secured by LCRC, which is jointly owned by three Chinese state-owned companies that collectively hold a 70% equity stake and one Lao state-owned enterprise that owns a 30% equity stake, is not backed by a sovereign guarantee.¹³⁷ However, in the event that the China-Laos Railway is not profitable, the Laotian authorities “will be under considerable pressure to cover any [financial] losses” (Hurley et al. 2019: 153). The Government of Laos is optimistic that the railway will turn a profit by 2027, its sixth year of expected operation (Obe and Kishimoto 2019),¹³⁸ but economic modeling suggests that the China-Laos Railway is “unlikely to bring major economic benefits and [has] the potential to present a very large contingent liability for the Lao PDR” (Lane 2020: 1). The commercial viability of the railway will ultimately hinge upon its ability to increase cargo and passenger traffic between Thailand and China, but there is significant uncertainty about when the railway connection on the Thai side of the border will reach completion.¹³⁹ There is also uncertainty about how much cargo and passenger traffic within Laos will move from the road network to the railway and if the Laotian Government will adopt the trade facilitation reforms that are needed to reduce border clearance times or the regulatory reforms in the logistics sector that are needed to ease market entry (World Bank 2020).

There are two ways in which the China-Laos Railway Project is being financed with “hidden debt.” First, the \$480 million China Eximbank loan that the Government of Laos secured to finance its equity stake in the LCRC is a classic case of “double-gearing” or “pyramiding,” which raises an important question about the financial health of the project company. An equity stake should be an asset, but if it is financed with debt, it is a liability, which suggests that the asset may be worthless. In other words, the project company structure that underpins the China-Laos Railway Project is seemingly being used to obscure more debt accumulation rather than for limited liability protection.¹⁴⁰ Second, if the LCRC is insufficiently profitable, anywhere between 0% and 100% of the \$3.54 billion debt that China Eximbank issued to the LCRC could become a repayment obligation of the Government of Laos.¹⁴¹ None of the equity holders in the LCRC have legal liability for any unpaid debts of the project company since it was established as an LLC. However, since the China-Laos Railway is a public infrastructure asset being financed through a PPP arrangement, there is a non-trivial possibility that the Laotian (and/or Chinese) authorities would feel compelled to bail out the LCRC if it defaulted on its repayment obligations to China Eximbank.¹⁴²

¹³⁵ The LCRC is identified as an LLC (有限公司) on its website. See <http://www.lcrc.ltd/index.htm>

¹³⁶ The \$480 million loan agreement that the Government of Laos and China Eximbank signed on September 8, 2016, carries the following borrowing terms: 2.3% interest rate, 25-year maturity, and 5-year grace period. The borrower reportedly pledged revenues from a bauxite mine and three potash mines as sources of collateral to secure the loan.

¹³⁷ The \$480 million loan is captured via Project ID#33726 in AidData's 2.0 dataset. It is also included in the China's Overseas Development Finance Database maintained by Boston University's Global Development Policy Center. The \$3.54 billion debt financing package that China Eximbank issued to the LCRC is captured via captured via Project ID#85304 in AidData's 2.0 dataset. It is not included in the database maintained by Boston University's Global Development Policy Center.

¹³⁸ President Thongloun Sisoulith has said “I am not concerned much about the burden of debt or the construction of the high-speed railway” (Obe and Kishimoto 2019).

¹³⁹ China wants to establish a high-speed railway from Bangkok to the Laotian border in Nong Khai Province (via Nakhon Ratchasima) and eventually create a “Pan-Asia Railway Network” that connects Kunming—the capital city of southwestern China's Yunnan Province—with Thailand, Laos, Malaysia, Singapore, and Indonesia. However, the railway segment in Thailand may not be complete until 2030.

¹⁴⁰ We are grateful to Anna Gelpert for sharing this insight.

¹⁴¹ This fact stands in tension with the way that LMIC governments disclose their actual and potential debt obligations via international reporting systems. For example, the World Bank's Debtor Reporting System (DRS) only tracks the obligations of “public sector [entities] in which the government holds a fifty percent or more share.” See <https://datatopics.worldbank.org/debt/QuarterlyBulletin-January2019>

Ultimately, the true size of the contingent public sector liability associated with the China-Laos Railway Project is unknowable (ex-ante), but that does not mean that it is inconsequential. Uncertainty about the Government of Laos' true level of liability has already prompted significant concern among credit rating agencies, intergovernmental organizations with surveillance responsibilities, and foreign creditors and investors (Barney and Souksakoun 2021). Moody's downgraded Laos' credit rating to "junk" status in August 2020, and Fitch Ratings took a similar action one month later, citing concerns about contingent liability risk. Since then, the government's foreign exchange reserves have dipped below \$900 million, which is less than its annual debt repayment obligations (worth more than \$1 billion), and the country's rate of economic growth has sharply declined. As of late 2020 and early 2021, the Laotian authorities were on the brink of sovereign default and urgently seeking debt relief from their Chinese creditors.¹⁴³ In order to free up liquidity, they sold a major public infrastructure asset—a large part of the country's electricity transmission grid—to a Chinese state-owned enterprise for \$600 million (in an apparent debt-for-equity swap).¹⁴⁴

Table 18 and Figure 19 indicate that, between 2000 and 2017, only 40.6% of China's \$800 billion overseas lending portfolio was directed to government borrowers (i.e., debts and debtors that fall within the first category that sits on the far left-hand side of the spectrum in Figure 18 above). An additional 12.8% was directed to private sector borrowers with no explicit or implicit forms of government liability protection (i.e., debts and debtors that fall within the last category on the far right hand side of the spectrum).¹⁴⁵ 44.1% of China's overseas lending portfolio was directed to the "murky middle": debts and debtors that fall within the second, third, and fourth categories in the middle of the public liability spectrum. These loans to the "murky middle" come in two flavors: those that benefit from explicit forms of government liability protection (5.5%) and those that benefit from implicit forms of government liability protection (38.6%). The former consist of loans from official sector institutions in China to private or public sector entities in host countries that have secured explicit host government repayment guarantees (i.e., "sovereign guarantees"), while the latter consist of loans to host country SOEs and state-owned banks and SPVs with some degree of host government ownership.¹⁴⁶ Across the entire eighteen-year period of measurement (2000-2017) in the 2.0 dataset, we find that official sector lending from China to the "murky middle" amounted to \$353 billion.

¹⁴² The China-Laos Railway Project also highlights an important methodological difference between how official sector lending from China to joint ventures (i.e., project companies that are jointly owned by Chinese and host country entities) is recorded in the 2.0 version of AidData's Global Chinese Development Finance Dataset and the Chinese Loans to Africa Database maintained by Boston University's Global Development Policy Center and the China Africa Research Initiative at the Johns Hopkins University School of Advanced International Studies (SAIS-CARI). The Chinese Loans to Africa Database does not record the face values of loans that are issued to joint ventures. It first identifies the share of the joint venture that is owned by a host country institution and then multiplies that share by the face value of the loan (to estimate the size of host country institution's liability). AidData does not follow this practice. Whenever an official sector loan from China is issued to a joint venture, AidData records the entire face value of the loan. It does so because, in the event of default, the equity holders in a joint venture typically do not have a legal obligation to assume responsibility for the outstanding debts of the joint venture. So long as the joint venture was established as a limited liability corporation (LLC), the equity holders are shielded from legal liability for outstanding debts. In the event of default, any repayment obligations assumed by equity holders would be the result of implicit rather than explicit forms of liability protection (e.g., public or political pressure to bail out a project company in financial distress). For a broader comparison of the 2.0 version of AidData's Global Chinese Development Finance Dataset and the Chinese Loans to Africa Database maintained by Boston University's Global Development Policy Center and the China Africa Research Initiative at the Johns Hopkins University School of Advanced International Studies (SAIS-CARI), see Table A-1 in the Appendix.

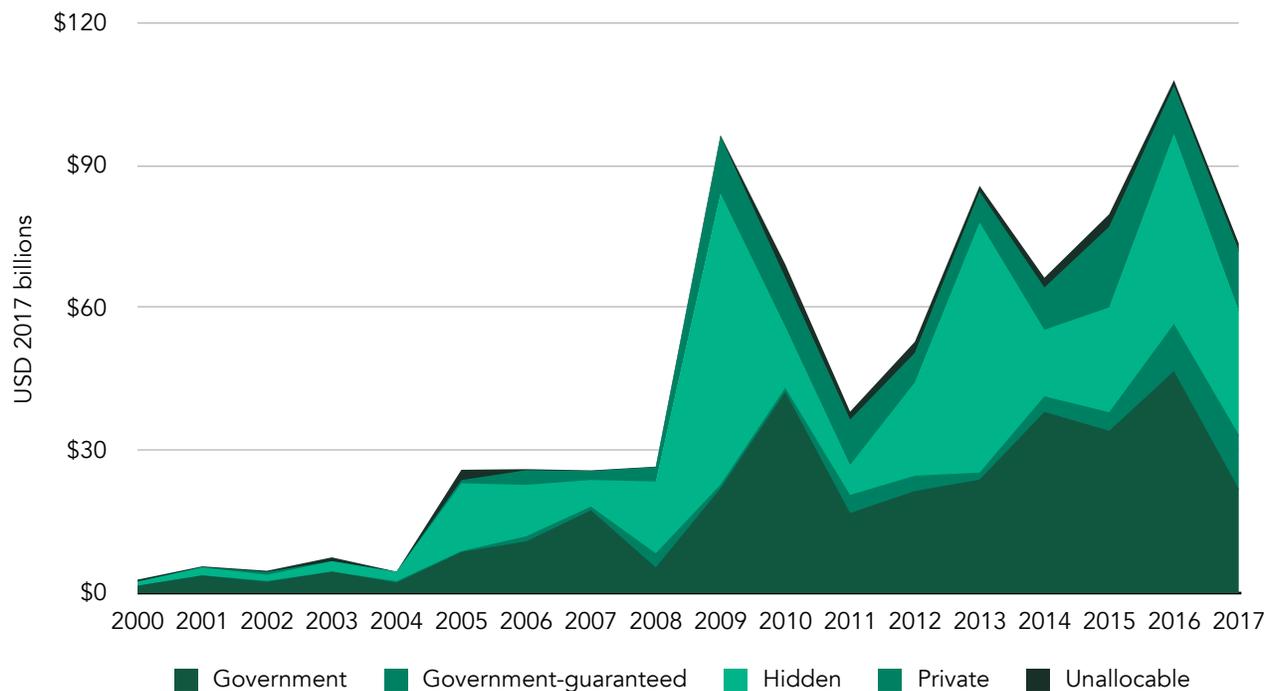
¹⁴³ The last sovereign default to take place in Asia was in Myanmar in 2002.

¹⁴⁴ In September 2020, China Southern Power Grid Co. was granted a majority ownership stake in Électricité du Laos Transmission Company Limited (EDLT) in exchange for a \$600 million fee (equity infusion). Under a 25-year concession agreement, EDLT is responsible for managing the country's high-voltage transmission network above 230 kilovolts. Électricité du Laos (EDL)—another Lao state-owned power company—has retained responsibility for the country's low-voltage transmission network under 230 kilovolts. In August 2021, Fitch Ratings announced that "[w]e expect the [Government of Laos] to pursue further asset sales and concession agreements to shore up external liquidity over the next few years, particularly as the new administration has opted for a greater focus on equity over debt financing" (Fitch Ratings 2021).

¹⁴⁵ An additional 2.5% of China's overseas lending portfolio between 2000 and 2017 was "unallocable" (to any one of the five categories along the public liability spectrum depicted in Figure 18 above) because the borrowers were not based in host countries (e.g., loans issued to Chinese companies).

¹⁴⁶ AidData has successfully identified information on the ownership structure of 90% of the individual SPVs (including joint ventures) in the 2.0 dataset. It was not able to identify the ownership structure of the remaining 10% of loans to SPVs in the 2.0 dataset. Given that it is difficult to know if an SPV borrower stands to benefit from an implicit form of host government liability protection without knowing if the host government has an ownership stake in an SPV, AidData erred on the side of caution and classified all these loans as "private."

Figure 19: China's overseas lending portfolio by level of public liability, 2000-2017



Source: AidData.

Note: The five categories of debt that are listed in this figure directly correspond to the five categories of debt in Table 18 below. "Government" debt refers to full-recourse loans to sovereign governments. "Government-guaranteed" debt refers to loans issued to private or public entities with explicit host government repayment guarantees. "Hidden" debt refers to loans issued to entities that are wholly or partially owned by the host government with implicit host government repayment guarantees. "Private" debt refers to loans issued to private entities without host government repayment guarantees. "Unallocable" debt refers to loans issued to borrowers that are not based in host countries (e.g., loans issued to Chinese companies).

Table 18: China's overseas lending portfolio by level of public liability, 2000-2017

Debt type	USD 2017 billions	% of portfolio
Government debt	325	40.6%
Government-guaranteed debt	44	5.5%
Hidden debt	309	38.6%
Private debt	103	12.8%
Unallocable	20	2.5%
Total	800	100%

Note: The five categories of debt that are listed in this figure directly correspond to the five categories of debt in Figure 19 above. "Government" debt refers to full-recourse loans to sovereign governments. "Government-guaranteed" debt refers to loans issued to private or public entities with explicit host government repayment guarantees. "Hidden" debt refers to loans issued to entities that are wholly or partially owned by the host government with implicit host government repayment guarantees. "Private" debt refers to loans issued to private entities without host government repayment guarantees. "Unallocable" debt refers to loans issued to borrowers that are not based in host countries (e.g., loans issued to Chinese companies).

4.2 Which countries have the highest levels of sovereign debt exposure and hidden debt exposure to China?

AidData's 2.0 dataset sheds light on a key feature of Beijing's overseas lending program that is not yet widely or fully understood by policymakers: the fact that many Chinese debts in the murky middle of the "public liability" spectrum (depicted in Figure 18 above and quantified in Table 18 and Figure 19 above) are not disclosed by LMIC governments because they are not, strictly speaking, the borrowers responsible for repayment.¹⁴⁷ Hidden debts—undisclosed debts that could become government repayment obligations in the future—are problematic even in normal times, but they are particularly worrisome during the COVID-19 pandemic because the repayment capacities of LMIC borrowers are substantially weakened and China's debtors are finding it increasingly difficult to engage in collective restructuring negotiations.¹⁴⁸

To be clear, loans from official sector institutions in China that benefit from explicit host government guarantees are contingent public sector liabilities that need to be carefully managed (as illustrated by the China Eximbank-financed resort project in the Maldives that we previously discussed). However, they are supposed to be treated as "sovereign debt" liabilities by the authorities in LMICs and reported as such to intergovernmental organizations with macroeconomic surveillance responsibilities (e.g., the World Bank and IMF), so AidData does not classify them as "hidden debt." We classify debts to official sector institutions in China as "hidden" if they are contracted by state-owned enterprises, state-owned banks, or state-owned special purpose vehicles/joint ventures without explicit host government guarantees.¹⁴⁹ We classify these debts as "hidden" because they are rarely disclosed as potential host government repayment obligations but may benefit from implicit forms of government liability protection (and thus become host government repayment obligations in the event of default by the primary borrowers).¹⁵⁰

Figure 20 below and Table A-4 in the Appendix put the scale and scope of the problem into perspective by identifying which borrower countries are most at risk of debt distress because of the loans that they have contracted from Chinese state-owned entities. On the x-axis, we plot the cumulative amount of Chinese debt contracted by government agencies in host countries and entities that received (explicit) repayment guarantees from government agencies in host countries between 2000 and 2017 as a percentage of host country GDP. On the y-axis, we plot the cumulative amount of Chinese debt contracted by host country SOEs and state-owned banks and SPVs with some degree of host government ownership between 2000 and 2017 as a percentage of host country GDP.¹⁵¹ The first source of variation is a measure of sovereign debt exposure to China and the second source of variation is a measure of hidden debt exposure to China (i.e., debts to Chinese state-owned entities that could become host government repayment obligations in the future). Whereas Horn et al. (2019: 14) estimate that "[m]ore than two dozen countries now owe more than 10% of their GDP to the Chinese government," we find that 44 countries now owe more than 10% of their GDP to the Chinese government. More specifically, we find that 38 countries have levels of *sovereign debt exposure* to China

¹⁴⁷ World Bank and IMF (2020b: 16).

¹⁴⁸ They are finding it increasingly difficult to engage in collective restructuring negotiations because their non-Chinese creditors are reluctant to engage unless their borrowers fully disclose the nature and scale of their outstanding debts to Chinese creditors (Bavier and Strohecker 2021) This is, in many cases, not possible because of binding confidentiality clauses in Chinese loan contracts (Gelpert et al. 2021).

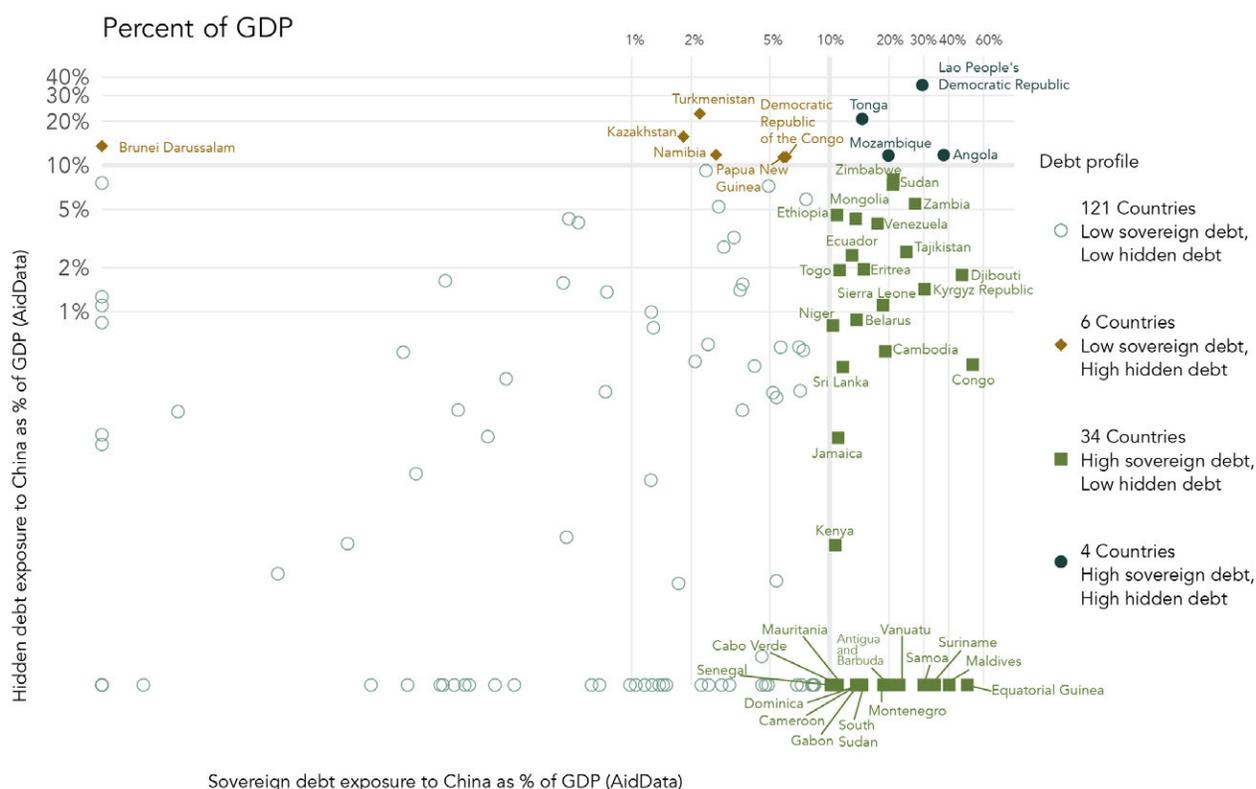
¹⁴⁹ State-owned entities are among the biggest beneficiaries of implicit forms of host government liability protection (Cebotari 2008; Bova et al. 2016). Therefore, we treat any degree of host government ownership of a borrowing entity as an indicator of whether it stands to benefit from an implicit form of host government liability protection. The key distinction between a borrowing entity that is state-owned and a borrowing entity that is privately-owned is that the former faces a less credible (i.e., "softer") budget constraint than the latter. Loss-making entities that are privately-owned typically go bankrupt, but loss-making entities that are state-owned "typically do not face the threat of bankruptcy, especially if they are responsible for the provision of socially sensitive goods and services, or if they are large employers" (Ter-Minassian 2017: 4). As the World Bank puts it, "[a]lthough non-guaranteed borrowing by state-owned enterprises constitutes only an implicit contingent liability there is a general expectation the government will step in if a default occurs and empirical evidence confirms this to be the case." See <https://datatopics.worldbank.org/debt/QuarterlyBulletin-January2019>

¹⁵⁰ Our definition of "hidden debt" is conservative in that it excludes loans from official sector institutions in China that benefit from explicit host government guarantees (i.e., government-guaranteed debt). In principle, all government-guaranteed debts should be disclosed via official reporting systems like the World Bank's Debtor Reporting System (DRS). However, in practice, government-guaranteed debts are underreported in official reporting systems.

¹⁵¹ The debt stock measures on the y-axis and x-axis are based on cumulative loan commitments. They do not account for loan disbursements or repayments. In Figure A-2 in the Appendix, we present the same summary statistics but only for BRI participant countries.

that exceed 10% of host country GDP,¹⁵² and 10 countries have levels of *hidden debt exposure* to China in excess of 10% of host country GDP.¹⁵³ 4 countries (Laos, Mozambique, Angola, and Tonga) straddle these two categories, with sovereign debt exposure to China in excess of 10% of host country GDP and hidden debt exposure to China in excess of 10% of host country GDP (see Figure 20).¹⁵⁴ All of these countries have recently sought debt relief from their official creditors in China.¹⁵⁵

Figure 20: Sovereign vs. hidden debt to China, all countries



Note: The following countries have hidden or sovereign debt less than or equal to 10% of their GDP - Afghanistan, Albania, Algeria, American Samoa, Argentina, Armenia, Aruba, Azerbaijan, Bahamas, Bangladesh, Barbados, Belize, Benin, Bhutan, Bolivia, Bosnia and Herzegovina, Botswana, Brazil, British Virgin Islands, Bulgaria, Burkina Faso, Burundi, Cayman Islands, Central African Republic, Chad, Chile, Colombia, Comoros, Cook Islands, Costa Rica, Cote d'Ivoire, Cuba, Curacao, Democratic People's Republic of Korea, Dominican Republic, Egypt, El Salvador, Eswatini, Fiji, French Polynesia, Gambia, Georgia, Ghana, Grenada, Guam, Guatemala, Guinea, Guinea-Bissau, Guyana, Haiti, Honduras, India, Indonesia, Iran, Iraq, Israel, Jordan, Kiribati, Kosovo, Lebanon, Lesotho, Liberia, Libya, Madagascar, Malawi, Malaysia, Mali, Marshall Islands, Mauritius, Mexico, Micronesia, Moldova, Morocco, Myanmar, Nauru, Nepal, New Caledonia, Nicaragua, Nigeria, Niue, North Macedonia, Northern Mariana Islands, Oman, Pakistan, Palau, Panama, Paraguay, Peru, Philippines, Puerto Rico, Romania, Russia, Rwanda, Saint Lucia, Sao

¹⁵² These thirty-eight countries are Venezuela, Congo-Brazzaville, Equatorial Guinea, Djibouti, the Maldives, Angola, Suriname, Samoa, Kyrgyz Republic, Laos, Zambia, Tajikistan, Vanuatu, Sudan, Antigua and Barbuda, Mozambique, Montenegro, Cambodia, Sierra Leone, South Sudan, Eritrea, Tonga, Cameroon, Dominica, Gabon, Belarus, Mongolia, Ecuador, Zimbabwe, Sri Lanka, Jamaica, Kenya, Mauritania, Togo, Ethiopia, Cape Verde, Senegal, and Niger.

¹⁵³ These ten countries are the Democratic Republic of the Congo, Papua New Guinea, Angola, Mozambique, Namibia, Brunei, Kazakhstan, Tonga, Turkmenistan, and Laos.

¹⁵⁴ Laos is in a class of its own, with exceptionally high levels of sovereign debt exposure (29.4% of GDP) and hidden debt exposure (35.4% of GDP) to China. According to the 2.0 dataset, Laos' overall level of debt exposure to China is equivalent to 64.8% of GDP (see Table A-4 in the Appendix). Interestingly, we find that many of Laos' largest sovereign debts (see Project ID#33809, 33726, 64813, 63452, 64776) and hidden debts (see Project ID#63762, 63450, 85304, 73301, 67486) are related to similar projects—namely, hydropower generation and transmission and the construction of the China-Laos Railway.

¹⁵⁵ See <http://www.sais-cari.org/debt-relief>

Tome and Principe, Serbia, Seychelles, Saint Maarten (Dutch part), Solomon Islands, Somalia, South Africa, St. Kitts and Nevis, St. Martin (French part), St. Vincent and the Grenadines, Syrian Arab Republic, Tanzania, Thailand, Timor-Leste, Trinidad and Tobago, Tunisia, Turkey, Turks and Caicos Islands, Tuvalu, Uganda, Ukraine, Uruguay, Uzbekistan, Viet Nam, Virgin Islands (U.S.), West Bank and Gaza Strip, Yemen*

Figure 20 provides several additional insights. The northwestern quadrant highlights a cohort of six countries where hidden debt exposure to China is high (over 10% of GDP) but sovereign debt exposure is worth less than 10% of GDP. These countries include Turkmenistan, Kazakhstan, Brunei, Namibia, Democratic Republic of the Congo, and Papua New Guinea. At the same time, one can see that 34 countries have levels of hidden debt exposure to China worth less than 10% of GDP but levels of sovereign debt exposure to China that exceed 10% of GDP. There is also considerable variation within the southeastern quadrant of Figure 20. Eight of the 34 countries (Congo-Brazzaville, Equatorial Guinea, Djibouti, the Maldives, Suriname, Kyrgyz Republic, Samoa, and Zambia) in this cohort have levels of sovereign debt exposure to China that exceed 25% of GDP, and notably, at least six of these countries have recently sought debt relief from their official creditors in China.¹⁵⁶ The remaining 26 countries in the southeastern quadrant (Tajikistan, Vanuatu, Sudan, Antigua and Barbuda, Cambodia, Montenegro, Sierra Leone, Venezuela, Eritrea, South Sudan, Belarus, Cameroon, Dominica, Gabon, Mongolia, Ecuador, Zimbabwe, Sri Lanka, Ethiopia, Jamaica, Kenya, Mauritania, Togo, Cape Verde, Niger, and Senegal) have levels of sovereign debt exposure to China that fall somewhere between 10% and 25% of GDP. At least 11 of these countries have recently sought debt relief from their official creditors in China.¹⁵⁷ However, as we describe in Box 4, when LMIC borrowers seek short-term relief from Beijing, they risk repaying their creditors substantially more over the lifetime of a loan (in net present value terms) than they would in the absence of a rescheduling.

¹⁵⁶ These countries include Congo-Brazzaville, Djibouti, the Maldives, Kyrgyz Republic, Samoa, and Zambia. See Lanuola Tusani T - Ah Tong (2021) and <http://www.sais-cari.org/debt-relief>

¹⁵⁷ These countries include Tajikistan, Vanuatu, Montenegro, Sierra Leone, Venezuela, Cameroon, Ecuador, Zimbabwe, Sri Lanka, Ethiopia, Kenya, and Mauritania. See The Sunday Mail (2020) and <http://www.sais-cari.org/debt-relief>

Box 4: Anatomy of a high-stakes debt rescheduling with China Eximbank¹⁵⁸

Between 2006 and 2013, the Republic of Congo (ROC) went on a borrowing spree. It signed a \$1.6 billion “strategic partnership” with China Eximbank on June 19, 2006, which allowed it to obtain loans for big-ticket infrastructure projects through a collateralization mechanism: Société Nationales des Pétroles Congolais (SNPC)—the country’s state-owned oil company—agreed to deposit a portion of the cash proceeds from its oil exports into an escrow account that is controlled by China Eximbank. A slew of infrastructure projects was approved and implemented through this mechanism, and after the ROC exhausted the first line of credit, China Eximbank extended another \$1.6 billion line of credit in 2013 through the same collateralization arrangement. Then, global oil prices declined sharply—from more than \$100 a barrel in 2013 to just over \$40 a barrel in 2016—and it became significantly more difficult for the ROC to service its debts to the Chinese lender. The Congolese authorities approached the IMF for a bailout, but its initial request was rejected. Public debt had reached an unsustainable level (nearly 90% of the country’s GDP) and China Eximbank was now the country’s largest bilateral creditor, so the IMF signaled that its assistance would be contingent upon a debt rescheduling deal with China Eximbank. Calixte Nganongo, the country’s Finance Minister, initiated negotiations with China Eximbank in late 2017 but did not reach a final debt restructuring agreement until April 2019.

The lender and the borrower restructured 8 loans (worth \$1.32 billion) for a set of housing, dam, road, commercial real estate, and water treatment plant projects that would require near-term debt service, rather than recently contracted loans that did not yet require debt service (because their grace periods were still in effect).¹⁵⁹ Prior to rescheduling, all 8 of these loans were contracted at an interest rate of 0.25%. Their maturities varied between 13 and 20 years, and their grace periods fell somewhere between 3 and 5 years. When the debt rescheduling deal was struck in April 2019, Congo-Brazzaville’s outstanding obligations to China Eximbank for these 8 loans amounted to \$1.6 billion, and under the terms of the rescheduling, Congo-Brazzaville agreed to repay 33% of its outstanding debt obligations under each of the 8 loans (approximately \$532 million) within 3 years. For the remaining 67% of its outstanding debt obligations under each of the 8 loans, Congo-Brazzaville agreed to meet its obligations according to *extended maturities but higher interest rates*. More specifically, China Eximbank agreed to extend the maturity of each loan by 15 years, increase the interest rate attached to the single largest (\$1 billion) loan to 2%, and increase the interest rates attached to the other seven loans to 1.5%.

Consequently, after the debt restructuring deal was struck in April 2019, the net present value of total repayments from Congo-Brazzaville to China Eximbank increased from \$1.3 billion (before restructuring) to \$1.6 billion (after restructuring). China Eximbank did not take a haircut when it restructured Congo-Brazzaville’s debts. Quite the opposite: it successfully negotiated \$300 million in *additional* loan repayments from Congo-Brazzaville (in net present value terms), which would not have occurred in the absence of a restructuring.¹⁶⁰

Another way to estimate the scale of the “hidden debt” problem is to compare reported flows and unreported flows. In June 2020, the World Bank took the unprecedented step of publishing previously confidential data on debt flows (and stocks) that can be disaggregated according to individual pairs of borrower and creditor governments.¹⁶¹ Data on official sector loans from China are voluntarily reported by 119 LMIC governments to the World Bank through its

¹⁵⁸ An earlier version of this case study was published in Gardner et al. (2020).

¹⁵⁹ The eight China Eximbank loans that were rescheduled supported the following projects: Djiri Water Treatment Plant Extension Project (ID#69323), Djiri Water Treatment Distribution Network Project (ID#69355), Liouesso Hydroelectric Dam Project (ID#31028), Brazzaville Shopping Center Project (ID#58408), Mpila Social Housing Project (ID#31029), Mpila Commercial Area (Twin Towers) Project (ID#58720), Mpila Memorial Project (ID#58721), and Phase 2 (375 km Dolisie-Brazzaville Section) of the National Route 1 Project (ID#369). The largest of the eight loans was a \$1 billion loan to support the construction of a segment of National Route 1 (NR1) between Dolisie and Brazzaville. This project was officially completed on March 1, 2016. However, the road was not well-maintained by the Congolese authorities after its completion.

¹⁶⁰ The temporary repayment relief that China Eximbank provided in April 2019 was apparently insufficient. In June 2021, Congolese President Denis Sassou Nguesso asked Xi Jinping for another major debt rescheduling.

¹⁶¹ See <https://datatopics.worldbank.org/debt/ids/>

Debtor Reporting System (DRS).¹⁶² The DRS data cover the same eighteen-year period captured in AidData's 2.0 dataset as well as two additional years (2018 and 2019). In total, AidData's 2.0 dataset captures \$676 billion of official sector loan commitments from China to LMIC borrowers with explicit or implicit host government liability protection (i.e., loans that represent actual or potential host government repayment obligations) between 2000 and 2017.¹⁶³ The DRS captures \$310 billion of official sector loan commitments from China to LMIC borrowers with explicit host government liability protection between 2000 and 2017.¹⁶⁴ This comparison suggests that AidData has captured approximately \$366 billion of official sector debt flows from China that represent actual or potential LMIC government repayment obligations *but are not recorded in the DRS* (i.e., the main international reporting system for LMIC governments to disclose their repayment obligations).¹⁶⁵

One of the reasons why this gap is so large is that AidData's 2.0 dataset includes official sector loans from China which benefit from *implicit* host government liability protection (e.g., the \$3.54 billion debt financing package that China Eximbank issued to the LCRC for the China-Laos Railway Project).¹⁶⁶ A second reason is that AidData provides substantially greater coverage of loans contracted by public sector entities other than central government institutions (e.g., state-owned banks and enterprises) in LMICs.¹⁶⁷ A third reason is that not all LMIC governments voluntarily disclose their debts via the DRS. The World Bank is very much aware of these underreporting problems. In November 2020, it acknowledged that "[t]he availability of comprehensive, timely and consistent public sector debt data produced by borrowing countries needs to improve, especially for (i) non-standard debt instruments; (ii) debt contracted by public sector entities other than the central government; (iii) limited information on terms and conditions of some debt instruments; and (iv) information on the terms of official bilateral debt restructuring" (World Bank and IMF 2020b: 16). They also warned that "[p]ublic debt disclosure remains particularly weak in countries at high risk of debt distress and fragile states [and] [...] there is a risk that public sector indebtedness is substantially larger in several [low-income and middle-income countries] than publicly reported" (World Bank and IMF 2020b: 16).

To better understand where underreporting problems are most and least acute, we compare the levels of host government debt exposure to China that are documented in AidData's 2.0 dataset and the DRS (in Table A-27 in the Appendix). To maximize comparability across the AidData and DRS datasets, we first calculate the sum of all Chinese loan commitments from 2000-2017 (recorded by AidData) and the sum of all Chinese loan commitments from 2000-2017 (recorded in the DRS) and transform all of these values into constant 2017 USD.¹⁶⁸ Then, we normalize the AidData-based measure of debt exposure to China and the DRS-based measure of debt exposure to China by host

¹⁶² The DRS has been in existence since 1952 (World Bank 2021). It is designed to capture loans issued to government borrowers and private borrowers with government repayment guarantees. In total, 120 countries participate in the DRS. China is one of the participating countries. Therefore, we restrict our analysis of the DRS to the other 119 participating countries.

¹⁶³ This figure includes lending to host government agencies, host country state-owned enterprises, host country state-owned banks, SPVs with some degree of host government ownership, and privately-owned institutions that secured host government repayment guarantees. It excludes lending to private sector institutions without any explicit or implicit liability protection from the host government. It was calculated in constant 2017 USD.

¹⁶⁴ Across the 119 countries that voluntarily disclosed their debts to official sector institutions in China via the DRS, AidData's 2.0 dataset records \$645 billion of official sector lending commitments from China to host government agencies, host country state-owned enterprises, host country state-owned banks, SPVs with some degree of host government ownership, and privately-owned institutions that secured host government repayment guarantees between 2000 and 2017.

¹⁶⁵ According to World Bank (2021), the "Debtor Reporting System (DRS) is the most detailed single source of verifiable information on the external indebtedness of low- and middle-income countries. All countries that borrow from IBRD or IDA agree to report, annually, loan-by-loan on stocks and flows for long-term external debt owed by a public agency or a private agency with a public guarantee [...]."

¹⁶⁶ AidData's 2.0 dataset may also provide better coverage of official sector loans from China which benefit from *explicit* host government liability protection (i.e., sovereign guarantees). The DRS seeks to measure all government and government-guaranteed debt from official sector loans from China. However, underreporting of government-guaranteed debt is a known problem in the DRS. This AidData and DRS coverage issue warrants further investigation.

¹⁶⁷ According to the World Bank, "[b]y far the most significant omission in DRS reports relates to borrowing by state-owned enterprises on their own account, without benefit of a government guarantee." See <https://datatopics.worldbank.org/debt/QuarterlyBulletin-January2019>

¹⁶⁸ Consistent with our previous analysis of these data, the AidData-based measure of debt exposure to China captures official sector lending from China to host government agencies, host country state-owned enterprises, host country state-owned banks, SPVs with some degree of host government ownership, and privately-owned institutions that secured host government repayment guarantees (as a percentage of host country GDP). However, it excludes official sector lending from China to private sector institutions without any explicit or implicit liability protection from the host government. The DRS-based measure of debt exposure to China captures official sector lending from China to central government borrowers and private and public sector borrowers with government repayment guarantees (as a percentage of host country GDP).

country GDP.¹⁶⁹ Figure 21 below provides a country-by-country comparison of the differences across these two measures. It demonstrates that only 49 governments provide a relatively complete picture of their actual and potential repayment obligations to official creditors in China through the DRS.¹⁷⁰ The vast majority of governments substantially underreport their actual and potential repayment obligations to China—or do not disclose any of their repayment obligations to any external creditors—through the DRS. By way of illustration, consider Venezuela. Its government has voluntarily disclosed \$699 million of official sector loan commitments from China to the DRS between 2000 and 2017. Yet, according to AidData’s 2.0 dataset, Venezuela contracted \$74.7 billion of sovereign debt (i.e., government and government-guaranteed debt) and an additional \$16.3 billion of hidden debt (i.e., potential government repayment obligations resulting from debts contracted by state-owned banks, enterprises, and SPVs) from official sector institutions in China between 2000 and 2017. This comparison implies that Venezuela’s level of Chinese debt exposure is underreported in the DRS by \$90.3 billion, which is equivalent to roughly 20% of Venezuela’s GDP.¹⁷¹

The two “delta” (Δ) variables in Table A-27 in the Appendix are country-level barometers of unreported (public) debt exposure to China. One is measured in terms of inflation-adjusted U.S. dollars and the other is measured as a percentage of host country GDP. Table A-27 in the Appendix demonstrates that, while Venezuela is an extreme example, it is hardly an isolated case of underreporting. Across the 154 LMIC governments that are jointly covered by AidData and the DRS, we find that 57% (88 governments) have underreported their levels of Chinese debt exposure to the DRS.¹⁷² The total amount of official sector debt to China that these governments have opted not to report to the DRS is \$385 billion. The average government in this cohort has underreported its actual and potential repayment obligations to official sector creditors in China by 5.8% of its GDP.¹⁷³ This problem has grown worse over time. Figure 22 below shows that, among the LMIC governments jointly covered by AidData and the DRS, average annual underreporting of repayment liabilities to official sector creditors in China was \$13 billion during the pre-BRI period (2000-2012). However, during the first five years of BRI implementation, average annual underreporting was \$40 billion.

Figure 21 below also calls attention to a subset of countries where underreporting to the DRS is particularly acute. It shows that 58 LMIC governments have levels of underreported debt to China that are equivalent to 1% of GDP or more and 29 LMIC governments have levels of underreported debt to China that are equivalent to 5% of GDP or more. Underreporting is especially severe in Equatorial Guinea, Suriname, Congo-Brazzaville, Turkmenistan, Laos, Venezuela, Antigua and Barbuda, Sierra Leone, Montenegro, Sudan, Kazakhstan, Democratic Republic of the Congo, South Sudan, Namibia, Eritrea, Papua New Guinea, Iran, and Djibouti. These 18 LMIC governments all have levels of underreported debt to China in excess of 10% of GDP.¹⁷⁴

¹⁶⁹ We also normalize host country GDP to constant 2017 USD.

¹⁷⁰ More specifically, 49 governments (that participate in the DRS) meet one of two conditions: (1) there is no monetary difference between the Chinese loan commitments that they reported to the DRS between 2000 and 2017 and the Chinese loan commitments recorded in AidData’s 2.0 dataset, or (2) the Chinese loan commitments that they have reported to the DRS between 2000 and 2017 exceed the Chinese loan commitments recorded in AidData’s 2.0 dataset. 70 governments (that participate in the DRS) do not meet either of the conditions. An additional 35 LMICs in the AidData’s 2.0 dataset do not participate in the DRS.

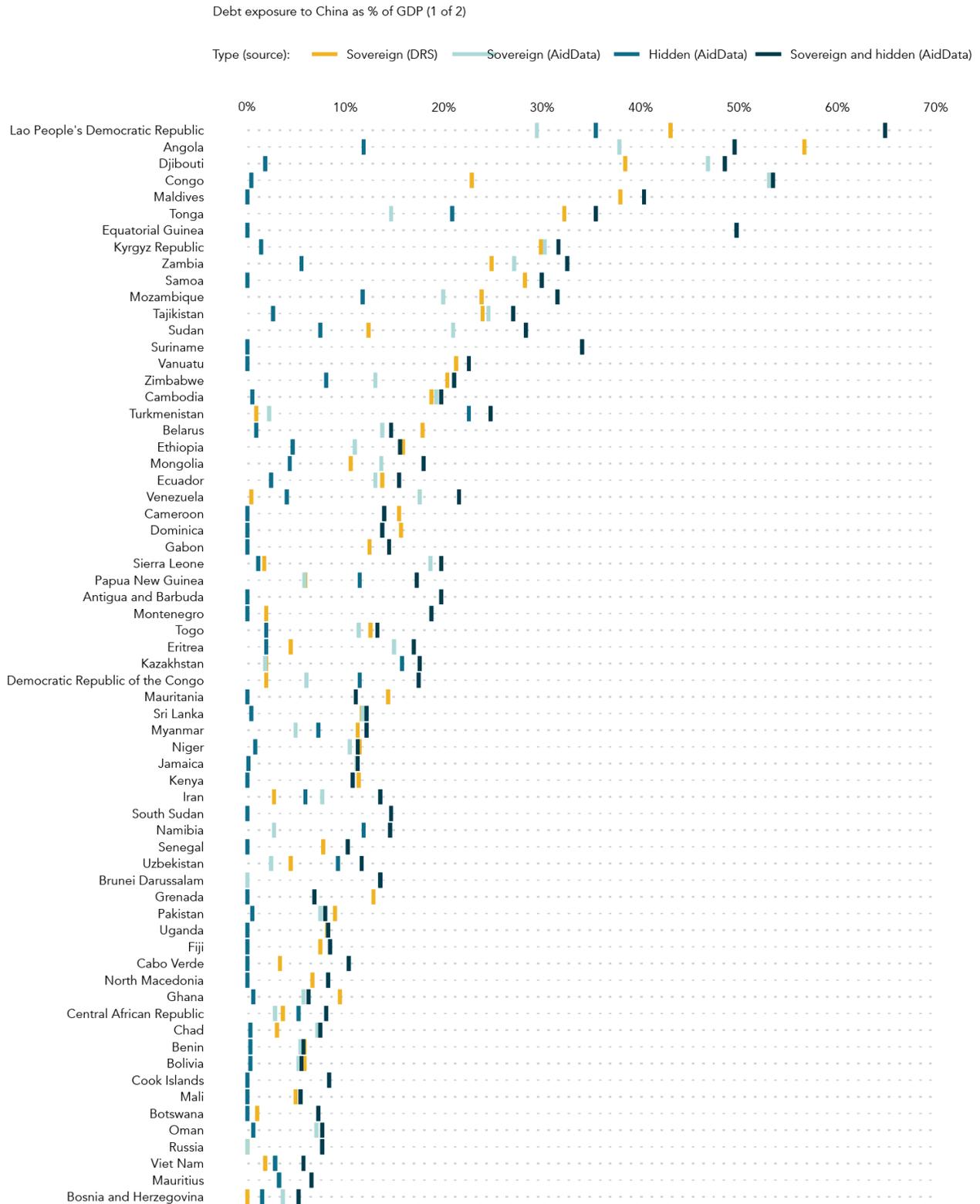
¹⁷¹ This \$90.3 billion figure is based on the sum of Venezuela’s sovereign debt and hidden debts as recorded by AidData (\$91 billion) less the \$699 million that the Venezuelan authorities voluntarily disclosed to the World Bank via the DRS.

¹⁷² This calculation is based on the total number of LMICs with positive “AidData-DRS Δ in constant 2017 USD” values in Table A-27 in the Appendix. Given that the DRS is only designed to capture the repayment obligations of LMICs, this calculation excludes the 11 high-income countries that are included in AidData’s 2.0 dataset.

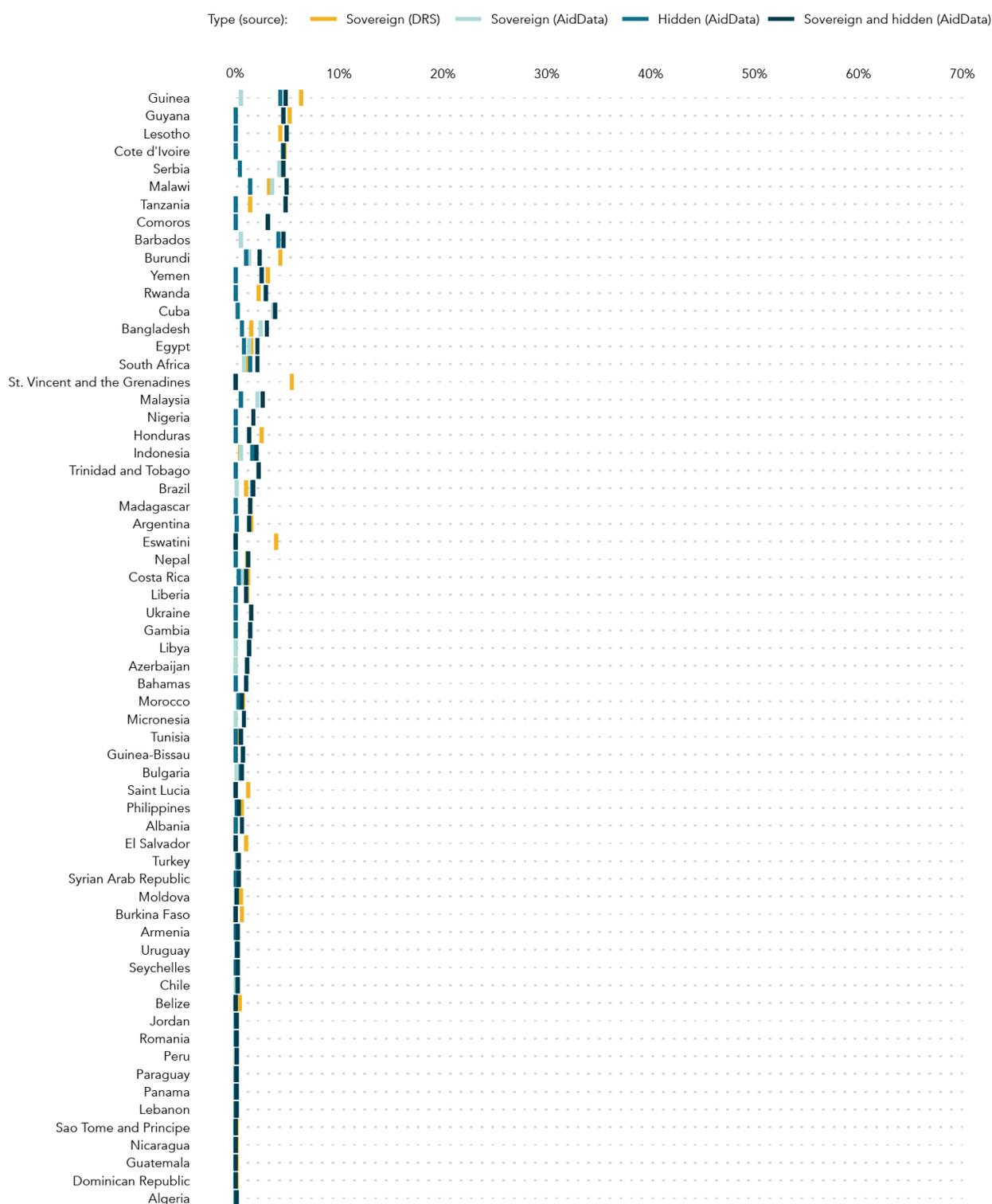
¹⁷³ In a handful of countries (Angola, Belarus, Mauritania, Ghana, Grenada, and Burundi), the DRS records significantly higher levels of official sector debt from China (worth 2% of host country GDP or more) than AidData, which suggests that there are still some underreported debt flows in AidData’s 2.0 dataset. AidData will investigate and address these issues prior to the release of the next iteration of its Global Chinese Development Finance Dataset.

¹⁷⁴ Table A-27 in the Appendix also indicates that at least one high-income government (Brunei) has a level of underreported debt to China in excess of 10% of GDP.

Figure 21: Country-by-country comparison of DRS and AidData measures of host government debt exposure to China



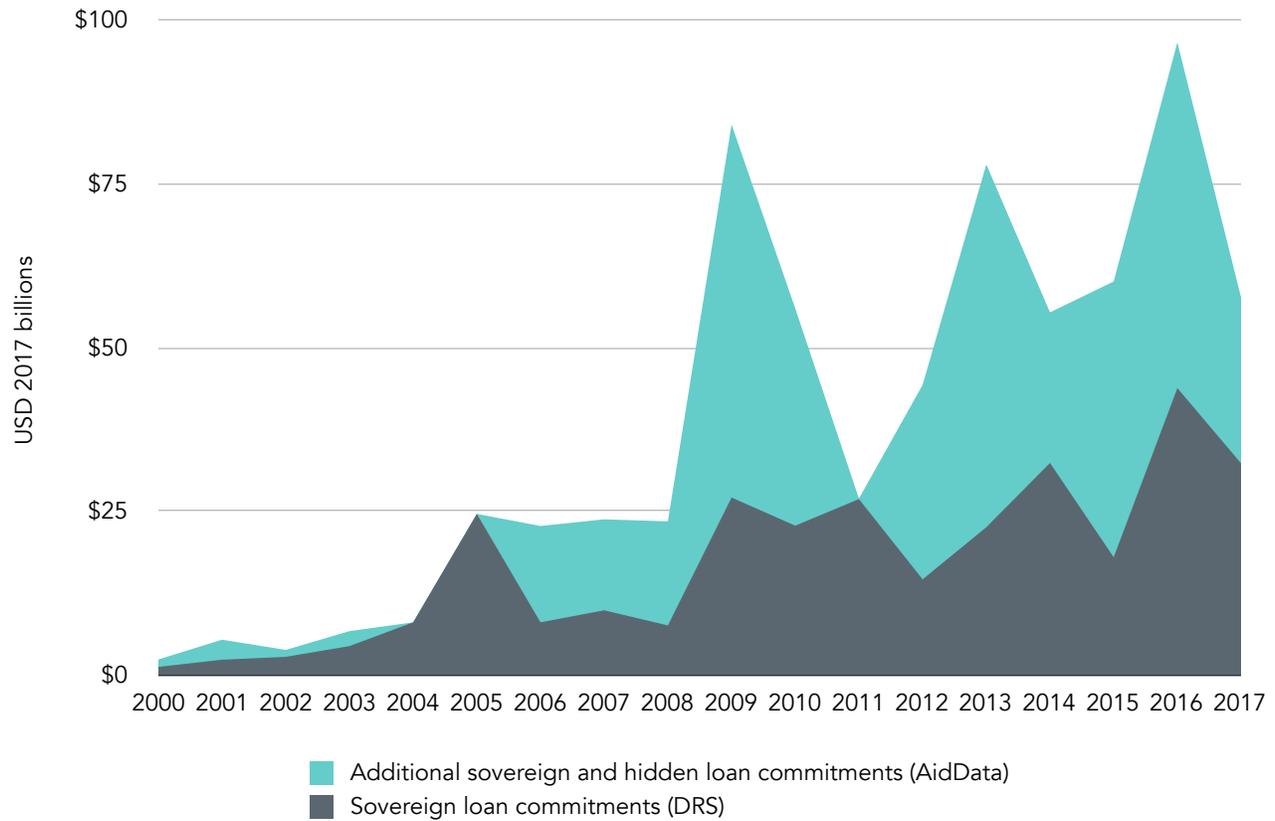
Debt exposure to China as % of GDP (2 of 2)



Source: AidData and World Bank Debtor Reporting System.

Note: Unless otherwise specified, the AidData, DRS, and GDP data in this table are reported in constant (2017) U.S. dollars. It was not possible to reliably deflate GDP into constant (2017) U.S. dollars for three countries with especially high levels of inflation (Venezuela, Zimbabwe, and South Sudan). Therefore, for these three countries, we calculated the variables that are expressed as a percentage of host country GDP by dividing Chinese loan commitment values in nominal dollars by GDP in nominal dollars for each year

Figure 22: Underreporting of sovereign debt exposure to China via the World Bank's Debtor Reporting System (DRS), 2000-2017



Source: AidData and World Bank Debtor Reporting System.

5. What does the 2.0 dataset tell us about BRI implementation?

5.1 BRI project implementation risks, setbacks, achievements, and failures: The need for a stronger evidentiary foundation

The empirical literature on the BRI has largely focused on the overall volume of lending and how it has changed from year-to-year (Kratz et al. 2020; Ma et al. 2021). However, policymakers and researchers still know relatively little about the *implementation* of BRI projects because publicly available datasets provide few details about when, where, by whom, and how they are implemented. With the release of the 2.0 version of AidData’s Global Chinese Development Finance Dataset, we seek to close this evidence gap. The latest version of our dataset identifies the specific contractors and sub-contractors responsible for the implementation of Chinese development projects (in countries that do and do not participate in the BRI), which opens up new opportunities to analyze whether projects fare better or worse when they are undertaken by specific organizations or types of organizations. It also identifies the precise calendar days when projects were originally expected to start and end, and the precise calendar days when implementation actually commenced and concluded. A separate, but related, feature of the 2.0 dataset is that it captures the geographical footprints of Chinese development projects with a high degree of locational precision.¹⁷⁵ In Section 6, we demonstrate that the “art of the possible”—with respect to measuring the intended and unintended impacts of Chinese development projects—is vastly greater with highly precise data on spatio-temporal rollout of project implementation.¹⁷⁶ Analysts and decision-makers who wish to better understand BRI project effectiveness and value-for-money now have many more ways of doing so.¹⁷⁷

Another aspect of AidData’s 2.0 dataset that sets it apart from others is the inclusion of “cradle to grave” narratives that “tell the story” of each project. These narratives consist of 1.93 million words (roughly the same number of words one would find in 19 full-length books) across 13,427 projects. They provide detailed information about *how* Chinese development projects are being implemented in practice and where/why they are failing or faltering. They capture *ex ante* project risks, including economic and financial viability concerns (e.g., results of cost-benefit analysis undertaken, sufficiency of the revenues generated by the project facilitate loan repayment), land acquisition and involuntary resettlement concerns, and concerns related to environmental degradation and preservation of cultural heritage. They then describe efforts to mitigate these risks during implementation—for example, through environmental and social impact assessments, compensation to involuntarily displaced communities, and renegotiated loan terms and conditions after borrowers go into default or fall behind on their repayment schedules. The narratives also document how Chinese donors and lenders as well as their contractors have responded to implementation challenges and various host country concerns—for example, by increasing on-site supervision, temporarily or permanently halting construction, withholding grant or loan disbursements, easing or hardening loan repayment terms, threatening to pursue or pursuing litigation, activating cross-cancellation or cross-default contract clauses, or declaring force majeure. The rich, qualitative information that is contained in these project narratives, we will soon demonstrate, can be leveraged to better understand the types of problems that Chinese development projects encounter most and least frequently during implementation.

¹⁷⁵ In the 2.0 dataset, we have calculated a *Project Implementation Score* for every project that has entered implementation or reached completion. The ordinal, five-point score provides an indication of how many implementation details are captured in each project record. More specifically, it measures how many of the following fields are populated: implementing agency, implementation start date (actual or planned), completion date (actual or planned), geographic location, and a specified sector allocation. The average *Project Implementation Score* in the 2.0 dataset is 3.4.

¹⁷⁶ Also see Chapters 7 and 8 of Dreher et al. (forthcoming).

¹⁷⁷ A growing number of projects being financed by OECD-DAC members and multilateral development banks are subjected to rigorous impact evaluations—i.e., those that establish a credible counterfactual and address the question of what would have happened in the absence of the project to isolate the change in an outcome that is attributable to that project as opposed to other factors (BenYishay 2018). However, the vast majority of these evaluations are of health, nutrition, education, and other social sector projects (Cameron et al. 2016). Projects in “hardware” sectors—like transportation and energy infrastructure—remain under-evaluated. With data from household surveys, satellites, mobile phones, and real-time sensors, it is increasingly feasible to measure the net, attributable impacts of such projects. However, as Dollar (2008) explains, “Western donors have by and large gotten out of hard infrastructure sectors ... and [t]hey [instead] channel their assistance overwhelmingly to social sectors or to infrastructure sectors such as water supply and sanitation that have direct effects on household health.”

Box 5: How AidData measures BRI infrastructure projects underway between 2013 and 2021

To analyze the implementation of BRI infrastructure projects (as we do in Section 5 of this paper), one needs to differentiate between BRI infrastructure projects and the other Chinese government-financed infrastructure projects in the 2.0 version of AidData's dataset. We do so by first identifying the year in which each country officially joined the BRI (between 2013 and 2021).¹⁷⁸ Then, for each recipient country in the dataset, we identify the subset of projects that were implemented or completed between the year in which the country joined BRI and present day. We do so by using several variables in our dataset that track the status of projects and the precise (calendar day) timing of their implementation and completion:

- projects with completion dates that fall between when a country joined the BRI and present day;
- projects with implementation start dates that fall between when a country joined BRI and present day (note: some of these projects have been completed while others are still in implementation); and
- projects that were officially committed (via legally-binding agreements) in the same year when a country joined the BRI—or any year thereafter—and that we know have entered implementation (even if we lack a specific project implementation start date) or reached completion (even if we lack a specific project completion date)

After identifying this subset of Chinese government-financed development projects in BRI participant countries, we further prune the sample to only include infrastructure projects (by using a set of keyword search procedures).¹⁷⁹ “Infrastructure projects” generally include projects that involve physical construction activities (e.g. roads, railways, pipelines, transmission lines, fiber optic networks, etc.) and exclude projects that involve the provision of cash, technical assistance, scholarships, equipment, or supplies.

By following these procedures, we identify 949 Chinese government-financed infrastructure projects underway in BRI participant countries between 2013 and 2021.¹⁸⁰ Table 19 and Table 20 present the ten countries with the most BRI infrastructure projects and the highest levels of financing for BRI infrastructure projects. There is considerable overlap between these two lists, including 5 countries in South, Southeast, or Central Asia (Cambodia, Indonesia, Pakistan, Sri Lanka, Kazakhstan) and 1 country in Eastern Europe (Belarus). In Figure 23, we present the broader portfolio of Chinese Government funding for BRI infrastructure projects (worth \$170 billion) underway in every major world region between 2013 and 2021.

¹⁷⁸ We measure the year in which a country “joined the BRI” as the first year in which it signed a BRI cooperative agreement or BRI MOU. See footnote 54 for more details.

¹⁷⁹ We isolate infrastructure projects by identifying all projects with title fields or description fields that included one or more of the following keywords: construc*, build, rehabilit*, upgrad*, renovat*, exten*, restor*, built, groundbreaking, fiber, power plant, expansion, electrification, hydro*, instal*, foundation. We also exclude all projects that are assigned to the following flow type categories: debt forgiveness, debt rescheduling, scholarships, training, or free-standing technical assistance activities.

¹⁸⁰ 941 of these BRI infrastructure projects reached implementation or completion. Eight of them were officially committed BRI infrastructure projects that were subsequently suspended or cancelled.

Table 19: Top 10 countries with BRI infrastructure projects underway, by project value

Country	2017 USD billions
Pakistan	27.3
Indonesia	20.3
Kazakhstan	12.1
Malaysia	8.4
Cambodia	6.8
Kenya	6.3
Belarus	6.1
Sri Lanka	5.5
Bangladesh	5.0
Ethiopia	4.1

Table 20: Top 10 countries with BRI infrastructure projects underway, by project count

Country	Project count
Cambodia	82
Pakistan	71
Indonesia	71
Mongolia	43
Belarus	35
Myanmar	33
Cameroon	30
Sri Lanka	25
Angola	25
Kazakhstan	21

Figure 23: Map of Chinese government funding for BRI infrastructure projects underway between 2013 and 2021



Source: AidData.

The 2.0 dataset reveals a great deal of implementation variation—from project-to-project and country-to-country—in the BRI infrastructure portfolio. For example, with precise data on project implementation start dates and completion dates, it is now possible to measure exactly how long it takes to implement BRI infrastructure projects in different settings. Table 21 demonstrates that, in Iran, the *average* BRI infrastructure project that reaches completion takes 7.1 years (2,585 days) to implement.¹⁸¹ By way of comparison, the average BRI infrastructure project in Azerbaijan—Iran’s northern neighbor—takes less than 1 year (307 days) to implement (see Table 22). Our dataset also reveals that a whole host of BRI infrastructure projects in Iran never reach completion but are instead suspended, cancelled, or put in a state of abeyance.

Table 21: Top 10 countries with longest average implementation times for BRI infrastructure projects

Year	Average days to implement
Nigeria	3333 days (9.1 years)
Iran	2585 days (7.1 years)
Gabon	2471 days (6.8 years)
Russia	1874 days (5.1 years)
Viet Nam	1783 days (4.9 years)
Sri Lanka	1684 days (4.6 years)
Ecuador	1594 days (4.4 years)
Algeria	1554 days (4.3 years)
Serbia	1534 days (4.2 years)
Congo	1494 days (4.1 years)

Note: This table excludes countries with less than 5 BRI infrastructure projects.

¹⁸¹ In Table 21 and Table 22, we use the variables in our dataset (*start_actual* and *end_actual*) that measure the precise calendar days when project implementation actually commenced and concluded to calculate the average number of days it takes to complete a BRI project (as defined in Box 5) in a given country. We only report average project implementation times for countries with at least five observations (BRI projects).

Table 22: Top 10 countries with shortest average implementation times for BRI infrastructure projects

Year	Average days to implement
Philippines	156 days (0.4 years)
Azerbaijan	307 days (0.8 years)
Cabo Verde	371 days (1 years)
Myanmar	438 days (1.2 years)
Mongolia	498 days (1.4 years)
Moldova	506 days (1.4 years)
Micronesia	524 days (1.4 years)
Madagascar	528 days (1.4 years)
South Africa	608 days (1.7 years)
Tanzania	623 days (1.7 years)

Note: This table excludes countries with less than 5 BRI infrastructure projects.

Iran's experience with the BRI highlights a broader constraint that influences the implementation of BRI infrastructure projects around the globe: the ease with which Chinese state-owned lenders can make use of the international financial system and thereby facilitate foreign currency-denominated payments to Chinese suppliers of goods and services. Beijing created a single state-owned bank—the Bank of Kunlun—to facilitate transactions with Iran and minimize the exposure of other Chinese state-owned banks to international sanctions.¹⁸² However, in 2012, the U.S. Treasury sanctioned the Bank of Kunlun and cut off its access to U.S. dollars and the U.S. financial system.¹⁸³ The Bank of Kunlun responded by shifting gears and facilitating transactions with Iran in renminbi and euros. But this strategy also failed. After the U.S. Government announced that it would withdraw from the “Iran nuclear deal,” the Bank of Kunlun decided to stop facilitating euro-denominated transactions in August 2018 in anticipation of another wave of U.S. sanctions.¹⁸⁴ Then, on November 5, 2018, the U.S. Treasury sanctioned a wide swathe of Iranian individuals and entities and threatened to impose secondary sanctions on any non-U.S. individuals or entities. To avoid exposure to secondary sanctions, the Bank of Kunlun immediately suspended renminbi-denominated transactions (for non-humanitarian activities). Without any way of paying for Chinese goods and services with dollars, euros, or renminbi, it has become increasingly difficult for Iranian government entities and companies and their Chinese counterparts to implement BRI projects.¹⁸⁵

The Tehran-Mashhad High-Speed Railway Electrification Upgrading Project (captured via ID#67389 in the 2.0 dataset) is a case in point. Originally billed as a flagship BRI project, it sought to electrify a 926-kilometer railway that runs from Tehran to the eastern city of Mashhad in Khorasan Razavi Province. Its ultimate goal was to transport 25 million passengers and 10 million tons of cargo per year. The Iranian Government signed a commercial contract with China National Machinery Import and Export Corporation (CMC) in June 2015 and later secured a \$1.5 billion loan from China Eximbank to finance 85% of the cost of the commercial contract. The project commenced on February 6, 2016, and was scheduled to reach completion within 48 months (February 6, 2020). However, as of June 2019, it had still only

¹⁸² The Bank of Kunlun is majority-owned by China National Petroleum Corporation (CNPC), a Chinese state-owned oil company.

¹⁸³ The U.S. Treasury sanctioned the Bank of Kunlun for funneling money to an organization associated with Iran's Revolutionary Guards.

¹⁸⁴ The formal name of the “Iran nuclear deal” is the Joint Comprehensive Plan of Action (JCPOA).

¹⁸⁵ This constraint is crucial because most loans from Chinese state-owned banks are issued in order to help Iranian borrowers purchase goods and services from Chinese suppliers. Consequently, the U.S. Treasury's actions have brought many BRI projects in Iran to a grinding halt.

achieved a 3% completion rate. In January 2021, CMC withdrew from the project because U.S. sanctions and “currency problems” made it too difficult to proceed.¹⁸⁶

Several countries, such as Cuba and Sudan, have encountered similar obstacles to BRI project implementation. However, others have found ways to circumvent international sanctions with the support of Chinese state-owned banks (Rapoza 2014; Marson and Ostroukh 2016). Russian state-owned companies in the oil and gas sector are subject to U.S. and E.U. sanctions that severely restrict their access to long-term, dollar- and euro-denominated loans, but our dataset reveals that these companies still represent some of Beijing’s biggest borrowers (see, for example, Project ID#43012, 43069, 85211, 67166, 43002, 67039 and Table A-3a in the Appendix).¹⁸⁷ They have accessed substantial amounts of Chinese credit via pre-export finance (PXF) facilities, which can be designed to exploit loopholes in the international sanctions regime.¹⁸⁸

5.2 What types of problems do BRI infrastructure projects and other Chinese government-financed infrastructure projects encounter during implementation?

The “cradle to grave” project descriptions in the 2.0 dataset highlight a wide range of other impediments to BRI implementation, including strikes, riots, public protests, wars, corruption scandals, natural disasters, public health restrictions, political transitions, bankruptcies, loan defaults, contractual disputes, lawsuits, and ruptures in diplomatic relations.¹⁸⁹ To leverage the vast trove of qualitative information that is contained in these descriptions, we use a set of systematic search and categorization procedures to quantify and compare the prevalence of different types of problems among (a) BRI infrastructure projects and (b) Chinese government-financed infrastructure projects that are implemented outside of the BRI. We first define four major problem types related to (1) scandals, controversies, or alleged violations; (2) financial wrongdoing; (3) community or ecosystem harm; and (4) underperformance vis-à-vis project objectives (described in more detail below). We then identify a set of corresponding keywords for each problem type that, if present in a project’s “description” field within the 2.0 dataset, may indicate it encountered a certain type of problem. For each problem type, we isolate all projects in our two subsamples of interest—all BRI infrastructure projects and Chinese government-financed infrastructure projects that are implemented outside of the BRI—with “description” fields that contain one or more of the pre-specified keywords.¹⁹⁰ This analysis encompasses projects backed by official financial (or in-kind) commitments that reached implementation or completion in these searches. We also include suspended and cancelled projects in order to avoid sample selection bias. After identifying the subset of projects with “description” fields that contain one or more of the pre-specified keywords, we manually review each of the corresponding project descriptions to eliminate “false positives”—e.g., a description that references the keyword “lawsuit” to describe litigation affecting an earlier phase of a project backed by a non-Chinese financier but not the subsequent, Chinese government-financed phase of the project. More specifically, we confirm or disconfirm that the projects in question encountered the types of problems that we intended to identify with the pre-specified set of keywords. However, at the manual review stage, we do not seek to differentiate between problems that were effectively or ineffectively managed. Nor do we seek to independently evaluate the veracity of any reported instances of harm, wrongdoing, or poor performance. Our goal is to identify which types of problems arose during implementation and we treat any reported instances of harm, wrongdoing, or poor performance as problems

¹⁸⁶ The parties reportedly explored the possibility of implementing the project through an EPC+F arrangement, whereby China Eximbank would extend the loan to CMC (the EPC contractor) and the Iranian Government would issue a sovereign guarantee in support of the loan. Our dataset demonstrates that Chinese state-owned banks have attempted to implement many projects through EPC+F arrangements (to avoid making any foreign exchange transfers to their Iranian counterparts). However, these arrangements have proven difficult to implement for several different reasons (Imam Jomeh Zadeh et al. 2020; Bahadoran-Baghbaderani and Mohamadi 2021).

¹⁸⁷ The 2.0 dataset indicates that Russia is China’s biggest borrower country (see Table A-3a in the Appendix), which is largely the result of Chinese debts incurred by Russian state-owned oil and gas companies over the last 15 years. However, our dataset also reveals that some big-ticket infrastructure projects in Russia backed by Chinese state-owned banks have encountered major problems because of U.S. and E.U. sanctions (e.g., Project ID#43054).

¹⁸⁸ A PXF facility is an arrangement in which a commodity producer gets up-front cash from a customer in return for a promise to repay the customer with that commodity in the future (potentially at a discount). Transaction lawyers advertise that they can help clients craft PXF facility agreements in ways that exploit the so-called “Trade Finance Exemption” in international sanctions.

¹⁸⁹ The project descriptions in the 2.0 dataset reveal that, in 2020 and 2021, many BRI infrastructure projects encountered implementation difficulties related to the COVID-19 pandemic, including work stoppages, higher rates of illness among construction workers, difficulty accessing key project inputs, and weakened loan repayment capacities.

¹⁹⁰ All searches are conducted in English because the project descriptions in the 2.0 dataset were prepared in English.

(regardless of their merit and how they were handled). However, we are not able to account for “false negatives” (i.e., cases in which a specific type of problem arose during project implementation, but the problem was not captured in the “description” field within AidData’s 2.0 dataset), so the summary statistics that we report should be treated as *lower-bound estimates*.

Our analysis suggests that at least 7% of the BRI infrastructure projects in the 2.0 dataset encountered some type of scandal, controversy, or alleged violation during implementation.¹⁹¹ However, these “problem projects” are unevenly distributed across Beijing’s global portfolio. Table 23 indicates that 59 of the 65 projects that fall within this category are located in just six countries: Pakistan (10 projects), Indonesia (9 projects), Malaysia and Vietnam (5 projects each) as well as Kenya, Kyrgyz Republic, and Papua New Guinea (4 projects each).

Table 23: Top 10 countries with BRI infrastructure project descriptions that refer to scandals, controversies, or alleged violations

Country	Project Count	USD 2017 millions
Pakistan	10	5,675
Indonesia	9	5,224
Malaysia	5	18,863
Viet Nam	5	2,747
Kenya	4	5,047
Kyrgyz Republic	4	1,055
Papua New Guinea	4	436
Cambodia	2	860
Mozambique	2	768
Belarus	2	727

To better understand the nature of the problems affecting BRI infrastructure projects during implementation, we apply three additional sets of keyword search terms to the project descriptions in our dataset. First, we seek to identify BRI infrastructure projects that were affected by claims of corruption or financial wrongdoing. Our analysis suggests that at least 3% of the BRI infrastructure projects in the 2.0 dataset encountered this type of problem.¹⁹² These projects, as Table 24 demonstrates, are heavily concentrated in 6 countries: Pakistan, Kyrgyz Republic, Indonesia, Kenya, Zambia, and Papua New Guinea.

¹⁹¹ These 65 projects are collectively worth \$48 billion. We identified these projects by first applying the following keyword search terms to the BRI infrastructure project descriptions in the 2.0 dataset: *allege**, *allegation*, *criticiz**, *criticism*, *complain**, *controvers**, *fiasco*, *turmoil*, *protest**, *violat**, *noncomplan**, *non-complan**, *breach**, *probe**, *audit**, *inquiry*, *scrutin**, *uncover**, *scandal*, *dispute**, *fined*, *sued*, *lawsuit*, *arbitrat**, *court*, and *litigat**. We then reviewed each of the identified project descriptions “by hand” to remove false positives.

¹⁹² We identified these 30 projects (worth \$30 billion) by applying the following keyword search terms to the BRI project descriptions in the 2.0 dataset: *misuse**, *abuse**, *bid-rig**, *misappropriat**, *mismanage**, *steal*, *theft*, *stole**, *corrupt**, *bribe**, *graft*, *fraud*, *kickback*, *siphon**, *embezzle**, *illicit*, *illegal*, *inflat**, *overprice**, *over-price**, *wrongdoing*, *collusion*, *collude**, *loot**, *plunder**, *prosecut**, *arrest*, *convict**, *criminal*, *extradit**, *imprison*, and *blacklist**. We then reviewed each of the identified project descriptions “by hand” to remove false positives.

Table 24: Top 10 countries with BRI infrastructure project descriptions that reference claims of corruption or other types of financial wrongdoing

Country	Project count	USD 2017 millions
Pakistan	4	2,675
Kyrgyz Republic	4	1,055
Indonesia	4	980
Kenya	3	3,552
Zambia	3	585
Papua New Guinea	3	411
Malaysia	2	14,541
Cameroon	2	227
Sri Lanka	2	209
Venezuela	1	3,901

The qualitative project descriptions in the 2.0 dataset shed additional light on the specific types of financial wrongdoing that reportedly took place.¹⁹³ For example, in Papua New Guinea (PNG), China Eximbank provided a \$229 million preferential buyer's credit (PBC) in 2016 for a project that involved laying 5,600 kilometers of submarine fiber optic cable to connect coastal and maritime provincial centers across the country (see Project ID#61213).¹⁹⁴ The project became a subject of local controversy because the proceeds of the loan were used to finance a commercial contract—between PNG DataCo Ltd. (a PNG state-owned enterprise) and Huawei Technologies Co Ltd. (“Huawei”)—that was allegedly overpriced by 30-50%.¹⁹⁵ In the Kyrgyz Republic, China Eximbank issued a \$386 million loan for the modernization of the Bishkek thermal power plant (TPP) in 2013 (see Project ID#39620). Then, during the middle of winter in 2018, the power plant failed, and local residents were left with no heating. When civil society organizations followed the paper trail related to the China Eximbank-financed modernization project, evidence of embezzlement emerged. An investigation resulted in the firing of Prime Minister Sapar Isakov. In total, 30 government officials—including another (former) Prime Minister (Jantoro Satybaldiev), a former mayor of Bishkek (Kubanychbek Kulmatov), and a former Energy Minister (Osmonbek Artykbaev)—were charged with corruption and using their positions to lobby for the selection of a Chinese company (TBEA) as the contractor for the project. Prosecutors estimate that bid-rigging and the inflated cost of the sole-source contract issued to TBEA cost the Government of the Kyrgyz Republic as much as \$111 million. Nurlan Omurkul, the director of the Bishkek TPP, later acknowledged that “I’ve worked my whole life in power and heating plants and knew all along that the Chinese price of \$386 million was too expensive” (Higgins 2019).

Second, we attempt to identify BRI infrastructure projects that are associated with harm to local communities or ecosystems. Our analysis suggests that at least 1.5% of BRI infrastructure projects in the 2.0 dataset were affected by

¹⁹³ By identifying projects that faced claims of corruption or other types of financial wrongdoing, AidData is not rendering judgment about the veracity of the underlying claims. Nor is AidData implying that the financiers or implementers of these projects were necessarily responsible for financial wrongdoing. It is important to remember that a large proportion of China’s overseas development finance program takes place in countries that pose high levels of fiduciary risk (see Table 4 above in Section 3).

¹⁹⁴ The Ministry of Treasury of the Government of Papua New Guinea then on-lent the proceeds of the PBC to Kumul Consolidated Holdings (a PNG state-owned enterprise), which in turn use the proceeds to finance approximately 85% of the cost of a \$270 million commercial contract with PNG DataCo Ltd. and Huawei Technologies Co Ltd.

¹⁹⁵ Concerns have also arisen that revenue generated by the Australian Government grant-financed Coral Sea Cable System (CSCS) is being used to “cross-subsidize” the Kumul Submarine Cable Project (i.e., facilitate loan repayment to China Eximbank).

problems related to human and environmental hazards.¹⁹⁶ Table 25 indicates that these “problem projects” are disproportionately located in three countries: Indonesia, Papua New Guinea, and Belarus. The 700MW Sumsel-1 Power Plant Construction Project in Indonesia, which is being financed by ICBC, Bank of China, and China Construction Bank, is an illustrative case.¹⁹⁷ It involves the construction of a coal-fired power plant—with two, 350MW power generation units (Unit 1 and Unit 2)—and an 80 kilometer, 275kV transmission line. In March 2020, more than a hundred construction workers from the project site went on strike to protest health and safety violations, workplace discrimination, illegal layoffs, and the failure to provide overtime pay to employees. The construction of the plant has also reportedly caused flooding and damage to a nearby oil palm plantation.¹⁹⁸

Table 25: Seven countries with BRI infrastructure project descriptions that reference community or ecosystem harm

Country	Project count	USD 2017 millions
Indonesia	6	4,651
Papua New Guinea	2	176
Belarus	2	727
Cambodia	1	759
Zambia	1	164
Pakistan	1	93
Myanmar	1	-

Third, we seek to identify BRI infrastructure projects that have underperformed vis-à-vis their original objectives (e.g., borrowers that default on their repayment obligations, infrastructure assets that are underutilized or less profitable than expected, companies that end up going into bankruptcy, contractors that fail to meet key milestones that are specified in their contracts). Our analysis suggests that at least 10% of the BRI infrastructure projects in the 2.0 dataset fall into this category.¹⁹⁹ While some of these projects are located in “hotspots” that we have already discussed, others are not.²⁰⁰ Take, for example, the Djibouti-Addis Ababa Railway Project, which is the largest BRI project in Ethiopia and Djibouti. The Ethiopian government contracted three China Eximbank loans worth \$2.49 billion to finance the construction of one segment of the railway (measuring approximately 650 kilometers in length) that falls within its jurisdictional boundaries. In parallel, the Djiboutian government secured a \$491.7 million China Eximbank loan to finance the construction of a 100 kilometer segment that passes through its territory at the Ethiopian border and terminates at the Port of Doraleh.²⁰¹ The railway was completed and put into operation in January 2018, but it has

¹⁹⁶ We identified these 14 projects (worth \$6.5 billion) by applying the following keyword search terms to the BRI project descriptions in the 2.0 dataset outside the emergency response and disaster preparedness sectors: disaster, destroy*, destruction, ruin*, despoil, degrad*, pollut*, displace*, hazard*, exploit*, involuntary, unsafe, cracks, substandard, low-quality, and defective. We also excluded all projects assigned to the emergency aid/disaster preparedness sectors. We then reviewed each of the identified project descriptions “by hand” to remove false positives.

¹⁹⁷ For more detailed information about this project, see Project ID#69419, #69418, and #62064.

¹⁹⁸ Then, in March 2020, the project's sponsor declared force majeure and stated that construction would be delayed because of the COVID-19 pandemic. Labor negotiations were also delayed due to a COVID-19-related travel ban preventing employees of Guangdong Engineering from returning from China.

¹⁹⁹ We identified these 91 projects (worth \$54 billion) by applying the following keyword search terms to the BRI project descriptions in the 2.0 dataset: freeze, froze*, halt*, suspend*, cancel*, withheld, postpone*, abeyance, withhold, abandon*, mothball*, threat*, renege*, renegotiate*, default*, arrears, solvency, insolvent, cross-subsidize, unprofitable, losses, loss-making, bankrupt*, underperform*, reschedule*, rescope*, jeopardize*, rescind*, revoke*, remediate*, distress*, shutter*, seize*, expropriate*, confiscate*, failure, delay*, and overrun*. We then reviewed each of the identified project descriptions “by hand” to remove false positives.

²⁰⁰ These projects, as Table 26 demonstrates, are heavily concentrated in 4 countries: Indonesia, Sri Lanka, Pakistan, and Malaysia.

²⁰¹ The three China Eximbank loans that supported the Ethiopian segment of the railway are captured in Project ID#70083, #70085, and #70086. The China Eximbank loan that supported the Djiboutian segment of the railway is captured in Project ID#46183.

generated substantially less railway revenue than originally expected, which has made it difficult for the Ethiopian government and the Djiboutian government to service their debts.²⁰² In Ethiopia's case, China Eximbank responded by extending the loan repayment period from 15 years to 35 years. In Djibouti's case, China Eximbank agreed to extend the maturity of the loan from 15 years to 25 years, lengthen the grace period from 5 years to 10 years, and modestly reduce the interest rate (from 6-month LIBOR plus 300 basis points to 6-month LIBOR plus 210 basis points). However, it remains to be seen if the Djibouti-Addis Ababa Railway will find a path to commercial viability; according to the Chief Economist of Sinosure, China's state-owned overseas insurance provider has already written off approximately \$1 billion in losses due to the project's poor commercial performance (Pilling and Feng 2018).

Table 26: Top 10 countries with BRI infrastructure project descriptions that reference underperformance vis-à-vis original objectives

Country	Project count	USD 2017 millions
Indonesia	12	6,239
Sri Lanka	11	3,933
Pakistan	7	1,800
Malaysia	5	18,863
Kenya	4	5,197
Papua New Guinea	4	211
Ethiopia	3	2,420
Kazakhstan	3	1,759
Belarus	3	1,013
Viet Nam	3	664

Given that the 2.0 dataset provides a comprehensive picture of China's overseas development finance portfolio around the globe, it also provides a unique opportunity to check how BRI infrastructure projects have fared in comparison to other Chinese government-financed infrastructure projects. More specifically, from an ease of project implementation perspective, is participation in the BRI a privilege or a penalty? Table 27 suggests that it may be the latter. When we compare the implementation of BRI infrastructure projects to Chinese government-financed infrastructure projects that are implemented outside of the BRI, we find that BRI infrastructure projects on average encounter longer delays during implementation. Across all sectors where Chinese infrastructure projects are taking place, the average difference in the duration of the implementation delay is 272 days: it takes 771 days, on average, to implement an infrastructure project with funding from the Chinese government outside of the BRI; however, it takes 1,047 days, on average to implement a BRI infrastructure project. The same pattern is present in the three infrastructure sectors where China has the biggest financial footprint: (1) construction, industry, mining; (2) transport and storage; and (3) energy.

The underlying reason(s) why BRI infrastructure projects are facing longer delays in implementation are not yet widely understood, but there are several competing and complementary hypotheses that merit attention. One possibility is that BRI infrastructure projects are oversized and overpriced, which leads to higher levels of host country criticism and a higher probability that the underlying commercial contracts financed with Chinese loans and export credits will be renegotiated.²⁰³ The China Eximbank-financed East Coast Rail Link Project in Malaysia—captured via Project ID#85858,

²⁰² The three China Eximbank loans that supported this project are captured in Project ID#70083, #70085, and #70086.

²⁰³ Although this problem has potentially become more acute during the BRI era, it clearly existed before China introduced its flagship, global infrastructure initiative in 2013. Mohamed Nasheed, who served as the President of the Maldives from 2008-2012, puts it this way: "[t]hey came in; they did the work and sent us the bill. So it's not the loan interest rates as such but the costing itself. They over-invoiced us and charged us for that and now we have to repay the interest rate and the principal amount. ... I can't see how our development can be rapid enough to have the amount of savings to re-pay China" (The Economic Times 2019).

#49309, and #73473 and described in Box 6—is a case in point. Another possibility is that BRI infrastructure projects are larger and more complex and thus more likely to encounter problems related to human health and safety, environmental protection, compensation for involuntarily displaced communities, and cultural heritage preservation.²⁰⁴

Box 6: The implementation consequences of overpricing in a China Eximbank-financed project

On September 26, 2016, the Ministry of Finance Incorporated (MOF Inc.) of Malaysia established a wholly-owned subsidiary and special purpose vehicle called Malaysia Rail Link Sdn Bhd (MRL or MRLSB) to design, finance, implement, and maintain the East Coast Rail Link (ECRL). One month later, China Communications Construction Company Ltd (CCCC) and MRLSB signed a commercial contract worth RMB 72.8 billion (46 billion ringgit) for Phase 1 of the ECRL Project. China Eximbank and MRLSB subsequently signed a loan agreement worth RMB 61.88 billion (39.1 billion ringgit) for Phase 1 of the ECRL Project. Then, on May 13, 2017, CCCC and MRLSB signed an Engineering, Procurement, Construction and Commissioning (EPCC) contract worth RMB 14.2 billion (9 billion ringgit) for Phase 2 of the ECRL Project. However, in August 2018, newly elected Prime Minister Mahathir Mohamad cancelled the ECRL Project and stated that it could have been developed by a Malaysian company for less than half the value of the contracts that had been won by CCCC. Then, in January 2019, an investigation by the *Wall Street Journal* revealed that the Chinese Government had previously recommended that the previous government in Malaysia price the ECRL (and another China Eximbank-financed project) at an above-market values in order to generate excess cash that it could use to repay the maturing debts of 1MDB (a state investment fund).²⁰⁵ After project cancellation, China Eximbank informed the new Malaysian government that it could either renegotiate the original commercial contracts or pay termination costs of about 21.78 billion ringgit. The Malaysian government chose to renegotiate. On April 12, 2019, CCCC and MRLSB signed a Supplemental Agreement (SA) regarding Phase 1 and Phase 2 of the Engineering, Procurement, Construction & Commissioning (EPCC) for the ECRL Project, which reduced the overall cost of the ECRL Project from 65.5 billion ringgit to 44 billion ringgit. The contract renegotiation process has led to major implementation delays. As of March 2021, the project had only achieved a 20% completion rate. The originally expected project completion date was June 30, 2024, but it has been pushed back to December 31, 2026.

Table 27: Average days to implement and complete a project, BRI vs. non-BRI infrastructure projects

Sectors	BRI infrastructure projects	Non-BRI infrastructure projects
All sectors	1,047	771
Energy	1,295	1,260
Industry, mining, and construction	1,156	961
Transport and storage	1,320	1,096

According to Table 28, while at least 6.9% of the BRI infrastructure project descriptions in the dataset refer to some type of scandal, controversy, or alleged violation that arose during implementation, only 3.7% of non-BRI infrastructure project descriptions include such references. Similarly, when we look for evidence of problems related to corruption or other forms of financial wrongdoing across the two subsamples, we find that 3.2% of the BRI project descriptions in the 2.0 dataset identify these types of problems, but only 1.4% of the non-BRI infrastructure project descriptions do so. With respect to projects that have potentially underperformed vis-à-vis their original objectives or brought harm to

²⁰⁴ There are of course other potential explanations, including the possibility that the larger size of BRI infrastructure projects makes them more prone to cost overruns (and thus implementation delays) or that BRI infrastructure projects are hastily conceived and implemented due to political pressures from Beijing.

²⁰⁵ The Prime Minister (Najib Razak) was, at the time, accused of stealing \$681 million from 1MDB (Wright and Hope 2019).

local communities and ecosystems, there are few differences across the subsamples. However, we find large differences across the subsamples when we compare the proportions of BRI infrastructure spending and non-BRI infrastructure spending that are associated with these different types of problems (see Table 29). More than twice as much BRI infrastructure spending (25.9%) is associated with some type of scandal, controversy, or alleged violation than non-BRI infrastructure spending (9.8%). The proportion of BRI infrastructure spending affected by problems related to financial wrongdoing (16.1%) is approximately five times higher than the proportion of non-BRI infrastructure spending (2.9%). With respect to problems related to local community or ecosystem harm, we find a 3.6% prevalence rate in the BRI infrastructure portfolio and a 1.8% rate in the non-BRI infrastructure portfolio. When we consider projects that have apparently underperformed vis-à-vis their original objectives, we find a 29.4% prevalence rate in the BRI infrastructure portfolio and a 18.4% rate in the non-BRI infrastructure portfolio. If we define the prevalence rate as exposure to any one of these problems, the BRI infrastructure portfolio registers a 34.9% problem prevalence rate, and the non-BRI infrastructure portfolio registers a 21.4% problem prevalence rate.²⁰⁶

Table 28: BRI vs. non-BRI infrastructure project descriptions that reference a problem type, by % of project descriptions

Problem type	BRI infrastructure projects	Non-BRI infrastructure projects
Scandals, controversies, or alleged violations	6.9%	3.7%
Financial wrongdoing	3.2%	1.4%
Community or ecosystem harm	1.5%	0.8%
Underperformance vis-à-vis original objectives	9.6%	8.2%
Any of these 4 types of problems	12.8%	10.1%

Table 29: BRI vs. non-BRI infrastructure projects that reference a problem type, by % of transaction values

Problem type	BRI infrastructure projects	Non-BRI infrastructure projects
Scandals, controversies, or alleged violations	25.9%	9.8%
Financial wrongdoing	16.1%	2.9%
Community or ecosystem harm	3.6%	1.8%
Underperformance vis-à-vis original objectives	29.4%	18.4%
Any of these 4 types of problems	34.9%	21.4%

However, we also find that these types of problems are not equally prevalent across all types of BRI infrastructure projects (see Table 30). When BRI infrastructure projects are exclusively undertaken by host country organizations (or organizations that are neither from China nor the host country), they are less likely to encounter these types of

²⁰⁶ This estimate is broadly consistent with a previous estimate generated by a private consultancy. RWR Advisory maintains a proprietary database of BRI projects, which reportedly shows that 32% of the BRI project portfolio (by monetary value) has encountered problems during implementation (Kynge 2018). However, since the RWR Advisory database is shielded from public scrutiny, we have not been able to conduct an in-depth comparison to AidData's 2.0 dataset.

problems during implementation.²⁰⁷ Yet, among BRI infrastructure projects that are co-financed, these types of problems are more likely to arise.²⁰⁸ These sources of variation underscore the importance of better understanding how the upstream financing and implementation arrangements that govern BRI infrastructure projects—and other Chinese government-financed development projects—influence downstream outcomes.

Table 30: Prevalence rate of problems among BRI Infrastructure projects, by type of financing and implementation arrangement

		Problem prevalence rate	% of all BRI infrastructure projects
Cofinancing	Cofinanced with any type of agency	21%	14%
	Implemented solely by a host-country agency	10%	14%
Implementation	Implemented by neither a non-Chinese agency nor a host-country agency	6%	14%
	Implemented solely by a Chinese agency	40%	35%
	Co-implemented by a Chinese & host-country agency	44%	37%

Note: In this table, the problem prevalence rate is defined as the percentage of projects that encountered at least one of the following types of problems: (1) scandals, controversies, or alleged violations; (2) financial wrongdoing; (3) community or ecosystem harm; and (4) underperformance vis-à-vis project objectives. We do not disaggregate the sample of co-financed projects into projects co-financed by Chinese and non-Chinese organizations due to small sample sizes.

5.3 Learning from failure: A closer look at suspended and cancelled Chinese development projects

The 2.0 dataset is also different from other publicly available datasets of Chinese development finance in that it captures project suspensions and cancellations (see Table A-1 in the Appendix).²⁰⁹ AidData has previously faced criticism for publishing data on projects backed by official commitments that are subsequently suspended or

²⁰⁷ We find that 14% of all BRI infrastructure projects in the 2.0 dataset are exclusively implemented by organizations that are neither from China nor the host country, 35% are exclusively implemented by Chinese organizations, 14% are exclusively implemented by host country organizations, and 37% are jointly implemented by Chinese and host country organizations. Yet we find a proportionally lower problem prevalence rate among BRI infrastructure projects exclusively implemented by organizations that are neither from China nor the host country (6%) and among BRI infrastructure projects exclusively implemented by host country organizations (10%). The opposite is true of BRI infrastructure projects exclusively implemented by Chinese organizations and jointly implemented by Chinese and host country organizations. They have proportionally higher problem prevalence rates—40% and 44%, respectively.

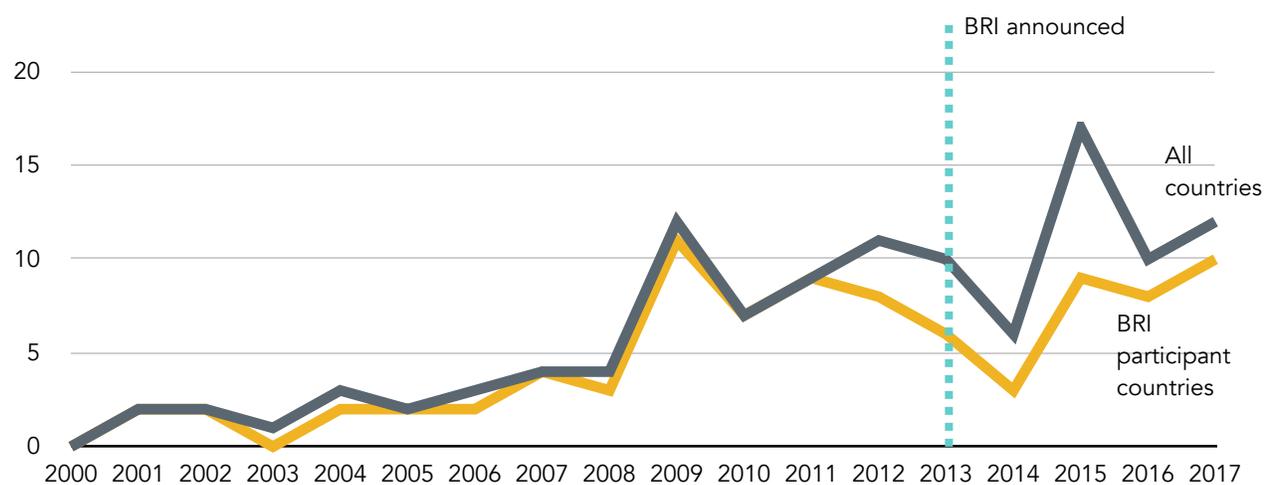
²⁰⁸ Whereas 14% of all BRI infrastructure projects in the 2.0 dataset involve co-financing and 86% do not, we find a proportionally higher problem prevalence rate (21.5%) among BRI infrastructure projects that involve co-financing and a proportionally lower problem prevalence rate (7.8%) among BRI infrastructure projects that do not. This pattern in the data does necessarily imply that co-financing is the “culprit.” It may simply reflect the fact that co-financed projects are larger in size and larger projects are riskier than smaller projects. This issue merits further empirical investigation.

²⁰⁹ Users of the 2.0 dataset can identify all suspended and cancelled projects by sorting on the *status* variable. Users should also keep in mind that suspended, cancelled, and pledged but not committed projects will be excluded if the *Recommended_for_Aggregates* filter is applied.

cancelled.²¹⁰ However, we maintain that it is important to systematically track these projects and subject them to analysis. Shielding suspended and cancelled projects from public scrutiny leaves analysts and decision-makers with an incomplete picture of China's overseas development finance portfolio. It also limits opportunities to learn from failure.

Figure 24 shows that, during the BRI era, Beijing has faced more project suspensions and cancellations than it had during the pre-BRI era. A similar, post-2013 trend is observed in BRI participant countries.²¹¹ A "BRI backlash" is evidently underway, but it is concentrated in a particular set of countries.²¹² In Table 31, we calculate the aggregate monetary value of all project suspensions and cancellations in BRI participant countries. Many of the countries that enter the "top ten" list—including Malaysia, Kazakhstan, Ecuador, and Costa Rica—are places where there is clear evidence of BRI "buyer's remorse." In Malaysia, the Prime Minister cancelled Phase 1 of the China Eximbank-financed East Coast Rail Link Project based on concerns about overpricing and corruption. He told the *New York Times* that "[i]t's all about borrowing too much money, which we cannot afford and cannot repay because we don't need these projects in Malaysia" (Beech 2018). In Kazakhstan, CDB issued a \$1.5 billion loan (backed by a sovereign guarantee) to an SPV called Astana LRT LLP—that is owned by the City of Astana—for the Astana Light Rail Project in 2015 (ID#53930).²¹³ However, two years later, the President of Kazakhstan ordered an investigation into the officials who initiated the project. The chief executive of Astana LRT LLP was accused of embezzling project funds and fled the country. The local authorities suspended the construction of the railway, and the half-finished project became a source of public discontent. In Figure 25, we present the broader set of BRI projects (scaled by their financial values) around the globe that were suspended or cancelled between 2013 and 2021.²¹⁴

Figure 24: Suspensions and cancellations of Chinese government-financed projects in BRI vs. non-BRI countries, 2000-2017



Source: AidData.

²¹⁰ The main criticism that AidData has faced is that users of its dataset may generate inflated estimates of official development finance commitments from China by including suspended and cancelled projects in their analyses (see Chapter 3 of Dreher et al. forthcoming). However, for users who wish to estimate official development finance commitments from China, AidData has consistently provided guidance on how to isolate the formally approved, active, and completed Chinese government-financed projects in its datasets (i.e., by using the "status" and "umbrella" variables to identify all projects with a status designation of Pipeline: Commitment, Implementation, and Completion that have not also been designated as umbrella agreements).

²¹¹ The "BRI participant countries" category in Figure 24 captures all projects that were officially committed during or after 2013 but subsequently suspended or cancelled among the subset of countries that signed a BRI MOU/cooperation agreement during or after 2013.

²¹² Chinese development projects have raised concerns about corruption, overpricing, political capture, debt sustainability, and environmental degradation in at least two dozen countries. These concerns have had knock-on effects. A growing number of politicians from LMICs have cancelled or mothballed high-profile Chinese development projects because major changes in public sentiment have made it difficult for them to maintain close relations with China (Aamir 2018; Balding 2018; Mundy and Hille 2019; Rolland 2019; and Parks 2019).

²¹³ The Government of Kazakhstan provided a sovereign guarantee in support of the loan that was issued to the SPV.

²¹⁴ Figure 25 includes projects that were officially committed during or after 2013 but subsequently suspended or cancelled among the subset of countries that signed a BRI MOU/cooperation agreement during or after 2013.

Table 31: Monetary value of project suspensions and cancellations in BRI countries, 2013-2021

Country	USD 2017 millions
Malaysia	11,576.2
Kazakhstan	1,474.7
Bolivia	1,025.0
Kenya	952.5
Costa Rica	889.3
Sudan	674.6
Ethiopia	534.4
Ecuador	417.3
Zambia	411.0
Cameroon	310.5

Figure 25: Map of suspended and cancelled project financing in BRI countries, 2013-2021



Source: AidData.

At the same time, the 2.0 dataset demonstrates that some countries are encountering fewer obstacles than others during the implementation of BRI infrastructure projects. Table 32 provides a list of the countries in the dataset with the highest number of BRI infrastructure projects completed ahead of schedule. Kenya is at the top of the list. Beijing's flagship BRI project in Kenya—the Mombasa-Nairobi Standard Gauge Railway (SGR)—is an illustrative case. The purpose of this project, which was financed with two China Eximbank loans worth approximately \$3.5 billion (captured via ID#37103 and ID#31777 in the 2.0 dataset), was to construct a 475-kilometer railway from the port of Mombasa to Nairobi. Its ultimate objective was to transport passengers and cargo from Nairobi to the southeastern port city of Mombasa at 120 kilometers per hour and reduce travel times and transport costs by as much as 60 percent. The

project was implemented at an astonishingly fast pace.²¹⁵ It commenced on December 12, 2014, and was completed on May 31, 2017, eighteen months ahead of schedule. This achievement is remarkable in light of the scale and complexity of the project and the significant obstacles that arose during project implementation (Dreher et al. forthcoming).

Table 32: Number of BRI infrastructure projects completed ahead of schedule, by country

Year	Projects ahead of schedule
Kenya	5
Indonesia	3
Mongolia	3
Cameroon	3
Cambodia	2
Lao People's Democratic Republic	2
Zambia	2
Maldives	2
Pakistan	1
Belarus	1
Kyrgyz Republic	1
Sri Lanka	1
Papua New Guinea	1
Uzbekistan	1
Senegal	1
Serbia	1
Ghana	1
Fiji	1
Suriname	1
Georgia	1
Rwanda	1

²¹⁵ Mega-transport projects like this one are notoriously difficult to implement and often beset by delays and cost overruns (Dimitriou et al. 2014; Flyvbjerg et al. 2002).

The ease of project implementation typically depends—at least in part—on host country choices and characteristics. In the case of the Mombasa-Nairobi SGR, President Kenyatta acted as the “project owner” and assumed responsibility for resolving politically contentious matters that could delay or derail the project. He also identified a specific goal to guide the efforts of everyone involved in project implementation: putting the railway into operation before he stood for re-election in August 2017. At the same time, project implementation outcomes often depend upon the specific contractors who are responsible for implementation. Here again, the case of the Mombasa-Nairobi SGR is instructive. Conservationists sounded the alarm when they learned that the railway would run through the Tsavo National Park wildlife sanctuary. But China Road and Bridge Corporation (CRBC)—the Chinese state-owned enterprise responsible for project implementation—moved quickly to mitigate the risk of biodiversity loss by undertaking various in-situ conservation activities. It created access corridors for wildlife migration, building some bridges as high as seven meters tall to ensure the safe passage of giraffes and elephants from one side of the park to the other. Alongside the railway, it installed dust-suppressing sprinklers, noise screens, and drinking water facilities for wildlife to mitigate concerns about health hazards during the construction phase and water scarcity during dry seasons. Another implementation challenge was the fact that the construction of the railway would require the displacement of nearby residents. To help resolve contentious disputes, CRBC hired local people who were trusted by local residents, such as pastors from nearby churches. These “community liaison officers helped CRBC understand and respond to local grievances—a tactic that independent observers have described as “an effective strategy for gaining greater [local] acceptance of the SGR” (Wissenbach and Wang 2017: 14).

In Section 6, we will explain how several features of AidData’s 2.0 dataset have opened up new opportunities to evaluate supply-side and demand-side factors that affect project implementation outcomes.

6. New and improved features of the dataset for prospective users to consider

By way of conclusion, we would like to highlight several new and improved features of the 2.0 dataset that may be useful to analysts and decision-makers:

(1) **Locational Precision.** Previous versions of the dataset used a point-based geocoding methodology to identify the physical locations of Chinese development projects (AidData Research and Evaluation Unit 2017; Bluhm et al. 2018; Dreher et al. forthcoming). These locational data opened up new opportunities for social scientists to measure the effects of Chinese development projects at subnational rather than national scales (e.g., BenYishay et al. 2016; Isaksson and Kotsadam 2018a, 2018b; Brazys et al. 2017; Bluhm et al. 2018; Brazys and Dukalskis 2019; Martorano et al. 2020; Dreher et al. forthcoming, 2021b; Iacoella et al. 2021; Blair and Roessler 2021). However, most of these data were generated with a non-trivial amount of spatial measurement imprecision.²¹⁶ The latest (2.0) version of our dataset provides substantially more precise locational information about Chinese development projects. The physical boundaries and exact locations of schools, hospitals, stadiums, government buildings, power plants, and factories are now represented with polygons.²¹⁷ Likewise, we have used polygons to precisely characterize the geographical scope of special economic zones, industrial parks, mining concessions, protected areas, and plots of land under cultivation. Line vectors (i.e., “squiggly” lines) are provided to capture the exact routes of roads, bridges, tunnels, railways, power lines, canals, and pipelines. Technically-savvy users can now access our data via GeoJSON files, which can be merged with georeferenced outcome and covariate data to undertake geospatial impact evaluations and other types of geospatial analysis.²¹⁸ We also provide OpenStreetMap URLs—as well as stable hyperlinks to GeoJSON files (on AidData’s GitHub repository)—so that anyone can instantly visualize the geographical locations and features of Chinese development projects. An important caveat is that we are only able to provide these geospatial details for the subset of projects in our dataset that have physical footprints (e.g., roads, railways, transmission lines) or involve activities at specific locations (e.g., medical teams stationed at a given hospital, equipment given to park rangers to patrol a well-demarcated protected area). Out of the 13,427 projects in the 2.0 version of AidData’s Global Chinese Development Finance Dataset, 3,285 projects (worth \$410 billion) have corresponding GeoJSON files and OpenStreetMap URLs.²¹⁹

By way of illustration, Figure 26 uses all of the GeoJSON files for a single country (Laos) to visualize the geographical locations and features of Chinese development projects that were underway in that country between 2000 and 2021.²²⁰ The long, teal, “squiggly” line that runs from the country’s border with China in the north to its border with Thailand in the south represents the precise path of the China-Laos Railway Project (which we discussed at length in Section 4).²²¹ Most of the orange lines and polygons in Figure 26 represent hydroelectric power plants and transmission lines that evacuate power to residential and commercial customers. In Figure 27, we “zoom in” on the area surrounding the capital (Vientiane) of Laos to take a closer look at the nature of the locational data that are included in AidData’s 2.0

²¹⁶ For example, AidData may have identified the district in which a hospital was located but not its exact location, or the starting point and end point of a road but not the precise route between those two points.

²¹⁷ The polygons in the 2.0 dataset are closed shapes made up of straight-line segments that seek to capture the precise boundaries of a geographical area or feature. When physical boundary data are not available, but a precise location is available, AidData provides points rather than polygons. However, note that all features (captured via GeoJSON files) are represented as polygons in their final form; for example, points and line segments are buffered slightly to form a polygon.

²¹⁸ When spatial measurement imprecision is minimized, analysts can conduct geospatial impact evaluations (GIEs) with substantially greater accuracy. If “treated” locations are measured with a significant amount of error, GIE estimates of project impact can be biased toward zero (akin to false negatives) and thereby understate—or mask—the true effects of Chinese development projects (BenYishay et al. 2017; Marty et al. 2019).

²¹⁹ However, given that many Chinese development projects support multiple segments of physical infrastructure or otherwise take place in multiple locations, there are substantially more OpenStreetMap URLs in our dataset than there are projects with GeoJSON files and OpenStreetMap URLs. In total, our dataset provides 3,285 GeoJSON files and 7,809 OpenStreetMap URLs for 3,285 Chinese government-financed projects. As a point of comparison, the geolocated dataset of Chinese overseas development finance produced by Boston University’s Global Development Policy Center provides spatial data (polygons, lines, and points) for 615 Chinese government-financed projects (Gallagher and Ray 2020; Ray et al. 2021). For a broader comparison of the 2.0 version of AidData’s Global Chinese Development Finance Dataset and various Chinese development finance datasets maintained by Boston University’s Global Development Policy Center, see Table A-1 in the Appendix.

²²⁰ The colors in the map represent the OECD sector codes to which projects in the 2.0 dataset have been assigned.

²²¹ The GeoJSON file for this project (accessible via <https://github.com/aiddata/china-osm-geodata>) was constructed with the following OpenStreetMap URL: <https://www.openstreetmap.org/relation/10168930#map=15/17.8810/102.7150>

dataset. In the northwestern section of the map, one can see a teal-colored polygon north of the Mekong River. This geographical feature captures the precise boundaries of Wattay International Airport, which was upgraded with a preferential buyer's credit from China Eximbank (captured via Project ID#35756). Approximately 5 kilometers southeast of that airport, one can see three polygons—in light blue and dark blue—that capture the exact locations and physical boundaries of Mahosot Hospital, Hospital 103, and a National Cultural Hall. All these facilities were rehabilitated with grant funding from the Chinese government (see Project ID#64210, #64211, and #85264). The orange lines that run from north to south represent China Eximbank-financed transmission lines bringing electricity from the 130MW Nam Khan 2 Hydropower Plant to the country's capital, as well as a China Eximbank-financed project that involves the reconstruction of the 115kV Donekoy substation, the 115kV Sokpaluang substation, and transmission lines between the substations (captured via Project ID#33809 and #64786). The teal line that runs from north to south represents one small segment of the China-Laos Railway (captured via Project ID#33726 and #85304). Sandwiched in between the orange and teal lines are two additional polygons—one in pink and another in yellow—that represent the precise locations and physical boundaries of the National University of Laos (where a Confucius Institute and a Huawei cloud computing laboratory are housed) and the International Conference Center, both of which have benefited from Chinese government grant funding (see Project ID#35757, #43956, and #73289).²²²

To illustrate the value of these precise locational data when they are analyzed in conjunction with high-resolution outcome data, consider a single project from the 2.0 dataset: the 230kV Nabong-Nam Ngum 1-Hin Heup Power Transmission Line Project in Laos, which was financed by China Eximbank in August 2016 financed with a \$162.35 million preferential buyer's credit.²²³ A core objective of this project was to facilitate the distribution of electricity from the Nam Ngum 1 hydroelectric dam by constructing a 90-kilometer transmission line from the Nam Ngum 1 substation to the Hinheup (Hin Heup) substation and expanding existing substation capacity. Project implementation commenced in November 2016 and ended in May 2018 (eighteen months ahead of schedule). A formal completion ceremony took place on July 4, 2018, and the project warranty period officially ended on September 2, 2019. We can explore whether electrification rates increased in the areas near the project site by merging AidData's georeferenced project data with high-resolution satellite imagery on nighttime light output from NOAA's Visible Infrared Imaging Radiometer Suite (VIIRS). To do so, we first use the GeoJSON files in the 2.0 dataset to identify the precise locations and boundaries of the Nam Ngum 1 and Hinheup (Hin Heup) substations (with polygons) and the precise path of the 90 km transmission line that runs between the substations (with a line vector). Figure 28 visualizes these project features in a map.²²⁴ Then, to identify geographical areas that could potentially benefit from the transmission line and substations, we create five-kilometer buffers around these project features (i.e., the intervention sites). We then calculate zonal statistics for these "catchment areas" to produce aggregate measures of our outcome of interest. Since the data from VIIRS are available before and after project implementation took place, we can measure the rate of change in nighttime light output during the "pre-treatment" period (2014-2017) and the "post-treatment" period (2017-2020). This analysis, which is visually represented in Figure 28, suggests that the geographical areas within a five-kilometer buffer around the substations and transmission line experienced a 26 percent increase in the average rate of change in nighttime light output between the periods before and after project implementation.

²²² There are several additional Chinese government-financed projects that are captured via lines and polygons in Figure 27, but for which we did not have enough space to create inset boxes. These include Triumphal Arch Park, Saysettha Comprehensive Development Zone, a satellite ground control station, and a Lao National Television building (captured via Project ID#64695, #33755, #64693, #64690, #64770, and #64663).

²²³ This China Eximbank-financed project is captured in AidData's 2.0 dataset via ID#63448. China Eximbank also financed the construction of the Nam Ngum 1 hydroelectric power plant (as captured via ID#63447 in AidData's 2.0 dataset). Neither of these China Eximbank-financed projects are included in the two relevant datasets (China's Global Energy Finance Dataset and China's Overseas Development Finance Dataset) published by Boston University's Global Development Policy Center.

²²⁴ These GeoJSON files can be accessed from AidData's GitHub repository via <https://github.com/aiddata/china-osm-geodata>.

Figure 26: Precise locations and physical boundaries of 66 Chinese government-financed projects in Laos

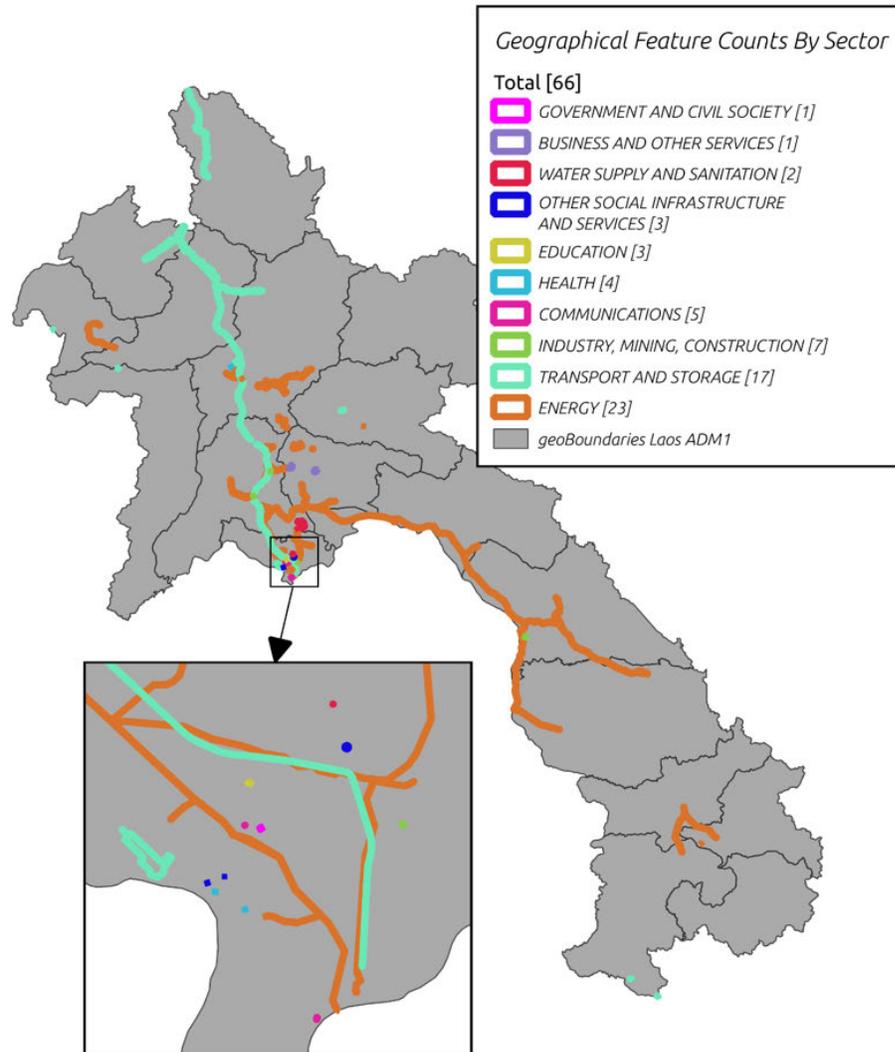


Figure 27: Precise locations and physical boundaries of Chinese government-financed projects in the areas surrounding Vientiane, the capital of Laos

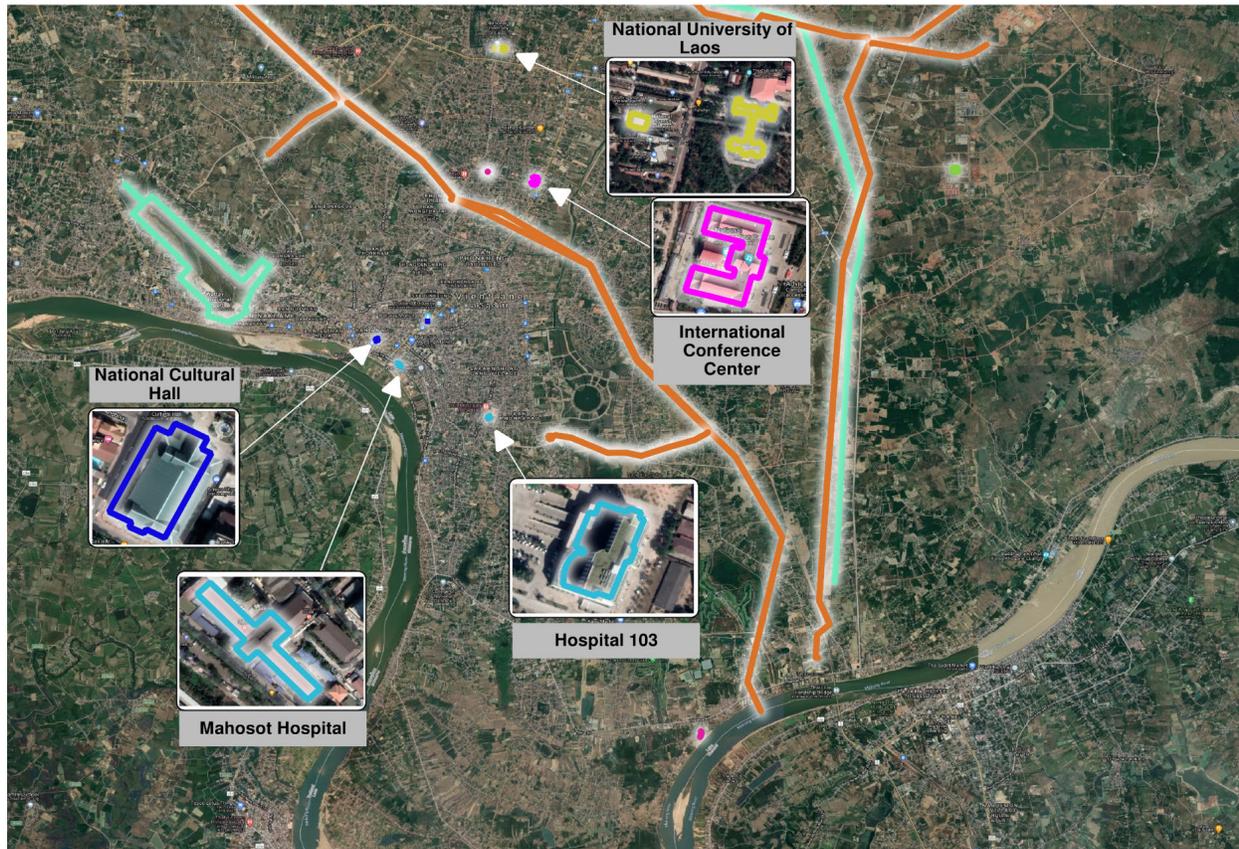
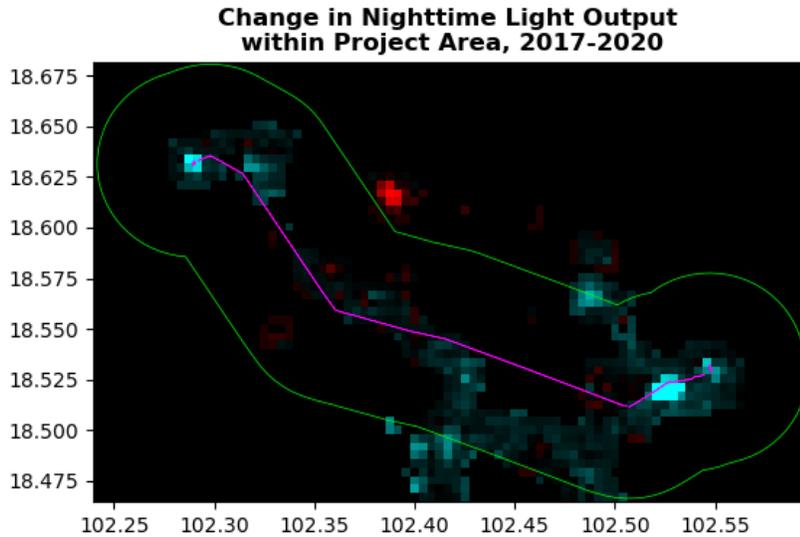
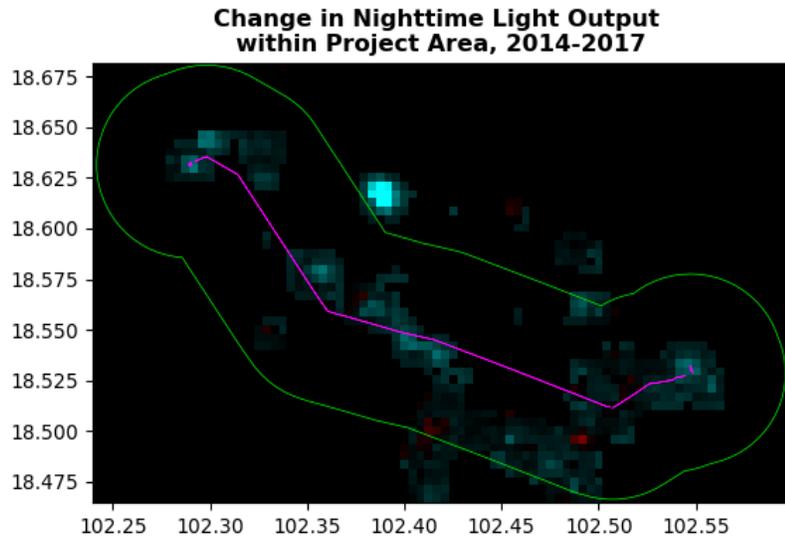


Figure 28: Changes in nighttime light output before and after implementation of China Eximbank-financed 230kV Nabong-Nam Ngum 1-Hin Heup Power Transmission Line Project in Laos



(2) Exact timing of project implementation. Existing Chinese development finance datasets do not adequately address increasing levels of demand for data on the timing of project implementation (i.e., when treatment “turns on” and “turns off”) among social scientists. Nor do they adequately address demand among policymakers and practitioners for rich details on project implementation. To ease these informational constraints, AidData has prioritized the collection of high-precision (i.e., calendar day) data on the implementation start dates and completion dates of Chinese development projects. These variables were included in earlier iterations of our dataset. However, in the 2.0 version of our dataset, these variables have vastly improved coverage rates. In the 1.0 version of our dataset, we were only able to identify precise implementation start dates for 745 projects and precise project completion dates for 906 projects. In the 2.0 version of our dataset, we have identified precise implementation start dates for 5,539 projects (worth \$438 billion) and precise project completion dates for 6,061 projects (worth \$333 billion). With calendar day-level information on the timing of project implementation and exact locational details, users of our dataset can now measure the spatio-temporal rollout of project implementation with a high level of precision.

To provide an illustration of how these high-precision data on the timing of project implementation data can be put to productive use, consider the design of a new study that seeks to measure the public opinion impacts of Chinese government-financed development projects (Wellner et al. 2021). To do so, the authors use a Regression Discontinuity Design (RDD) that leverages data on Chinese development project implementation and completion dates as well as time-stamped, respondent-level data from the Gallup World Poll (GWP). The GWP dataset consists of approximately 1.5 million survey responses across 125 countries and nearly 2,000 subnational jurisdictions from 2006 to 2020.²²⁵ Wellner et al. (2021) exploit the staggered roll-out of the GWP and the availability of precise interview dates by comparing respondents who were interviewed in the month before and the month after the occurrence of a particular type of Chinese project “event.”²²⁶ They estimate the public opinion impacts of several different types of Chinese project “events,” including implementation start dates and completion dates. Similarly, to estimate the local corruption impacts of Chinese development finance, Isaksson and Kotsadam (2018b) leverage variation in the timing of project implementation. More specifically, they compare Afrobarometer survey responses from people who lived near Chinese development projects that were already underway with Afrobarometer survey responses from people who lived near Chinese development projects that had not yet entered implementation.

(3) Organizational responsibility for project implementation. Another question that has prompted speculation and debate among scholars and policymakers is the extent to which the outcomes of BRI projects—and Chinese development projects more generally—depend upon the organizations responsible for implementation (e.g., Jansson 2013; Farrell 2016). Recognizing that this question cannot be answered without a stronger evidentiary foundation, AidData has made a concerted effort to systematically populate the *implementing_agencies* variable in the 2.0 dataset—in particular, for large, “implementation-intensive” projects.²²⁷ In the 1.0 version of our dataset, we were able to identify implementing agencies for 29% of projects (1,272 out of 4,373 projects) worth \$223 billion (USD 2014). However, in the 2.0 version of our dataset, we have managed to identify implementing agencies for 63% of projects (6,886 out of 10,849 projects) worth \$682 billion. These implementing agencies include 1,045 government agencies (30%), 958 state-owned companies (27%), 554 private sector organizations (16%), and 189 special purpose vehicles/joint ventures (5%). The remaining 770 implementing agencies (22%) consist of non-governmental organizations (NGOs), inter-governmental organizations (IGOs), and organizations that AidData could not reliably assign to a category (“unspecified”). 35% of these implementing agencies are from China, while 58% are from host countries. 7% are neither from China nor the host country where the project is based (e.g., IGOs). We anticipate that these data will create new opportunities to evaluate the supply-side and demand-side factors that affect project implementation outcomes.

In order to better understand the relationship between implementing agencies and project outcomes, we have also constructed detailed narratives—in the “description” field of the 2.0 dataset—that provide an overview of project accomplishments and failures, contractor performance vis-à-vis deadlines and deliverables, and efforts to manage and mitigate social, environmental, and fiduciary risks (e.g., pollution increases and health hazards near the project site, public protests from local stakeholders, embezzlement scandals, indictments, prosecutions, and convictions of project personnel). In Section 5, we provided an empirical demonstration of how the information in the 2.0 project narratives can be put to productive use (through keyword searching). We stopped short of analyzing the prevalence of different

²²⁵ They focus on the following GWP survey question: “Do you approve or disapprove of the job performance of the leadership of China?”

²²⁶ They analyze these data with an event-study model that includes high-dimensional fixed effects. By using fixed effects at the country-level and province-year level and including a battery of variables that control for individual, geographical area, and survey characteristics, the timing of the GWP interviews can be considered as-if random, thereby providing a plausibly exogenous source of variation necessary for causal inference.

²²⁷ There are many different types of transactions in our dataset that are not “implementation-intensive,” such as cash grants, commodity (e.g., oil, coal, rice, corn, wheat) donations, equipment donations, balance of payments support, pre-export finance facilities, debt forgiveness, scholarships, and trainings.

types of implementation problems in projects that are undertaken by different types of contractors, but we anticipate that this may be a fruitful avenue for future analysis.²²⁸

A cursory examination of the contractors involved in *suspended and cancelled* projects from the 2.0 dataset also underlines the need to better understand the relationship between project performance and the organizations responsible for implementation. It is notable that 100% of the contractors listed in Table 33 are state-owned enterprises.²²⁹ The fact that there are no Chinese private enterprises on the list suggests that the 2.0 dataset may be useful to those who wish to understand if Chinese development projects fare any better or worse during implementation when they are undertaken by specific organizations.²³⁰ It is our hope that the dataset will also create a stronger basis for determining which organizational characteristics correlate with better project performance.

Table 33: List of Chinese implementing agencies Involved in two or more suspended or cancelled projects

Implementing agency	Number of suspended or cancelled projects	USD 2017 millions
China Harbour Engineering Co., Ltd.	4	993
China National Aero-Technology Import & Export Corporation (CATIC)	3	158
China Petroleum Pipeline Bureau	2	1,906
China Railway International Group Co., Ltd. (CRIG)	2	1,478
ZTE Corporation	2	1,028
China State Construction Engineering Corporation (CSCEC)	2	483
AVIC International Holding Corporation	2	410
Sinohydro	2	310
China International Water and Electrical Corporation (CWE)	2	275
China Road & Bridge Corporation (CRBC)	2	269
Shandong Hi-Speed Group Corporation	2	218
Dongfang Electric Corporation (DEC)	2	204
China Railway Engineering Corporation 7th Bureau (CREC7)	2	194
China Railway Construction Corporation (CRCC)	2	171
China Shandong International Economic and Technical Cooperation Corporation (SIETC)	2	169
China Civil Engineering Construction Corporation (CCECC)	2	123

²²⁸ For example, one could explore if reported cases of financial wrongdoing are more prevalent among Chinese government-financed development projects that are implemented by Chinese state-owned enterprises or Chinese private enterprises.

²²⁹ Jansson (2013) argues that Chinese state-owned enterprises are more willing than Chinese private enterprises to engage in risky projects and activities.

²³⁰ The 2.0 dataset demonstrates that Chinese private enterprises are very much involved in the implementation of Chinese government-financed development projects.

Note: Since multiple implementing agencies can be involved in a single project, the project counts and monetary amounts in this table may be counted multiple times

(4) Lending terms and conditions. Since the fall 2017 release of the 1.0 version of the dataset, AidData has prioritized the collection of more detailed information on the terms and conditions that govern the loan and export credit contracts issued by Chinese state-owned entities—when they are first issued and when they are subsequently revised. We have done so, in part, by systematically implementing search procedures that enable the identification of loan and export credit agreements in the official registers/gazettes and parliamentary websites of LMICs (Gelpern et al. 2021: 11). We have also done so by taking special care to retrieve the terms and conditions that are documented in the debt information management systems of borrower countries. For 50% of the loans and export credits (and 56% of the debt in monetary terms) in the 2.0 dataset, we have obtained the three key pricing details that are needed to calculate financial concessionality levels (i.e., grant elements). By way of comparison, only 29% of the loans and export credits in the 1.0 dataset included all three of these pricing details (see Table 34). Whereas 35% of the loans and export credits in the 1.0 dataset identified an interest rate, this figure has increased to 53% in the 2.0 dataset. Similarly, 37% of the loans and export credits in the 1.0 dataset identified a maturity length and 28% identified a grace period, but these coverage rates have increased to 63% and 41%, respectively, in the 2.0 dataset. To the best of our knowledge, AidData is the only organization that produces a global dataset of Chinese development finance and publishes loan and export credit pricing details at the transaction level. Our 2.0 dataset identifies 1,659 interest rates, 1,940 maturity lengths, and 1,285 grace periods across 3,103 loans and export credits in Africa, Asia, Oceania, Eastern and Central Europe, the Middle East, and Latin America and the Caribbean.²³¹

Table 34: Loans with face values and borrowing terms, AidData 2.0 vs. 1.0 dataset

Variable	1.0 dataset coverage	2.0 dataset coverage
Transaction amount	92%	89%
Interest rate	35%	53%
Maturity	37%	63%
Grace period	28%	41%
Grant element	29%	50%

Three additional features of the 2.0 dataset may be of interest to users. First, we have added commitment fee and management fee variables to the dataset to capture an important but a poorly understood feature of Chinese loan pricing practices.²³² These fees vary considerably across loans.²³³ While some include management and commitment fees as low as 0.08%, others include fees as high as 1.45%. Second, we have added three variables that capture the different types of “credit enhancements” used by Chinese state-owned lenders to increase their repayment prospects: (i) formal and informal pledges of collateral that can be seized in the event that borrower defaults on its repayment

²³¹ There is one region-specific dataset—the Chinese Loans to Africa Database maintained by Boston University's Global Development Policy Center and the China Africa Research Initiative at the Johns Hopkins University School of Advanced International Studies (SAIS-CARI)—that provides such information. As a point of comparison, it identifies 589 interest rates, 435 maturities, and 359 grace periods across 1144 loans and export credits to countries in Africa. 51% of the loans and export credits in the Chinese Loans to Africa Database have a specified interest rate, while 38% have a specified maturity length and 31% have a specified grace period.

²³² A commitment fee is a fee that a borrower must pay to compensate the lender for its commitment to lend; it is usually payable semi-annually and the size of the fee is usually based on a fixed percentage of the undisbursed loan amount. A management (or “front-end”) fee is a one-time, lump sum fee that is charged as a percentage of the face value of the loan.

²³³ To illustrate how these fees work in practice, consider the \$492,400,000 preferential buyer's credit (PBC) agreement that the Government of Bolivia signed with China Eximbank in 2015 for the Rurrenabaque-Riberalta Highway Project. This loan was provided with a 3% interest rate, a 0.25% commitment fee, and a 0.25% management (front-end) fee. Upon signature of the PBC agreement, the Government of Bolivia had to remit a lump-sum payment of \$1.231 million (.25% x \$492,400,000) to China Eximbank. In the 39 days that elapsed between the start date of the loan (November 14, 2015) and the first date when the Government of Bolivia was expected to pay a commitment fee, the undisbursed balance of the loan was still \$492,400,000, so China Eximbank charged the Government of Bolivia a pro-rated commitment fee of \$133,358 [.25% x \$492,400,000 x (39/360)]. Then, in the first six months of 2016, China Eximbank disbursed \$98,480,000 to the Government of Bolivia, leaving the undisbursed balance of the loan at \$415,918,000 and Government of Bolivia a commitment fee charge of \$558,699 (Banco Central de Bolivia 2016). This PBC was later split two smaller PBCs (worth \$216,515,817 and \$275,884,183), which are captured via Project ID#38832 and #52515 in the 2.0 dataset.

obligations, (ii) the issuance of any repayment guarantees by parties other than the borrower, and (iii) the acquisition of credit insurance. The 2.0 version of our dataset reveals that 44% of official sector lending from China (in monetary terms) is collateralized, 17% is backed by third-party repayment guarantees, and 13% is insured. 61% is backed by at least one type of credit enhancement. Third, we have made special efforts to document the debt cancellation and rescheduling actions of Chinese state-owned lenders. With the 1.0 version of our dataset, Horn et al. (2019: 32) identify 140 Chinese debt cancellation and rescheduling actions between 2000 and 2017. They find that these types of actions are far more common among official Chinese creditors than private external creditors (banks and bondholders). However, the 2.0 version of our dataset identifies an even larger number (212) of debt cancellation and rescheduling actions by Chinese state-owned lenders during the same 18-year period: 134 debt cancellation actions in 64 countries and 78 debt rescheduling actions in 36 countries.

(5) ODA- and OOF-Adjacent Financial Transfers. In previous iterations of our dataset, we only included projects backed by official financial transfers with development, commercial, or representational intent. We did not include projects backed by official financial transfers with military intent. Nor did we include projects financed with aid or debt from Huawei Technologies Co., Ltd. (“Huawei”) or any of its subsidiaries (due to a lack of agreement about whether Huawei should be treated as an “official” source of financing). We adhered to these practices to ensure that every financial transfer in the dataset was consistent with the ODA or OOF eligibility criteria (as described in the OECD-DAC reporting directives). In our view, this approach is important because it enables users of our dataset to make cross-donor and cross-lender comparisons—globally, regionally, nationally, and sub-nationally—since most international donors and lenders use the same development finance categorization criteria. In the 2.0 version of AidData’s Global Chinese Development Finance Dataset, we do not deviate from these practices. However, given that some analysts and decision-makers have expressed interest in learning more about Huawei-financed projects and projects with military intent that are backed by official financial flows, we have included two additional datasets that capture these “ODA-adjacent” and “OOF-adjacent” projects in separate worksheets within the master .csv data file.²³⁴ AidData’s Global Huawei Finance Dataset captures 153 Huawei-financed projects worth \$1.4 billion in 64 countries. AidData’s Global Chinese Military Finance Dataset captures 392 projects, worth \$8.3 billion in 89 countries that have a military purpose and are financed by official sources in China (e.g., the Ministry of Defense, the People’s Liberation Army, and military SOEs like NORINCO and Poly Technologies).²³⁵

²³⁴ Consistent with OECD-DAC reporting directives, we identify projects as having military intent if they seek to promote the security interests of the country from which the financial transfers originate or strengthen the lethal force capabilities of military institutions in the recipient country. When military institutions are involved in a project with a humanitarian or development purpose, we code the project as having development intent. Other activities that involve the military but qualify as having development intent include peacebuilding and peacekeeping operations (when peacekeepers are executing specific development-related activities, such as medical personnel providing medical training and medical care, engineering personnel deployed to build transportation infrastructure, etc.); security system management and reform efforts that reinforce civilian control; removal of landmines and explosive remnants of war; reintegration of demobilized military personnel into the economy; conversion of production facilities from military to civilian outputs; repatriation and demobilization of armed factions, and disposal of their weapons; technical co-operation to control, prevent and/or reduce the proliferation of small arms and light weapons; and efforts to demobilize, disarm, release, reintegrate, repatriate and resettle child soldiers. The direct provision of equipment or funds to military institutions (e.g., defense ministries, different branches of the armed forces) do not meet the OECD-DAC reporting directives for development-related purposes and are identified as having military intent in AidData’s 2.0 dataset.

²³⁵ We provide GeoJSON files (on AidData’s GitHub repository) for 19 projects in AidData’s Global Chinese Military Finance Dataset and 21 projects in AidData’s Global Huawei Finance Dataset.

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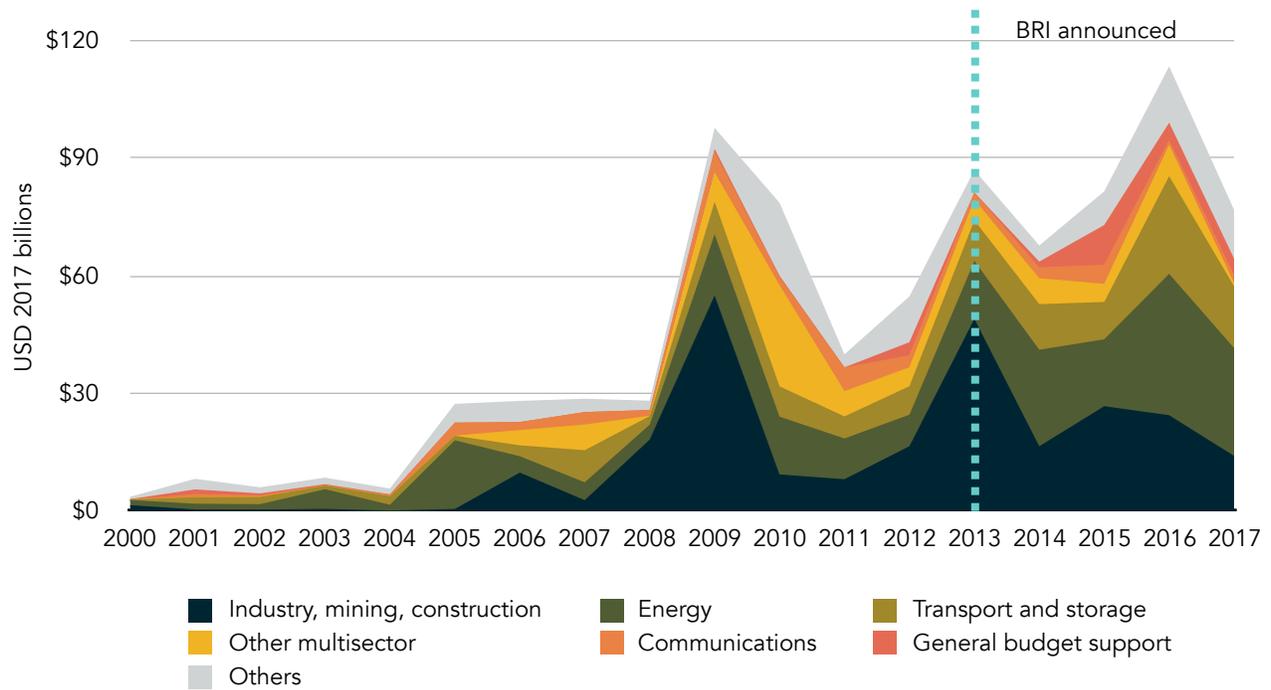
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Appendix: Supplementary Information

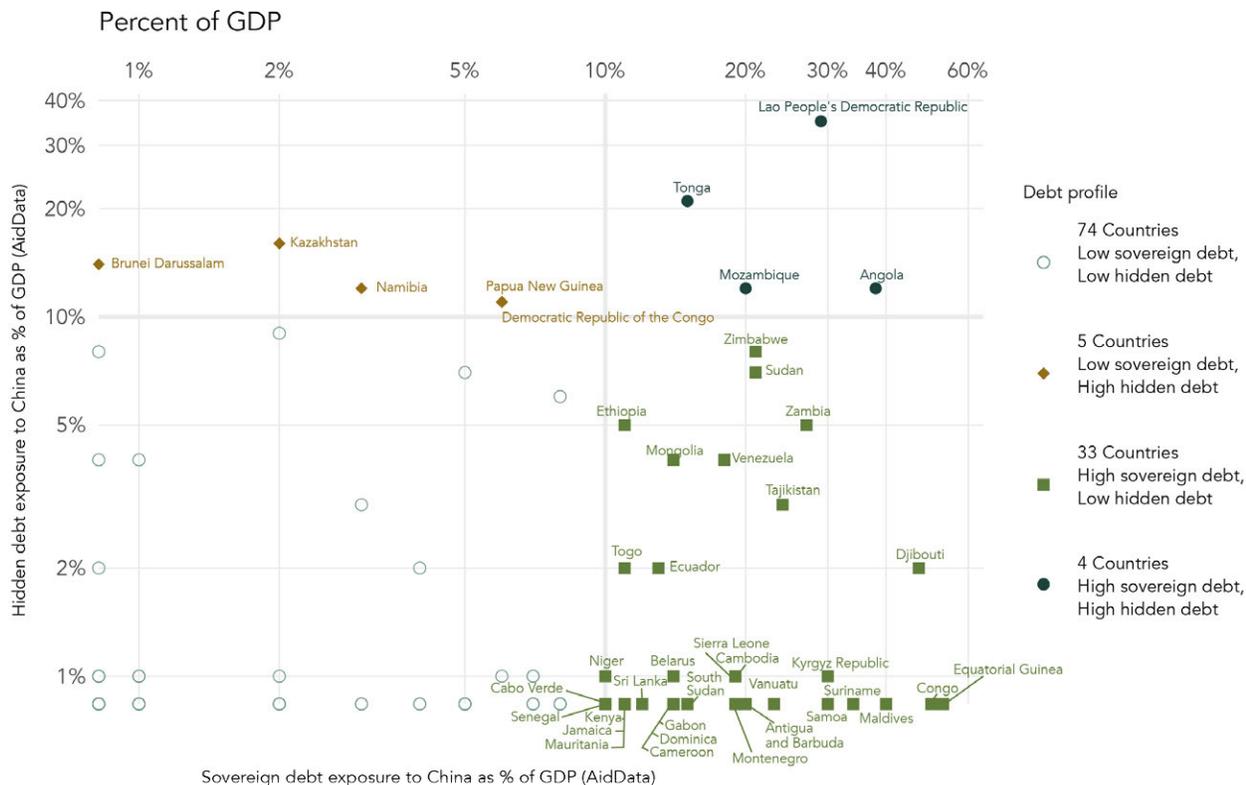
Section 1. Figures and tables referenced in the report

Figure A-1: Chinese development finance commitments by sector, 2000-2017



Source: AidData.

Figure A-2: Sovereign vs. hidden debt, BRI participant countries



Source: AidData.

The following countries have hidden or sovereign debt less than or equal to 10% of their GDP - Afghanistan, Albania, Algeria, Armenia, Azerbaijan, Bangladesh, Barbados, Benin, Bolivia, Bosnia and Herzegovina, Botswana, Bulgaria, Burundi, Chad, Chile, Comoros, Cook Islands, Costa Rica, Cote d'Ivoire, Cuba, Dominican Republic, Egypt, El Salvador, Fiji, Gambia, Georgia, Ghana, Grenada, Guinea, Guyana, Indonesia, Iran, Iraq, Kiribati, Lebanon, Lesotho, Liberia, Libya, Madagascar, Malaysia, Mali, Micronesia, Moldova, Morocco, Myanmar, Nepal, Nigeria, Niue, North Macedonia, Oman, Pakistan, Panama, Peru, Philippines, Romania, Russia, Rwanda, Serbia, Seychelles, Solomon Islands, Somalia, South Africa, Tanzania, Thailand, Timor-Leste, Trinidad and Tobago, Tunisia, Turkey, Uganda, Ukraine, Uruguay, Uzbekistan, Viet Nam, Yemen

Table A-1: AidData 2.0 dataset comparison to other datasets

Scope & coverage			Dataset summary					Project details reported							
Institution & Dataset	Sectors	Geographies	Financiers	Types of flows	# of records	# of fields	Sources publicly available	Total \$ tracked	Time frame	Financial details	Involved agencies	Implementation details	Avg description length	OECD classifications	Sub-national location data
AidData															
Global Chinese Development Finance Dataset (Version 2.0)	All	Global (165 countries)	All Official Entities: EXIM, CDB, People's Bank of China, State-Owned Commercial Banks, Government Agencies, State-Owned Companies (totaling 369 Chinese official entities)	Loans, Grants, Scholarships, Technical Assistance, Debt Rescheduling and Debt Forgiveness	13,386	60+	90,000	\$851 Billion	2000-2017, with implementation details through 2021	Transaction Amount (in Local Currency, Nominal USD, Constant USD), Interest Rate, Maturity, Grace Period, Management Fee, Commitment Fee, Grant Element, Insurance, Guarantee, Collateral	Funding, co-financing, implementing, receiving, and accountable agencies	Status, Commitment year, planned/actual implementation and completion dates.	~142 words	Sectors, Flow Class (ODA, OOF)	~3,000 physical locations.
Boston University															
China's Global Energy Finance Database	Energy	Global (73 countries)	EXIM, CDB	Loans	281	11	None	\$245 Billion	2000-2020	Transaction Amount (in Nominal USD)	Funding Agency, Receiving Agency	Commitment year	~5 words	None	City or province location
China's Overseas Development Finance Database	All	Global (94 countries)	EXIM, CDB	Loans	858	8	None	\$462 Billion	2008-2019	Transaction Amount (in Nominal USD)	Funding Agency, Receiving Agency	Commitment year	~5 words	None	Physical locations for 615 projects

China's Global Power Database	Power	Global (83 countries)	EXIM, CDB, Investors	Non-concessional Loans & FDI	77	17	None	None	2000-2033	None provided	Funding/Investing entity, Receiving agency	Year of Commission, status	None	None	None
China Africa Research Initiative and Boston University															
Chinese Loans to Africa Database	All	Africa (54 countries)	All Lenders (EXIM, CDB, Private/Commercial Banks, State-Owned Companies, Private Businesses, People's Bank of China)	Loans	1,141	15	None	\$153 Billion	2000-2019	Transaction Amount (in Nominal USD), Collateral, Interest Rate, LIBOR Rate, Grace Period, Term	Funding Agency, Receiving Agency, Implementing Agency	Commitment year, status	~7 words	Sectors	None
Boston University and Inter-American Dialogue															
China-Latin America Finance Database	All	Latin America & the Caribbean (18 countries)	Exim, CDB	Loans	99	6	None	\$137 Billion	2005-2020	Transaction Amount (in Nominal USD)	Funding Agency	Commitment Year	None	None	None
Inter-American Dialogue															
China-Latin America Commercial Loans Tracker	Mining & Infrastructure	Latin America & the Caribbean (9 countries)	5 Chinese Commercial Banks	Loans	40	6	None	None	2012-2020	None	None	None	~5 words	None	None
Lowy Institute															
Pacific Aid Map (v2020)	All	Pacific Islands (8 countries)	EXIM, and Government Agencies	Loans, Grants, Technical Assistance	287	~20	~450 Sources	\$6.7 billion	2011-2020	Transaction Amount (Nominal USD)	Implementing Agency	Commitment Year, Completion Year, Status	~75 words	Sectors	Geo-coordinates for 250+ projects

Table A-2: Countries Included in the 2.0 Dataset

Country	Row Count
Afghanistan	123
Albania	47
Algeria	40
American Samoa	No projects found
Angola	350
Antigua and Barbuda*	59
Argentina*	67
Armenia	40
Aruba*	No projects found
Azerbaijan	27
Bahamas**	31
Bangladesh	120
Barbados*	74
Belarus	112
Belize	No projects found
Benin	107
Bhutan	No projects found
Bolivia	103
Bosnia and Herzegovina	29
Botswana	88
Brazil	134
British Virgin Islands**	No projects found
Brunei Darussalam**	26
Bulgaria	42
Burkina Faso	No projects found
Burundi	113
Cabo Verde	85
Cambodia	308
Cameroon	132
Cayman Islands**	No projects found
Central African Republic	107

Chad	96
Chile*	32
Colombia	46
Comoros	68
Congo	168
Cook Islands	34
Costa Rica	49
Cote D'Ivoire	94
Cuba	118
Curacao**	2
DPRK	126
Democratic Republic of the Congo	249
Djibouti	96
Dominica	83
Dominican Republic	5
Ecuador	122
Egypt	71
El Salvador	1
Equatorial Guinea	121
Eritrea	61
Eswatini	No projects found
Ethiopia	218
Fiji	152
French Polynesia**	2
Gabon	82
Gambia	16
Georgia	43
Ghana	156
Grenada	93
Guam**	1
Guatemala	No projects found
Guinea	101
Guinea-Bissau	78

Guyana	69
Haiti	33
Honduras	3
India	55
Indonesia	257
Iran	77
Iraq	20
Israel**	15
Jamaica	79
Jordan	72
Kazakhstan	124
Kenya	191
Kiribati	1
Kosovo	No projects found
Kyrgyz Republic	96
Lao People's Democratic Republic	240
Lebanon	71
Lesotho	114
Liberia	144
Libya	7
Madagascar	111
Malawi	155
Malaysia	39
Maldives	77
Mali	149
Marshall Islands	41
Mauritania	99
Mauritius	95
Mexico	59
Micronesia	142
Moldova	43
Mongolia	139
Montenegro	20

Morocco	59
Mozambique	117
Myanmar	280
Namibia	140
Nauru	13
Nepal	157
New Caledonia**	No projects found
Nicaragua	1
Niger	115
Nigeria	104
Niue	23
North Macedonia	35
Northern Mariana Islands*	No projects found
Oman*	10
Pakistan	280
Palau	1
Panama*	8
Papua New Guinea	145
Paraguay	3
Peru	97
Philippines	92
Puerto Rico*	No projects found
Romania	28
Russia	146
Rwanda	104
Saint Lucia	15
Samoa	123
Sao Tome and Principe	22
Senegal	83
Serbia	66
Seychelles*	101
Sierra Leone	166
Sint Maarten (Dutch part)*	1

Solomon Islands	No projects found
Somalia	50
South Africa	105
South Sudan	120
Sri Lanka	174
St. Kitts and Nevis	No projects found
St. Martin (French part)	No projects found
St. Vincent and the Grenadines	No projects found
Sudan	285
Suriname	63
Syrian Arab Republic	60
Tajikistan	110
Tanzania	204
Thailand	55
Timor-Leste	75
Togo	120
Tonga	110
Trinidad and Tobago*	29
Tunisia	75
Turkey	59
Turkmenistan	38
Turks and Caicos Islands**	No projects found
Tuvalu	No projects found
Uganda	144
Ukraine	70
Uruguay*	49
Uzbekistan	149
Vanuatu	120
Venezuela	84
Viet Nam	111
Virgin Islands (U.S.)**	No projects found
West Bank and Gaza Strip	30
Yemen	74

Zambia	167
Zimbabwe	204

*These countries and territories were classified as middle-income at some point during the data collection commitment year period (2000-2017), but by 2017 they were classified as high-income.

**These countries and territories were classified as high-income for the entire data collection commitment year period (2000-2017).

Table A-3a: The 50 largest loans in the 2.0 dataset, by 2017 USD value

Project ID	Recipient	Commitment Year	Funding Agency	Receiving Agency	USD 2017 Billions	Collateralized
85211	Russia	2013	China National Petroleum Corporation (CNPC)	PJSC Rosneft Oil Company	32.06	Yes
43069	Russia	2009	China Development Bank (CDB)	PJSC Rosneft Oil Company	19.56	Yes
43012	Russia	2009	China Development Bank (CDB)	OAO AK Transneft	13.04	Yes
37808	Venezuela	2010	China Development Bank (CDB)	Banco de Desarrollo Económico y Social de Venezuela (BANDES) China Venezuela Joint Fund Government of Venezuela	12.50	Yes
37804	Venezuela	2010	China Development Bank (CDB)	Banco de Desarrollo Económico y Social de Venezuela (BANDES) China Venezuela Joint Fund Government of Venezuela	12.09	Yes
67166	Russia	2005	China Development Bank (CDB) Export-Import Bank of China	PJSC Rosneft Oil Company Vnesheconombank (VEB Bank)	11.30	Yes
54489	Kazakhstan	2008	Bank of China (BOC) China Development Bank (CDB)	Asia Gas Pipeline LLP (AGP)	9.93	Yes
39118	Venezuela	2015	China Development Bank (CDB)	Government of Venezuela	9.83	Yes
38420	Brazil	2009	China Development Bank (CDB)	Petróleo Brasileiro S.A. (Petrobras)	9.13	Yes
53063	Angola	2016	China Development Bank (CDB)	Government of Angola Sociedade Nacional de Combustíveis de Angola (Sonangol)	7.07	Yes
67002	Russia	2006	Bank of China (BOC)	Taihu Limited	6.35	No

35985	Venezuela	2007	China Development Bank (CDB)	Banco de Desarrollo Económico y Social de Venezuela (BANDES) Government of Venezuela Pétroleos de Venezuela S.A. (PDVSA)	6.25	Yes
55426	Peru	2014	Bank of China (BOC) China Development Bank (CDB) Export-Import Bank of China Industrial and Commercial Bank of China (ICBC)	Minera Las Bambas S.A.C. (Minera Las Bambas)	5.77	Yes
67064	Russia	2016	China Development Bank (CDB)	OAQ Yamal LNG	5.73	Yes
37528	Venezuela	2009	China Development Bank (CDB)	Banco de Desarrollo Económico y Social de Venezuela (BANDES) Government of Venezuela Pétroleos de Venezuela S.A. (PDVSA)	5.21	Yes
53068	Brazil	2016	China Development Bank (CDB)	Petróleo Brasileiro S.A. (Petrobras)	5.12	Yes
59384	Brazil	2017	China Development Bank (CDB)	Petróleo Brasileiro S.A. (Petrobras)	5.00	Yes
39099	Venezuela	2015	China Development Bank (CDB)	Banco de Desarrollo Económico y Social de Venezuela (BANDES) China Venezuela Joint Fund Government of Venezuela	4.92	Yes
41089	Venezuela	2015	China Development Bank (CDB)	Government of Venezuela	4.92	Yes
85858	Malaysia	2016	Export-Import Bank of China	Malaysia Rail Link Sdn Bhd (MRL)	4.87	No
38316	Venezuela	2013	China Development Bank (CDB)	Banco de Desarrollo Económico y Social de Venezuela (BANDES) China Venezuela Joint Fund Government of Venezuela	4.86	Yes
67062	Russia	2016	Export-Import Bank of China	OAQ Yamal LNG	4.85	Yes
39997	Kazakhstan	2012	Bank of China (BOC) China Development Bank (CDB)	Asia Gas Pipeline LLP (AGP)	4.79	Yes
37838	Venezuela	2011	China Development Bank (CDB)	Banco de Desarrollo Económico y Social de Venezuela (BANDES) Government of Venezuela Pétroleos de Venezuela S.A. (PDVSA)	4.27	Yes
37915	Venezuela	2012	Industrial and Commercial Bank of China (ICBC)	Pétroleos de Venezuela S.A. (PDVSA)	4.07	Yes
38163	Venezuela	2012	China Development Bank (CDB)	Banco de Desarrollo Económico y Social de Venezuela (BANDES) China Venezuela Joint Fund Government of Venezuela	4.07	Yes

41905	Turkmenistan	2013	China Development Bank (CDB)	Turkmengaz	3.98	Yes
40393	Turkmenistan	2009	China Development Bank (CDB)	Turkmengaz	3.91	Yes
39567	Kazakhstan	2009	Export-Import Bank of China	Mangistau Investments B.V. (MIBV)	3.91	Yes
38053	Venezuela	2013	China Development Bank (CDB)	Petrolera Sinovensa, S.A.	3.90	No
41918	Pakistan	2014	Export-Import Bank of China	Government of Pakistan Pakistan Atomic Energy Commission	3.86	No
38380	Venezuela	2014	China Development Bank (CDB)	Banco de Desarrollo Económico y Social de Venezuela (BANDES) Government of Venezuela Pétroleos de Venezuela S.A. (PDVSA)	3.86	Yes
85304	Lao People's Democratic Republic	2016	Export-Import Bank of China	Laos-China Railway Company	3.63	Yes
484	Equatorial Guinea	2006	Export-Import Bank of China	Government of Equatorial Guinea	3.53	Yes
38170	Brazil	2015	China Development Bank (CDB)	Petróleo Brasileiro S.A. (Petrobras)	3.44	No
66543	Oman	2017	Bank of China (BOC) China Bank of Communications (BoCom or BoComm) China Development Bank (CDB) Industrial and Commercial Bank of China (ICBC)	Oman Ministry of Finance	3.20	No
47101	Angola	2010	Industrial and Commercial Bank of China (ICBC)	Sociedade Nacional de Combustíveis de Angola (Sonangol)	3.02	Yes
61056	Kazakhstan	2009	China Development Bank (CDB)	KAZ Minerals PLC	3.00	No
39720	Bahamas	2010	Export-Import Bank of China	Baha Mar Ltd.	2.96	Yes

73145	Democratic Republic of the Congo	2008	Export-Import Bank of China	Sino-Congolais des Mines (Sicomines SARL)	2.69	Yes
73852	Angola	2013	China Development Bank (CDB)	Sonangol Finance Limited	2.43	Yes
36064	Peru	2010	Export-Import Bank of China	Minera Chinalco Perú S.A.	2.42	Yes
37002	Argentina	2014	China Development Bank (CDB)	Argentina Ministry of Economy	2.41	Yes
61320	Indonesia	2017	China Development Bank (CDB)	PT Kereta Cepat Indonesia China (KCIC)	2.38	Yes
59129	Ethiopia	2007	China Development Bank (CDB)	Ethiopian Telecommunications Corporation ZTE Corporation	2.34	No
67003	Russia	2014	Bank of China (BOC)	Unspecified Project Company	2.31	Yes
67039	Russia	2016	Bank of China (BOC)	Gazprom	2.27	Yes
58413	Venezuela	2016	China Development Bank (CDB)	Pétroleos de Venezuela S.A. (PDVSA)	2.25	Yes
41917	Pakistan	2014	Export-Import Bank of China	Government of Pakistan Pakistan Atomic Energy Commission	2.17	No

Table A-3b: Top 25 Chinese government grant-financed projects from the 2.0 dataset, by 2017 USD value

Project ID	Recipient	Commitment year	Funding agency	USD 2017 millions	Project title
86340	DPRK	2008	China Ministry of Commerce	483.49	Chinese Government donates 500,000 tons of crude oil in 2008
86338	DPRK	2006	China Ministry of Commerce	426.88	Chinese Government donates 500,000 tons of crude oil in 2006
86339	DPRK	2007	China Ministry of Commerce	413.98	Chinese Government donates 500,000 tons of crude oil in 2007
67768	DPRK	2010	China Ministry of Commerce	392.81	Chinese Government provided RMB 2.22 billion grant for New Yalu River Bridge Construction Project
86337	DPRK	2005	China Ministry of Commerce	391.00	Chinese Government donates 500,000 tons of crude oil in 2005
63332	DPRK	2011	China Ministry of Commerce	371.38	Chinese Government donates 500,000 tons of crude oil in 2011 (Linked to Project ID#41496)
86342	DPRK	2010	China Ministry of Commerce	352.07	Chinese Government donates 500,000 tons of crude oil in 2010
86343	DPRK	2012	China Ministry of Commerce	351.07	Chinese Government donates 500,000 tons of crude oil in 2012
86344	DPRK	2013	China Ministry of Commerce	348.92	Chinese Government donates 500,000 tons of crude oil in 2013
86336	DPRK	2004	China Ministry of Commerce	300.76	Chinese Government donates 500,000 tons of crude oil in 2004
52424	Pakistan	2017	China Ministry of Commerce	230.00	Chinese Government provides \$230 million grant for New Gwadar International Airport Construction Project
63306	DPRK	2003	China Ministry of Commerce	227.45	Chinese Government donates 472,167 tons of crude oil to North Korea in 2003
53786	Tajikistan	2017	China Ministry of Commerce	221.98	Chinese Government provides RMB 1.5 billion grant for Government Complex and Parliamentary Complex Construction Project (Linked to Project ID#71727)
63152	DPRK	2000	China Ministry of Commerce	217.02	Chinese Government donates 437,500 tons of crude oil in 2000 (Linked with Project ID#63154, #63155)
53541	Pakistan	2011	China Ministry of Commerce	210.31	Chinese Government provides RMB 1.273 billion grant for Post Flood (N-35, N-5, N-55) Road Rehabilitation Project
52427	Costa Rica	2007	Unspecified Chinese Government Institution	202.99	Chinese Government commits 130 million USD in aid to Costa Rica

8634 8	DPRK	2017	China Ministry of Commerce	186.18	Chinese Government donates 500,000 tons of crude oil in 2017
6315 5	DPRK	2002	China Ministry of Commerce	182.21	Chinese Government donates 437,500 tons of crude oil in 2002 (Linked with Project ID#63152, #63154)
4954 2	Africa, regional	2006	China Ministry of Commerce	176.95	Chinese Government provides RMB 800 million grant for African Union Conference Center and Office Complex Construction Project (Linked to Project ID#52335)
8634 6	DPRK	2015	China Ministry of Commerce	175.33	Chinese Government donates 500,000 tons of crude oil in 2015
8634 7	DPRK	2016	China Ministry of Commerce	162.62	Chinese Government donates 500,000 tons of crude oil in 2016
4888 7	Cambodia	2015	China Ministry of Commerce	156.42	Chinese Government provides RMB 1 billion grant for Morodok Techo National Stadium Construction Project
7179 1	Nepal	2017	China Ministry of Commerce	147.98	Chinese Government provides RMB 1 billion grant through ETCA for Upgrading of the Kodari Highway and Rasuwa Bridge Construction Project
3726 6	Costa Rica	2009	China Ministry of Commerce	136.89	Chinese Government provides \$105 million grant for National Football Stadium Construction Project
3407 0	Bangladesh	2008	China Ministry of Commerce	135.21	Chinese Government provides RMB 710 million grant for Bangladesh-China Friendship Exhibition Center Construction Project

Table A-4: Sovereign and hidden debt exposure by borrower country, 2000-2017

Country	ISO code	Hidden debt exposure to China as % of GDP (AidData)	Sovereign debt exposure to China as % of GDP (AidData)
Afghanistan	AFG	0%	0%
Albania	ALB	0%	1%
Algeria	DZA	0%	0%
American Samoa	ASM	0%	0%
Angola	AGO	12%	38%
Antigua and Barbuda	ATG	0%	20%
Argentina	ARG	0%	1%
Armenia	ARM	0%	0%
Aruba	ABW	0%	0%
Azerbaijan	AZE	1%	0%

Bahamas	BHS	0%	1%
Bangladesh	BGD	1%	2%
Barbados	BRB	4%	1%
Belarus	BLR	1%	14%
Belize	BLZ	0%	0%
Benin	BEN	0%	5%
Bhutan	BTN	0%	0%
Bolivia	BOL	0%	5%
Bosnia and Herzegovina	BIH	2%	4%
Botswana	BWA	0%	7%
Brazil	BRA	2%	0%
British Virgin Islands	VGB	0%	0%
Brunei Darussalam	BRN	14%	0%
Bulgaria	BGR	1%	0%
Burkina Faso	BFA	0%	0%
Burundi	BDI	1%	1%
Cabo Verde	CPV	0%	10%
Cambodia	KHM	1%	19%
Cameroon	CMR	0%	14%
Cayman Islands	CYM	0%	0%
Central African Republic	CAF	5%	3%
Chad	TCD	0%	7%
Chile	CHL	0%	0%
Colombia	COL	0%	0%
Comoros	COM	0%	3%
Congo	COG	0%	53%
Cook Islands	Cook	0%	8%
Costa Rica	CRI	0%	1%
Cote d'Ivoire	CIV	0%	5%
Cuba	CUB	0%	4%
Curacao	CUW	0%	0%
DPRK	PRK	0%	0%

Democratic Republic of the Congo	COD	11%	6%
Djibouti	DJI	2%	47%
Dominica	DMA	0%	14%
Dominican Republic	DOM	0%	0%
Ecuador	ECU	2%	13%
Egypt	EGY	1%	1%
El Salvador	SLV	0%	0%
Equatorial Guinea	GNQ	0%	50%
Eritrea	ERI	2%	15%
Eswatini	SWZ	0%	0%
Ethiopia	ETH	5%	11%
Fiji	FJI	0%	8%
French Polynesia	PYF	0%	0%
Gabon	GAB	0%	14%
Gambia	GMB	0%	1%
Georgia	GEO	0%	0%
Ghana	GHA	1%	6%
Grenada	GRD	0%	7%
Guam	GUM	0%	0%
Guatemala	GTM	0%	0%
Guinea	GIN	4%	0%
Guinea-Bissau	GNB	0%	1%
Guyana	GUY	0%	5%
Haiti	HTI	0%	0%
Honduras	HND	0%	1%
India	IND	0%	0%
Indonesia	IDN	2%	0%
Iran	IRN	6%	8%
Iraq	IRQ	0%	0%
Israel	ISR	0%	0%
Jamaica	JAM	0%	11%
Jordan	JOR	0%	0%

Kazakhstan	KAZ	16%	2%
Kenya	KEN	0%	11%
Kiribati	KIR	0%	0%
Kosovo	XKX	0%	0%
Kyrgyz Republic	KGZ	1%	30%
Lao People's Democratic Republic	LAO	35%	29%
Lebanon	LBN	0%	0%
Lesotho	LSO	0%	5%
Liberia	LBR	0%	1%
Libya	LBY	1%	0%
Madagascar	MDG	0%	1%
Malawi	MWI	1%	4%
Malaysia	MYS	0%	2%
Maldives	MDV	0%	40%
Mali	MLI	0%	5%
Marshall Islands	MHL	0%	0%
Mauritania	MRT	0%	11%
Mauritius	MUS	3%	3%
Mexico	MEX	0%	0%
Micronesia	FSM	1%	0%
Moldova	MDA	0%	0%
Mongolia	MNG	4%	14%
Montenegro	MNE	0%	19%
Morocco	MAR	0%	0%
Mozambique	MOZ	12%	20%
Myanmar	MMR	7%	5%
Namibia	NAM	12%	3%
Nauru	NRU	0%	0%
Nepal	NPL	0%	1%
New Caledonia	NCL	0%	0%
Nicaragua	NIC	0%	0%
Niger	NER	1%	10%

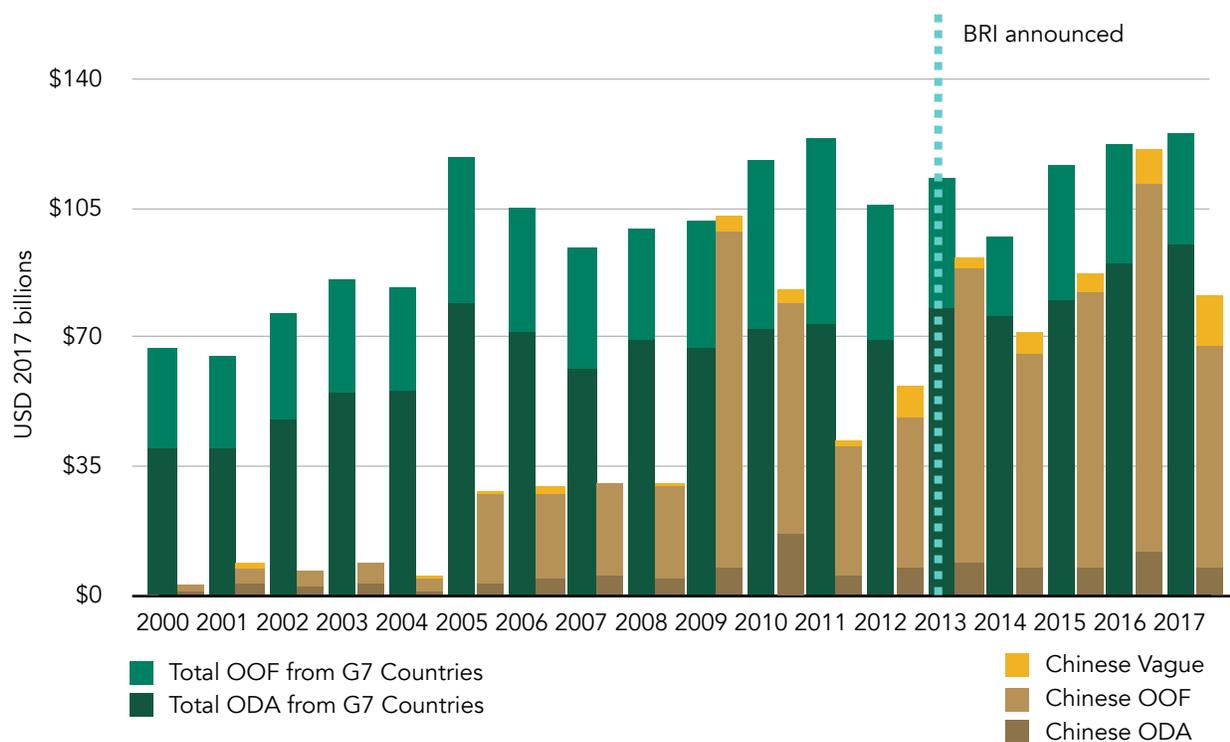
Nigeria	NGA	0%	2%
Niue	NIU	0%	0%
North Macedonia	MKD	0%	8%
Northern Mariana Islands	MNP	0%	0%
Oman	OMN	1%	7%
Pakistan	PAK	1%	7%
Palau	PLW	0%	0%
Panama	PAN	0%	0%
Papua New Guinea	PNG	11%	6%
Paraguay	PRY	0%	0%
Peru	PER	0%	0%
Philippines	PHL	0%	0%
Puerto Rico	PRI	0%	0%
Romania	ROU	0%	0%
Russia	RUS	8%	0%
Rwanda	RWA	0%	3%
Saint Lucia	LCA	0%	0%
Samoa	WSM	0%	30%
Sao Tome and Principe	STP	0%	0%
Senegal	SEN	0%	10%
Serbia	SRB	0%	4%
Seychelles	SYC	0%	0%
Sierra Leone	SLE	1%	19%
Sint Maarten (Dutch part)	SXM	0%	0%
Solomon Islands	SLB	0%	0%
Somalia	SOM	0%	0%
South Africa	ZAF	1%	1%
South Sudan	SSD	0%	15%
Sri Lanka	LKA	0%	12%
St. Kitts and Nevis	KNA	0%	0%
St. Martin (French part)	MAF	0%	0%
St. Vincent and the Grenadines	VCT	0%	0%
Sudan	SDN	7%	21%

Suriname	SUR	0%	34%
Syrian Arab Republic	SYR	0%	0%
Tajikistan	TJK	3%	24%
Tanzania	TZA	0%	5%
Thailand	THA	0%	0%
Timor-Leste	TLS	0%	0%
Togo	TGO	2%	11%
Tonga	TON	21%	15%
Trinidad and Tobago	TTO	0%	2%
Tunisia	TUN	0%	0%
Turkey	TUR	0%	0%
Turkmenistan	TKM	23%	2%
Turks and Caicos Islands	TCA	0%	0%
Tuvalu	TUV	0%	0%
Uganda	UGA	0%	8%
Ukraine	UKR	0%	1%
Uruguay	URY	0%	0%
Uzbekistan	UZB	9%	2%
Vanuatu	VUT	0%	23%
Venezuela	VEN	4%	18%
Viet Nam	VNM	3%	3%
Virgin Islands (U.S.)	VIR	0%	0%
West Bank and Gaza Strip	PSE	0%	0%
Yemen	YEM	0%	2%
Zambia	ZMB	5%	27%
Zimbabwe	ZWE	8%	21%

Note: Unless otherwise specified, the data in this table are reported in constant (2017) U.S. dollars. It was not possible to reliably deflate GDP into constant (2017) U.S. dollars for three countries with especially high levels of inflation (Venezuela, Zimbabwe, and South Sudan). Therefore, for these three countries, we calculated the variables that are expressed as a percentage of host country GDP by dividing Chinese loan commitment values in nominal dollars by GDP in nominal dollars for each year.

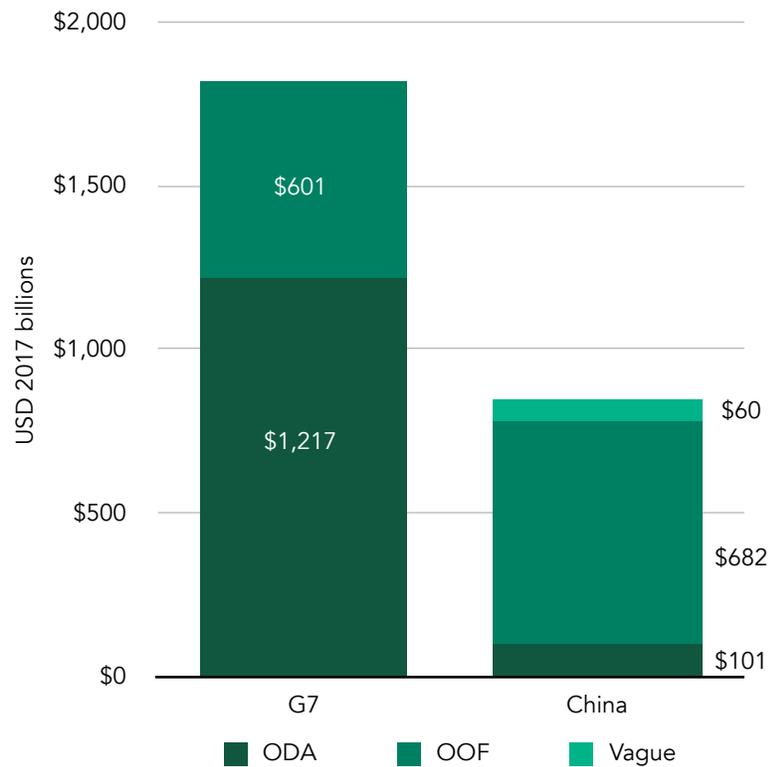
Section 2. Characteristics of China's overseas development finance portfolio (summary statistics)

Figure A-3: Official finance portfolios of China and G7 countries, 2000-2017



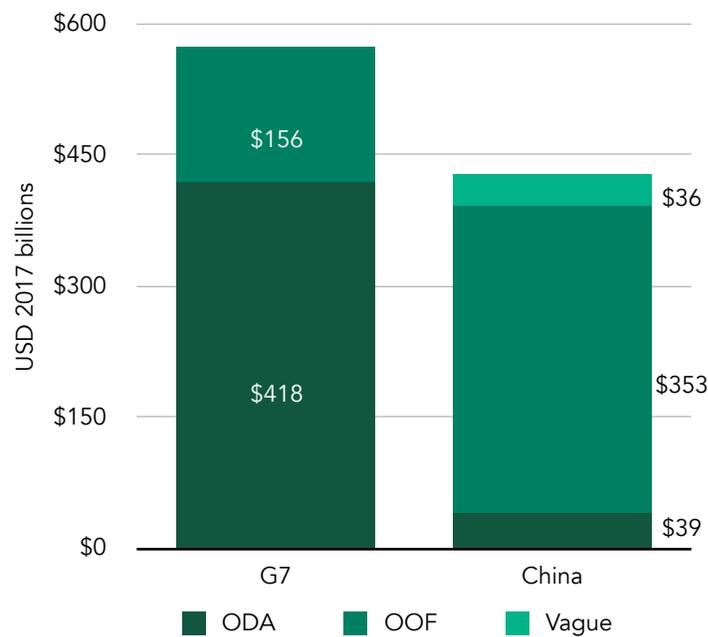
Source: AidData and OECD DAC.

Figure A-4: Total official financial flows from G7 vs. China, 2000-2017



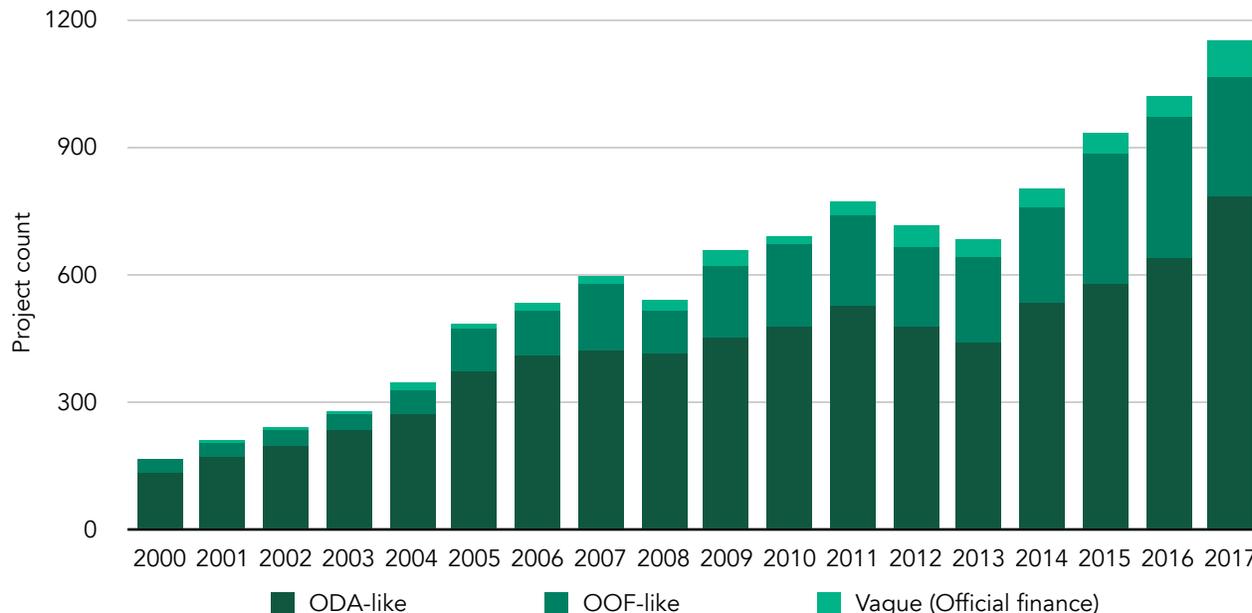
Source: AidData and OECD DAC.

Figure A-5: Total official financial flows from G7 vs. China, 2013-2017



Source: AidData and OECD DAC.

Figure A-6: Chinese official development finance flows by project count, 2000-2017



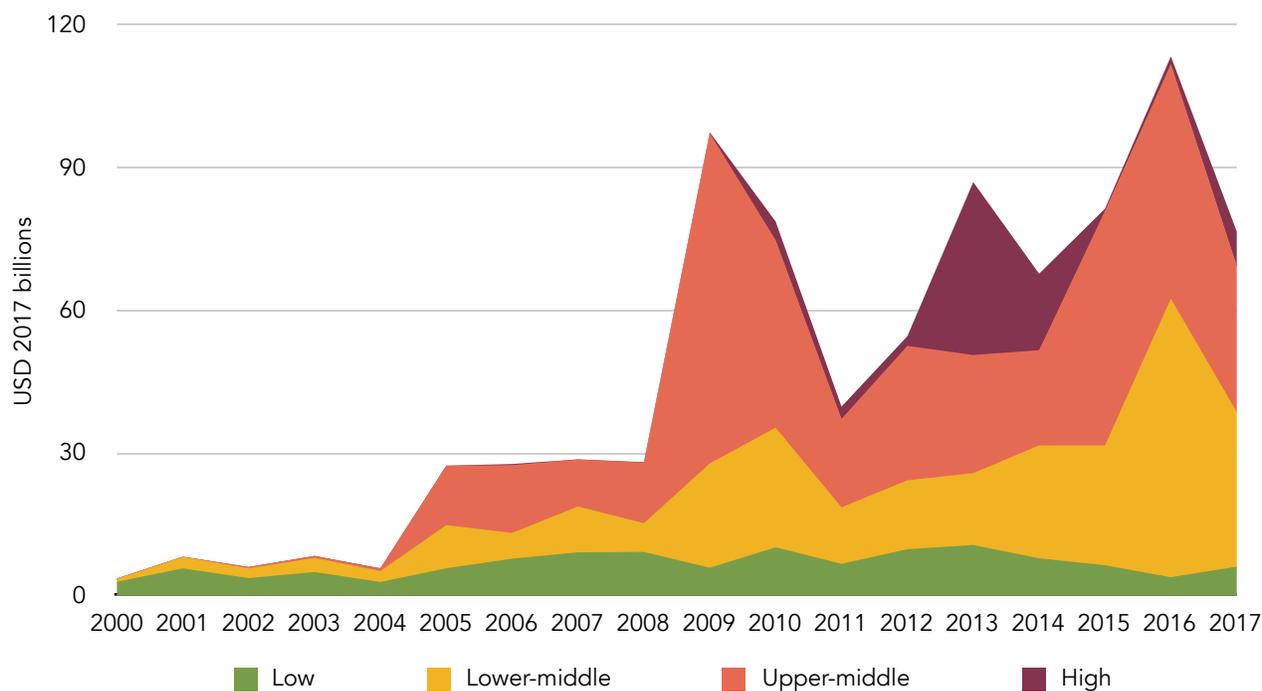
Source: AidData.

Table A-5: Chinese official finance by region, before and during BRI

	Region	Project count	% of project count	Total USD 2017 billions	% of USD 2017 billions
Pre-BRI (2000-2012)	Asia	1,637	26%	119.6	29%
	Africa	3,045	49%	99.3	24%
	America	653	10%	98.5	24%
	Europe	278	4%	72.7	17%
	Middle East	189	3%	18.6	4%
	Oceania	429	7%	7.1	2%
	Multi-region	15	0%	0.0	0%
	Total	6,246	100%	415.9	100%
BRI (2013-2017)	Asia	1,164	25%	126.1	30%
	Africa	2,107	46%	108.1	25%
	America	632	14%	93.8	22%
	Europe	243	5%	77.6	18%
	Middle East	151	3%	17.6	4%
	Oceania	297	6%	4.0	1%

Multi-region	10	0%	0.1	0%
Total	4,604	100%	427	100%

Figure A-7: China's development finance portfolio by income bracket, 2000-2017



Source: AidData.

Note: Not all high-income countries are covered in our dataset.

Table A-6: China's development finance portfolio by income bracket, before and during BRI

	Income bracket	Project count	% of project count	USD 2017 billions	% of USD 2017 billions
Pre-BRI (2000-2012)	Low-income	2,882	46%	84.6	20%
	Lower-middle income	2,070	33%	114.1	27%
	Upper-middle income	1,043	17%	206.6	50%
	High-income	137	2%	9.1	2%
	Unallocated	114	2%	1.5	0%
	Total	6,246	100%	415.9	100%
	Low-income	1,334	29%	34.9	8%

BRI (2013-2017)	Lower-middle income	1,746	38%	155.2	36%
	Upper-middle income	1,260	27%	174.6	41%
	High income	216	5%	61.7	14%
	Unallocated	48	1%	0.7	0%
	Total	4,604	100%	427.2	100%

Table A-7: China's overseas development finance portfolio by financial flow type, before and during BRI

	Flow type	Project count	% of project count	USD 2017 billions	% of USD 2017 billions
Pre-BRI (2000-2012)	Grant	3,553	57%	16.3	4%
	Free-standing technical assistance	595	10%	0.1	0%
	Scholarships/training in the donor country	254	4%	0.0	0%
	Loan	1,090	17%	274.9	66%
	Export Buyer's Credit	449	7%	96.6	23%
	Supplier's Credit/Export Seller's Credit	94	2%	15.0	4%
	Debt forgiveness	111	2%	12.5	3%
	Debt rescheduling	49	1%	-	0%
	Vague TBD	51	1%	0.5	0%
	Total	6,246	100%	415.9	100%
BRI (2013-2017)	Grant	2,418	53%	9.9	2%
	Free-standing technical assistance	380	8%	0.1	0%
	Scholarships/training in the donor country	318	7%	0.0	0%
	Loan	1,075	23%	310.1	73%
	Export buyer's credit	290	6%	100.4	24%
	Supplier's credit/export seller's credit	32	1%	3.1	1%
	Debt forgiveness	17	0%	3.3	1%
	Debt rescheduling	25	1%	-	0%
	Vague TBD	49	1%	0.3	0%

Total	4,604	100%	427.2	100%
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Table A-8: Chinese development finance portfolio by sector, 2000-2017

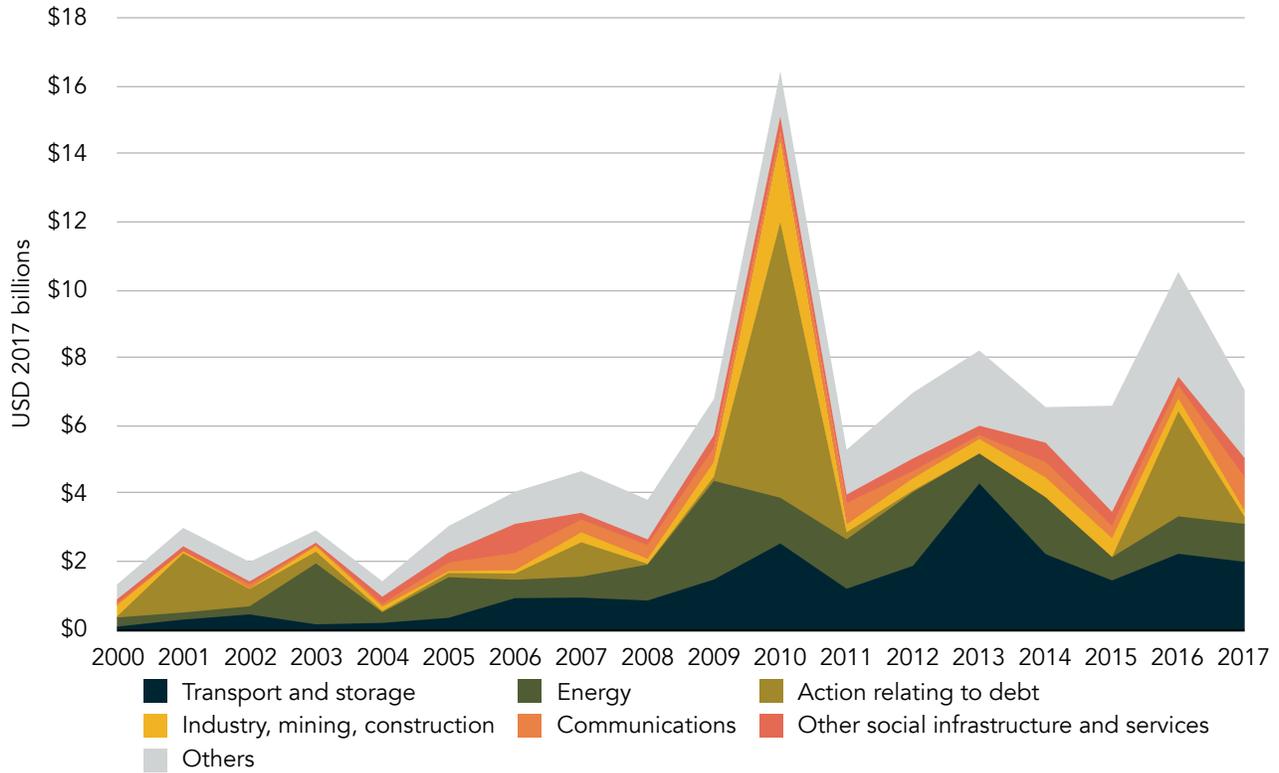
Sector	Project count	% of project count	USD 2017 billions	% of USD 2017 billions
Industry, mining, construction	302	4.8%	123.3	29.7%
Energy	431	6.9%	89.5	21.5%
Other multisector	123	2.0%	55.3	13.3%
Transport and storage	553	8.9%	50.1	12.0%
Communications	326	5.2%	28.3	6.8%
Action relating to debt	175	2.8%	14.5	3.5%
Other social infrastructure and services	428	6.9%	13.9	3.3%
General budget support	35	0.6%	6.3	1.5%
Banking and financial services	44	0.7%	5.2	1.3%
Water supply and sanitation	134	2.1%	5.2	1.3%
Agriculture, forestry, fishing	380	6.1%	4.7	1.1%
Trade policies and regulations	51	0.8%	4.4	1.1%
Government and civil society	792	12.7%	3.9	0.9%
Health	875	14.0%	3.3	0.8%
Education	866	13.9%	2.6	0.6%
Other commodity assistance	18	0.3%	1.5	0.4%
Business and other services	29	0.5%	1.1	0.3%
Developmental food aid/food security assistance	103	1.6%	1.0	0.2%
Emergency response	484	7.7%	0.7	0.2%
Unallocated/unspecified	41	0.7%	0.7	0.2%
General environmental protection	33	0.5%	0.11	0.0%
Reconstruction relief and rehabilitation	13	0.2%	0.08	0.0%
Disaster prevention and preparedness	4	0.1%	0.01	0.0%
Population policies/programmes and reproductive health	6	0.1%	0.00	0.0%

Pre-BRI
(2000-2012)

Total	6,246	100.0%	416	100.0%
Industry, mining, Construction	245	5.3%	130.9	30.6%
Energy	436	9.5%	120.1	28.1%
Transport and storage	450	9.8%	72.3	16.9%
Other multisector	71	1.5%	25.5	6.0%
General budget support	14	0.3%	20.2	4.7%
Communications	166	3.6%	12.6	3.0%
Banking and financial services	59	1.3%	8.1	1.9%
Other social infrastructure and services	321	7.0%	6.2	1.5%
Water supply and sanitation	129	2.8%	5.6	1.3%
Action relating to debt	51	1.1%	5.3	1.2%
Agriculture, forestry, fishing	221	4.8%	3.5	0.8%
Government and civil society	465	10.1%	3.4	0.8%
Business and other services	46	1.0%	2.9	0.7%
Education	826	17.9%	2.5	0.6%
Health	573	12.4%	2.3	0.5%
Trade policies and regulations	38	0.8%	2.3	0.5%
Unallocated/unspecified	30	0.7%	2.2	0.5%
Emergency response	359	7.8%	0.9	0.2%
Other commodity assistance	16	0.3%	0.15	0.0%
General environmental protection	28	0.6%	0.06	0.0%
Developmental food aid/food security assistance	43	0.9%	0.05	0.0%
Reconstruction relief and rehabilitation	12	0.3%	0.05	0.0%
Disaster prevention and preparedness	4	0.1%	0.004	0.0%
Population policies/programmes and reproductive health	1	0.0%	-	0.0%
Total	4,604	100.0%	427	100.0%

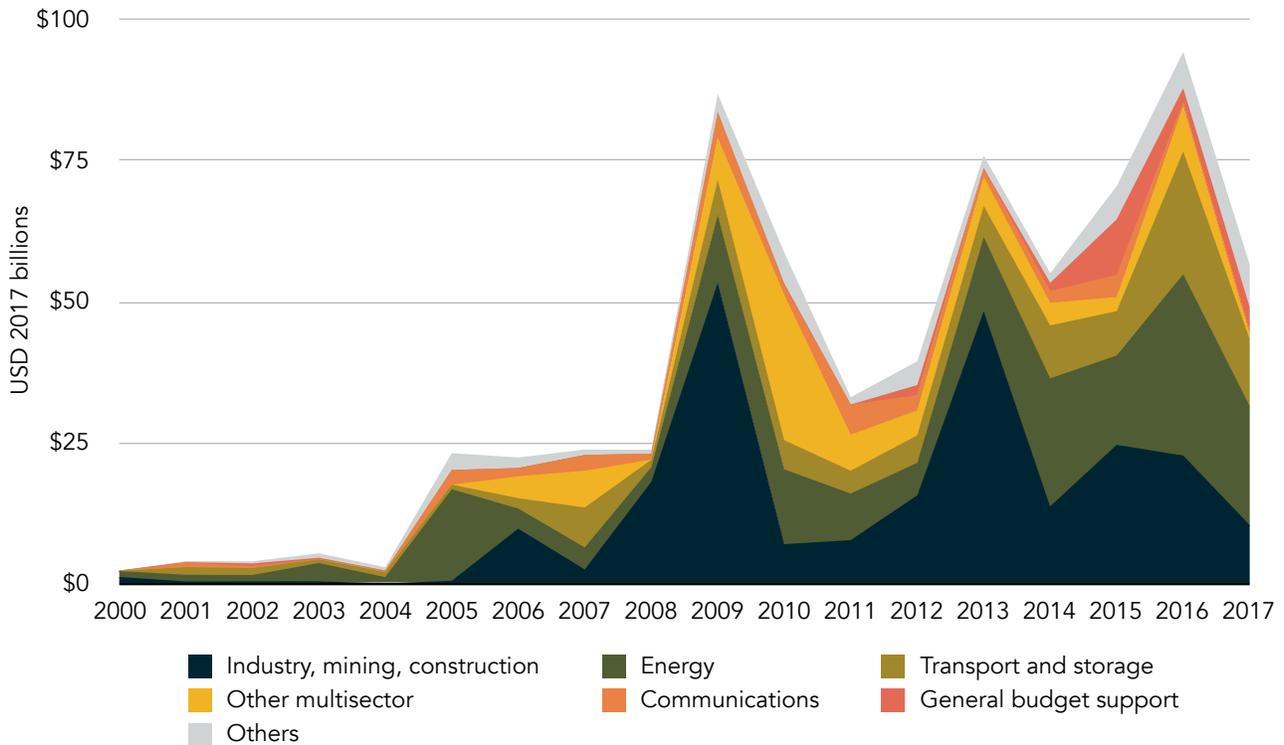
BRI
(2013-2017)

Figure A-8: Chinese ODA commitments by sector, 2000-2017



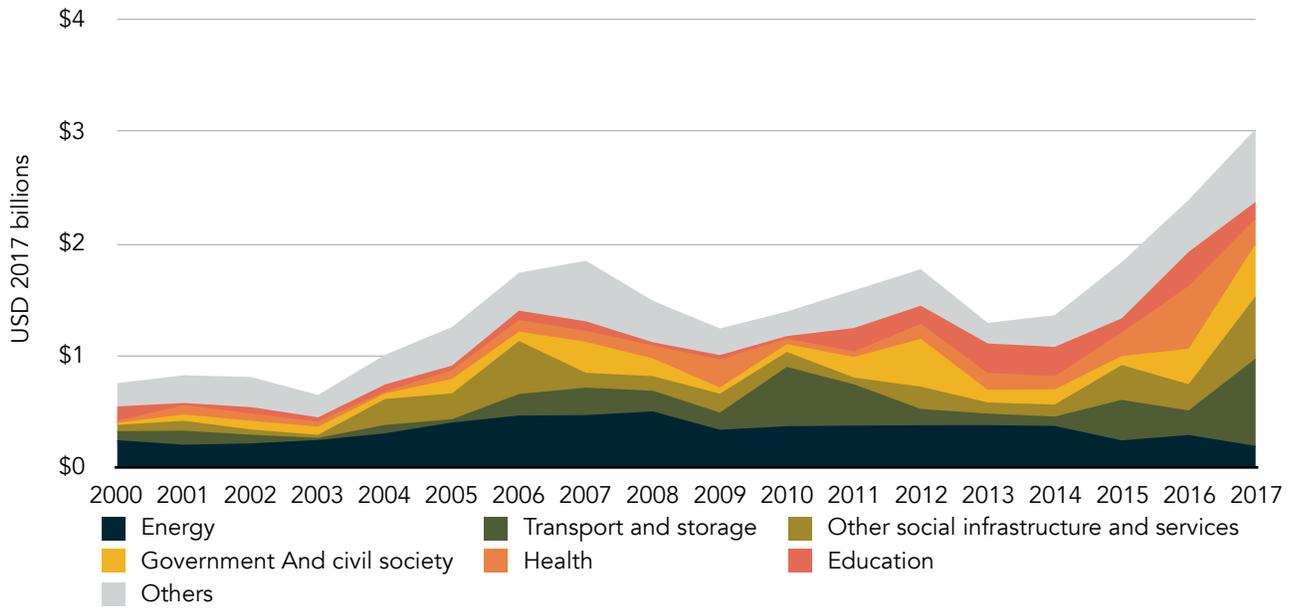
Source: AidData.

Figure A-9: Chinese OOF commitments by sector, 2000-2017



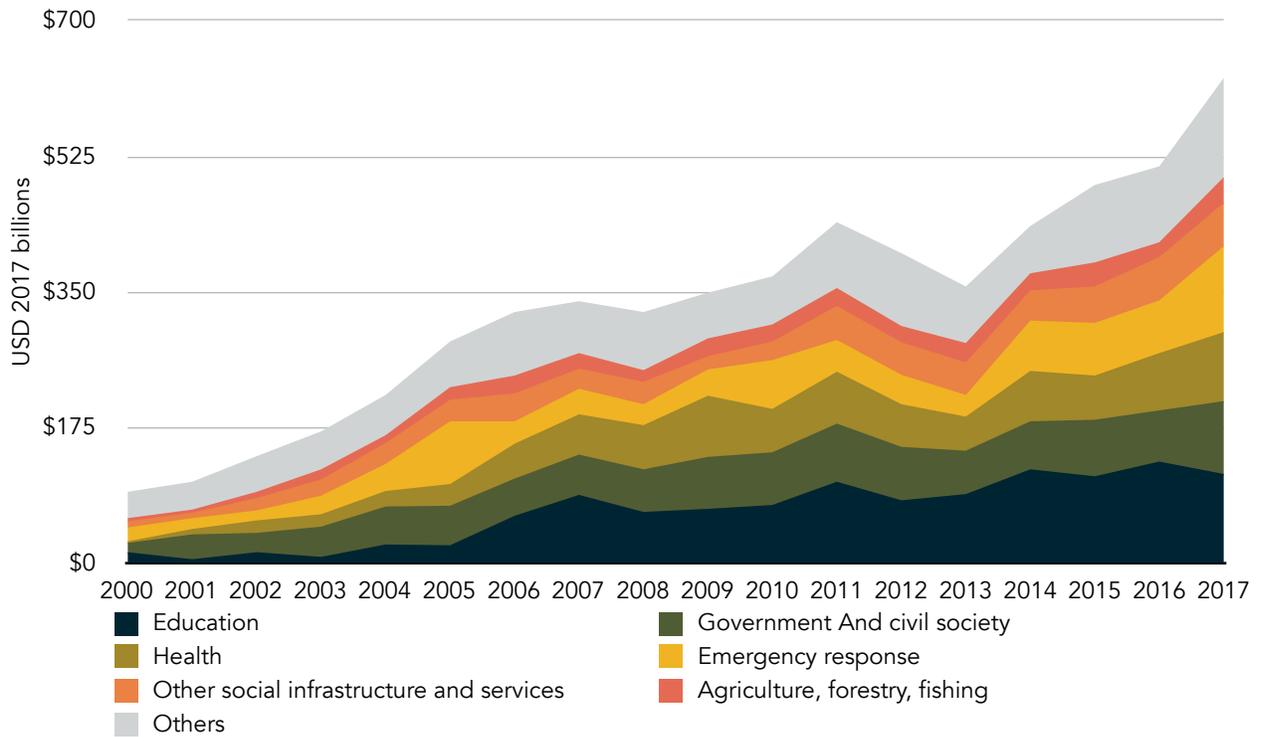
Source: AidData.

Figure A-10: Sectoral allocation of Chinese government grants in USD, 2000-2017



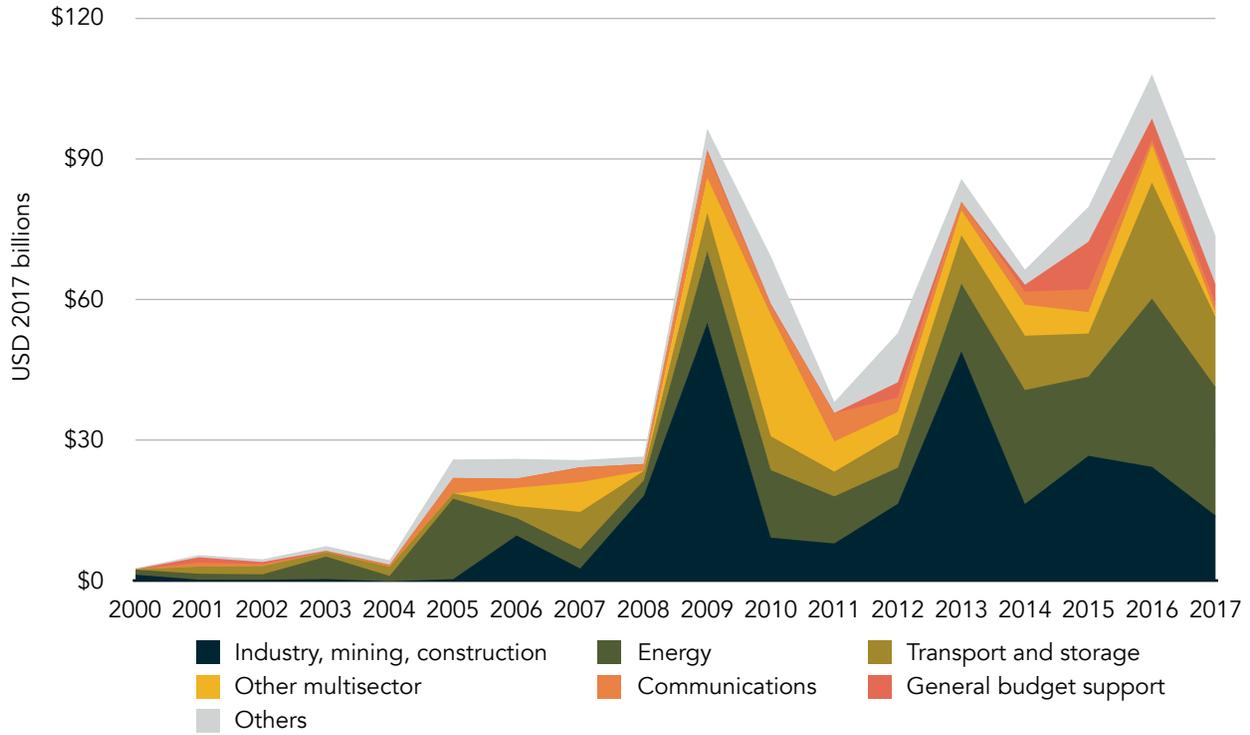
Source: AidData.

Figure A-11: Sectoral allocation of Chinese government grants by project count, 2000-2017



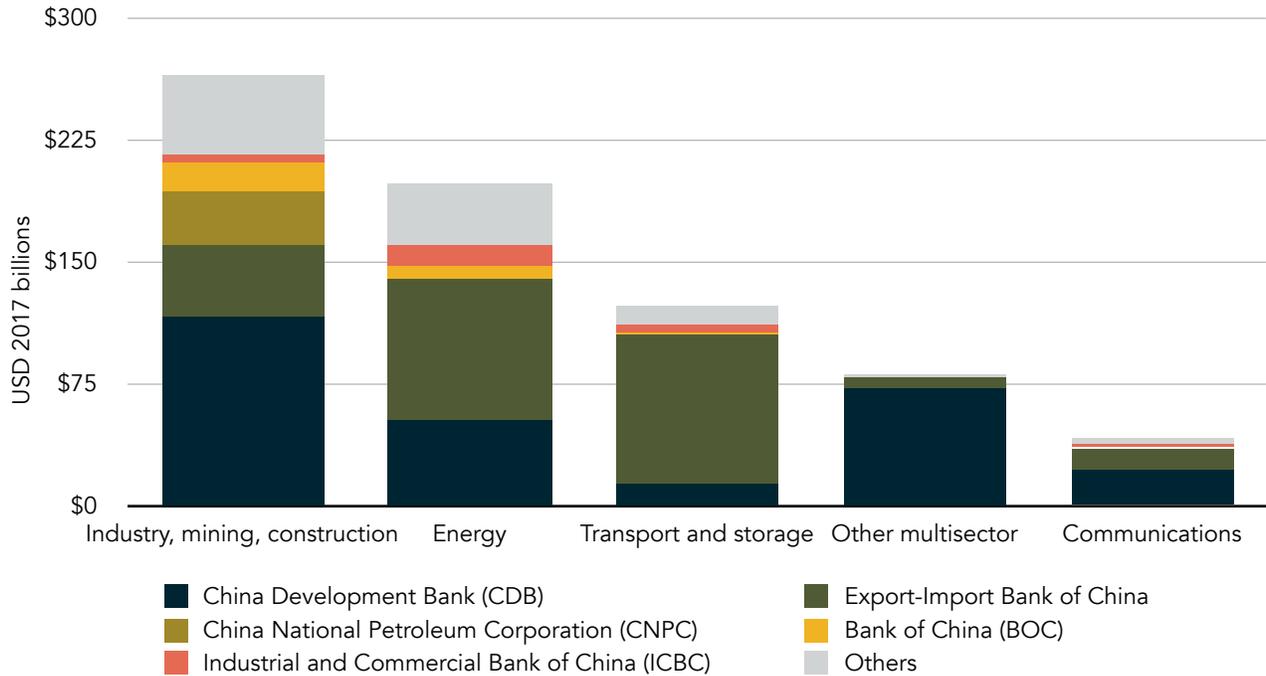
Source: AidData.

Figure A-12: Sectoral allocation of official sector loans from China, 2000-2017



Source: AidData.

Figure A-13: Top five sectors by funding agency, 2000-2017



Source: AidData.

Table A-9: Top 25 recipients of grants and loans from official sector institutions in China, 2000-2017

Top 25 recipients of grants		Top 25 recipients of loans	
Recipient	USD 2017 billions	Recipient	USD 2017 billions
DPRK	7.17	Russia	151.80
Pakistan	1.11	Venezuela	81.96
Suriname	1.10	Angola	50.47
Nepal	0.69	Brazil	38.97
Sri Lanka	0.60	Indonesia	36.04
Cambodia	0.54	Kazakhstan	35.19
Bangladesh	0.46	Pakistan	33.15
Afghanistan	0.43	Viet Nam	18.37
Kenya	0.42	Ecuador	16.92
Lao People's Democratic Republic	0.40	Ethiopia	16.26
Tajikistan	0.38	Iran	15.27
Africa, regional	0.36	Lao People's Democratic Republic	14.57
Zimbabwe	0.33	Sudan	11.94
Myanmar	0.33	Sri Lanka	11.63
Liberia	0.32	South Africa	10.88
Malawi	0.31	Peru	10.59
Grenada	0.30	Kenya	10.16
Sudan	0.30	Malaysia	10.06
Uganda	0.29	Cambodia	9.75
Costa Rica	0.29	Bangladesh	9.26
Mali	0.29	Myanmar	9.07
Kyrgyz Republic	0.28	India	8.86
Democratic Republic of the Congo	0.28	Turkmenistan	8.78
Tanzania	0.27	Argentina	8.65
Belarus	0.27	Zambia	8.29

Section 3. Financiers and recipients/borrowers

Table A-10: Top 25 loan-financed projects and commitments by funding agency

Funding agency	USD 2017 millions	% USD 2017 millions	Project count
China Development Bank (CDB)	312,819.6	39.1%	640
Export-Import Bank of China	272,112.8	34.0%	1499
Combination of Agencies	77,528.3	9.7%	85
Industrial and Commercial Bank of China (ICBC)	42,034.6	5.3%	237
China National Petroleum Corporation (CNPC)	34,140.4	4.3%	5
Bank of China (BOC)	30,215.6	3.8%	121
China Construction Bank Corporation (CCB)	3,430.7	0.4%	26
China Ministry of Commerce	3,291.3	0.4%	188
Unspecified Chinese Government Institution	2,854.6	0.4%	147
PetroChina	2,371.7	0.3%	2
People's Bank of China (PBC)	2,334.8	0.3%	46
ICBC Financial Leasing Co., Ltd. (ICBCFL) (ICBC Leasing)	2,174.2	0.3%	2
Huarong Energy Africa Co., Ltd. (华融能源非洲有限公司)	2,000.0	0.2%	1
China Machinery Engineering Corporation (CMEC)	1,425.7	0.2%	6
Unspecified Chinese Bank	1,386.9	0.2%	4
Agricultural Bank of China	1,246.3	0.2%	7
China Electric Power Equipment and Technology Company (CET)	1,119.9	0.1%	3
China National Machinery Industry Corporation (Sinomach)	932.8	0.1%	4
Silk Road Fund	796.0	0.1%	1
ZTE Corporation	707.3	0.1%	5
MCC-JJJ Mining Development Company Limited	626.0	0.1%	1
China National Building Material Company (CNBM)	400.0	<0.1%	1
Aluminum Corporation of China (CHINALCO)	373.8	<0.1%	1
Postal Savings Bank of China (PSBC)(中国邮政储蓄银行)	350.0	<0.1%	1
Poly Technologies	343.6	<0.1%	6

Table A-11: Top 25 grant-financed projects and commitments by funding agency

Funding agency	USD 2017 millions	% USD 2017 millions	Project count
China Ministry of Commerce	21,770.2	83%	1,167
Unspecified Chinese Government Institution	3,498.7	13%	3,211
China National Petroleum Corporation (CNPC)	155.0	1%	37
ZTE Corporation	77.7	0.3%	42
Combination of Agencies	73.1	0.3%	29
China Ministry of Defense	71.1	0.3%	19
China Ministry of Finance	55.7	0.2%	16
CITIC Construction Co., Ltd. (中信建设有限责任公司)	54.2	0.2%	5
China Ministry of Agriculture	53.6	0.2%	8
Jilin Provincial Government	53.6	0.2%	1
Chinese Embassy	46.8	0.2%	641
China Machinery Engineering Corporation (CMEC)	40.1	0.2%	3
People's Liberation Army of China	36.7	0.1%	14
Hanban (Confucius Institute Headquarters)	28.7	0.1%	270
China Ministry of Foreign Affairs	25.7	0.1%	20
Shenzhen Municipal People's Government	22.0	0.1%	2
CNPC AktobeMunaiGas JSC (CNPC AMG)	21.4	0.1%	28
Export-Import Bank of China	15.9	0.1%	1
China International Center for Economic and Technical Exchanges (CICETE)	11.3	<0.1%	2
China Road & Bridge Corporation (CRBC)	10.7	<0.1%	9
National Development and Reform Commission (NDRC)	10.7	<0.1%	5
People's Government of Guangdong Province (GDPTO)	10.5	<0.1%	7
China Harbour Engineering Co., Ltd.	9.2	<0.1%	16
China Ministry of Environmental Protection	6.1	<0.1%	19
China National Energy Administration (NEA)	5.6	<0.1%	1

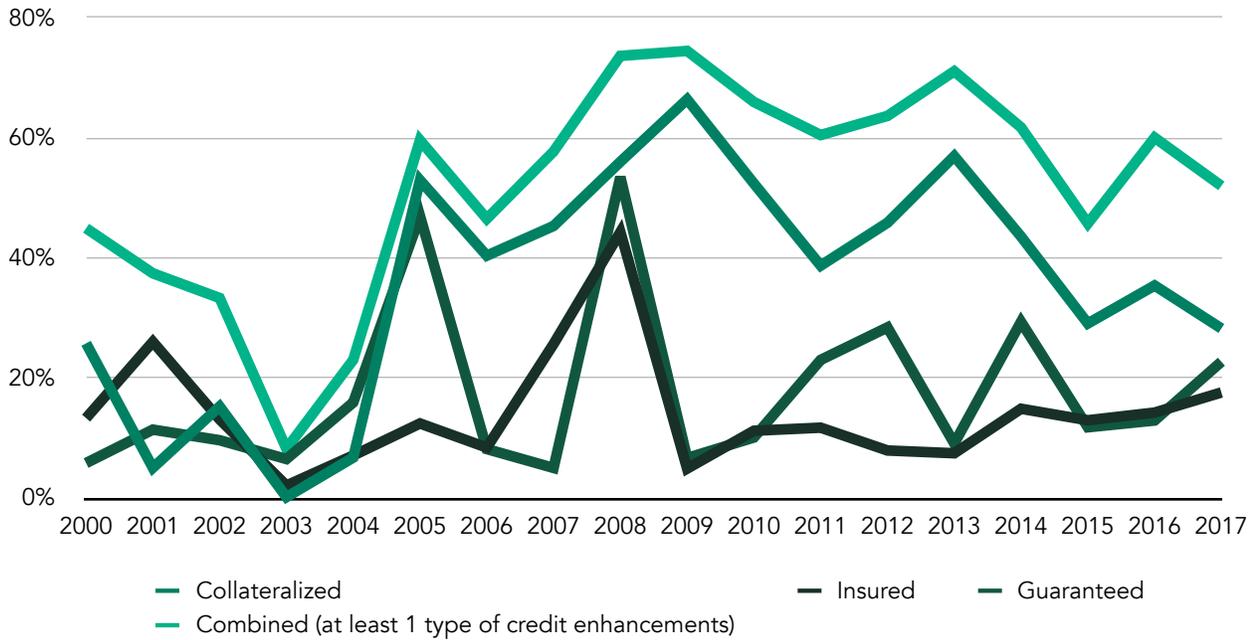
Table A-12: ODA-financed projects and commitments by funding agency

Funding agency	USD 2017 millions	% USD 2017 millions	Project count
Export-Import Bank of China	44,344.8	44.1%	466
China Ministry of Commerce	28,256.4	28.1%	1,480
Unspecified Chinese Government Institution	15,648.4	15.6%	4,207
China Development Bank (CDB)	7,924.5	7.9%	24
Bank of China (BOC)	1,152.9	1.1%	5
Combination of Agencies	1,084.6	1.1%	38
Industrial and Commercial Bank of China (ICBC)	694.9	0.7%	9
People's Bank of China (PBC)	290.6	0.3%	9
China National Petroleum Corporation (CNPC)	174.1	0.2%	46
Sinochem Corporation	148.0	0.1%	2
China Ministry of Finance	104.8	0.1%	17
State Administration of Foreign Exchange (SAFE)	97.8	0.1%	1
China Ministry of Defense	69.8	0.1%	21
ZTE Corporation	67.0	0.1%	43
CITIC Construction Co., Ltd. (中信建设有限责任公司)	54.2	0.1%	7
China Ministry of Agriculture	53.6	0.1%	25
Jilin Provincial Government	53.6	0.1%	2
Chinese Embassy	46.5	<0.1%	561
China Machinery Engineering Corporation (CMEC)	40.1	<0.1%	3
People's Liberation Army of China	36.7	<0.1%	52
China Ministry of Foreign Affairs	25.9	<0.1%	20
Shenzhen Municipal People's Government	22.0	<0.1%	1
CNPC AktobeMunaiGas JSC (CNPC AMG)	17.8	<0.1%	25
CNMC Industrial Zone Development Zambia Limited	14.5	<0.1%	1
China International Center for Economic and Technical Exchanges (CICETE)	11.3	<0.1%	2

Table A-13: Top 25 OOF-financed projects and commitments by funding agency

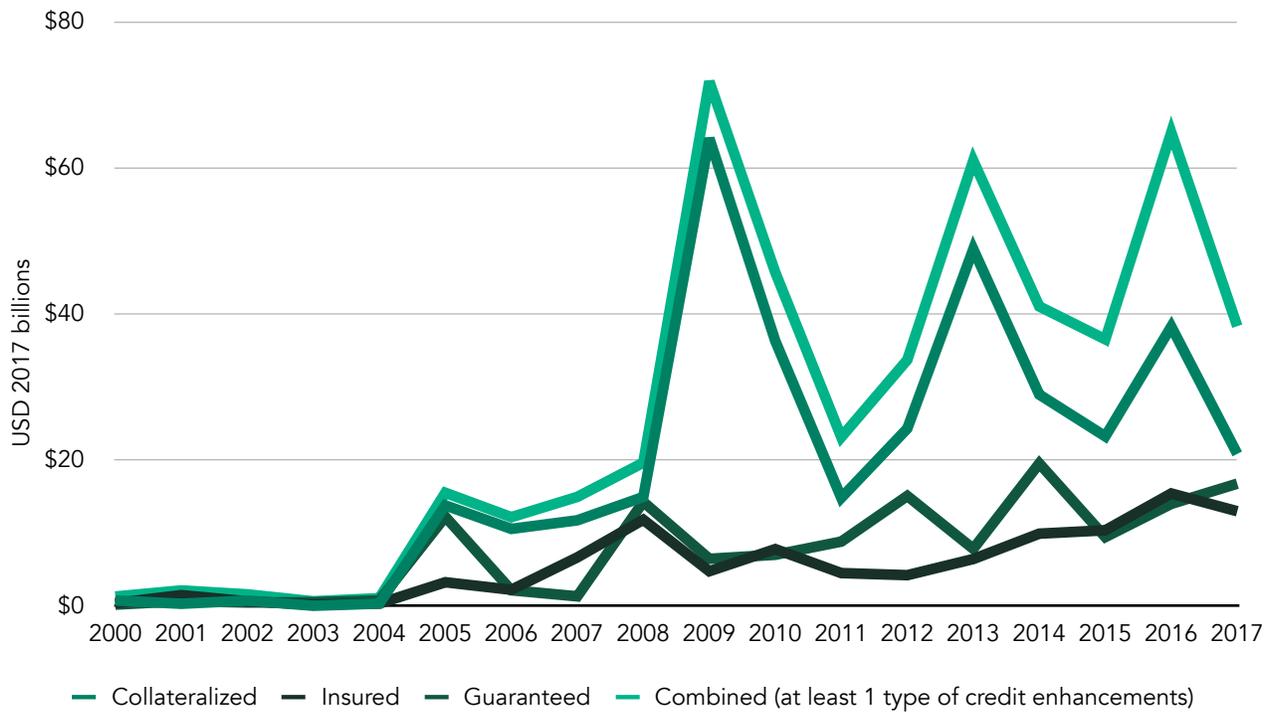
Funding agency	USD 2017 millions	% USD 2017 millions	Project count
China Development Bank (CDB)	281,572.4	41.3%	494
Export-Import Bank of China	211,519.5	31.0%	905
Combination of Agencies	76,199.6	11.2%	95
China National Petroleum Corporation (CNPC)	34,126.9	5.0%	5
Industrial and Commercial Bank of China (ICBC)	30,459.0	4.5%	187
Bank of China (BOC)	26,412.2	3.9%	103
China Construction Bank Corporation (CCB)	3,381.5	0.5%	24
PetroChina	2,371.7	0.3%	2
ICBC Financial Leasing Co., Ltd. (ICBCFL) (ICBC Leasing)	2,174.2	0.3%	2
China Machinery Engineering Corporation (CMEC)	1,336.7	0.2%	5
Agricultural Bank of China	1,246.3	0.2%	7
Unspecified Chinese Bank	1,192.7	0.2%	3
China Electric Power Equipment and Technology Company (CET)	1,119.9	0.2%	3
China National Machinery Industry Corporation (Sinomach)	932.8	0.1%	4
Silk Road Fund	796.0	0.1%	1
ZTE Corporation	718.0	0.1%	8
Unspecified Chinese Government Institution	691.8	0.1%	298
MCC-JJJ Mining Development Company Limited	626.0	0.1%	1
China National Building Material Company (CNBM)	400.0	0.1%	1
Aluminum Corporation of China (CHINALCO)	373.8	0.1%	1
China Ministry of Commerce	357.4	0.1%	42
Postal Savings Bank of China (PSBC)(中国邮政储蓄银行)	350.0	0.1%	1
Poly Technologies	343.6	0.1%	6
China Merchants Bank Co., Ltd.	295.0	<0.1%	1
China National Aero-Technology Import & Export Corporation (CATIC)	242.4	<0.1%	4

Figure A-14: Official sector loans from China with various types of credit enhancements, % by transaction value



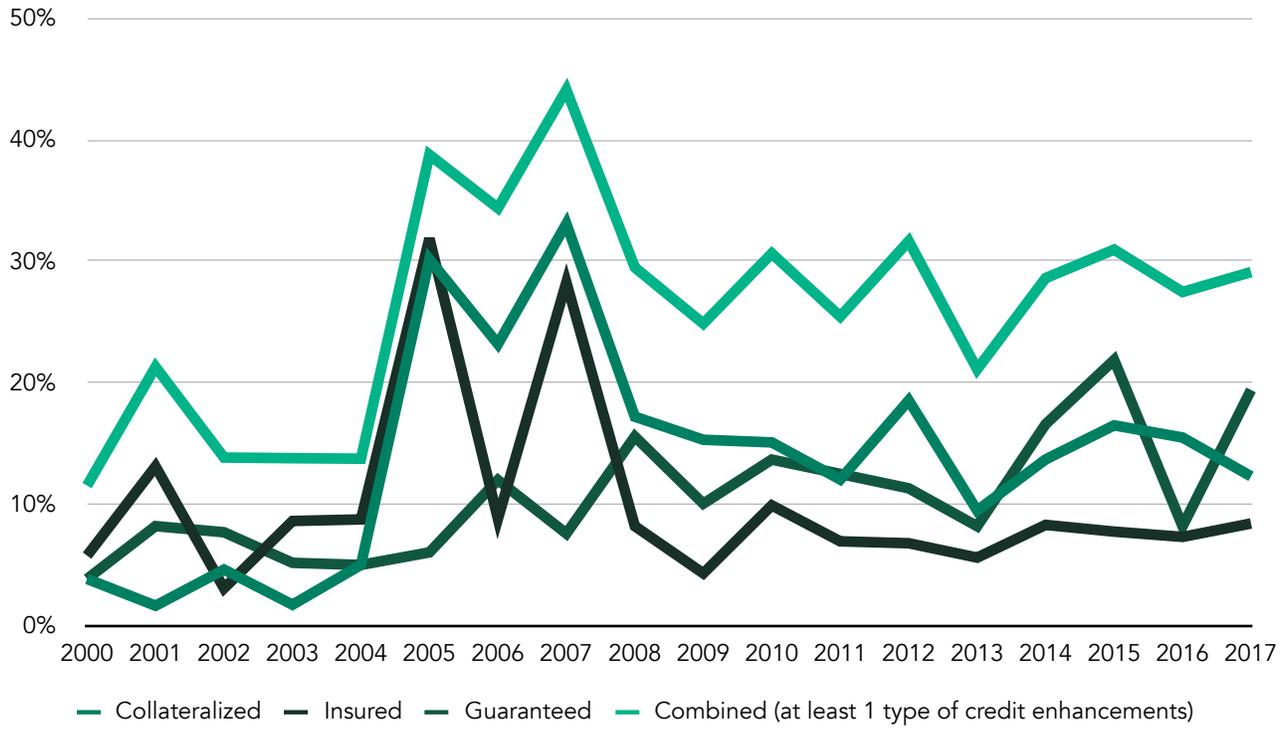
Source: AidData.

Figure A-15: Official sector loans from China with various types of credit enhancements

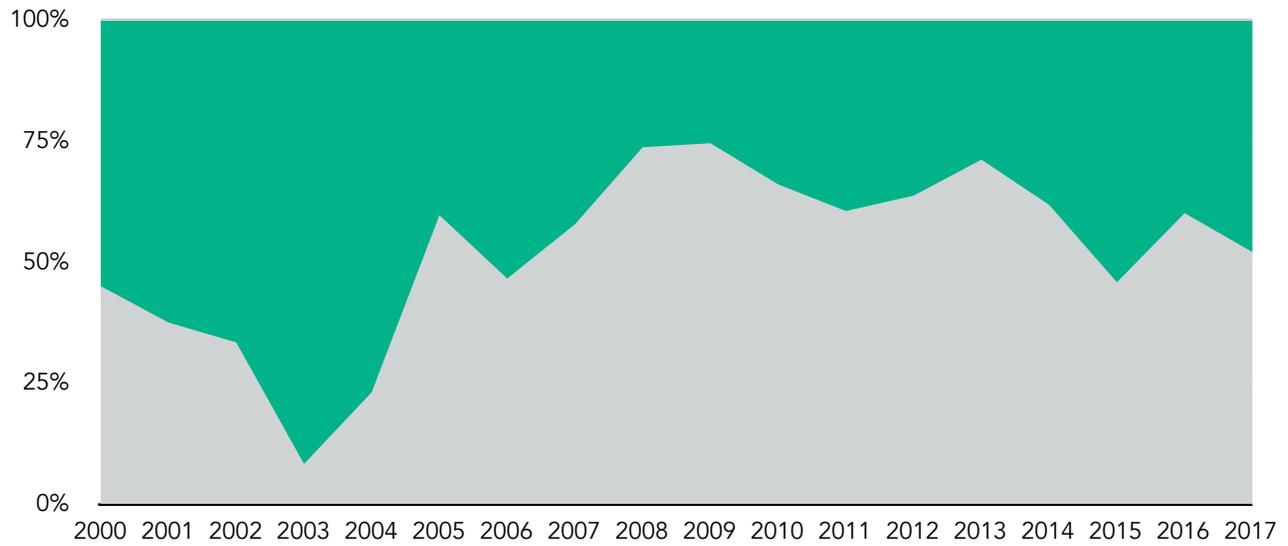


Source: AidData.

Figure A-16: Official sector loans from China with various types of credit enhancements, % by project count



Source: AidData.

Figure A-17: Percent of official sector lending with credit enhancements

■ Lending with credit enhancement(s)

■ Lending with no credit enhancements

Source: AidData.

Table A-14: Top 10 borrowers by levels of collateralization

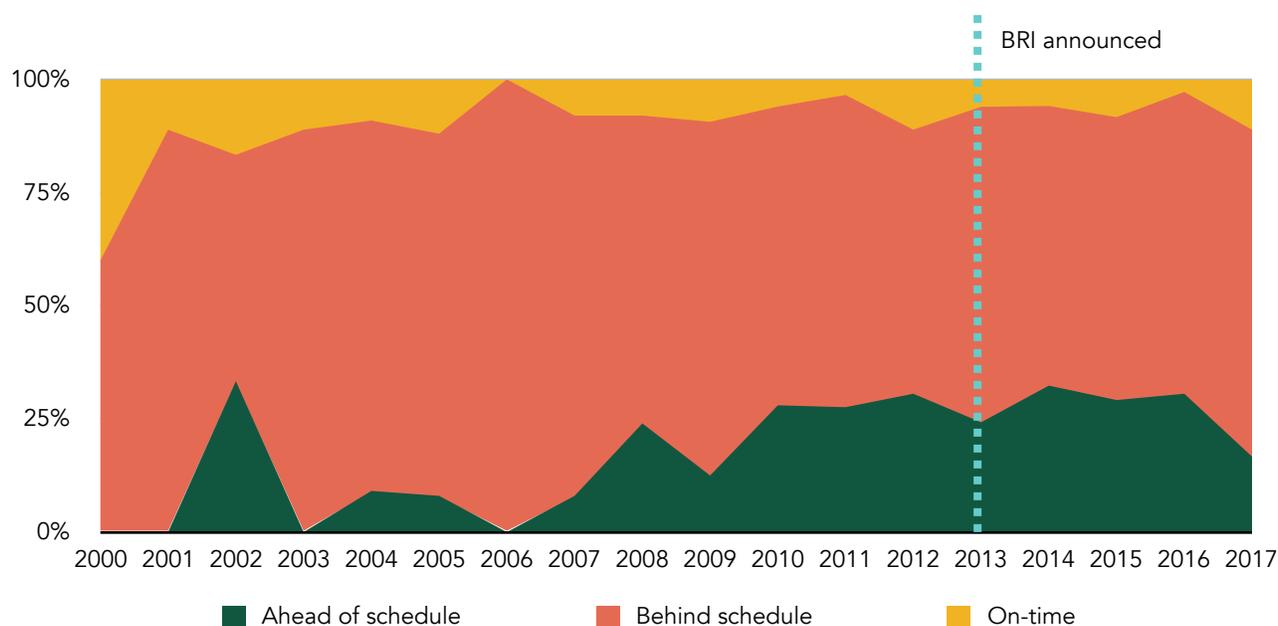
Top 10 borrowers by % of lending that is collateralized		Top 10 borrowers by % of loans that are collateralized		Top 10 borrowers by total monetary value of collateralized lending	
Borrowers	Collateralized %	Borrowers	Collateralized %	Borrowers	USD 2017 billions
Venezuela	92.5%	Democratic Republic of the Congo	69.57%	Russia	96.1
Peru	90.0%	Congo	68.75%	Venezuela	84.2
Turkmenistan	88.6%	Venezuela	67.19%	Angola	29.7
Equatorial Guinea	80.3%	Equatorial Guinea	66.67%	Kazakhstan	21.1
Russia	76.6%	Angola	46.96%	Brazil	19.8
Uganda	74.3%	Uganda	33.33%	Ecuador	9.8
Democratic Republic of the Congo	67.4%	Peru	33.33%	Indonesia	9.6
Congo	67.3%	Sierra Leone	27.27%	Peru	9.5
Ecuador	58.0%	Ecuador	26.19%	Turkmenistan	7.9
Angola	56.5%	Benin	25.00%	Democratic Republic of the Congo	5.0

Note: This table only includes countries that secured more than 10 official sector loans from China between 2000-2017.

Note: This table only includes countries that secured more than 10 official sector loans from China between 2000-2017.

Section 4. Project implementation

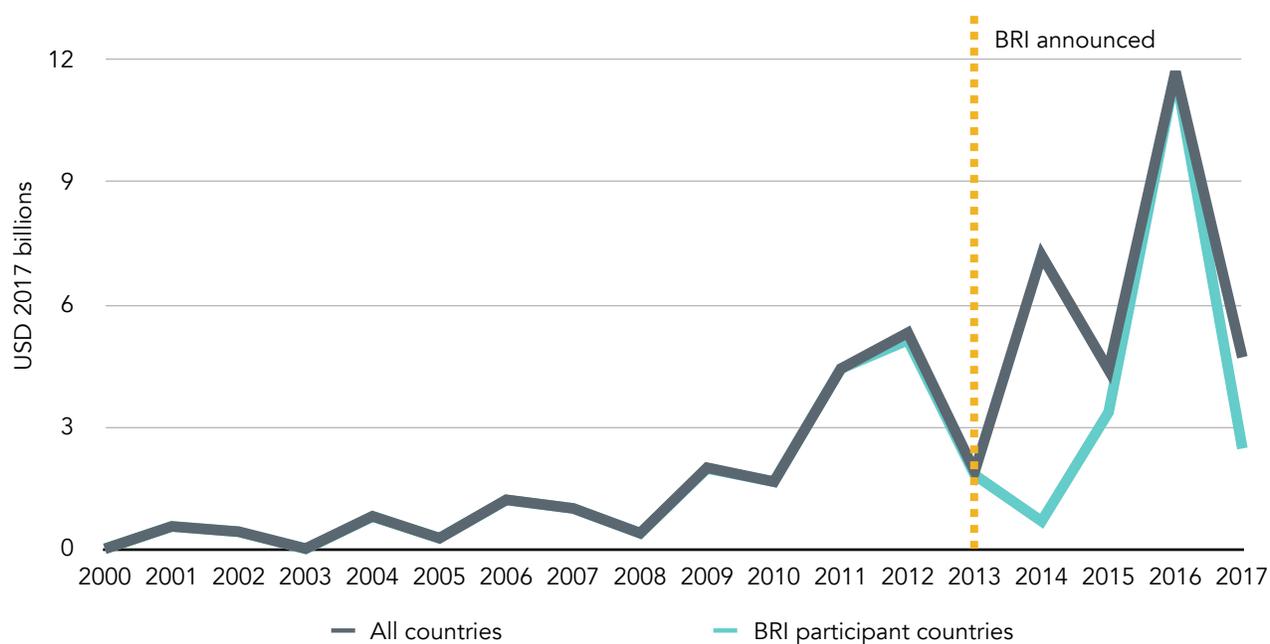
Figure A-18: Percentage of projects completed on-time, ahead of schedule, or behind schedule, 2000-2017



Source: AidData.

Note: Percentages reflect the % of projects completed ahead of schedule, behind schedule, or on-time for the 431 projects in the 2.0 dataset that have both the planned and actual completion dates filled in.

Figure A-19: Project suspensions and cancellations, 2000-2017



Source: AidData.

Figure A-20: Map of project suspensions and cancellations by transaction amount, all countries, 2000-2017



Source: AidData.

Figure A-21: Development finance project cycle

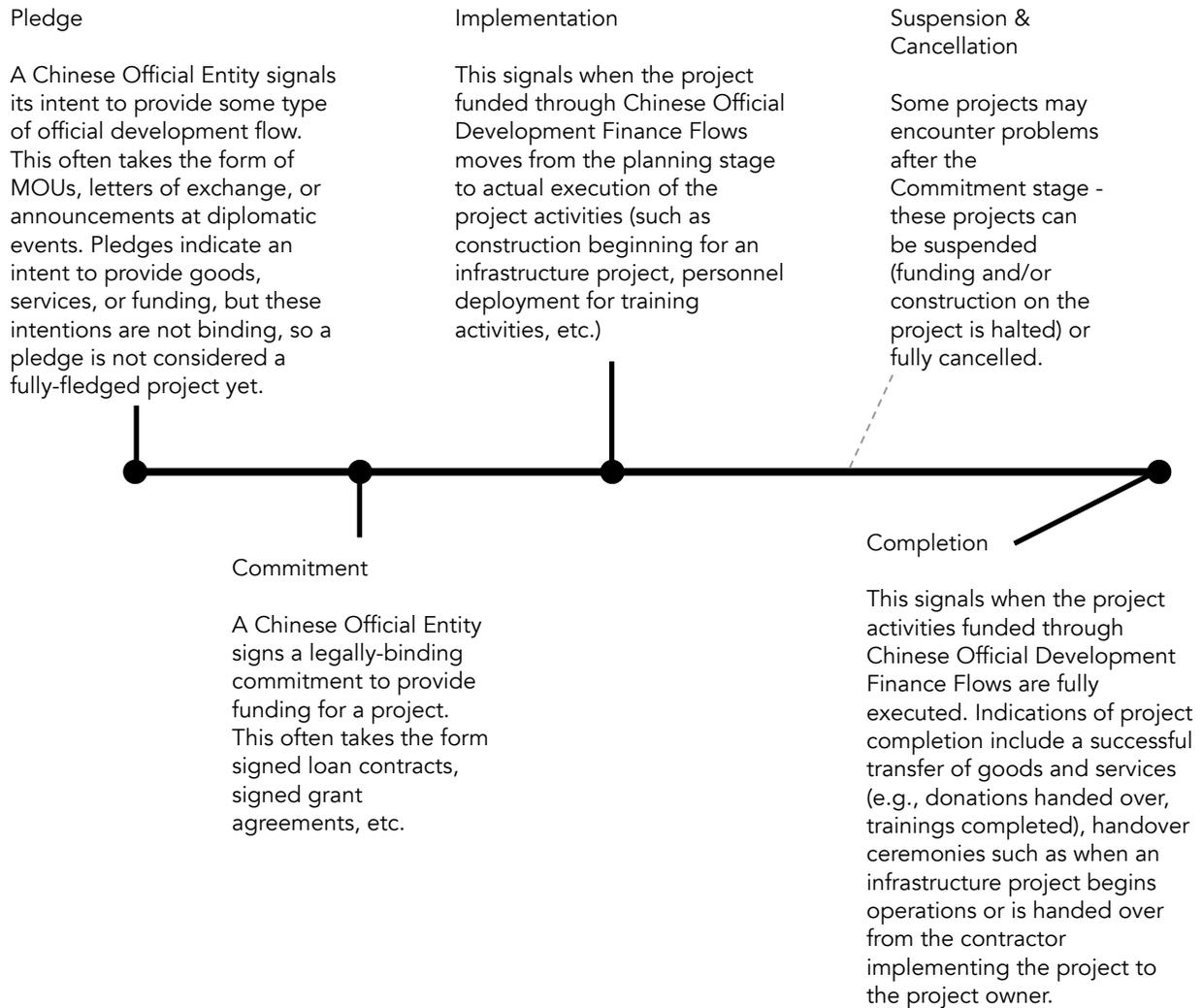
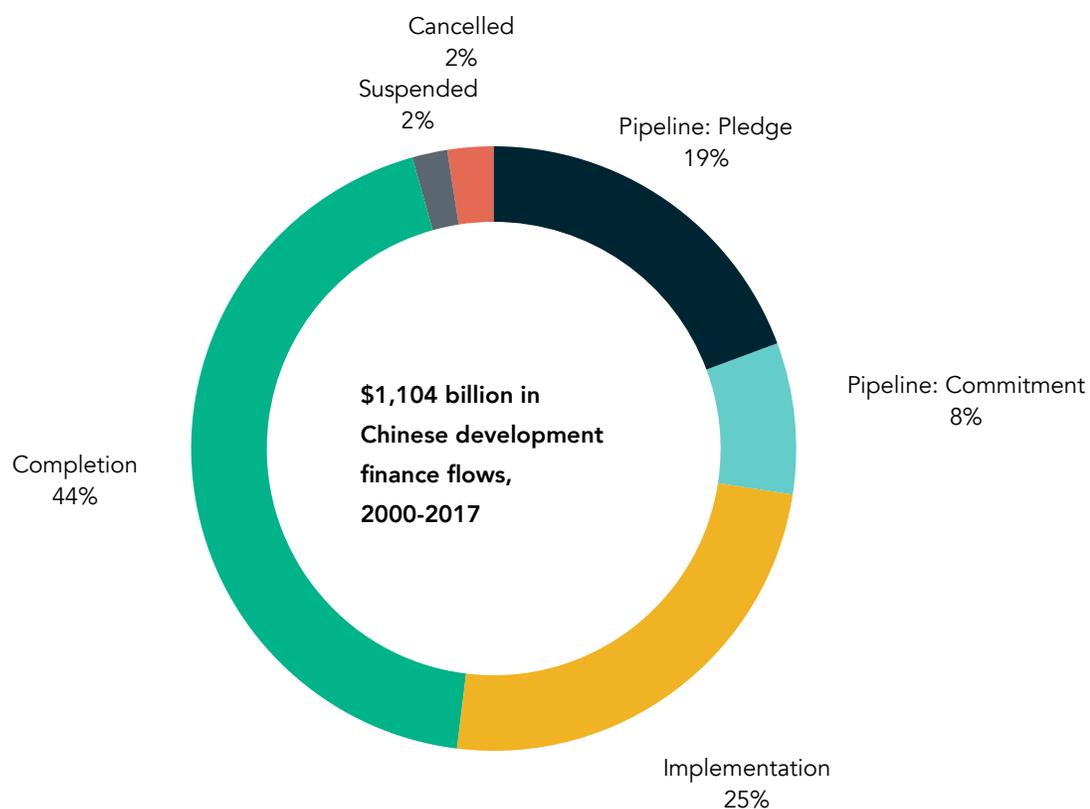


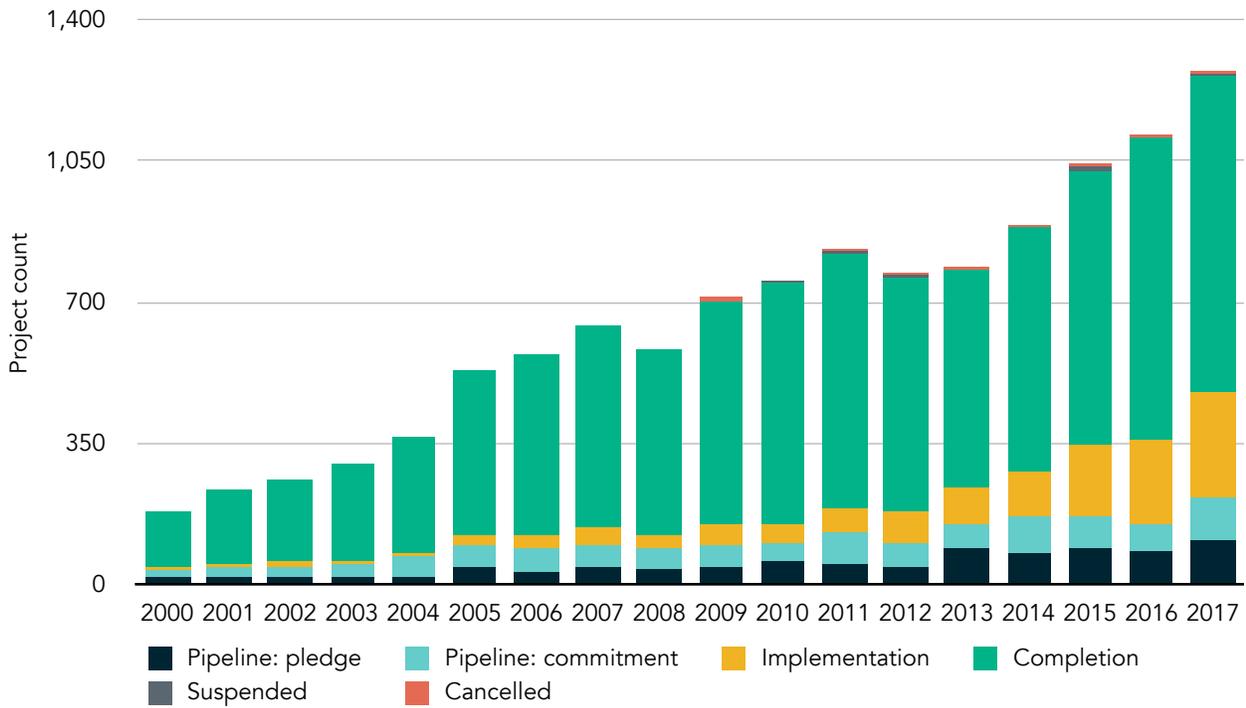
Figure A-22: Chinese development finance by project status category, 2000-2017



Source: AidData.

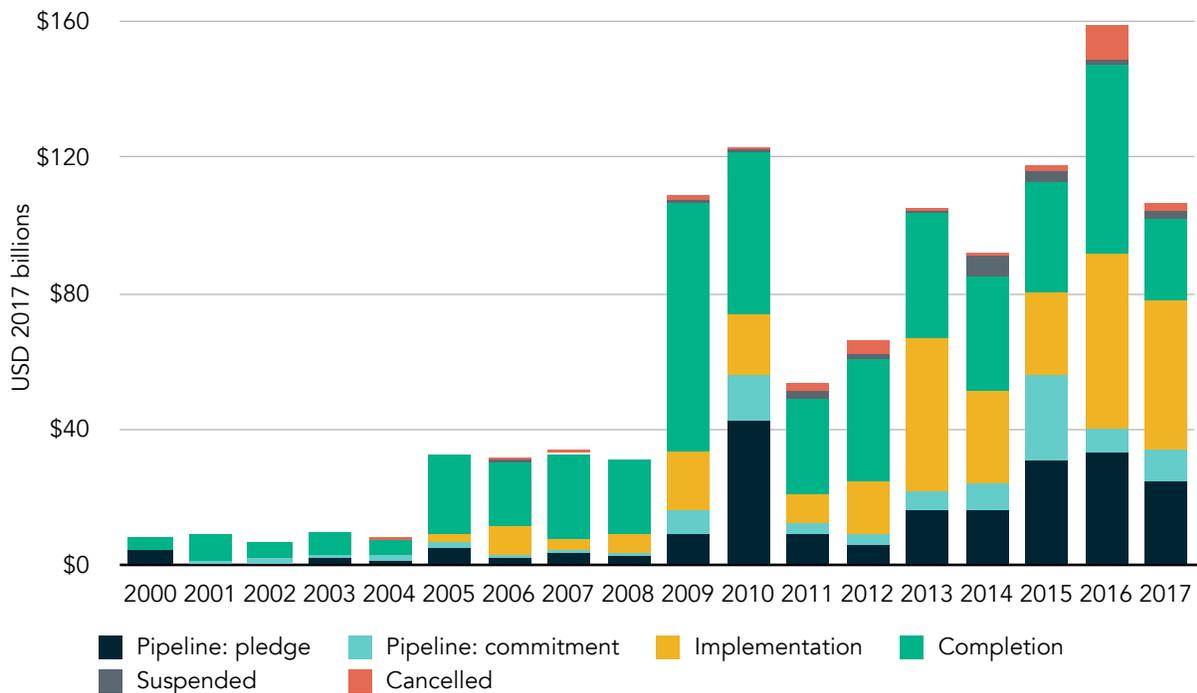
Note: This figure includes all "recommended for aggregates" projects (officially committed, implemented, and completed projects) plus pledged, suspended, and cancelled projects. No umbrella projects are included. For any analysis that requires the aggregation of projects supported by official financial (or in-kind) commitments from China, including analysis of monetary amounts and project counts, AidData recommends excluding pledged, suspended, and cancelled projects (since pledged, suspended, and cancelled projects represent financial transfers that likely did not occur or will not occur). We included these projects in this figure to show the full spectrum of projects captured in the 2.0 dataset.

Figure A-23: Distribution of Chinese development project status over time by project count, 2000-2017

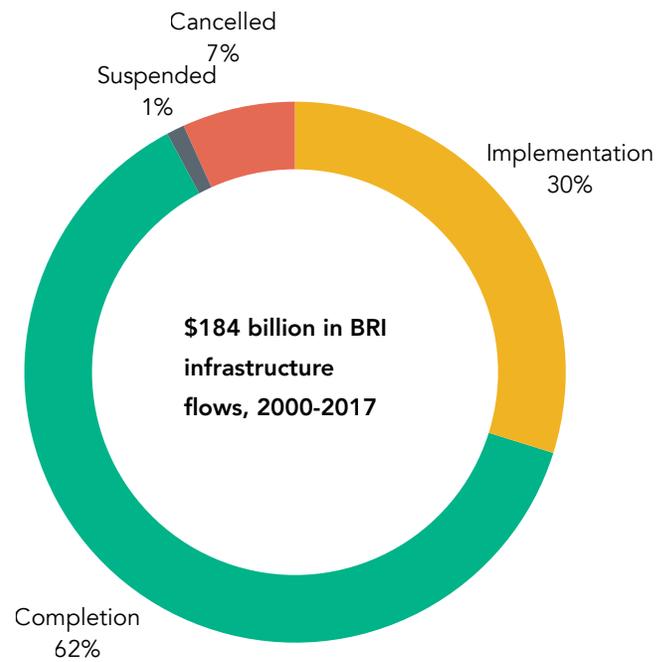


Source: AidData.

Figure A-24: Distribution of Chinese development project status, 2000-2017



Source: AidData.

Figure A-25: Distribution of BRI infrastructure projects by status, 2013-2021:

Source: AidData.

Note: This figure includes all "recommended for aggregates" projects (officially committed, implemented, and completed projects) plus pledged, suspended, and cancelled projects that meet the criteria for BRI infrastructure financing (as described in Box 5 in the report). We have included these to show the full spectrum of BRI financial flows for infrastructure projects captured in the 2.0 dataset.

Table A-15: Top 20 Chinese implementing agencies by project count

Implementing agency	Project count
Huawei Technologies Co., Ltd.	164
SinoHydro	162
Chinese Embassy	134
China Road & Bridge Corporation (CRBC)	132
China Machinery Engineering Corporation (CMEC)	102
ZTE Corporation	84
China Harbour Engineering Co., Ltd.	83
China State Construction Engineering Corporation (CSCEC)	83
China Civil Engineering Construction Corporation (CCECC)	69
China Development Bank (CDB)	63
Shanghai Construction Group General Co.	61
China Gezhouba Group Company Ltd. (CGGC)	59
Nuctech Company Limited (Tongfang Vision Technology Co., Ltd.)	57
Beijing Construction Engineering Group Co., Ltd. (BCEG)	55
China CAMC Engineering Co., Ltd.	52
China Communications Construction Co., Ltd. (CCCC)	51
China National Machinery Industry Corporation (Sinomach)	43
China Geo-Engineering Corporation (CGC)	42
China International Water and Electrical Corporation (CWE)	42
China National Complete Plant Import & Export Corporation Group (COMPLANT)	42

Table A-16: Top 20 Chinese and non-Chinese implementing agencies by number of BRI infrastructure projects

Implementing agency	Project count
China Road & Bridge Corporation (CRBC)	14
China Harbour Engineering Co., Ltd.	8
China National Heavy Machinery Corporation (CHMC) Electricite du Cambodge	7
China Machinery Engineering Corporation (CMEC)	7
PowerChina Huadong Engineering Corporation Limited	7
TBEA Co., Ltd.	6
Government of Pakistan	5
SinoHydro	5
China Harbour Engineering Co., Ltd. Hengyi Industrial (Brunei) Co., Ltd.	5
Guangdong Foreign Construction Co., Ltd (GDFC)	5
China First Metallurgical Construction Group Co. (CFMCC) MCC Ruba International Construction Company (Pvt) Ltd.	4
Government of Angola SinoHydro	4
China Railway 14th Bureau Group Co., Ltd. (CRCC14)	4
Nuctech Company Limited (Tongfang Vision Technology Co., Ltd.)	4
China CAMC Engineering Co., Ltd.	4
China Gezhouba Group Company Ltd. (CGGC)	4
Beijing Construction Engineering Group Co., Ltd. (BCEG)	4
Power Construction Corporation of China Ltd. (POWERCHINA)	4
China Road & Bridge Corporation (CRBC) Government of the Kyrgyz Republic	4
China Road & Bridge Corporation (CRBC) Guangzhou Wanan Construction Supervision, Co. Ltd.	4

Section 5. BRI participation and financing

Table A-17: Year that countries first signed a BRI cooperative agreement or MOU

BRI country	Year signed
Afghanistan	2013
Albania	2017
Algeria	2018
Angola	2018
Antigua and Barbuda	2018
Armenia	2015
Austria	2018
Azerbaijan	2015
Bahrain	2018
Bangladesh	2019
Barbados	2019
Belarus	2013
Benin	2019
Bolivia	2018
Bosnia and Herzegovina	2017
Botswana	2021
Brunei Darussalam	2018
Bulgaria	2015
Burundi	2018
Cabo Verde	2018
Cambodia	2013
Cameroon	2015
Chad	2018
Chile	2018
Comoros	2019
Congo	2018
Cook Islands	2018
Costa Rica	2018
Cote D'Ivoire	2017

Croatia	2017
Cuba	2019
Cyprus	2019
Czech Republic	2015
Democratic Republic of the Congo	2021
Djibouti	2018
Dominica	2018
Dominican Republic	2018
Ecuador	2018
Egypt	2016
El Salvador	2018
Equatorial Guinea	2019
Estonia	2017
Ethiopia	2018
Fiji	2018
Gabon	2018
Gambia	2018
Georgia	2016
Ghana	2018
Greece	2018
Grenada	2018
Guinea	2018
Guyana	2018
Hungary	2015
Indonesia	2015
Iran	2018
Iraq	2015
Italy	2019
Jamaica	2019
Kazakhstan	2015
Kenya	2017
Kiribati	2020

Kuwait	2018
Kyrgyz Republic	2013
Lao People's Democratic Republic	2018
Latvia	2016
Lebanon	2017
Lesotho	2019
Liberia	2019
Libya	2018
Lithuania	2017
Luxembourg	2019
Madagascar	2017
Malaysia	2017
Maldives	2017
Mali	2019
Malta	2018
Mauritania	2018
Micronesia	2018
Moldova	2013
Mongolia	2013
Montenegro	2017
Morocco	2017
Mozambique	2018
Myanmar	2016
Namibia	2018
Nepal	2017
New Zealand	2017
Niger	2019
Nigeria	2018
Niue	2018
North Macedonia	2013
Oman	2018
Pakistan	2013

Panama	2017
Papua New Guinea	2016
Peru	2019
Philippines	2017
Poland	2015
Portugal	2018
Qatar	2019
Romania	2015
Russia	2017
Rwanda	2018
Samoa	2018
Saudi Arabia	2018
Senegal	2018
Serbia	2015
Seychelles	2018
Sierra Leone	2018
Singapore	2018
Slovakia	2015
Slovenia	2017
Solomon Islands	2019
Somalia	2015
South Africa	2015
South Korea	2018
South Sudan	2018
Sri Lanka	2017
Sudan	2018
Suriname	2018
Tajikistan	2018
Tanzania	2018
Thailand	2014
Timor-Leste	2017
Togo	2018
Tonga	2018

Trinidad and Tobago	2018
Tunisia	2018
Turkey	2015
Uganda	2018
Ukraine	2017
United Arab Emirates	2018
Uruguay	2018
Uzbekistan	2015
Vanuatu	2018
Venezuela	2018
Viet Nam	2017
Yemen	2017
Zambia	2018
Zimbabwe	2018

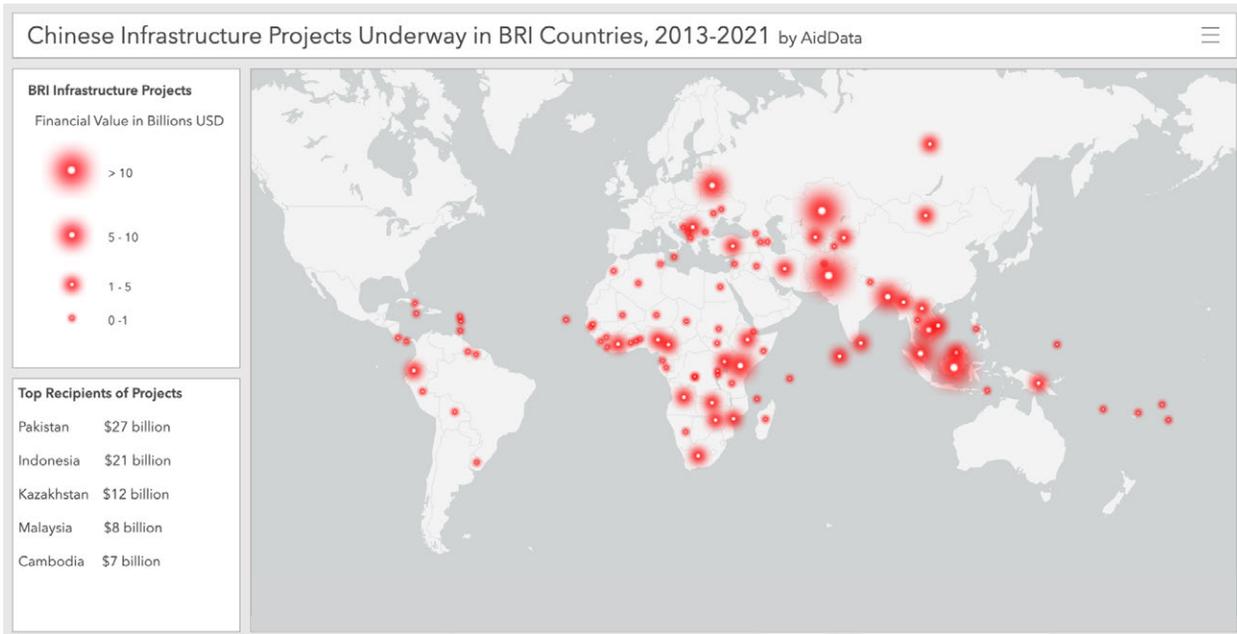
Note: We measure the year in which a country “joined the BRI” as the first year in which it signed a BRI cooperation agreement or a formal BRI memorandum of understanding (MOU) with China. We used the “Official BRI participants by year of joining” dataset made available by the Council of Foreign Relations (CFR) in March 2021 as a baseline (Sacks 2021; Hillman and Sacks 2021). For countries where CFR designated the year as “unknown,” we conducted desk research to confirm the first year in which a BRI cooperation agreement or MOU was signed between China and that country.

Figure A-26: BRI infrastructure projects underway by project count, 2013-2021



Source: AidData.

Figure A-27: BRI infrastructure projects underway by transaction value, 2013-2021



Source: AidData.

Note: Financial values are in constant 2017 USD.

Table A-18: BRI infrastructure projects underway by country

Country	USD 2017 billions	Project count
Pakistan	27.32	71
Indonesia	20.26	71
Kazakhstan	12.07	21
Malaysia	8.38	6
Cambodia	6.77	82
Kenya	6.31	18
Belarus	6.15	35
Sri Lanka	5.45	25
Bangladesh	5.02	9
Ethiopia	4.13	13
Cameroon	3.94	30
Venezuela	3.90	1
Viet Nam	3.81	12
Iran	3.12	7
Russia	3.09	3
Uzbekistan	3.08	15
Turkey	2.81	15
South Africa	2.55	8
Lao People's Democratic Republic	2.48	20
Serbia	2.45	8
Kyrgyz Republic	2.11	21
Cote d'Ivoire	2.08	8
Myanmar	2.02	33
Zambia	1.82	15
Ecuador	1.78	7
Brunei Darussalam	1.75	5
Angola	1.74	25
Papua New Guinea	1.57	16
Maldives	1.51	10
Mozambique	1.43	10
Senegal	1.42	10

Zimbabwe	1.36	6
Nigeria	1.36	6
Mongolia	1.25	43
Uganda	1.09	4
Egypt	0.89	9
Bolivia	0.82	3
North Macedonia	0.77	10
Bosnia and Herzegovina	0.70	2
Gabon	0.67	3
Djibouti	0.67	3
Nepal	0.65	17
Ghana	0.60	6
Azerbaijan	0.54	5
Cuba	0.45	5
Jamaica	0.39	3
Suriname	0.37	3
Congo	0.37	4
Thailand	0.37	3
Mali	0.36	3
Tajikistan	0.32	4
Morocco	0.29	2
Philippines	0.24	8
Guinea	0.22	4
Sudan	0.21	3
Madagascar	0.17	5
Gambia	0.16	4
Bulgaria	0.15	1
Togo	0.14	5
Afghanistan	0.13	14
Burundi	0.12	6
Liberia	0.12	2
Antigua and Barbuda	0.10	2
Vanuatu	0.07	2

Mauritania	0.07	6
Samoa	0.07	6
Tanzania	0.07	8
Tunisia	0.07	2
Sierra Leone	0.06	2
Guyana	0.06	4
Grenada	0.06	1
Cabo Verde	0.05	8
Panama	0.05	1
Costa Rica	0.05	2
Romania	0.05	1
Lebanon	0.05	8
Fiji	0.04	4
South Sudan	0.03	3
Micronesia	0.03	6
Benin	0.03	2
Algeria	0.03	2
Comoros	0.03	1
Georgia	0.03	4
Rwanda	0.03	2
Seychelles	0.02	3
Moldova	0.02	6
Peru	0.02	2
Uruguay	0.02	1
Namibia	0.02	3
Dominica	0.01	2
Niue	0.01	1
Armenia	0.01	2
Cook Islands	0.01	1
Albania	0.01	3
Democratic Republic of the Congo	0.01	1
Iraq	0.0020	2
Somalia	0.0020	3

Montenegro	0.0001	1
Timor-Leste	-	3
Chad	-	1
Ukraine	-	2
Equatorial Guinea	-	1
Total	169.52	941

Table A-19: Sectoral breakdown of BRI infrastructure projects underway

Sector	USD 2017 billions
Energy	61.77
Transport and storage	49.04
Industry, mining, construction	36.54
Communications	4.94
Other social infrastructure and services	4.08
Other multisector	3.53
Water supply and sanitation	3.40
Health	1.52
Government and civil society	1.18
Education	1.00
Agriculture, forestry, fishing	0.89
Trade policies and regulations	0.36
Action relating to debt	0.35
Business and other services	0.30
Unallocated/unspecified	0.27
Banking and financial services	0.23
Emergency response	0.10
Reconstruction relief and rehabilitation	0.02

Table A-20: Income bracket breakdown of BRI infrastructure projects underway

Income bracket of recipient country	USD 2017 billions
Lower-middle income	94.4
Upper-middle income	52.5
Low-income	20.4
High-income	2.3

Table A-21: Chinese official financial commitments per country before and after joining the BRI (weighted average)

Country	Average commitments per year before BRI	Average commitments per year after BRI	% increase
Kazakhstan	4,452.79	2,635.09	-41%
Indonesia	1,803.17	6,418.48	256%
Viet Nam	1,548.96	249.95	-84%
Iraq	1,158.18	14.86	-99%
Pakistan	1,146.31	5,110.67	346%
Kenya	980.38	884.62	-10%
Sri Lanka	962.88	1,742.91	81%
Malaysia	931.79	1,675.19	80%
Cambodia	908.74	844.63	-7%
Belarus	895.99	647.18	-28%
Myanmar	770.19	208.26	-73%
Uzbekistan	707.70	658.77	-7%
Papua New Guinea	628.26	460.78	-27%
South Africa	459.39	2,344.50	410%
Cameroon	437.69	804.22	84%
Cote d'Ivoire	302.71	119.98	-60%
Kyrgyz Republic	251.02	307.38	22%
Serbia	240.90	420.79	75%
Ukraine	196.10	0.10	-100%
Mongolia	158.30	282.49	78%
Turkey	130.68	1,591.68	1118%
Montenegro	113.43	3.09	-97%

Philippines	103.73	463.79	347%
Maldives	103.72	686.60	562%
Nepal	92.74	191.52	107%
Bosnia and Herzegovina	91.99	698.02	659%
Morocco	91.96	-	-100%
Thailand	68.01	0.02	-100%
Egypt	50.46	2,223.22	4305%
Bulgaria	45.60	106.97	135%
Georgia	39.35	18.39	-53%
Romania	24.27	15.64	-36%
Afghanistan	16.31	33.13	103%
Panama	9.21	-	-100%
Yemen	8.65	142.70	1549%
Lebanon	7.04	29.48	319%
Moldova	6.91	4.92	-29%
Madagascar	6.65	173.75	2514%
Timor-Leste	5.46	1.20	-78%
Armenia	5.23	16.19	209%
Somalia	2.85	5.70	100%
Somalia	1.9	5.7	204%
North Macedonia	1.57	154.32	9741%
Albania	0.69	5.15	646%
Azerbaijan	0.67	189.64	28190%
Total	19,970.5	32,591.7	63%

Note: This table excludes Russia, which is an outlying observation. All commitment values are measured in constant 2017 USD.

Section 6. Metadata

Overview of TUFF 2.0 methodology

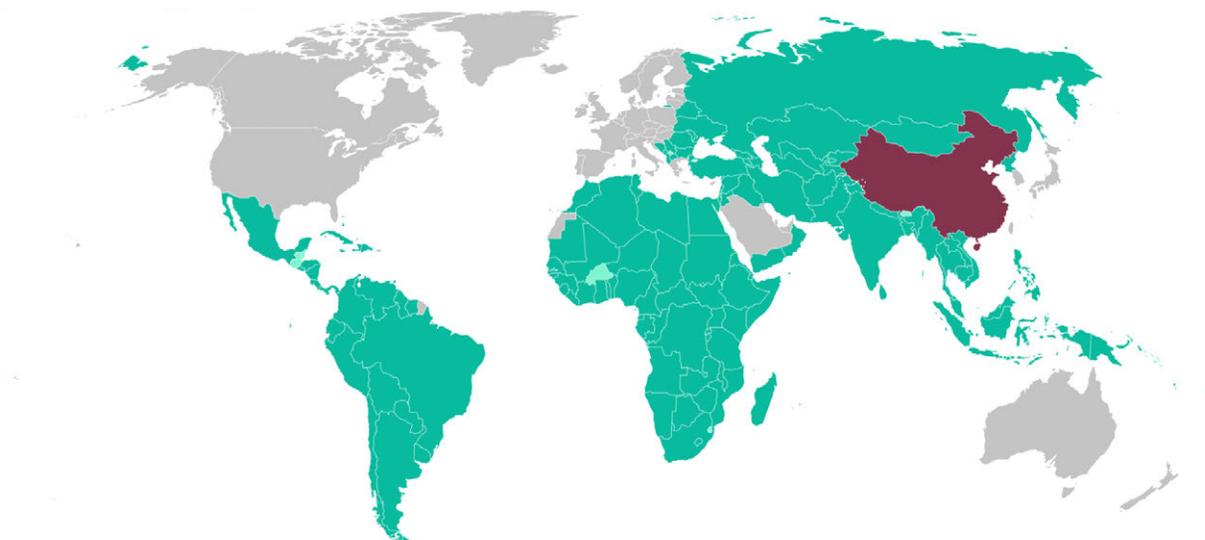
AidData's Global Chinese Development Finance Dataset (Version 2.0) was collected using Tracking Underreported Financial Flows (TUFF). TUFF is a transparent, systematic, and replicable methodology that enables the collection of detailed financial, operational, and locational information about Chinese ODA- and OOF-financed projects (Custer et al. 2021). It is undertaken in three stages: (1) project identification, (2) project verification and enhancement, (3a) project-level data quality assurance, and (3b) quality assurance of the dataset as a whole.

The 2.0 version of AidData's Global Chinese Development Finance Dataset was collected using a re-engineered version of the TUFF methodology ("TUFF 2.0") that involved three major improvements (Custer et al. 2021). First, instead of relying on media sources to identify individual projects, AidData began its search process by systematically reviewing tens of thousands of primary, official sources. These sources include unredacted grant and loan agreements published in government registers and gazettes, official records extracted from the aid and debt information management systems of host countries, annual reports published by Chinese state-owned banks, Chinese Embassy and MOFCOM websites, reports published by parliamentary oversight institutions in host countries, and AidData's direct correspondence with finance ministry officials in developing countries. Official source retrieval was undertaken on a country-by-country basis to comprehensively track the full range of financial and in-kind transfers from official sector institutions in China. Then, as a supplement, AidData conducted a set of systematic search procedures in Factiva—a Dow Jones-owned media database that draws on approximately 33,000 media sources worldwide in 28 languages, including newspapers and radio and television transcripts—to identify non-official sources that also provide useful information about Chinese government-financed projects. Second, TUFF 2.0 involved the implementation of an enhanced set of data quality assurance protocols to identify important project implementation details, such as calendar day-level commencement and completion dates, precise geographical locations and features of project activities, and the contractors and subcontractors responsible for implementation. Third, TUFF 2.0 prioritized the collection of more detailed information on the terms and conditions that govern the loan and export credit contracts issued by Chinese state-owned entities, such as maturities, grace periods, interest rates, grant elements, commitment fees, management fees, and the use of credit enhancements (including collateral, insurance, and repayment guarantees).

The construction of the dataset was only possible because of the collective efforts of hundreds of professional staff, faculty, research assistants, and expert reviewers at multiple institutions over the last five years. More details on the full methodology and how it was applied to construct the 2.0 version of AidData's Global Chinese Development Finance Dataset can be found in Custer et al. (2021).

AidData's Global Chinese Development Finance Dataset (Version 2.0) systematically captures official financial transfers from China to 165 countries worldwide, including all low- and middle-income countries (as of 2017), as well as 11 countries and territories that were designated as high-income countries over the entire data collection commitment year period (2000-2017). This dataset seeks to provide comprehensive coverage of all low- and middle- income countries, as well as full coverage of the five major regions, including Asia, Africa, Latin America and the Caribbean, the Middle East, and Eastern Europe. The 11 high-income countries were included to help ensure comprehensive coverage in each region to the extent possible. In total, we have captured Chinese Government-financed development projects in 145 countries, meaning we found no projects in 20 countries and territories despite systematic searches.

Figure A-28: Coverage of AidData's Global Chinese Development Finance Dataset, Version 2.0



Source: AidData.

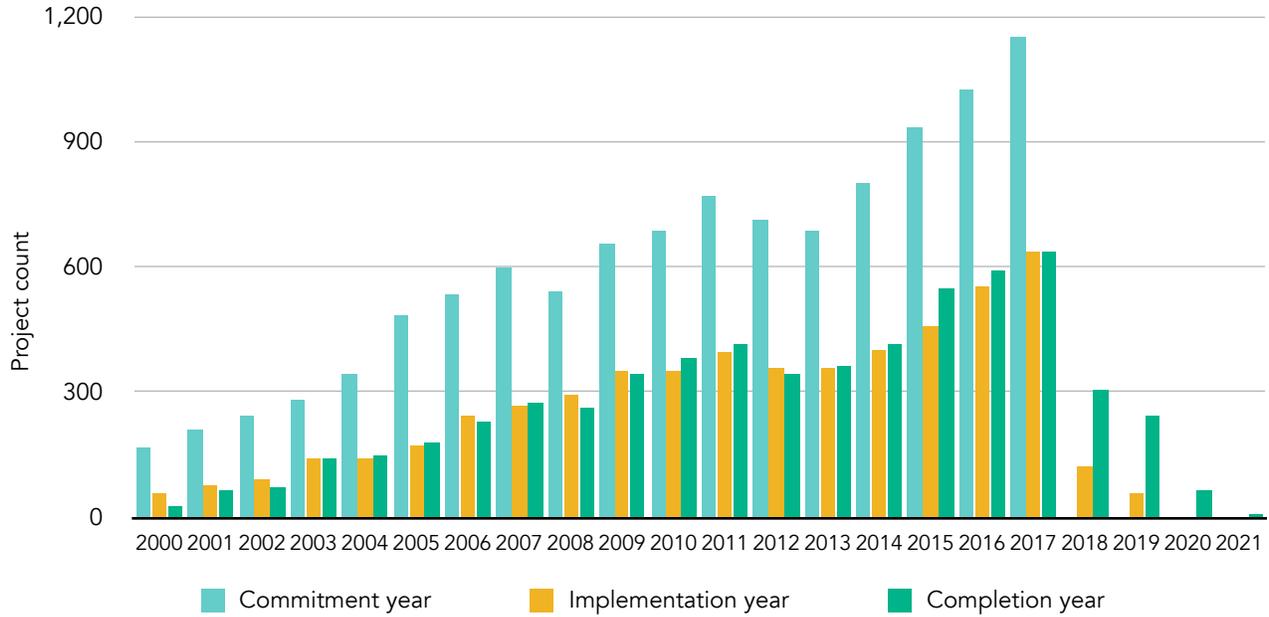
The 2.0 dataset is built upon a wide array of publicly available sources. For each project in the dataset, all the sources used to confirm the existence of the project and construct the project record are linked and included in the final version of the dataset. Table A-22 provides an overview of the nature and the number of sources used to construct the 2.0 dataset. In many cases, official sources provide information about multiple projects, which is one of the main reasons why the total number of unique sources is 63,464 but the total number of sources is 91,356.

Table A-22: Source counts for AidData's Global Chinese Development Finance Dataset, Version 2.0

Source type	# of source references	Source category	Source type	# of unique sources	Source category
Donor/recipient official source	35996	Official	Donor/recipient official source	24662	Official
Implementing/intermediary organization source	8957	Official	Implementing/intermediary organization source	6518	Official
Other official source (non-donor, non-recipient, non-implementing)	5504	Official	Other official source (non-donor, non-recipient, non-implementing)	2895	Official
NGO/civil society/advocacy (non-donor, non-recipient, non-implementing)	2019	Non-official	NGO/civil society/advocacy (non-donor, non-recipient, non-implementing)	1065	Non-official
Academic journal article	2038	Non-official	Academic journal article	686	Non-official
Other academic (working paper, dissertation)	2542	Non-official	Other academic (working paper, dissertation)	840	Non-official
Media report	30958	Non-official	Media report	24470	Non-official

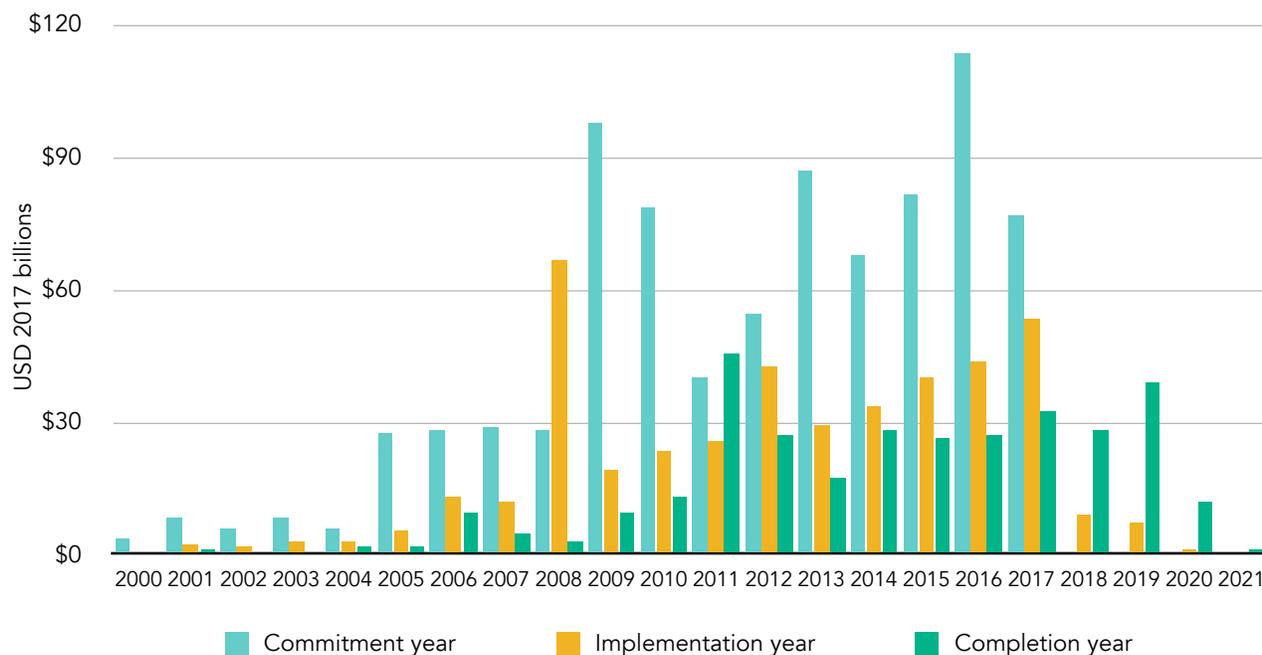
Social media, including unofficial blogs	946	Non-official	Social media, including unofficial blogs	763	Non-official
Other	2396	Non-official	Other	1565	Non-official
Total	91356		Total	63464	

Figure A-29: Distribution of projects by commitment year, implementation start year, and completion year



Source: AidData.

Figure A-30: Financial flows by commitment year, implementation start year, and completion year



Source: AidData.

Table A-23: Project counts by year of actual start of project implementation

Year	Total # of projects	# in implementation
2000	58	1
2001	75	3
2002	93	2
2003	139	3
2004	143	2
2005	173	3
2006	245	10
2007	268	19
2008	293	9
2009	350	18
2010	349	17
2011	396	29
2012	360	42
2013	358	46

2014	400	29
2015	460	48
2016	552	83
2017	634	132
2018	123	62
2019	57	50
2020	6	6
2021	2	2
Blank	5,311	640

Table A-24: China's overseas development finance portfolio, by project value thresholds

Threshold	% of total projects	% of total financial value	Project count	USD 2017 billions
Above \$1 billion	1%	53%	154	447
Between \$500m and \$1 billion	2%	13%	167	113
Between \$250m and \$500m	3%	13%	320	114
Between \$50m and \$250m	11%	15%	1,175	130
Between \$1m and \$50m	28%	5%	3,005	39
Under \$1 million	16%	0.1%	1,722	0.5
Blank	40%	0%	4,306	-
Total	100%	100%	10,849	843

Table A-25: Breakdown of project records with missing transaction amounts

Flow type	% of projects	Project count
Grant	57%	2,453
Free-standing technical assistance	21%	921
Scholarships/training in the donor country	12%	504
Loan	5%	235
Vague TBD	2%	74
Debt rescheduling	2%	74
Export buyer's credit	1%	34
Debt forgiveness	0%	8
Supplier's credit/export seller's credit	0%	3
Total	100%	4,306

Table A-26: Availability of actual project commencement and completion dates, 1.0 vs. 2.0 dataset

Implementation dates	1.0 dataset	2.0 dataset
Actual implementation date	745 projects (17% of officially committed projects)	5,539 projects (51.1% of officially committed projects)
Actual completion date	906 projects (20.7% of officially committed projects)	6,061 projects (55.9% of officially committed projects)

Table A-27: Country-by-country comparison of DRS and AidData measures of host government debt exposure to China

Country	Reports to DRS	Sovereign debt exposure to China (AidData)	Sovereign debt exposure to China (DRS)	Hidden debt exposure to China (AidData)	Sovereign and hidden debt exposure to China (AidData)	AidData-DRS Δ in constant 2017 USD	Sovereign debt exposure to China as % of GDP (AidData)	Sovereign debt exposure to China as % of GDP (DRS)	Hidden debt exposure to China as % of GDP (AidData)	Sovereign and hidden debt exposure to China as % of GDP (AidData)	AidData-DRS Δ in % of GDP
Afghanistan	Y	0	0	0	0	0	0.0%	0.0%	0.0%	0.0%	0.0%
Albania	Y	86	0	0	86	86	0.6%	0.0%	0.0%	0.6%	0.6%
Algeria	Y	59	5	42	102	97	0.0%	0.0%	0.0%	0.1%	0.1%
American Samoa	N	0	-	0	0	0	-	-	0.0%	0.0%	0.0%
Angola	Y	39,888	59,771	12,412	52,301	(7,470)	37.8%	56.6%	11.8%	49.5%	-7.1%
Antigua and Barbuda	N	270	-	0	270	270	19.7%	-	0.0%	19.7%	19.7%
Argentina	Y	6,437	7,467	365	6,801	(665)	1.3%	1.5%	0.1%	1.3%	-0.1%
Armenia	Y	24	25	0	24	(0)	0.2%	0.2%	0.0%	0.2%	0.0%
Aruba	N	0	-	0	0	0	0.0%	-	0.0%	0.0%	0.0%
Azerbaijan	Y	0	0	448	448	448	0.0%	0.0%	1.1%	1.1%	1.1%
Bahamas	N	114	-	0	114	114	1.0%	-	0.0%	1.0%	1.0%
Bangladesh	Y	7,115	4,328	1,750	8,865	4,537	2.4%	1.5%	0.6%	3.0%	1.6%
Barbados	N	22	-	167	189	189	0.5%	-	4.1%	4.6%	4.6%
Belarus	Y	7,496	9,740	481	7,977	(1,763)	13.7%	17.8%	0.9%	14.6%	-3.2%
Belize	N	0	7	0	0	(7)	0.0%	0.4%	0.0%	0.0%	-0.4%
Benin	Y	839	903	40	879	(24)	5.4%	5.8%	0.3%	5.7%	-0.2%
Bhutan	Y	0	0	0	0	0	0.0%	-	0.0%	0.0%	0.0%
Bolivia	Y	1,904	2,117	103	2,007	(110)	5.2%	5.8%	0.3%	5.5%	-0.3%
Bosnia and Herzegovina	Y	692	0	294	986	986	3.6%	0.0%	1.5%	5.2%	5.2%

Botswana	Y	1,258	168	0	1,258	1,090	7.2%	1.0%	0.0%	7.2%	6.3%
Brazil	Y	2,258	20,680	32,116	34,374	13,694	0.1%	1.0%	1.6%	1.7%	0.7%
British Virgin Islands	N	0	-	0	0	0	0.0%	-	0.0%	0.0%	0.0%
Brunei Darussalam	N	0	-	1,750	1,750	1,750	0.0%	-	13.5%	13.5%	13.5%
Bulgaria	Y	44	44	330	374	330	0.1%	0.1%	0.5%	0.6%	0.5%
Burkina Faso	Y	0	94	0	0	(94)	0.0%	0.6%	0.0%	0.0%	-0.6%
Burundi	Y	41	139	33	74	(65)	1.3%	4.3%	1.0%	2.3%	-2.0%
Cabo Verde	Y	172	54	0	172	117	10.3%	3.3%	0.0%	10.3%	7.0%
Cambodia	Y	4,725	4,602	133	4,857	255	19.2%	18.7%	0.5%	19.7%	1.0%
Cameroon	Y	5,464	6,069	0	5,464	(605)	13.9%	15.4%	0.0%	13.9%	-1.5%
Cayman Islands	N	0	-	0	0	0	0.0%	-	0.0%	0.0%	0.0%
Central African Republic	Y	63	81	119	182	101	2.8%	3.6%	5.2%	8.0%	4.4%
Chad	Y	769	322	31	801	479	7.1%	3.0%	0.3%	7.4%	4.4%
Chile	N	14	-	582	596	596	0.0%	-	0.2%	0.2%	0.2%
Colombia	Y	50	0	50	100	100	0.0%	0.0%	0.0%	0.0%	0.0%
Comoros	Y	38	38	0	38	0	3.1%	3.1%	0.0%	3.1%	0.0%
Congo	Y	6,201	2,675	51	6,252	3,577	53.0%	22.8%	0.4%	53.4%	30.6%
Cook Islands	N	33	-	0	33	33	8.3%	-	0.0%	8.3%	8.3%
Costa Rica	Y	435	693	168	603	(90)	0.7%	1.2%	0.3%	1.0%	-0.2%
Cote d'Ivoire	Y	2,760	2,853	3	2,763	(90)	4.5%	4.7%	0.0%	4.6%	-0.1%
Cuba	N	3,441	-	202	3,643	3,643	3.6%	-	0.2%	3.8%	3.8%
Curacao	N	0	-	0	0	0	0.0%	-	0.0%	0.0%	0.0%

Democratic People's Republic of Korea	N	0	-	0	0	0	0.0%	-	0.0%	0.0%	0.0%
Democratic Republic of the Congo	Y	2,443	767	4,624	7,067	6,300	6.0%	1.9%	11.4%	17.4%	15.5%
Djibouti	Y	1,511	1,240	58	1,568	328	46.8%	38.4%	1.8%	48.5%	10.1%
Dominica	Y	63	71	0	63	(9)	13.7%	15.6%	0.0%	13.7%	-1.9%
Dominican Republic	Y	0	53	0	0	(53)	0.0%	0.1%	0.0%	0.0%	-0.1%
Ecuador	Y	1,267	13,317	2,372	15,042	1,724	13.0%	13.7%	2.4%	15.4%	1.7%
Egypt	Y	2,852	3,337	1,722	4,574	1,236	1.3%	1.5%	0.8%	2.1%	0.6%
El Salvador	Y	0	236	0	0	(236)	0.0%	1.0%	0.0%	0.0%	-1.0%
Equatorial Guinea	N	5,251	-	0	5,251	5,251	49.7%	-	0.0%	49.7%	49.7%
Eritrea	Y	796	235	104	900	666	14.9%	4.4%	1.9%	16.9%	12.5%
Eswatini	Y	0	179	0	0	(179)	0.0%	3.9%	0.0%	0.0%	-3.9%
Ethiopia	Y	10,850	15,666	4,557	15,407	(260)	10.9%	15.8%	4.6%	15.5%	-0.3%
Fiji	Y	385	338	0	385	47	8.4%	7.4%	0.0%	8.4%	1.0%
French Polynesia	N	0	-	0	0	0	0.0%	-	0.0%	0.0%	0.0%
Gabon	Y	2,303	1,973	0	2,303	330	14.4%	12.4%	0.0%	14.4%	2.1%
Gambia	Y	25	0	0	25	25	1.4%	0.0%	0.0%	1.4%	1.4%
Georgia	Y	8	8	0	8	(0)	0.0%	0.0%	0.0%	0.0%	0.0%
Ghana	Y	3,800	6,306	385	4,185	(2,121)	5.7%	9.4%	0.6%	6.2%	-3.2%
Grenada	Y	73	136	0	73	(63)	6.8%	12.8%	0.0%	6.8%	-6.0%
Guam	N	0	-	0	0	0	0.0%	-	0.0%	0.0%	0.0%
Guatemala	Y	0	67	0	0	(67)	0.0%	0.1%	0.0%	0.0%	-0.1%

Guinea	Y	59	779	532	591	(189)	0.5%	6.3%	4.3%	4.8%	-1.5%
Guinea-Bissau	Y	10	0	0	10	10	0.7%	0.0%	0.0%	0.7%	0.7%
Guyana	Y	342	392	0	342	(51)	4.6%	5.2%	0.0%	4.6%	-0.7%
Haiti	Y	0	0	0	0	0	0.0%	0.0%	0.0%	0.0%	0.0%
Honduras	Y	287	561	0	287	(274)	1.3%	2.5%	0.0%	1.3%	-1.2%
India	Y	0	336	0	0	(336)	0.0%	0.0%	0.0%	0.0%	0.0%
Indonesia	Y	4,954	3,904	17,283	22,236	18,332	0.5%	0.4%	1.6%	2.0%	1.7%
Iran	Y	7,617	2,743	5,861	13,478	10,734	7.6%	2.7%	5.9%	13.5%	10.7%
Iraq	N	0	-	0	0	0	0.0%	-	0.0%	0.0%	0.0%
Israel	N	0	-	0	0	0	0.0%	-	0.0%	0.0%	0.0%
Jamaica	Y	1,481	1,481	18	1,500	19	11.1%	11.1%	0.1%	11.2%	0.1%
Jordan	Y	31	63	0	31	(32)	0.1%	0.1%	0.0%	0.1%	-0.1%
Kazakhstan	Y	3,172	3,236	27,271	30,443	27,207	1.8%	1.9%	15.7%	17.5%	15.7%
Kenya	Y	9,287	9,796	22	9,309	(487)	10.7%	11.3%	0.0%	10.7%	-0.6%
Kiribati	N	0	-	0	0	0	0.0%	-	0.0%	0.0%	0.0%
Kosovo	Y	0	0	0	0	0	0.0%	0.0%	0.0%	0.0%	0.0%
Kyrgyz Republic	Y	2,233	2,206	105	2,338	132	30.2%	29.8%	1.4%	31.6%	1.8%
Lao People's Democratic Republic	Y	5,575	8,144	6,692	12,267	4,123	29.4%	43.0%	35.4%	64.8%	21.8%
Lebanon	Y	24	0	0	24	24	0.1%	0.0%	0.0%	0.1%	0.1%
Lesotho	Y	100	88	0	100	12	4.9%	4.3%	0.0%	4.9%	0.6%
Liberia	Y	54	63	0	54	(9)	1.0%	1.1%	0.0%	1.0%	-0.2%
Libya	N	0	-	391	391	391	0.0%	-	1.3%	1.3%	1.3%
Madagascar	Y	186	191	0	186	(5)	1.4%	1.4%	0.0%	1.4%	0.0%
Malawi	Y	340	305	135	476	170	3.5%	3.2%	1.4%	4.9%	1.8%

Malaysia	N	6,975	-	1,529	8,504	8,504	2.1%	-	0.5%	2.6%	2.6%
Maldives	Y	1,502	1,415	0	1,502	88	40.3%	37.9%	0.0%	40.3%	2.3%
Mali	Y	923	841	2	925	85	5.4%	4.9%	0.0%	5.4%	0.5%
Marshall Islands	N	0	-	0	0	0	0.0%	-	0.0%	0.0%	0.0%
Mauritania	Y	750	979	0	750	(229)	11.0%	14.3%	0.0%	11.0%	-3.3%
Mauritius	N	391	-	383	774	774	3.3%	-	3.2%	6.5%	6.5%
Mexico	Y	38	0	0	38	38	0.0%	0.0%	0.0%	0.0%	0.0%
Micronesia	N	0	-	3	3	3	0.0%	-	0.8%	0.8%	0.8%
Moldova	Y	0	48	14	14	(34)	0.0%	0.5%	0.1%	0.1%	-0.3%
Mongolia	Y	1,636	1,267	520	2,156	889	13.6%	10.5%	4.3%	17.9%	7.4%
Montenegro	Y	1,012	105	0	1,012	908	18.7%	1.9%	0.0%	18.7%	16.8%
Morocco	Y	256	751	385	641	(110)	0.2%	0.7%	0.3%	0.6%	-0.1%
Mozambique	Y	2,637	3,163	1,550	4,187	1,024	19.9%	23.8%	11.7%	31.5%	7.7%
Myanmar	Y	3,322	7,540	4,874	8,196	656	4.9%	11.2%	7.2%	12.1%	1.0%
Namibia	N	323	-	1,425	1,747	1,747	2.7%	-	11.8%	14.5%	14.5%
Nauru	N	0	-	0	0	0	0.0%	-	0.0%	0.0%	0.0%
Nepal	Y	395	363	0	395	32	1.2%	1.1%	0.0%	1.2%	0.1%
New Caledonia	N	0	-	0	0	0	0.0%	-	0.0%	0.0%	0.0%
Nicaragua	Y	0	10	0	0	(10)	0.0%	0.1%	0.0%	0.0%	-0.1%
Niger	Y	1,386	1,516	107	1,494	(22)	10.4%	11.4%	0.8%	11.2%	-0.2%
Nigeria	Y	6,444	6,375	52	6,496	121	1.7%	1.7%	0.0%	1.7%	0.0%
Niue	N	0	-	0	0	0	0.0%	-	0.0%	0.0%	0.0%
North Macedonia	Y	964	780	0	964	184	8.2%	6.6%	0.0%	8.2%	1.6%
Northern Mariana Islands	N	0	-	0	0	0	0.0%	-	0.0%	0.0%	0.0%

Oman	N	4,998	-	410	5,408	5,408	7.0%	-	0.6%	7.6%	7.6%
Pakistan	Y	24,383	29,402	1,802	26,185	(3,217)	7.4%	8.9%	0.5%	7.9%	-1.0%
Palau	N	0	-	0	0	0	0.0%	-	0.0%	0.0%	0.0%
Panama	N	59	-	0	59	59	0.1%	-	0.0%	0.1%	0.1%
Papua New Guinea	Y	1,347	1,350	2,618	3,965	2,615	5.8%	5.9%	11.4%	17.2%	11.3%
Paraguay	Y	49	0	0	49	49	0.1%	0.0%	0.0%	0.1%	0.1%
Peru	Y	0	0	243	243	243	0.0%	0.0%	0.1%	0.1%	0.1%
Philippines	Y	639	2,048	478	1,117	(931)	0.2%	0.6%	0.1%	0.3%	-0.3%
Puerto Rico	N	0	-	0	0	0	0.0%	-	0.0%	0.0%	0.0%
Romania	N	253	-	0	253	253	0.1%	-	0.0%	0.1%	0.1%
Russia	Y	0	0	117,681	117,681	117,681	0.0%	0.0%	7.6%	7.6%	7.6%
Rwanda	Y	302	236	0	302	65	2.9%	2.2%	0.0%	2.9%	0.6%
Saint Lucia	Y	0	19	0	0	(19)	0.0%	1.2%	0.0%	0.0%	-1.2%
Samoa	Y	250	236	0	250	14	29.9%	28.2%	0.0%	29.9%	1.7%
Sao Tome and Principe	Y	0	0.4	0	0	(0)	0.0%	0.1%	0.0%	0.0%	-0.1%
Senegal	Y	2,463	1,866	0	2,463	597	10.2%	7.7%	0.0%	10.2%	2.5%
Serbia	Y	1,992	2,078	203	2,195	117	4.2%	4.4%	0.4%	4.6%	0.2%
Seychelles	N	2	-	0	2	2	0.2%	-	0.0%	0.2%	0.2%
Sierra Leone	Y	733	69	44	776	708	18.6%	1.7%	1.1%	19.7%	18.0%
Sint Maarten (Dutch part)	N	0	-	0	0	0	0.0%	-	0.0%	0.0%	0.0%
Solomon Islands	Y	0	0	0	0	0	0.0%	0.0%	0.0%	0.0%	0.0%
Somalia	Y	0	0	0	0	0	0.0%	0.0%	0.0%	0.0%	0.0%
South Africa	Y	2,498	4,000	4,545	7,043	3,043	0.8%	1.2%	1.4%	2.1%	0.9%

South Sudan	N	2,132	-	0	2,132	2,132	14.6%	-	0.0%	14.6%	14.6%
Sri Lanka	Y	10,394	10,326	374	10,768	442	11.7%	11.6%	0.4%	12.1%	0.5%
St. Kitts and Nevis	N	0	-	0	0	0	0.0%	-	0.0%	0.0%	0.0%
St. Martin (French part)	N	0	-	0	0	0	0.0%	-	0.0%	0.0%	0.0%
St. Vincent and the Grenadines	Y	0	43	0	0	(43)	0.0%	5.4%	0.0%	0.0%	-5.4%
Sudan	Y	8,786	5,144	3,087	11,872	6,729	20.9%	12.3%	7.4%	28.3%	16.0%
Suriname	N	902	-	0	902	902	34.0%	-	0.0%	34.0%	34.0%
Syrian Arab Republic	Y	131	67	0	131	64	0.3%	0.1%	0.0%	0.3%	0.1%
Tajikistan	Y	2,148	2,095	225	2,373	278	24.5%	23.9%	2.6%	27.0%	3.2%
Tanzania	Y	2,887	850	0	2,887	2,036	4.8%	1.4%	0.0%	4.8%	3.4%
Thailand	Y	0	0	0	0	0	0.0%	0.0%	0.0%	0.0%	0.0%
Timor-Leste	Y	0	0	0	0	0	0.0%	0.0%	0.0%	0.0%	0.0%
Togo	Y	837	932	143	980	48	11.3%	12.5%	1.9%	13.2%	0.7%
Tonga	Y	69	152	98	167	15	14.6%	32.2%	20.8%	35.4%	3.2%
Trinidad and Tobago	N	461	-	0	461	461	2.2%	-	0.0%	2.2%	2.2%
Tunisia	Y	180	154	11	191	36	0.5%	0.4%	0.0%	0.5%	0.1%
Turkey	Y	1,124	1,524	1,806	2,930	1,406	0.1%	0.2%	0.2%	0.3%	0.2%
Turkmenistan	Y	796	316	8,111	8,907	8,591	2.2%	0.9%	22.5%	24.7%	23.9%
Turks and Caicos Islands	N	0	-	0	0	0	0.0%	-	0.0%	0.0%	0.0%
Tuvalu	N	0	-	0	0	0	0.0%	-	0.0%	0.0%	0.0%
Uganda	Y	2,874	2,873	0	2,874	1	8.2%	8.1%	0.0%	8.2%	0.0%
Ukraine	Y	1,670	0	0	1,670	1,670	1.5%	0.0%	0.0%	1.5%	1.5%

Uruguay	N	49	-	47	97	97	0.1%	-	0.1%	0.2%	0.2%
Uzbekistan	Y	1,553	2,854	6,010	7,562	4,708	2.4%	4.4%	9.2%	11.6%	7.2%
Vanuatu	Y	196	184	0	196	12	22.5%	21.2%	0.0%	22.5%	1.3%
Venezuela	Y	74,741	699	16,329	91,070	90,371	17.5%	0.4%	4.0%	21.5%	21.1%
Viet Nam	Y	7,617	4,574	7,205	14,823	10,249	2.9%	1.8%	2.8%	5.7%	3.9%
Virgin Islands (U.S.)	N	0	-	0	0	0	0.0%	-	0.0%	0.0%	0.0%
West Bank and Gaza Strip	N	0	-	0	0	0	0.0%	-	0.0%	0.0%	0.0%
Yemen	Y	310	389	0	310	(80)	2.5%	3.1%	0.0%	2.5%	-0.6%
Zambia	Y	6,608	6,066	1,337	7,945	1,880	27.1%	24.8%	5.5%	32.5%	7.7%
Zimbabwe	Y	1,652	3,146	1,448	3,099	(46)	13.0%	20.3%	8.0%	21.0%	0.7%