Contents

1. Introduction

During the 19th National Party Congress in 2017, China's Communist Party formally adopted the Belt and Road Initiative (BRI) under its Party Constitution as part of a resolution to achieve "shared growth through discussion and collaboration." As a result, President Xi Jinping entered his second term with a strategy of international engagement defined by BRI, signaling a sustained commitment to an initiative that has already been heavily invoked by China's leadership. The Party Congress may mark the point at which ambitious rhetoric shifted to an operational program.

As envisioned, BRI spans at least 68 countries with an announced investment as high as $8 trillion for a vast network of transportation, energy, and telecommunications infrastructure linking Europe, Africa, and Asia.[1] It is an infrastructure financing initiative for a large part of the global economy that will also serve key economic, foreign policy, and security objectives for the Chinese government.

Yet, important questions arise on sustainable financing of the initiative within BRI countries, and how the Chinese government will position itself on debt sustainability. Infrastructure financing, which often entails lending to sovereigns or the use of a sovereign guarantee, can create challenges for sovereign debt sustainability. And when the creditor itself is a sovereign, or has official ties to a sovereign as do China's policy banks—China Development Bank (CDB), the Export-Import Bank of China (China Exim Bank), and the Agricultural Development Bank of China (ADBC)—these challenges often affect the bilateral relationship between the two governments. They are also, to varying degrees, guided by standards determined by multilateral institutions like the World Bank and International Monetary Fund (IMF), or by multilateral mechanisms like the Paris Club.

It remains unclear the degree to which BRI, a Chinese-led bilateral initiative that seeks to employ some multilateral mechanisms to achieve its financing goals, will be guided by multilateral standards on debt sustainability. This paper will explore the policy considerations facing China and possible multilateral partners in BRI like the World Bank, Asian Infrastructure Investment Bank (AIIB), and Asian Development Bank (ADB) when it comes to sustainable financing and when debt problems arise.

As a starting point, the paper assesses the current debt vulnerabilities of all likely BRI prospect countries. In a subset of 23 countries that we determine to be significantly or highly vulnerable to debt distress, we construct a BRI project lending pipeline based on publicly reported sources. Integrating this financing data into a country's debt as of end-2016, we consider the movement in a country's overall public debt-to-GDP ratio, as well as the concentration of that debt with China as creditor. Along these two dimensions, we identify eight countries where BRI appears to create the potential for debt sustainability problems, and where China is a dominant creditor in the key position to address those problems. We next describe the credit risk that China faces in each of the eight countries. Finally, we

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[1] The highest estimate we've identified in media reports. See Balding, 2017; Moser, 2017; Wo-lap, 2016.

examine China's experience as a creditor facing debt problems with a borrowing sovereign country. We consider the degree to which China has participated in multilateral approaches to managing these problems, and highlight cases where China has managed a debt problem strictly through the bilateral relationship and with ad hoc outcomes that do not follow the practices of other leading creditor countries.

Based on this assessment, we offer conclusions and recommendations about how BRI, and the Chinese government as its leading architect, should approach the question of debt sustainability in BRI countries.

We conclude that multilateral actors can, and should, encourage policies and procedures for BRI that would improve the initiative's development impact. To do so, they should obtain clear commitments from the Chinese architects of BRI about the applicability of multilateral standards that pertain to debt sustainability. For its part, this is an opportunity for China to embrace more sustainable lending practices in its bilateral engagements. By adhering to widely accepted "rules of the road" for sovereign creditors, this initiative could make great strides in spurring productivity growth through sound infrastructure investments in developing economies. The alternative will be an initiative that introduces new debt vulnerabilities in developing countries and risks growth setbacks in some of these countries.

2. Debt sustainability and BRI

Some public reporting has expressed alarm about the implications of BRI for debt sustainability.[2] The primary concern is that an $8 trillion-dollar initiative will leave countries with debt "overhangs" that will impede sound public investment and economic growth more generally (see Box 1). There is also concern that debt problems will create an unfavorable degree of dependency on China as a creditor. Increasing debt, and China's role in managing bilateral debt problems, has already exacerbated internal and bilateral tensions in some BRI countries, such as Sri Lanka, where citizens have regularly clashed with police over a new industrial zone surrounding Hambantota port,[3] and Pakistan, where Chinese officials openly appealed to opposition politicians to embrace the construction of the China-Pakistan Economic Corridor (CPEC), BRI's "flagship project" to bolster ties between Beijing and Islamabad.[4]

The sustainability of BRI financing will depend in part on the productivity of the BRI projects themselves. The developmental benefits of increased public infrastructure investment more broadly have been promoted by multilateral development institutions. For example, a widely quoted ADB study asserts that in Asia alone, $26 trillion in infrastructure investments are needed over the 2016-2030 period to maintain 3 to 7 percent economic growth, eliminate poverty, and respond to climate change.[5]

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[2] Heydarian 2017; Krakowska 2017; Zhang 2017.
[3] Aneez 2017.
[4] The Economist, May 2017.
[5] ADB, 2017.

Box 1: Why debt sustainability matters

If infrastructure is a critical engine of growth in developing economies, then debt financing is the fuel for that engine. Public borrowing to support productive investment is central to the development narratives of today's wealthy countries and it continues to drive growth in emerging economies. However, there is also considerable evidence indicating significant negative impacts on countries and their people when governments incur too much debt.

When government borrowing is not accompanied by enough economic growth and revenue generation to fully service the debt, it can generate a downward spiral that inevitably ends in the need for debt restructuring or reduction.[6] Domestic spending on infrastructure and social services may be sacrificed in order to service the debt, with the problem compounded when governments borrow additional funds just to meet debt servicing needs.[7] This occurred from the 1970s into the 1990s, when developing countries' debt compounded at an annual average of roughly 20 percent, rising from $300 billion to $1.5 trillion. For the poorest countries, external public debt increased from slightly above 20 percent of GDP in 1970 to almost 140 percent of GDP by 1994. Between 1978 and 1988, interest payments alone on low-income countries' external debts jumped from $230 million to $1.3 billion.[8]

Doubts about a country's ability to service its debt as debt ratios worsen can increase the cost of capital as investors demand a higher return to compensate for increased risk, creating a self-fulfilling debt prophecy.[9] In Argentina, for example, prior to default the average interest rate of the total public debt went from 5.8 percent in 1996 to 9.4 percent in 2001, and bonds issued in 2001 required dollar interest rates of about 15 percent.[10] Imbalances in the external accounts due to negative shocks on the terms of trade or weak exports can result in a real exchange rate depreciation that increases the burden of payments in terms of local currency and enhances the probability of a sovereign default.[11]

The macroeconomic impacts of a rapidly increasing country-risk premium and, if it occurs, a sovereign default, result in significant damage to the economy and to citizen livelihoods. A sovereign default can lead to a banking crisis, as banks have to make write-downs on credits provided to the state; an economic crisis, as aggregate demand falls; and a currency crisis due to a sudden stop in foreign capital.[12] The negative effects can be relatively short-lived, depending on the nature of the workout, but the impacts on individuals who fall into poverty can be lasting. In the case of Argentina, for example, by the end of 2002, 58 percent of the population was living on incomes below the national poverty line and a quarter were considered destitute.[13]

There are also potential cross-border spillover effects from a sovereign default. For example, in the wake of the Latin American debt crisis, commercial creditors who were exposed to sovereign default risks, be it directly via their holdings of foreign government debt or indirectly via their exposure to the banking sector of the defaulting country, reduced their overseas exposure and/or raised the country-risk premiums.[14] While state-owned financial intermediaries such as CDB and China Exim Bank can operate in a riskier manner than purely private institutions, even they could apply a much more conservative business model on a portfolio-wide basis if borrowers exhibit financial stress.

Evidence in some countries appears to support the idea that debt-financed infrastructure investment can play a key role in catalyzing economic growth. For example, Ethiopia has achieved rapid economic growth in a large part due to a massive public investment program financed through loans and other credit instruments.[15] Public infrastructure investment in Ethiopia rose from about 5 percent of GDP in the early 1990s to 18.6 percent of GDP in 2011, and GDP growth averaged over 10 percent between 2010 and 2015. China's economic performance has also benefited from a massive infrastructure investment program, though Chinese authorities have also had to address the monetary expansion, instability in financial markets, economic fragility, and build-up of debt that resulted from these investments.

More generally, the evidence of a causal relationship between public investment and economic growth is mixed. One widely cited study concludes that there is only a weak and short-term positive association between investment spending and growth, with lagged impacts proving insignificant.[16] Another recent analysis finds that investment and infrastructure projects are less likely to be successful when they are undertaken during periods of higher-than-average public investment, which is particularly relevant in light of the BRI "big-push" approach to infrastructure investment.[17]

The sustainability of a country's debt depends not only on macroeconomic variables, but also on the structure of its debt portfolio. For low-income countries (LICs), access to concessional financing is critical for achieving the twin goals of debt sustainability and progress toward reaching development goals. The higher the concessionality, or grant element, of the loan, the less risk of default on the part of the borrower. For multilateral institutions such as the World Bank and the AIIB, the financing terms for loans to sovereign governments are publicly available. This practice is also followed by most bilateral development finance institutions. However, CDB and China Exim Bank do not disclose the terms of their loans, making it difficult, if not impossible, to accurately assess the present value of the debt owed by a country to China. Anecdotal evidence from media and IMF reports indicate that the terms of CDB and China Exim Bank loans vary widely, from interest-free loans in the case of some Pakistan projects to a fully commercial rate in the case

[6] Sturzenegger and Zettelmeyer, 2006.
[7] Shabir and Yassin, 2015.
[8] World Bank International Debt Statistics.
[9] Nicolini, 2016.
[10] Damill, Frankel, and Rapetti, 2006.
[11] Sturzenegger and Zettelmeyer, 2006.
[12] Borensztein and Panizza, 2008
[13] World Bank Argentina Poverty Assessment, 2003.
[14] Trebesch et al., 2012.
[15] Moller and Wacker, 2017.
[16] Warner, 2014.
[17] Presbitero, 2016.

of the Ethiopia-Djibouti railway.[18] Borrowers are also susceptible to exchange rate risks given that most CDB and China Exim loans are denominated in dollars or renminbi.

Other major country creditors may be particularly sensitive to the prospect of BRI investments leading to debt overhang problems and another round of debt relief on a multilateral basis, having already spent billions of dollars to relieve many countries of their debt burdens through Paris Club treatments, the Heavily Indebted Poor Country (HIPC) Initiative, and the Multilateral Debt Relief Initiative. For these reasons, it is appropriate to identify debt sustainability as a key variable in BRI (MDRI) and one that deserves scrutiny during the early stages of the initiative.

Our analysis finds that BRI is unlikely to cause a systemic debt problem in the regions of the initiative's focus. While the aggregate numbers look large, when assessed in the context of the size of the economies that are likely to benefit from BRI investments, the amounts are consistent with current levels of infrastructure investment. Over a 20-year span, an $8 trillion investment program for BRI countries would amount to less than 1.5 percent of GDP per annum, and about 2.5 percent excluding China. It is also likely that some of the China-sourced financing will merely substitute for other sources. These levels are modest in comparison to the ADB's estimated infrastructure financing "needs" in Asia, which are projected to be 5.1 percent of the region's GDP.

Nonetheless, we conclude that there are some countries, most of whom are small and relatively poor, that face a significantly increased risk of a sovereign debt default if planned BRI projects are implemented in an expeditious manner and financed with sovereign loans or guarantees.

Our methodology focuses on two factors: 1) the general risk of sovereign debt distress that individual BRI countries are facing today, and 2) the degree to which BRI financing will add to the risk of debt distress. Because of the policy implications, we center our attention on countries where debt to China, as a share of total public external debt, would be particularly high due to BRI-related projects.

In the following sections, we elaborate on each stage of our methodology (Figure 1):

1. We first **identify 23 BRI countries** at risk of debt distress today according to standard measures of debt sustainability.

2. For each of these countries we **construct a BRI lending pipeline** based on publicly available sources.

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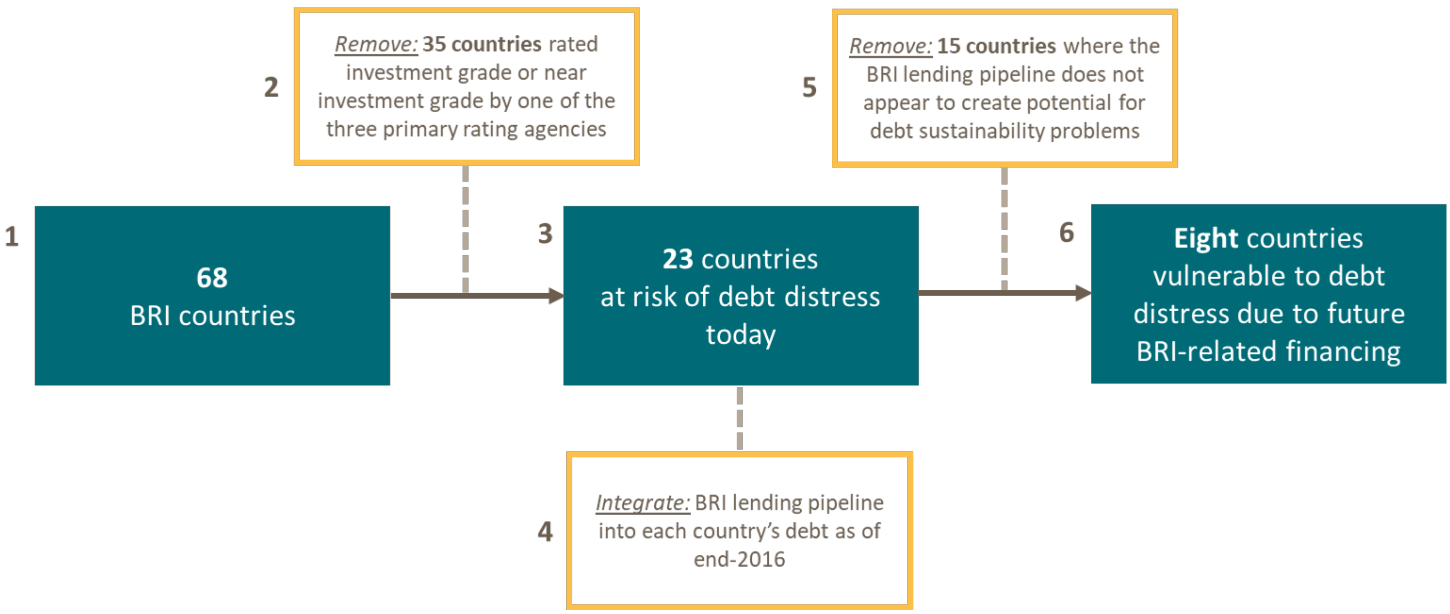
[18] See IMF, July 2016 for grant elements calculated for select Djibouti projects, and Mughal, 2017 for reporting on Pakistan. AidData also calculates grant elements for a variety of projects.

3. We **integrate the lending pipeline** into the countries' overall debt and debt to China as of end-2016.[19]

4. We determine **eight countries** for whom BRI creates the potential for debt sustainability problems.

There are clear limitations to this methodology, which are addressed in appendix A.

Figure 1: Methodology



3. Methodology

3.1 Debt vulnerability in BRI countries

We identify 68 countries that fall under the scope of BRI based on reports from Chinese quasi-official organizations and BRI's geographical representation. By region, these countries are grouped as follows:

- East and Southeast Asia (14): Brunei, China, Indonesia, Malaysia, Mongolia, Myanmar, Cambodia, Laos, Philippines, Singapore, South Korea, Thailand, Timor-Leste, and Vietnam;

- Central and South Asia (13): Afghanistan, Bangladesh, Bhutan, India, Kazakhstan, Kyrgyzstan, Maldives, Nepal, Pakistan, Sri Lanka, Tajikistan, Turkmenistan, and Uzbekistan;

[19] This is the latest available statistic.

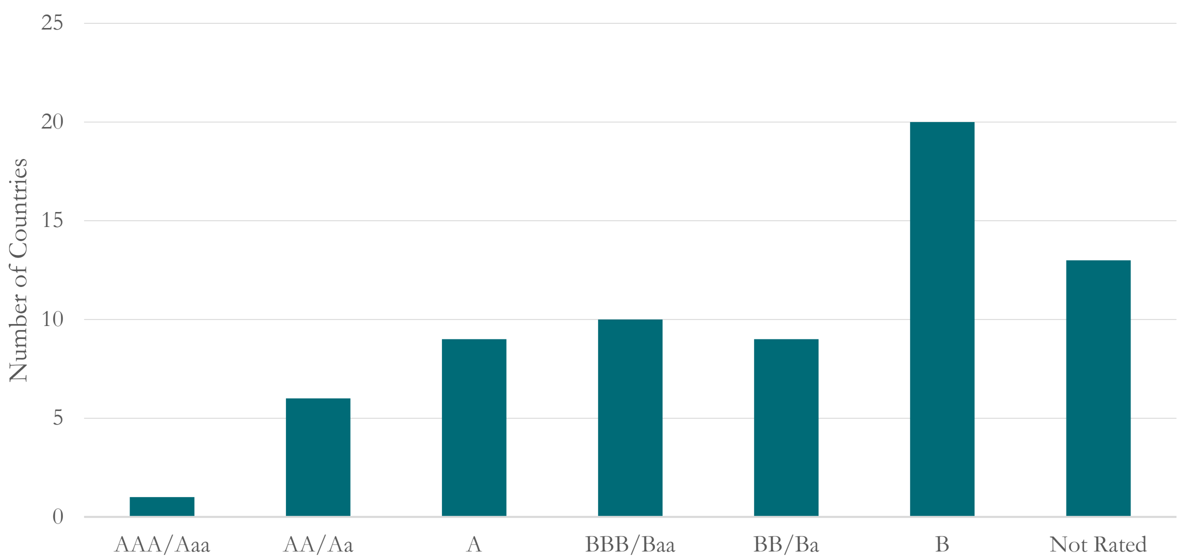
- Middle East and Africa (17): Bahrain, Djibouti, Egypt, Ethiopia, Iran, Iraq, Israel, Jordan, Kenya, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, Syria, United Arab Emirates, and Yemen;

- Europe and Eurasia (24): Albania, Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Estonia, Georgia, Hungary, Latvia, Lithuania, Macedonia, Moldova, Montenegro, Poland, Romania, Russia, Serbia, Slovakia, Slovenia, Turkey, and Ukraine.

The annual economic output of these 68 countries is roughly $25 trillion, with China itself accounting for some 45 percent of the total. They are heterogenous economies, small and large, developed and developing, commodity-dependent and more diversified exporters. To assess current levels of debt risk among these countries, we apply a series of filters.

We first look at the sovereign credit risk ratings issued by the three major credit rating agencies: Standard & Poor's, Moody's, and Fitch Ratings. Of the 68 BRI countries we identified, there are 35 countries at the time of publication that are rated investment grade or near investment grade, and therefore have a low risk of debt distress (Figure 2).[20] As a result, we believe the risk of debt distress from additional BRI-related financing in these countries is small.

Figure 2: Sovereign credit ratings for likely BRI countries



[20] These 35 countries have long-term foreign currency ratings of BB-/Ba3 or better from one of the three primary rating agencies (Standard & Poor's, Moody's, and Fitch Ratings). We use the highest rating from any of the three agencies.

We then focus on the risk of debt distress for the remaining 33 countries that are currently rated below investment grade. We draw primarily from the debt sustainability analyses (DSAs) conducted by the IMF and the World Bank. We remove from consideration Brunei, Iran, Moldova, Myanmar, Nepal, Timor-Leste, Turkmenistan, and Uzbekistan, all "not rated" countries that are at a low risk of debt distress. Moldova, Myanmar, and Nepal have a low risk of debt distress according to their most recent IMF/World Bank DSA, and the others have a public debt-to-GDP ratio below 25 percent. We also remove Syria and Yemen, both countries in conflict that are unlikely to be active BRI countries in the short to medium term. By region, this leaves the following 23 countries:

- East and Southeast Asia (3): Cambodia, Mongolia, and Laos;
- Central and South Asia (7): Afghanistan, Bhutan, Kyrgyzstan, Maldives, Pakistan, Sri Lanka, and Tajikistan;
- Middle East and Africa (7): Djibouti, Egypt, Ethiopia, Iraq, Jordan, Kenya, and Lebanon;
- Europe and Eurasia (6): Albania, Armenia, Belarus, Bosnia and Herzegovina, Montenegro, and Ukraine.

Given their current risk ratings, these 23 countries represent those for whom the risk of debt distress due to additional BRI-related financing could be quite high. To investigate this question in these countries, we next identify publicly reported projects under BRI, estimate a lending pipeline, and integrate this financing data into a country's debt.

3.2 Identifying BRI projects

China does not report cross-border project lending in a systematic or transparent manner. Beyond topline investment numbers that have been announced by Chinese officials, and the occasional projection on intended country-level investment under the initiative, BRI project information is not centrally reported.[21] Additionally, while Chinese policy and commercial banks will sometimes make public announcements about project investments, this is not done consistently and specific financing agreements are rarely published. It is also uncommon for the debtor countries to fully and completely disclose loan information. Given this reality, we identify BRI projects mainly through media publications, replicating the methods of other projects that have attempted to identify Chinese overseas lending (see Box 2).

We first identify publicly reported Chinese financed infrastructure projects starting from the first announcement of BRI by President Xi in Astana, Kazakhstan on September 7, 2013,

[21] One notable exception is for projects in CPEC. The Pakistan-China Institute and China Radio International have developed a CPEC portal that lists transportation, energy, and port infrastructure projects under the initiative, including varying levels of detail regarding progress and financing. CPEC, 2017.

through December 2017.[22] Consistent with the rhetoric of Chinese officials, we consider any Chinese infrastructure project in an identified BRI country since the announcement of the initiative to be a BRI project. Because we focus on the debt sustainability of countries implicated in BRI, we only identify infrastructure projects that we believe were or would be financed through sovereign or sovereign-guaranteed concessional and commercial loans or export credits.[23] This includes loans from Chinese policy banks to state-owned enterprises in BRI countries, even if the authorities might claim that there is no sovereign guarantee.[24] There may be some ambiguity about the degree to which there is a sovereign obligation or guarantee on the borrowing side of some of these transactions, but we err toward greater inclusion in order to identify debt risks. Experience shows that even in cases where there is no explicit sovereign guarantee, the obligations of state-owned or quasi-official entities are often implicitly guaranteed by the national government.

Box 2: Existing methods to identify Chinese overseas financing

The The College of William and Mary's AidData research lab hosts a global dataset on China's official development spending from 2000-2014. AidData has identified more than $350 billion in Chinese foreign aid and other forms of state financing using their Tracking Underreported Financial Flows (TUFF) methodology. Projects are identified through a comprehensive search of public official sources and verified by media and other additional sources. The Center for Strategic and International Studies' Reconnecting Asia project uses a similar method to catalogue Asian infrastructure projects. The Reconnecting Asia team collects project information from open primary sources, including national government agencies, international financial institutions, and project contracts. Information from these sources is supplemented and verified by other media publications. The United States Export Import Bank (US EXIM) conservatively estimates activities by Chinese export credit agencies by measuring export buyer's and seller's credits and concessional lending using media reporting. Johns Hopkins School of Advanced International Studies' China-Africa Research Initiative (SAIS-CARI) tracks loans to African governments from 2000-2015. SAIS-CARI applies a "forensic internet sleuthing" approach and identifies project loans through official websites of central banks, ministries of finance, Chinese contractors, and media reports. They supplement this data collection with in-country interviews and meetings with Chinese and African officials.

[22] Jinping, 2013.

[23] We recognize that loans to the private sector, particularly financial institutions, can have spillover effects on the sovereign, but we do not believe this will be the case with respect to BRI projects due to the focus on public infrastructure investments.

[24] One example is the Lao-China Railway Company set up to build and operate the Vientiane to China highspeed railway. The Lao Ministry of Finance asserts that no sovereign guarantee will be provided for the debt of the joint venture company, but ultimately the government would need to act if the company could not pay its debts.

We start with the databases referred to in box 2. For projects outside the scope of these databases,[25] we consult reporting by recipient country government agencies, reporting by the Chinese policy and commercial banks, and to a significantly lesser extent, project contracts released by BRI contractors, 89 percent of which are Chinese state-owned enterprises (SOEs).[26] Finally, and most prominently for projects announced in 2017, we rely on other media publications, ranging from Chinese state-owned news agencies, media in debtor countries, and other international media outlets.

3.3 Constructing the BRI lending pipeline in 23 countries

We next seek to identify the debt effects of adding a BRI project pipeline to our 23 target countries. Drawing from our estimated universe of BRI projects, we characterize a BRI pipeline project as any project whose financing may not be captured by a country's latest public debt figures, which we have through the end of 2016. In most cases, this includes: 1) a project announced in 2017, and 2) a project announced at any time since the beginning of the initiative, but with undisbursed loan commitments due to a delay in project implementation or other factors. Using these pipeline projects, we are able to estimate a lending pipeline value for each country by aggregating the debt component of each identified project.[27] A complete table of debt and lending pipeline statistics for these 23 countries can be found in appendix B.

We include the second group in the lending pipeline because these projects appear to reflect firm political commitments even though they have yet to move beyond the initial commitment phase. These projects may be a symptom of a broader trend—according to information available in the SAIS-CARI Loan Database on the three African countries in our elevated risk universe (Djibouti, Ethiopia, and Kenya), of the approximately $19 billion in Chinese loans of government origin between 2000-2015, over $5 billion have yet to be implemented.[28] For example, a coal power plant in Kenya, announced in 2015 and to be financed with an approximately $900 million loan from the Industrial and Commercial Bank of China (ICBC), is still in the proposal phase due to local protests over environmental and economic viability concerns. However, government officials continue to vocally support the project.[29]

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[25] AidData: post 2014, SAIS-CARI: post 2015, US EXIM: post 2016.
[26] US Congress, 2018.
[27] We estimated, when the lending information for a project was unavailable, that China would finance roughly 80 percent of the total cost of a project. There are various unofficial sources that provide anecdotal evidence of an 80:20 debt-to-equity ratio for projects in CPEC, BRI's flagship project. Additionally, in our own review of media sources we identified a financing ratio between roughly 80:20 and 75:25 for projects outside of CPEC. See Chaudhury, 2017; Dadwal and Purushothaman, 2017; Su, 2016; Husain, 2016.
[28] SAIS-CARI identifies whether a project has been signed, is signed but inactive, is in the implementation phase, or has been completed.
[29] ICBC, 2015; Medium, 2017.

3.4 The debt effect of the BRI lending pipeline

We then integrate the BRI lending pipeline into a country's debt as of the end of 2016.[30] In order to estimate those countries that may suffer from debt distress due to BRI-related financing, we use a debt threshold. There has been considerable research on debt thresholds, defined as a tipping point for public indebtedness beyond which economic growth drops off to such a degree that it leads to default or debt treatment. The evidence is mixed; some economies with relatively low debt levels have run into debt difficulties while others have been able to grow at relatively high levels of indebtedness for long periods without any apparent difficulty. That said, we base our analysis and judgments on recent research that shows a statistically significant threshold effect in the case of countries with **rising** debt-to-GDP ratios beyond 50-60 percent.[31]

Using this threshold, we find that of the 23 countries identified above, there are 10-15 that could suffer from debt distress due to future BRI-related financing, with eight countries of particular concern. These countries are Djibouti, the Kyrgyz Republic (Kyrgyzstan), Lao People's Democratic Republic (Laos), the Maldives, Mongolia, Montenegro, Pakistan, and Tajikistan (Figure 3).

[30] We add the total pipeline figure to the numerator and denominator of the debt ratios. The limitations of this method are addressed in Appendix A.
[31] Chudik et al., 2015.

Figure 3: Immediate marginal impact of BRI lending pipeline

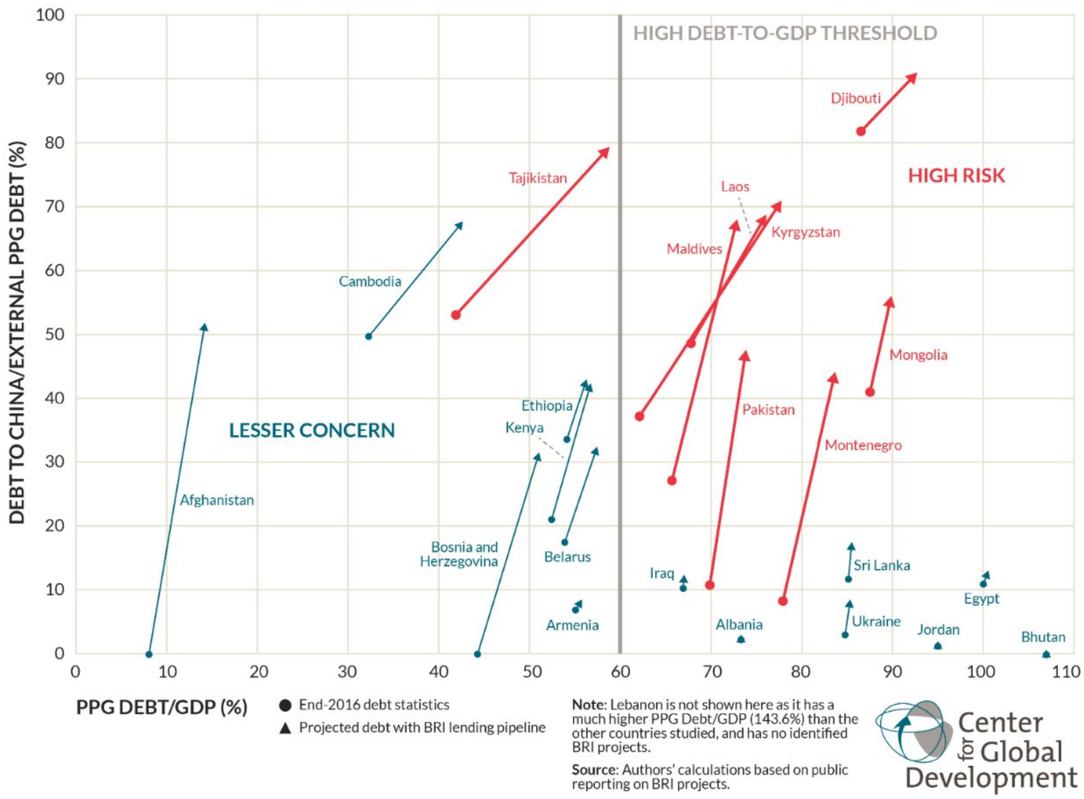


Figure 3 identifies these eight countries (red), and illustrates the estimated changes from BRI project lending in public and publicly guaranteed debt-to-GDP ratios, as well as the changing shares of Chinese debt relative to all external public and publicly guaranteed debt. This can be described as the current "upper bound," or worst-case scenario, of future debt if the initiative is implemented to the fullest extent of President Xi's vision.

Because we are interested in those countries that may invite a policy response from China, it is evident from this illustration that these eight countries are more significant for the purposes of our analysis than others. Countries of lesser concern (blue) are the following:

- While Albania, Bhutan, Jordan, and Lebanon have been represented at BRI events or have expressed interest in engaging more completely in the initiative, we did not identify any BRI projects in these countries.

- Afghanistan and Cambodia may see a significant rise in total debt to China as a percentage of total public external debt, but we do not believe the projects in these two countries will lead to a debt default or debt treatment due to the overall low level of debt.

- The Sri Lankan government may agree to additional BRI-related financial commitments but their size is likely to be tempered by the Hambantota Port experience.

- While our pipeline includes projects in Armenia, Egypt, Iraq, and Ukraine, the level of sovereign or sovereign-backed lending for BRI projects in comparison to the size of their economies or their total external debt exposure is not high enough to have an appreciable effect on debt levels.

- In Belarus, Bosnia and Herzegovina, Ethiopia, and Kenya, there could be an increase in the risk of debt distress in the short-term due to BRI-related projects. However, total public debt should remain low enough to mitigate the likelihood of default. For example, China has played a leading role in financing Ethiopia's investment program, providing 30 percent of total new public external debt over the past five years, and 90 percent of new bilateral debt. Nonetheless, with one of the most rapidly growing economies in the world, we expect Ethiopia will remain within prudent borrowing limits over the next several years.

To further test the risks of debt distress in the eight focus countries, it is useful to consider existing debt and growth projections for these countries. With recent research showing that rising debt-to-GDP ratios are as important as the level of debt in assessing the risk of debt distress,[32] table 1 shows the change in debt levels (actual and forecast) over the 2015-2018 period in our eight focus countries, based on IMF surveillance reports. Given the stylized fact that countries are more capable of sustainably financing high levels of public debt as they become wealthier, the table also provides averages for the world, middle-income economies, and low-income economies. It demonstrates that the expected levels of debt in the eight focus countries are well above the average for their peers.[33]

[32] Chudik et al., 2015.

[33] Note that the Maldives information reflects statistics prior to the rebasing of its gross domestic product.

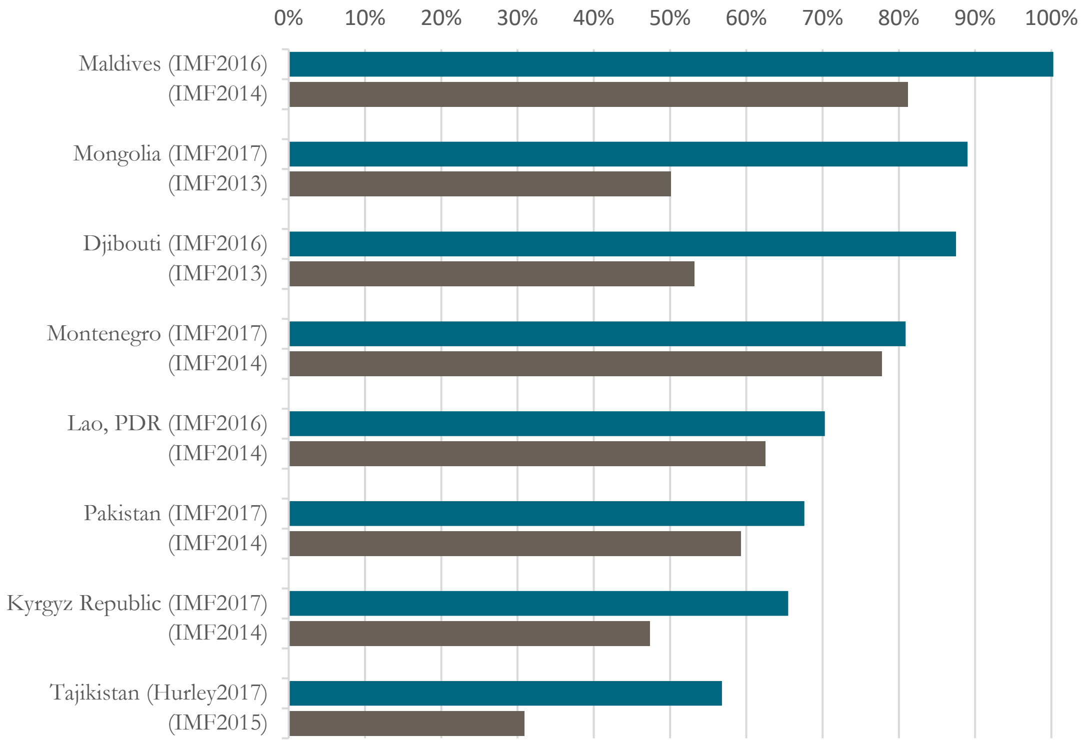
Table 1: General government gross debt (% of GDP)

	Actual		Forecast	
	2015	2016	2017	2018
World	**80.6**	**83.6**	**83.1**	**82.8**
MICs	**44.5**	**47.4**	**48.6**	**49.8**
Mongolia	62.1	87.6	85.3	89.0
Montenegro	76.8	78.0	79.7	80.9
Pakistan	65.7	70.0	69.1	67.6
LICs	**36.1**	**40.4**	**41.9**	**41.6**
Maldives	73.1	83.1	96.5	109.0
Djibouti	72.1	86.6	88.1	87.5
Laos	65.8	67.8	69.0	70.3
Kyrgyz Republic	65.0	62.1	64.2	65.5
Tajikistan	33.4	44.8	51.8	56.8

Moreover, IMF surveillance documents and DSAs indicate that forecasts may underestimate the pace of debt accumulation in these eight countries, suggesting that the risk of debt distress may prove to be higher if or when IMF forecasts become more accurate. Figure 4 shows recent changes in IMF forecasts of debt-to-GDP ratios in 2018 for each of the eight focus countries. For example, the IMF staff report for Mongolia published in May 2017 projects that the public debt to GDP ratio will be 101.3 percent in 2018, while the DSA conducted in 2013 projected that the ratio would be 50.1 percent.[34]

[34] The Tajikistan forecast for 2017 is based on the author's calculations due to lack of a publicly available IMF data. The Maldives data uses the 2016 projection due to the rebasing of the national accounts in 2017.

Figure 4: Forecasts of public debt/GDP for 2018

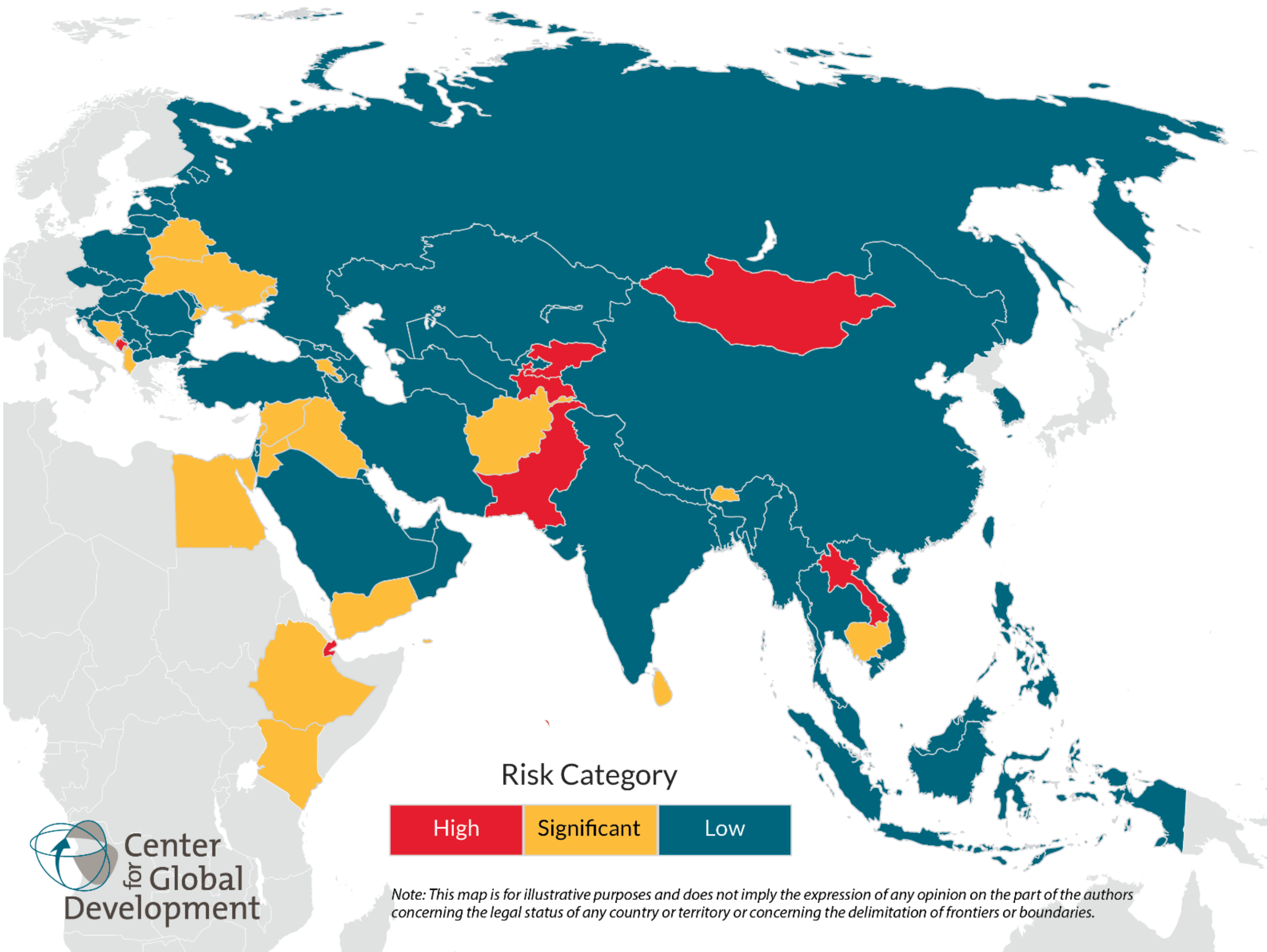


Recent research reinforces this point.[35] An evaluation of DSAs for low-income countries (LICs) from 2005-2015 finds evidence of a bias towards optimism for public and external debt projections. The bias was most significant for LICs with the highest incomes, greatest access to capital markets, and at a "moderate" risk of debt distress.

Finally, figure 5 summarizes the BRI debt effects identified in our study, highlighting in red the eight countries of greatest concern with the integrated BRI pipeline, with the other BRI countries coded by low and significant risk as determined by the major credit rating agencies.

[35] Mooney and de Soyres, 2017.

Figure 5: Risk including BRI pipeline projects



4. Eight focus countries

Beyond the quantitative measures and projections of debt risk, it is useful to consider the qualitative picture for the eight most vulnerable countries. In particular, a characterization of the existing bilateral relationships with China can help to inform expectations about policy behavior in each case.

Djibouti: Djibouti is the site of China's only overseas military base. The most recent IMF assessment stresses the extremely risky nature of Djibouti's borrowing program, noting that in just two years, public external debt has increased from 50 to 85 percent of GDP, the highest of any low-income country. Much of the debt consists of government-guaranteed public enterprise debt and is owed to China Exim Bank. According to multiple reports, China has provided nearly $1.4 billion of funding for Djibouti's major investment projects, equivalent to 75 percent of Djibouti's GDP.[36] Future projects reportedly include at least two new airports, a new port at Ghoubet, an oil terminal, and toll road.[37] While a number of Chinese loans have been extended at below-market rates, which will reduce the risk of default, others, such as the financing for the Addis Ababa–Djibouti railway, are reported to be closer to commercial rates.[38] Moreover, despite cautionary statements from the IMF, there is no indication that new borrowing will be limited to the projects that generate sufficient revenues to meet debt service requirements.

The Maldives: This archipelago in the Indian Sea is in the midst of an unprecedented public investment program aimed at promoting additional tourism, upgrading urban infrastructure, and adapting to climate change in accordance with its National Sustainable Development Strategy. The three most prominent investment projects in the Maldives are an upgrade of the international airport costing around $830 million, the development of a new population center and bridge near the airport costing around $400 million, and the relocation of the major port (no cost estimate).[39] China is heavily involved in all these projects. While China Exim Bank has reportedly announced financing at concessional terms—the airport is reportedly to be repaid in 20 years with a five-year grace period[40]— other creditors have apparently not been as generous, and the country is considered by the World Bank and the IMF to be at a high risk of debt distress due to its vulnerability to exogenous shocks.

Lao People's Democratic Republic ("Laos"): Laos is among the poorest countries in Southeast Asia, though it has been expanding rapidly with GDP growth averaging 8 percent over the past decade. Since 2013, the IMF has been raising doubts about the ability of Laos to service its debts if it moves ahead with its plans to build the China-Laos railway, in addition to other major capital projects. The $6 billion cost for the railway represents almost half the country's GDP, and although Lao Ministry of Finance officials stress that the government will **not** guarantee the vast majority of the financing from China Exim Bank, the Laotian government will be under considerable pressure to cover any losses.[41] The financial terms for many elements of the project remain a secret, although one source has reported that a $465 million loan from China Exim Bank for the joint company building and operating the railway will be provided at 2.3 percent interest with a five-year grace period and 25-year maturity.[42] The Laotian government has also reportedly signed a $600 million loan agreement with China Exim Bank for a hydropower project.[43]

Montenegro: Montenegro's debt problem is enormous. The World Bank estimates that public debt (including guarantees) as a share of GDP will climb to 83 percent in 2018 in the absence of fiscal adjustment. The source of the problem is one very large infrastructure

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[36] Downs and Becker, 2017; Downs et al., 2017.
[37] IMF, April 2017; Downs and Becker, 2017; SAIS-CARI, 2017.
[38] Sun, 2017.
[39] IMF, December 2016.
[40] Naish, 2015.
[41] IMF, January 2017.
[42] Janssen, 2017.
[43] The Nation, 2016.

project, a motorway linking the port of Bar with Serbia that would integrate the Montenegrin transport network with those of other Balkan countries. The Montenegro authorities concluded an agreement with China Exim Bank in 2014 for the latter to finance 85 percent of the estimated $1 billion cost for the first phase of the project. The estimated cost has since risen to $1.1 billion, or over 25 percent of GDP. The loan for the first phase of the project will reportedly be extended with an interest rate of 2 percent, five-year grace period, and 20-year repayment period.[44] The road is being built in three phases, and the IMF believes the second and third parts of the highway should only go forward with highly concessional funds because non-concessional terms would likely result in debt default.

Mongolia: Mongolia is in a particularly difficult position because its future economic prosperity depends, in large part, on large infrastructure investments that will increase productivity and facilitate exports. Financing for these investments will need to be secured on a concessional basis, which has not generally been the case in the past. Recognizing Mongolia's difficult situation, China Exim Bank agreed in early 2017 to provide financing under its $1 billion line of credit at concessional rates for a hydropower project and a highway project from the airport to the capital. However, according to local reporting, the hydropower project has stalled, and elements of this financing is reportedly being redirected to other projects.[45] But if reports that Beijing expects to channel some $30 billion in credit to BRI-related projects over the next five to ten years are true, then the prospect of a Mongolia default is extremely high, regardless of the concessional nature of the financing.[46]

Tajikistan: Tajikistan has been described as the "first leg" of the land-based elements of BRI. One of the poorest countries in Asia, it is assessed by the IMF and World Bank to have a "high risk" of debt distress. Despite this, it is planning to increase its external debt, both at concessional and non-concessional rates, to pay for infrastructure investments in the power and transportation sectors, including those elements supporting BRI. Most significantly, a $3 billion portion of the Central Asia-China gas pipeline (Line D) will pass through Tajikistan, reportedly financed through Chinese foreign direct investment (FDI), although there could be pressure for the Tajik government to cover some of the financing costs. There are conflicting reports on whether this project has stalled.[47] Most recently, Tajikistan issued $500 million in Eurobonds to pay for a new hydropower generating facility.[48] Debt to China, Tajikistan's single largest creditor, accounts for almost 80 percent of the total increase in Tajikistan's external debt over the 2007-2016 period.

Kyrgyz Republic ("Kyrgyzstan"): Like Tajikistan, Kyrgyzstan is a relatively poor country with significant new BRI-related infrastructure projects being constructed, much of it financed by external debt. By the end of March 2017, public and publicly guaranteed debt amounted to roughly 65 percent of GDP, of which external debt represented about 90

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[44] Government of Montenegro, 2014.
[45] Kohn, 2016; Mongolian News Agency, 2017.
[46] Kenderdine, 2017.
[47] Kosolapova, 2017; Michel, 2017.
[48] Reuters, 2017.

percent of the total. China's Exim Bank is the largest single creditor, with reported loans by the end of 2016 totaling $1.5 billion, or roughly 40 percent of the country's total external debt. Kyrgyz and Chinese authorities are reportedly discussing the construction of a chain of hydropower plants, a China-Kyrgyzstan-Uzbekistan railway, additional highway construction, and completion of the Central Asia-China gas pipeline.[49] While currently considered to be at a "moderate" risk of debt distress, Kyrgyzstan remains vulnerable to shocks resulting from a sizeable exchange rate depreciation exacerbated by the scaling up of public investments.

Pakistan: Through CPEC, Pakistan currently serves as a centerpiece for BRI. The total value of CPEC projects is currently estimated at $62 billion, with at least $33 billion of this amount expected to be invested in energy projects.[50] China will reportedly finance roughly 80 percent of that amount.[51] Yet despite this ambition, there have already been canceled projects, most recently three major road projects at the end of 2017.[52] Adding to Pakistan's risk of debt distress are the relatively high interest rates being charged by China. Unlike the 2-2.5 percent "concessional rate" given to some China Exim Bank customers, reports indicate that some of Pakistan's loans reflect rates as high as 5 percent.[53] The IMF notes that adverse shocks could lead to public debt ratios well above 70 percent. As a country that has requested six debt treatments from the Paris Club, Pakistan's massive amount of borrowing from China raises concerns that it will need to return a seventh time.

5. How will China respond to problems of debt distress in BRI countries?

In countries suffering from debt distress, the Chinese government has provided debt relief in an ad hoc, case-by-case manner.[54] It has generally refrained from participating in multilateral approaches to debt relief, though it does participate in debt relief discussions at the international financial institutions and engages informally with IMF staff on individual country cases. This contrasts with other major official creditors, all of whom participate actively in multilateral mechanisms dealing with sovereign defaults, in particular the Paris Club. While China is an observer at meetings of the Paris Club, it is not a member, so it is under no obligation to act in solidarity with Paris Club members or even to inform the Paris Club about the management of its credit activities.

Without a guiding multilateral or other framework to define China's approach to debt sustainability problems, we only have anecdotal evidence of ad hoc actions taken by China as the basis for characterizing the country's policy approach.

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[49] Taldybayeva, 2017.
[50] Shaikh and Tunio, 2017.
[51] See footnote 25.
[52] NDTV, 2017.
[53] Naviwala, 2017.
[54] The examples cited are taken primarily from press reports and IMF program documents. China does not disclose information on the details of any bilateral debt agreements.

Examples of the ways in which China has managed its claims include the following:[55]

- In 2011, China reportedly agreed to write off an unknown amount of debt owed by Tajikistan in exchange for some 1,158 square kilometers of disputed territory. At the time, Tajik authorities said they only agreed to provide 5.5 percent of the land that Beijing originally sought.[56]

- In 2011, with Cuba in a desperate economic situation and seeking debt relief, China, its largest single creditor, agreed to restructure between $4-6 billion of the debt. The details of the transaction were not disclosed, but it reportedly included an agreement by China to extend additional trade credits and financing for port rehabilitation. Some recent reports indicate that some of the debt was forgiven.[57]

- The IMF estimates that China has delivered over 80 percent of what it is expected to provide under HIPC. It was a creditor to 31 of the 36 HIPC countries, and the most recent publicly available information indicates that it provided relief in at least 28 of them, including 100 percent forgiveness for several (e.g., Burundi, Afghanistan, and Guinea).

- With Sri Lanka unwilling to service a $1.1 billion package of loans to China, with interest rates ranging from 2 to 6.3%, to finance the construction of the Hambantota Port, the two countries agreed to an arrangement whereby China transferred funds equivalent to the loan amount ($1.1 billion) to the Sri Lankan government in exchange for an 85% equity stake in the port company under a 99 year concession.[58]

China has also demonstrated a willingness to provide additional credit so a borrower can avoid default. A prominent example is China's agreement in early 2017 to extend an RMB 15 billion swap line to Mongolia for three years in support of an IMF Extended Fund Facility.

China's case-by-case approach to debt relief is likely to continue in the absence of full membership in the Paris Club or commitments to some multilateral framework. China gave serious consideration to Paris Club membership during its G20 presidency in 2016 but ultimately did not make a commitment to pursue membership. It did, however, agree to keep the door open and to play a "more constructive role" in Paris Club discussions.[59] Given Paris Club members' commitment to share data on their claims on a reciprocal basis, a decision by the Chinese authorities to fully participate in Paris Club activities would be a very

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[55] Appendix C includes a table on debt relief actions taken by Chinese authorities according to public sources.
[56] Atovulloev, 2016.
[57] Franks and Frank, 2010.
[58] This sentence has been corrected for the size of the loan package associated with the port and the interest rates associated with the loans. The original loan figure of $8 billion was an estimate of all Sri Lankan debt owed to China at the time of publication and was erroneously attributed to the Hambantota port project alone. The corrected language is based on IMF Country Report 19/135, Sri Lanka, April 2019.
[59] G20, 2017.

significant signal of the government's willingness to change a history of non-transparent credit activities.

Finally, despite ad hoc approaches to the treatment of debt problems, there are some signs that Chinese officials are moving toward greater policy coherence and discipline when it comes to *avoiding* unsustainable debt. For example, in November 2017, the China Banking Regulatory Commission issued its first ever regulations for China's policy banks, emphasizing greater risk controls for the overseas activities of CDB, China Exim Bank, and the ADBC.[60]

6. Recommendations

It is unlikely that BRI will be plagued with widescale debt sustainability problems. But it is also unlikely that the initiative will avoid any instances of debt problems among its participating countries. To date, China's behavior as a creditor has not been subject to the disciplines and standards that other major sovereign and multilateral creditors have adopted collectively. Following are recommendations for how China and major BRI partners can better align BRI with such disciplines and standards.

There are two underlying rationales for pursuing this alignment. First, there is the appeal to China as a good global citizen, so that its investment practices align with the pro-development rhetoric of BRI. In part, this will require pressure from leading partners in the initiative, and particularly the multilateral development banks (MDBs). Second, there is the appeal to China to take more effective approaches in its own interests as a creditor, recognizing the power of collective action over go-it-alone strategies.

These recommendations serve both purposes.

6.1. Multilateralizing BRI

A first-order question for BRI when it comes to debt sustainability—and operational features that relate to debt sustainability, such as lending transparency, procurement standards, and concessionality—is the degree to which the initiative will be multilateral in character, with a high degree of Chinese government influence, versus an initiative that is overwhelmingly directed, financed, and operated by the Chinese government. Chinese officials have encouraged participation by multilateral institutions like the World Bank and ADB, and BRI itself has coincided with the creation of Chinese-led MDBs like the AIIB and New Development Bank. Both suggest that Chinese officials see some value in a multilateral approach. But multilateral institutions, including the AIIB, adhere to a common set of practices pertaining to debt sustainability that do not reflect China's bilateral lending practices. Will BRI bend to the will of existing multilateral norms and standards, or will these

[60] Xiaomeng and Jia, 2017.

standards fail to shape the activities of the dominant sources of BRI financing, which so far have been CDB, China Exim Bank, and the Silk Road Fund?

The very creation of the AIIB, and its adoption of existing MDB rules, demonstrates a willingness to embrace multilateral norms in some instances. But the AIIB remains very small as a share of China's international financing, with annual investments so far of about $2 billion, compared to annual lending from the bilateral institutions of $30-40 billion.[61]

The World Bank, ADB, AIIB, and European Bank for Reconstruction and Development (EBRD) have reportedly signed a memorandum of understanding with the Chinese government to support BRI.[62] Yet, characterizations of the MOU suggest that it does not seek to apply MDB standards to the initiative overall, instead focusing more narrowly on cooperation among the MDBs themselves on BRI projects.[63] This approach by the MDBs is a missed opportunity. They are lending their reputations to the broader initiative while only seeking to obtain operational standards that will apply to a very narrow slice of BRI projects: those financed by the MDBs themselves.

Before going further, the World Bank and other MDBs should work toward a more detailed agreement with the Chinese government when it comes to the lending standards that will apply to any BRI project, no matter the lender.

6.2. Other mechanisms for standard-setting in BRI

When it comes to an agreement on lending standards, there are additional mechanisms for the Chinese government to consider.

6.2.1 A post-Paris Club approach to collective creditor action

The Chinese government has moved closer to joining the Paris Club in recent years, participating alongside some Paris Club treatments on an ad hoc basis and signaling intentions to join through the G20 and the US-China Strategic and Economic Dialogue.[64] The task for Paris Club members to date has been to convince Chinese officials that membership is in China’s interests as a creditor. The Club, after all, is a forum for ensuring maximum repayment under distressed conditions, rather than a “debt relief” forum. To date, China has determined that its interests are better served outside of the Club, and in particular, that it has sufficient leverage in its bilateral relationships to protect its interests. However, this view may continue to evolve as the number of strained bilateral relationships

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[61] A review of the CDB and China Exim annual reports indicates total foreign currency exposure for these two banks increased by roughly $40 billion in the 2016 fiscal year, though not all of this involves sovereign lending.
[62] Kim, 2017.
[63] It is also notable that the MOU itself is not publicly available, suggesting that transparency standards normally associated with the MDBs have been set aside in favor of those associated with the Chinese government.
[64] The September 2016 White House Fact Sheet on the dialogue included this statement: “China will continue to participate in the Paris Club on a regular basis and play a more constructive role, including further discussions on potential membership,” The White House, 2016.

grow as a result of debt distress. One of the key protections afforded by the Paris Club's collective action approach is reputational. No one creditor country can be singled out for bad behavior since the members agree to act together.

Nonetheless, even if China becomes convinced of the benefits of a collective approach, the political barriers to joining a G7-dominated institution may continue to delay Chinese membership in this debt forum. And it now appears that the US-China dialogue, the forum in which progress toward China's Paris Club membership has been made to date, has been set aside by the Trump administration.[65]

As a result, it may be incumbent on the wider Paris Club membership to consider the leverage that China has in these membership discussions as the basis for moving forward with a new agreement. Club members should consider, for example, that outstanding Paris Club claims currently total just over $300 billion. China's claims alone likely approach this figure, if not surpass it. For example, we estimate that China Exim Bank has credit exposure that is Paris Club "treatable" of about $90 billion, and we estimate CDB's foreign sovereign credit exposure at approximately $125 billion.[66] These are just two sources of Chinese government financing that are clearly Paris Club treatable. Other sources include the ADBC, as well as the newly launched Silk Road Fund, which was initially capitalized at $40 billion. There is no aggregate reporting on the Chinese government's credit exposure to other sovereigns, so the two figures for China Exim Bank and CDB certainly understate the extent of China's role as a creditor to other governments. It is unambiguously the case that China is the largest sovereign-to-sovereign creditor in the world based on the policy bank figures alone, and it is almost certainly the case that it has no close rival.

From this standpoint, it may be worthwhile to reorient the Paris Club membership discussion in favor of something new. The aim would be to maintain the core principles that guide the Paris Club, while opening the discussion to the possibility of a new forum, one in which China plays a meaningful role as a founding architect.

Whether the question is China's membership in the Paris Club, or movement toward a newly defined group of sovereign creditors, progress will depend on concessions from both sides of the deal. Chinese officials would do well to concede that the operating principles of the Paris Club have been forged through experience and do not inherently reflect a Western bias. For the existing Paris Club members, there needs to be clear recognition that the list of the world's largest sovereign creditors looks different today than it did in 1956 when the club formed. If the club is to continue to be effective in providing a public good to developed and developing countries alike, then China, along with a prospective class of emerging sovereign creditors, cannot continue to be outside the fold.

[65] Flemming and Donnan, 2017.

[66] China Exim Bank, 2016; CDB figures compiled from the AidData database.

6.2.2. Implementing a China-led G20 sustainable financing agenda

As part of China's 2016 G20 presidency, G20 leaders endorsed the "G20 Agenda toward a More Stable and Resilient International Financial Architecture." This agenda was carried forward in 2017 to include "G20 Operational Guidelines for Sustainable Financing," which provide a detailed, multifaceted approach to improving debt sustainability and debt restructuring processes. Given the provenance of this agenda, and China's ongoing leadership role as a 2017 member of the G20's "troika," the operational guidelines provide a sound basis for new Chinese commitments and leadership on debt issues. Pursuing these commitments in a BRI context would strengthen China's reputation in the G20 at a time when it is eager to be viewed by other G20 members as a rightful leader within the group. Moving forward on the operational guidelines would include commitments with respect to:

- "enhanced information sharing with respect to debt sustainability, including signaling to IFIs' staff if large public liabilities appear not to be included in the DSA of a debtor country";

- "as a general policy, information on past debt restructurings from official and private creditors should be made public";

- a shared responsibility between borrowing countries and sovereign lenders in maintaining debt on a sustainable path, including recognition of the "applicable requirements of the IMF's Debt Limit Policy and of the International Development Association's Non-Concessional Borrowing Policy."

It would fall to the IMF to play a leading role in monitoring progress toward these commitments.

6.3. China as donor

Chinese officials have emphasized the commercial nature of BRI while downplaying the role that traditional foreign aid will play. Yet, China's role as an aid donor is expanding globally. Increasingly, alongside loans and FDI, China is providing grant resources in LICs and through multilateral mechanisms like the World Bank's International Development Association (IDA). The evolution of China's participation in IDA is telling. After two decades as an aid recipient from the World Bank's fund for the poorest countries, China "graduated" from IDA assistance in 1999. In the years that followed, China was a very reluctant donor *to* IDA, allocating nominal sums while claiming that it remained a poor country and therefore was unable to play the role of donor. However, in the last funding round for IDA in 2016, China emerged as one of the largest donors. This rapid shift appears to be part of a broader strategy that embraces the role of grant-based foreign aid as part of China's engagement with developing countries.

Given China's outsized role as a commercially oriented creditor to developing countries, there is a case for directing some of these aid dollars in ways that mitigate the risks of commercial lending and better promote the development impact of that lending. We offer two recommendations for Chinese aid here: 1) to finance technical legal support to developing country borrowers, through new and existing multilateral mechanisms; and 2) to offer debt swap arrangements in support of environmental objectives.

China should take the lead in establishing and funding an international legal support facility (LSF) that would address potential asymmetries in financial sophistication between BRI creditors (largely Chinese institutions) and BRI borrowers. Some BRI borrowers may be well informed about markets and financial techniques while others may not enjoy the same level of knowledge. An LSF would allow LICs to secure expert counsel to advise them on the negotiation of debt operations. Since this recommendation would have China playing a leading financial role in the establishment of a facility, care would need to be taken that such funding would not constrain or bias the outcome of any negotiation. This facility would build upon the success of the African Legal Support Facility (ALSF), hosted by the African Development Bank. The ALSF was originally established in 2008 to help HIPCs establish a "level playing field" in the fight against litigating creditors, commonly known as vulture funds. Over time, it has increasingly focused on the negotiation of complex commercial and business transactions, including large-scale infrastructures, extractive resources, and debt operations. The total amount committed has been fairly small, $11.3 million in 2016 ($9 million for advisory services) and $46 million since the ALSF was established, but the ALSF has received widespread praise for the value of its services.

Following the ALSF model, a new LSF should partner with an existing MDB. There are various potential options, including the World Bank, which currently provides advisory services for structured finance and guarantees across a range of countries; the EBRD, which has a rich history of providing legal support for economic transition issues; and the ADB, which currently offers expertise in the development and structuring of public-private partnership projects. Housing a LSF at an existing MDB would give the parties involved in an individual transaction confidence that the advice is being rendered in an ethical, accountable, and professional manner.

There are also existing facilities—the World Bank-IMF Debt Management Facility and UNCTAD's Debt Management and Financial Analysis System—which rely on donor support and do not yet count China among their donors. Both initiatives provide technical support to developing country governments to improve debt management practices. By channeling support through these multilateral mechanisms, China would ensure an arm's-length approach to its aid.

Finally, China could adopt debt-for-nature swaps, an approach championed by environmental organizations since the 1980s and used extensively by the United States and some multilateral funds like the Global Environment Facility. Under a swap arrangement, borrower country debt is forgiven in exchange for the country's commitment to fund key environmental objectives, such as tropical forest preservation. These swaps proved to be enduringly popular in the United States until the pool of countries that owed money to the US government *and* had worthy environmental objectives to address became too small to justify an ongoing program. In contrast, China has a growing number of debtor countries to draw from, and the swap mechanism itself could be deployed in support of a wider range of public goods. Care should be taken that the swap's environmental objectives do not obscure debt reduction terms or conditions that are unfavorable to the debtor country. For example, there should be no requirement for the purchase of Chinese goods or services. The fundamental objective would be to address an indebtedness problem in a manner that achieves a wider benefit (and in the case of forest protection, even a global benefit) and allays concerns about China's behavior as evidenced in the cases of Sri Lanka and Tajikistan.

Appendixes

Appendix A: Limitations of the methodology

Transparency: As we discuss on page 8, the level of transparency around reporting on BRI projects and financing greatly influences the accuracy we can ascribe to our estimates of the project pipeline. As much of the information is gathered from media publications (in both our own analysis as well as the other databases), the majority of projects remain unverified and there is a risk of inaccuracy on project-level reporting. We do not claim our lending pipeline to be comprehensive, but rather an illustration based on what we can reasonably estimate from available information. It is inevitable in our calculations we unintentionally omitted announced projects or included projects that may not add to a country's future debt.

Project pipeline: In addition to transparency limitations, while we identify this pipeline as the current "upper bound" of risk, new projects will likely be announced, while others will be delayed, modified, or cancelled. This implies a potential further "upper bound" beyond the estimates in this paper. For example, according to a Sri Lankan government official, Beijing says it is "willing to give" an estimated additional $24 billion as part of BRI.[67] In Cambodia, China proposed a plan to develop over two million kilometers of national expressways by 2040 under BRI, at a cost of approximately $26 billion.[68] China-Belarus agreements are reported to be as high as $15.7 billion,[69] and in Pakistan, approved Chinese financing has reportedly reached $62 billion.[70] We also do not know the financing terms for most of the pipeline projects nor the terms for many existing project loans. If all new projects are financed with highly concessional loans then the risk of debt distress drops considerably, but the prospect for this is unlikely based on public reporting.

Project implementation: We do not know the pace of project implementation for a significant number of projects. There is the possibility that proper public financial management will result in the delay of projects until feasibility studies determine that the debt can be properly amortized and financing will be on extremely concessional terms. Additionally, beyond disbursement schedules outlined in a limited number of government documents, we do not know, for many projects, if funds have been completely or partially disbursed for a project.[71]

Debt-growth dynamics: We do not incorporate any debt-growth dynamic effect into our assessment, assuming that any such positive impact will only occur over the long run. And we do not know the degree to which Chinese financing will merely substitute for other

[67] The Economic Times, 2017.
[68] Chheang, 2017.
[69] SCMP, 2015.
[70] Venkatachalam, 2017.
[71] For example, the Sri Lankan Ministry of Finance reports loan disbursement schedules for many Chinese projects, so our project pipeline could estimate how much, if at all, credit lines had been drawn down on a specific project. In other cases, this information was not available, so the authors made an estimate based on the publicly available status of the project.

external (or domestic) financing. To address that issue, we focus our attention on those countries where the BRI pipeline is so large that substitution is unrealistic.

Appendix B: Select debt figures for countries significantly or highly vulnerable to debt distress

All figures in USD millions

Country	GDP	PPG Debt	PPG ED	Debt to China	BRI lending pipeline
Djibouti	1,727	1,496	1,464	1,200	1,464
Kyrgyz Republic	6,551	4,068	3,976	1,483	4,564
Lao, PDR	15,903	10,782	8,604	4,186	5,471
Maldives	4,224	2,775	879	240	1,107
Mongolia	10,951	9,593	7,392	3,046	2,469
Montenegro	4,374	3,412	2,406	200	1,535
Pakistan	278,913	195,239	58,014	6,329	40,021
Tajikistan	6,952	2,906	2,252	1,197	2,807
Afghanistan	19,469	1,558	1,227	0	1,280
Albania	11,864	8,696	4,069	100	0
Armenia	10,572	5,825	4,916	341	60
Belarus	47,407	25,552	17,588	3,094	3,828
Bhutan	2,213	2,370	2,341	0	0
Bosnia and Herzegovina	16,910	7,474	5,124	0	2,329
Cambodia	20,017	6,465	6,385	3,191	3,495
Egypt	332,791	333,124	43,096	4,779	740
Ethiopia	72,374	39,154	21,785	7,314	3,719
Iraq	171,489	114,726	67,395	7,010	1,000
Jordan	38,655	36,761	14,496	200	0
Kenya	70,529	36,957	19,325	4,089	6,879
Lebanon	49,599	71,224	18,848	500	0
Sri Lanka	81,322	69,286	32,565	3,850	2,136
Ukraine	93,270	79,186	50,832	1,590	2,475

PPG Debt = Public and Publicly Guaranteed Debt; ED = External Debt; PPG ED = Public and Publicly Guaranteed External Debt

Note: All GDP and debt statistics reflect 2016 or end-2016 values, with the exception of the lending pipeline, which reflect estimated values post-2016.
Source: World Bank, IMF, authors' estimates based on publicly available sources and the various databases cited in the paper

Appendix C: Debt relief actions taken by Chinese authorities

Year	Country	Description	Amount (US Dollars)
2000	Vanuatu	China agrees to write off 5 million USD of outstanding loan payments from Vanuatu relating to the construction of a parliamentary complex and law school	$ 5,000,000
2001	Equatorial Guinea	Chinese President Jiang Zemin announces an agreement on debt relief for Equatorial Guinea but no specific amount is mentioned	NA
2001	Cameroon	China cancels up to $34 million of Cameroon's debt	$ 34,000,000
2001	Ethiopia	China cancels $122.56 million of Ethiopian debt.	$ 122,560,000
2001	Mali	China cancels 37 billion CFA francs worth of Mali debt.	$ 49,900,000
2001	Sudan	China cancels 63 percent ($40.131 million) of Sudan's $63.7 million debt.	$ 40,131,000
2001	Zambia	China cancels USD$40 million in Zambian debt.	$ 40,000,000
2001	Uganda	Ugandan Vice President Wandira Specioza Kazibwe and Chinese Vice President Hu Jintao sign an agreement for China to cancel 50 million USD of debt.	$ 50,000,000
2001	Burundi	Burundi's External Relations and Cooperation Minister and the Chinese ambassador to Burundi sign an agreement for partial write off of debt worth 38 billion Burundi Francs.	$ 45,722,577
2001	Angola	A Chinese economic and trade delegation promises to write off about 10 percent of Angola's $80 million external debt to China during a three-day visit to Luanda.	$ 8,000,000
2001	Congo, Rep.	Chinese deputy economy minister Zhang Xiang signs an agreement cancelling $75 million of maturing debt owed by the Republic of Congo.	$ 75,000,000
2001	Guinea-Bissau	China cancels $5.8 million in debts owed by Guinea-Bissau.	$ 5,800,000
2001	Niger	President Tandja and PM Hama Amadou sign a protocol on forgiving $12 million of Niger's debt owed to China.	$ 12,000,000
2001	Mozambique	Sun Zhenyu, Chinese vice-minister of Foreign Trade and Economic Cooperation, announces that China will write off 22 million US dollars of Mozambique's debt.	$ 22,000,000
2001	Kenya	The Chinese government cancels 113 million RMB yuan (about $13.66 million USD) of Kenya's debts owed to China.	$ 13,652,177
2001	Tanzania	The government of China agrees to cancel part of Tanzania's debt with a value of over $70 million.	$ 70,877,778
2001	Madagascar	The Chinese Assistant Minister of Foreign Trade and Economic Cooperation and the Madagascar Acting Minister of Foreign Affairs sign an agreement to reduce USD 30 million of debt (64% of the total debt owed).	$ 30,000,000
2001	Rwanda	Chinese President Jiang Zemin and Rwandan President Paul Kagame signed a debt reduction deal cancelling loans totaling 113 million yuan.	$ 13,673,924
2001	Lesotho	China writes off R40-million debt owed by Lesotho for the construction of a national convention center.	$ 4,646,203
2002	Afghanistan	China agrees to write off all of Afghanistan's debt.	$ 19,500,000
2002	Cambodia	At the ASEAN summit, Chinese Premier Zhu Rongji announced the cancellation of Cambodia's debts	$ 200,000,000
2002	Cameroon	China and Cameroon agree to reschedule a loan of nearly 4,000 million FCFA (6 million dollars).	$ 5,738,978
2002	Ghana	China agrees to write off 85 percent of the debt owed by Ghana, the equivalent of $53.5 million USD.	$ 53,500,000
2002	Myanmar	China writes off $72 million of the debt owed by Myanmar to China.	$ 72,000,000
2002	Yemen	Yemen and China sign an agreement that eliminates 84 million USD out of an outstanding $185 million debt to China.	$ 84,000,000
2003	Bolivia	China agrees to forgive debt owed by Bolivia. The amount is not provided.	N/A

Year	Country	Description	Amount (US Dollars)
2003	Ghana	China cancels the $66 million USD debt owed by Ghana.	$ 66,000,000
2003	Guyana	China cancels 20 million USD of loan repayments from Guyana.	$ 20,000,000
2003	Eritrea	Eritrean Economic Advisor and China's Vice Minister for Foreign Trade and Economic Cooperation sign a $3m debt cancellation agreement.	$ 3,000,000
2003	Kyrgyz Republic	China EXIM restructures Kyrgyzstan's state debt of 250,000 dollars pursuant to the Paris Club agreement on the consolidation of the Kyrgyz Republic's debt.	$ 239,216
2003	Serbia and Montenegro	In 2003, China agrees to forgive $70 million of the arrears the Serbian oil and gas company Naftna Industrija Srbije (NIS) owed to Sinochem, a Chinese state-owned company.	$ 70,000,000
2003	Nigeria	Chinese Vice Foreign Minister Qiao Zonghuai signs a N325 million debt cancellation agreement with Nigeria.	$ 2,515,045
2003	Zimbabwe	The Chinese government agrees to reschedule a $42 million loan that the Chinese government had originally provided to the Zimbabwe Iron and Steel Company (ZISCO).	$ 42,000,000
2004	Zimbabwe	ExIm Bank officials sign two rescheduling agreements with Zimbabwe for loans totaling $17.9 million US dollars.	$ 17,900,000
2005	Equatorial Guinea	Following a visit to China, Equatorial Guinea's President Teodoro Obiang Nguema referenced China debt relief but it is unclear when it occurred and the amount involved.	NA
2005	Guinea	China cancels Guinea's debt in the amount of $45 million USD.	$ 45,000,000
2005	Somalia	A Chinese delegation (no further information) waives $3 million of Somalia's debt.	$ 3,000,500
2006	Benin	During his visit to Benin, Chinese foreign minister Li Zhaoxing agrees to cancel the country's debt.	NA
2006	Fiji	Chinese Prime Minister Wen Jiaboa pledges to cancel Chinese loans to Fiji that matured at the end of 2005. The value of the debts is unknown.	NA
2006	Georgia	At a meeting between Chinese President Hu Jintao and Georgian President Mikheil Saakashvili, China announces it would forgive most of Georgia's $3 million debt.	$ 2,600,000
2006	Laos	Chinese President Hu Jintao visited Vientiane and offers assistance and debt forgiveness.	$ 45,000,000
2006	Myanmar	China and Myanmar sign an agreement for China to cancel 240 million yuan ($30 million) in debt.	$ 30,099,938
2006	Samoa	Samoa Finance Minister Niko Lee Hang reports that China had forgiven $11.5 million USD of Samoa's debt.	$ 11,500,000
2006	Senegal	China agrees to cancel $18.5-$20 million USD in debt. The exact amount is unclear.	$ 18,500,000
2006	Zambia	China writes off $211 million of Zambia's debt which was incurred in the 1970s to build the TAZARA railway line.	$ 211,000,000
2007	Angola	The Chinese government signs an agreement with the Angolan government to cancel 50 million RMB (approximately 7 million USD) of debt owed by the Angolan government.	$ 6,572,433
2007	Burundi	During a two-day conference in Burundi, China announces it is cancelling 213 million CNY ($ 28 million) of Burundian debt.	$ 27,998,566
2007	Cameroon	Chinese President Hu Jintao agrees to cancel 16 billion CFA of Cameroon's debt to China.	$ 32,000,000
2007	Cape Verde	Chinese Premier Wen Jiabao announces cancellation of Cape Verde debts that matured at the end of 2005. No figures disclosed.	NA
2007	Central African Rep.	Chinese foreign minister Li Zhaoxing announces in the Central African Republic a debt cancellation worth 5.5 billion XAF ($11 million USD).	$ 11,475,863
2007	Chad	Chinese Foreign Minister Li Zhaoxing signs a CFA 16 billion debt-relief deal with Chad.	$ 33,384,329
2007	Congo, DR	China cancels $29 million of outstanding DRC debt	$ 29,000,000
2007	Congo, Rep.	Republic of Congo and China sign a protocol agreement on the cancellation of 30.6 billion CFA francs (about 64 million U.S. dollars) of debt owed to China.	$ 64,000,000

Year	Country	Description	Amount (US Dollars)
2007	Cote D'Ivoire	China writes off 40% of the debt owed by Cot d'Ivoire, amounting to 18 million EUR.	$ 24,636,020
2007	Equatorial Guinea	Chinese foreign minister Li Zhaoxing signs an agreement with Equatorial Guinea to write-off $75 million debt.	$ 75,000,000
2007	Ethiopia	Ethiopia and China sign a debt relief agreement for $18.5 million.	$ 18,500,000
2007	Ghana	China and Ghana sign a series of agreements, including one for debt cancellation worth $126 million USD.	$ 126,000,000
2007	Guinea	China promises Guinea debt relief worth $4 million USD.	$ 4,000,000
2007	Liberia	President Hu Jintao formally signs away 80 million RMB and 1 million USD in Liberian debt owed to China.	$ 11,000,000
2007	Madagascar	Four deals were signed with Madagascar for partial debt cancellation. No amounts were announced.	
2007	Mauritania	China forgives $61 million USD worth of Mauritanian debt.	$ 61,000,000
2007	Mozambique	Chinese President Hu Jintao announces the cancellation of all Mozambican public debt to China incurred in the period 1980 to 2005. According to Mozambican Finance Minister Manuel Chang, this debt amounts to about 30 million US dollars.	$ 30,000,000
2007	Rwanda	Rwandan President Paul Kagame and Chinese President Hu Jintao sign an agreement canceling Rwandan debt owed to China 'up through 2005' worth 160 million dollars.	$ 160,000,000
2007	Sierra Leone	Chinese Vice Foreign Minister Zhai Jun and Sierra Leone's Foreign Minister Zainab Bangura sign an agreement to cancel $22 million USD worth of Sierra Leone's debt.	$ 22,000,000
2007	Sudan	Sudan's President Umar al-Bashir and China's President Hu Jintao sign an agreement for forgiving part of Sudan's debts due to China amounting to some 470 million RMB (70 million USD).	$ 70,000,000
2007	Tanzania	The governments of China and Tanzania agree to forgive payment for 7 interest-free loans. The value of the debts are not disclosed.	NA
2007	Togo	Togolese Foreign Minister Ayeva Zarifou reports that the Chinese government has fulfilled an agreement to cancel 149 million RMB of debt owed by Togo.	$ 18,687,045
2007	Uganda	China's Assistant Minister for Commerce and Uganda's Finance Minister sign an agreement for China to cancel 17 million USD worth of Uganda's debt.	$ 17,000,000
2007	Zambia	The Chinese government cancels Zambia debt worth 8 million USD (60.3 million RMB).	$ 8,000,000
2008	Bolivia	China's Ambassador signs a debt relief protocol in La Paz. The amount of relief was not reported.	NA
2008	Cuba	China agrees to postpone the repayment of a part ($7.2 million) of Cuba's debt to China.	$ 7,200,000
2008	Kyrgyz Republic	The Governments of China and Kyrgyzstan signed an agreement transforming a credit worth $7 million into a grant.	$ 7,000,000
2010	Cambodia	Hun Sen, Cambodia's Prime Minister and Wu Bangguo, chairman of the National People' s Congress, sign an agreement to cancel the 200 million USD debt owed by Cambodia.	$ 200,000,000
2010	Cameroon	At the Africa-China Forum, China commits to additional debt cancellation for Cameroon, valued at CFA 2.1 billion.	$ 4,095,000
2010	Iraq	China and Iraq sign an agreement to officially forgive 80% of Iraq's debt---around $6.8 billion USD.	$ 6,800,000
2010	Sudan	The Chinese ambassador to Sudan and Sudanese officials sign an agreement to cancel 40 million RMB worth of Sudan's debt.	$ 5,908,185
2010	Zimbabwe	The Chinese government reaches an agreement with Zimbabwean state-owned steel company Ziscosteel to reschedule the $54.684 million in debt owed by the Zimbabwean steel producer.	$ 54,684,000
2011	Tanzania, Zambia	The Chinese government agrees to write off roughly 50 percent of the $150 million USD owed by Tazara.	$ 75,000,000
2011	Cote D'Ivoire	The Chinese Vice Foreign Minister and Cote d'Ivoire Foreign Minister sign documents that cancel certain debts. Details were not disclosed.	NA

Year	Country	Description	Amount (US Dollars)
2011	Cuba	China restructures or forgives Cuba's $6 billion debt to China. Details not provided.	$ 6,000,000,000
2011	Seychelles	China reschedules Seychelles' debt, allowing it to pay its 321 million rand debt over a period of 20 years, with a grace period of 10 years.	$ 44,207,982
2012	Togo	China cancels CFA 8.3 billion of Togo's debt.	$ 16,061,830
2014	Sudan	Sudan's Minister of Finance says the Chinese have offered more time for Khartoum to pay debts but declines to disclose any further details.	NA
2017	Comoros	China announces that it will write off Comorian government debt worth Cfr630m ($1.43m)	$ 1,430,000

Source: Drawn from the AidData database and supplemented by references to debt relief in IMF public documents

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