

Power Playbook

Beijing's Bid to Secure Overseas
Transition Minerals

Full Report

January 2025

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Acknowledgements

We thank John Custer, Sarina Patterson, and Alex Wooley for the editing, formatting, and graphic design of the final report; Lea Thome for comments on an earlier version of this report; Sasha Trubetskoy for cartographic support; and Brook Lautenslager for data management software support. We also owe a debt of gratitude to Guyu (Emily) Yang and Hazel Vineet for helping to construct the dataset that made this study possible. The cover photo is by Mineral Vision via Adobe Stock, used under the Standard license.

We gratefully acknowledge financial support from the William and Flora Hewlett Foundation and the Ford Foundation. The findings, interpretations, and conclusions expressed in this study are entirely those of the authors. They do not necessarily represent the views of the William and Flora Hewlett Foundation or the Ford Foundation. AidData's research is guided by the principles of independence, integrity, transparency, and rigor. A diverse group of funders supports AidData's work, but they do not determine its research findings or recommendations.

Citation

Escobar, B., Malik, A. A., Zhang, S., Walsh, K., Joosse, A., Parks, B. C., Zimmerman, J., & R. Fedorochko. (2025). *Power Playbook: Beijing's Bid to Secure Overseas Transition Minerals*. Williamsburg, VA: AidData at William & Mary.

Acronyms

BOC	Bank of China	MSP	Minerals Security Partnership
BRI	Belt and Road Initiative	Mt	Million metric tons
CCB	China Construction Bank	NZE	Net zero emissions
CDB	China Development Bank	OECD	Organisation for Economic Co-operation and Development
CFTM 1.0	AidData's Chinese Financing for Transition Minerals Dataset, Version 1.0	PGII	Partnership for Global Infrastructure and Investment
Chinalco	Aluminum Corporation of China	PNG	Papua New Guinea
CSR	Corporate social responsibility	PPG	Public and publicly guaranteed debt
DFC	U.S. International Development Finance Corporation	PRC	People's Republic of China
DRC	Democratic Republic of the Congo	REE	Rare earth element
ESG	Environmental, social, and governance	RFI	Resource-for-infrastructure
EV	Electric vehicle	Sinosure	China Export & Credit Insurance Corporation
DG GROW	European Commission's Directorate-General for Internal Market, Industry, Entrepreneurship, and SMEs	SNA	Social network analysis
EITI	Extractives Industries Transparency Initiative	SOE	State-owned enterprise
China Eximbank	Export-Import Bank of China	SPV	Special purpose vehicle
GCDF 3.0	AidData's Global Chinese Development Finance, Version 3.0	TUFF	Tracking Underreported Financial Flows
G7	The Group of 7	U.S.	United States
ICBC	Industrial and Commercial Bank of China	USD	U.S. dollars
IEA	International Energy Agency	USGS	United States Geological Survey
IMF	International Monetary Fund		
JV	Joint venture		
LIC	Low-income country		
LME	Liberal market economy		
MIC	Middle-income country		
MOFCOM	China's Ministry of Commerce		

Table of contents

1. Powering the future: Transition minerals, supply chain dynamics, and global influence.....	1
1.1 Power, processing, and policy: China's expanding role in the global mineral economy and the race to respond.....	3
1.2 Decoding Beijing's transition mineral financing playbook with a new dataset.....	10
2. China's shadow playbook: Repurposing BRI financing instruments and institutions for transition mineral operations.....	12
2.1. Making transition minerals a national priority.....	13
2.1.1 A bird's-eye view of Beijing's transition mineral financing portfolio in the Global South.....	16
2.2 Borrowers and financiers: Key players in Beijing's shadow playbook.....	24
2.2.1 The borrowers: Anchoring China's global resource strategy.....	24
2.2.2 The financiers: The lenders that bankroll China's overseas transition mineral operations.....	37
2.3 Tools of influence: China's financial tactics and risk management strategies.....	54
2.3.1 Going upstream: Securing access to critical resources via acquisitions and mine development.....	55
2.3.2 Serial financing: Relationship banking for Chinese companies.....	62
2.3.3 Limiting liability: How China limits repayment risk in its overseas transition mineral financing portfolio.....	66
3. Policy recommendations.....	70
4. References.....	73
5. Appendix: AidData's Chinese Financing for Transition Minerals Dataset, Version 1.0.....	79
A.1 AidData's approach to dataset creation.....	79
A.2 New variables.....	81

Figures and tables

Figure 2.1 Global distribution of China's official sector loans and grants for transition mineral operations in developing countries.....	17
Figure 2.2 Composition of China's transition mineral financing portfolio by supply chain segment.	
18	
Figure 2.3 Composition of China's transition mineral financing portfolio by mineral type and supply chain segment.....	20
Table 2.1 China's financial commitments for 5 types of transition minerals.....	22
Figure 2.4 Composition of China's transition mineral financing portfolio by time period and mineral type.....	23
Figure 2.5 Composition of China's transition mineral lending portfolio by sectoral grouping and level of public liability.....	27
Figure 2.6 Composition of China's transition mineral lending portfolio by sectoral grouping and use of JVs/SPVs.....	28
Figure 2.7 Composition of China's overseas lending portfolio for transition mineral operations with and without Chinese owners.....	30

Figure 2.8 Composition of China's transition mineral financing portfolio by transition mineral operation ownership category.....	33
Figure 2.9 Composition of China's transition mineral lending portfolio over time and by ownership category.....	35
Figure 2.10 China's leading official sector financiers of transition mineral projects.....	38
Figure 2.11 Composition of China's transition mineral lending portfolio by lending instrument type.....	41
Figure 2.12 Network of China's financing for transition mineral operations in low- and middle-income countries, 2000-2021.....	44
Figure 2.13 Network of China's financing for transition mineral operations at two selected mining sites.....	47
Figure 2.14 China's pre-BRI (2000-2013) financing network for transition mineral operations in the developing world.....	49
Figure 2.15 Composition of China's transition mineral lending portfolio by type of financier.....	51
Figure 2.16 China's early BRI (2014-2017) financing network for transition mineral operations in the developing world.....	52
Figure 2.17 China's late BRI (2018-2021) financing network for transition mineral operations in the developing world.....	53
Figure 2.18 Composition of China's transition mineral financing portfolio by purpose.....	57
Figure 2.19 Composition of China's transition mineral financing portfolio by purpose and time period.....	58
Figure 2.20 Number of official sector loans from China supporting mine acquisitions by type of transition mineral.....	59
Table 2.2 Top mine acquisitions by Chinese lending volumes.....	60
Table 2.3 Borrowing terms of China's transition mineral lending portfolio.....	62
Figure 2.21 China's financial commitments by transition mineral site and year.....	64
Figure 2.22 Composition of China's PPG lending portfolio with and without Chinese owners.....	67
Figure 2.23 Composition of China's PPG and non-PPG transition mineral lending portfolio over time by PRC ownership type.....	68
Table 2.4 Composition of China's transition mineral lending portfolio with credit enhancements from Chinese-owned entities.....	69

Executive summary

Beijing is a major source of financing for projects around the globe that involve the specific minerals—copper, cobalt, nickel, lithium, and rare earth elements (REEs)—that are needed to facilitate a clean energy transition and achieve the global goal of net zero emissions by 2050. Under the auspices of the Belt and Road Initiative (BRI), it has bankrolled mine acquisitions, the development and expansion of mineral extraction infrastructure, and the day-to-day operational needs of mine owners and operators. Yet its loan and grant commitments for “transition mineral” operations in low-income and middle-income countries are opaque and poorly-documented.

In order to help policymakers understand how Beijing is using the power of the purse to expand its control over key segments of the global supply chain for transition minerals, we have assembled a first-of-its-kind dataset that systematically tracks China’s official sector financial commitments for copper, cobalt, nickel, lithium, and REE extraction and processing operations across 165 low-income countries and middle-income countries over a twenty-two-year period.¹ Our analysis of the dataset demonstrates that China has provided nearly \$57 billion of aid and subsidized credit for transition mineral projects in a core group of 19 BRI participant countries. Beijing has prioritized upstream extraction operations rather than midstream processing activities.² We also find that Beijing has consistently assigned a high level of priority to copper: 83% of its official sector financial commitments involve copper extraction and processing operations. Yet there is some evidence that a pivot towards lithium mining operations is underway.

China has shielded its playbook for the pursuit of transition minerals in overseas markets from public scrutiny. However, our report seeks to overcome this

¹ The 1.0 version of AidData’s Chinese Financing for Transition Minerals Dataset (CFTM 1.0) can be accessed at aiddata.org/china-transition-minerals. It systematically tracks transition mineral projects supported by official sector loan and grant commitments from China over 22 financial commitment years (2000-2021) and it provides details on the timing of project implementation over a 25-year period (2000-2024).

² 92% of its transition mineral financing portfolio supports upstream extraction operations, but only 8% supports midstream processing activities.

challenge in a simple but powerful way—by following the money. We provide new empirical evidence that addresses two big-picture questions:

How has Beijing leveraged BRI lending institutions and instruments to expand its control of the global supply chain for transition minerals?

- A large network of 26 official sector creditors from China has come together to bankroll transition mineral projects in the developing world. Beijing’s policy banks—the Export-Import Bank of China (China Eximbank) and China Development Bank (CDB)—have played a pioneering role, extending nearly \$32 billion of credit for transition mineral operations.
- However, with the passage of time, Beijing has scaled back its use of the policy banks and ramped up its use of state-owned commercial banks, such as Industrial and Commercial Bank of China (ICBC), Bank of China (BOC), and China CITIC Bank. The policy banks accounted for nearly 90% of China’s transition mineral financing commitments to developing countries during the pre-BRI period. However, this figure plunged to 46% during the early BRI period and 14% during the late BRI period. At the same time, the share of China’s transition mineral financing portfolio provided by state-owned commercial banks sharply increased from 2% during the pre-BRI era to 39% during the early BRI period and 74% during the late BRI period.
- In order to more effectively manage the repayment risks and environmental, social, and governance (ESG) risks posed by transition mineral operations, Beijing has ratcheted down its use of bilateral lending instruments and ratcheted up its use of syndicated lending instruments. Syndication is effectively a de-risking shortcut: rather than relying upon a single Chinese bank to vet borrowing institutions and proposed projects, Beijing is increasingly outsourcing risk management to lending institutions with stronger due diligence standards and safeguard policies. At the turn of the century, there was not a single syndicated loan in China’s portfolio of loan-financed transition mineral projects in low-income and middle-income countries. By 2021, nearly 80% of its transition mineral

loan portfolio in the same set of countries was supported by syndicated lending arrangements with Chinese and non-Chinese creditors.

- Nearly three-quarters (74%) of China’s official sector lending portfolio in the developing world consists of loans to host government institutions and entities that have secured repayment guarantees from host government institutions.³ All of these loans qualify as public and publicly-guaranteed (PPG) debt. However, Beijing rarely uses PPG loans to bankroll transition mineral operations in the Global South. It has prioritized limited recourse project finance transactions rather than full recourse sovereign debt transactions: approximately 81% of China’s transition mineral lending portfolio in developing countries qualifies as non-PPG debt and roughly the same percentage of the portfolio supports project companies—including special purpose vehicles (SPVs) with a single shareholder and joint ventures (JVs) with multiple shareholders—without host government repayment guarantees.⁴
- The limited recourse project finance model offers Beijing something that the full recourse sovereign debt model cannot: the opportunity to control the overseas production and sale of transition materials that it lacks in sufficient quantities at home. In mining sector JVs and SPVs, the primary output is raw or processed mineral ore, which is typically allocated among the shareholders of JVs/SPVs based on their equity stakes. These mineral ore allocations are formalized through so-called “offtake agreements” that specify how much of the mine’s output each shareholder receives. Shareholders can then sell or direct their shares of the output as they wish. Chinese companies with equity stakes in overseas mines—via JVs and SPVs—usually sell their shares of the mineral output to buyers (importers) in mainland China. Therefore, by providing loans that allow

³ This figure is based on China’s official sector lending activities across all sectors between 2000 and 2021.

⁴ A unique feature of limited recourse project finance transactions is that borrowing institutions (SPVs and JVs) own the project assets. Therefore, the SPV/JV usually owns the mine, the output generated by it, and the revenues derived from the sale of the output. Loans to SPVs and JVs are often characterized as limited recourse project finance transactions because lenders only have recourse to the liquid and illiquid assets of their SPV/JV borrowers.

Chinese-owned JVs and SPVs to establish and expand transition mineral operations in developing countries, Beijing is locking in long-term access to the substantial ore reserves that its domestic mineral processing firms and battery production firms require.

- Beijing favors overseas transition mineral operations where its companies have skin in the game: 83% of China's official sector lending for transition mineral operations in developing countries is earmarked for mining sites that are partially or wholly owned by Chinese companies. These companies are not simply playing with "house money" (i.e., bank loans); they are investing their own money—via equity contributions—in the same overseas mining assets being bankrolled by Chinese state-owned creditors. Beijing wants its firms to have skin in the game to ensure that creditors and borrowers have a shared interest in the profitability of the overseas investments that they pursue. However, given that the majority of the companies receiving loans and providing equity contributions are Chinese state-owned enterprises, Beijing's party-state is financing overseas transition mineral operations in a way that places its Western competitors in liberal market economies (LMEs) at a significant disadvantage.

How has Beijing established itself as the pace-setter in the transition mineral sector—and outmaneuvered its Western competitors?

- One of the most important ways that Beijing has established a foothold in the overseas transition mineral sector is by helping its firms overcome *barriers to market entry*. The sector's capital-intensive nature sets a very high "price of admission." Acquiring a copper, cobalt, nickel, lithium, or REE mine requires a major upfront investment; a company seeking to purchase a majority ownership stake in such a mine might need several billion dollars of liquidity (i.e., freely available cash) to complete the transaction. Beijing has helped Chinese firms pay the high "price of admission" through an aggressive acquisition lending program.⁵

⁵ For example, consider a Chinese firm that wishes to acquire a majority ownership stake in an overseas mine for a cash consideration of \$1 billion. It would not be uncommon for Beijing's

- Beijing is also helping its companies—in particular, its state-owned enterprises—expand market share by linking the provision of credit for public infrastructure projects to (a) long-term concession agreements that grant Chinese firms exclusive rights to the profits generated by mining assets; and (b) long-term contracts that lock-in the sale of pre-specified quantities of mineral output to Chinese importers over extended periods of time. This “deal sweetener” has proven decisive in several developing countries—such as the Democratic Republic of the Congo (DRC)—where governing elites have strong political incentives to fast-track the implementation of big-ticket public infrastructure projects.
- Once a foothold is established (through the acquisition of an ownership stake in an overseas mine, the signing of a long-term concession agreement, or otherwise), Chinese state-owned creditors often provide a series of consecutive loans for the development and expansion of mines and working capital to sustain the operations at those mines. As “relationship bankers,” they provide borrowers with long-term financing packages that support transition mineral operations from cradle to grave. Between 2000 and 2021, Beijing channelled 66% of its official sector lending commitments for transition mineral operations to 14 major mining sites in 8 countries.⁶ All of these mining sites secured a series of consecutive loans from Chinese state-owned creditors.⁷ On average, the mining sites that benefited from serial lending received 3.6 loans from Chinese state-owned creditors between 2000 and 2021.
- In the interest of helping Chinese companies gain greater market share, Beijing’s state-owned banks have also prioritized the provision of

state-owned banks to offer the firm a \$700 million “acquisition loan” to provide 70% of the liquidity needed to purchase the asset. However, accessing this type of state credit would depend upon the Chinese firm (borrowing institution) using its own money to cover the remaining cost of the asset acquisition (\$300 million).

⁶ This figure excludes China’s official sector financial commitments for transition mineral operations in high-income countries.

⁷ The 14 mining sites are the Toromocho, Las Bambas, and Marcona mines in Peru; the Tenke Fungurume, Kamoa-Kakula, Sicomines, Kolwezi, and Kinsenda mines in the DRC; the Bor Mine in Serbia; the Aktogay mine in Kazakhstan; the Phu Kham mine in Laos; the Mirador mine in Ecuador; the Bisha mine in Eritrea; and the Ramu mine in Papua New Guinea.

subsidized credit (i.e., loans that are priced below market rates). Export credit agencies in Organisation for Economic Co-operation and Development (OECD) countries have “tied their own hands” for many decades, voluntarily abiding by a set of international rules that limit the provision of subsidized credit to domestic companies with overseas operations. However, Beijing never agreed to participate in the OECD’s “Gentlemen’s Agreement” on Officially Supported Export Credits and it has used concessional lending instruments to help its firms gain a competitive edge over Western firms in the overseas transition mineral sector. Our analysis demonstrates that China’s official sector lending commitments for copper, cobalt, nickel, lithium and REE operations in developing countries usually meet or exceed the OECD’s 25% grant element threshold for concessionality.

Beijing is following its own playbook rather than a set of rules and norms established by and for its Western competitors. Its go-it-alone approach begs the question of whether Washington and its allies have a coherent strategy to help their companies achieve market entry and expand market share in the overseas transition mineral sector. A related question is whether policymakers in Western capitals need to empower their export credit agencies and development finance institutions with new authorities and additional resources to “level the playing field.”

1. Powering the future: Transition minerals, supply chain dynamics, and global influence

World leaders are increasingly focused on achieving net zero emissions (NZE) by 2050 to combat the multiplying effects of climate change. Facilitating the clean energy transition will require major changes in how the world consumes energy, including a massive pivot away from fossil fuels and towards renewable energy sources like wind and solar. It will also demand large-scale investments in new technologies, such as solar photovoltaics and lithium-ion batteries.

Production of these new products is entirely dependent upon the availability of a handful of naturally occurring minerals with unique physical and chemical properties. These include copper, cobalt, lithium, nickel, and 17 rare earth element (REE) minerals, collectively characterized as “focus” transition minerals by the International Energy Agency (IEA) (IEA 2021). These materials are concentrated in developing countries with underdeveloped and poorly-enforced policies and laws that govern the management of natural resources, which make it difficult to extract such minerals while protecting local ecosystems and ensuring that significant economic benefits accrue to nearby communities.

For the world’s major powers, these minerals also hold special significance because they are key inputs into modern manufacturing and defense technologies. As such, reliable access to these minerals is a national security concern, with potential implications for the prevailing international order (Shiquan and Deyi 2022). As major powers pursue technological superiority, they increasingly seek to not only control global supply chains for transition minerals but also to lock their competitors out of these distribution networks. Washington and Beijing have therefore made access to transition minerals a central goal of their industrial, defense, and economic policies, while mobilizing large-scale public investments to achieve this goal.

Box 1.1 “Focus” transition minerals

In recent years, major industrialized economies and international organizations have developed lists of “critical minerals” that are considered to be essential for economic well-being and national security. Although such minerals are abundant beneath the Earth’s surface, their extraction, processing, and integration into new technologies depends upon various technical (e.g., quality, depth, accessibility) and socio-economic factors (e.g., conflict, environmental concerns, regulatory barriers).

For example, even if significant lithium deposits are discovered in remote areas of the Peruvian Andes, the region may lack the transportation infrastructure needed to move the material from mining sites to processing sites. Alternatively, the deposits may be of insufficient quality to justify new investments in extractive infrastructure. In other cases, the lands where these resources reside may belong to indigenous communities or sit within protected areas.

Given that there is no universally-accepted definition of “critical minerals,” organizations such as the United States Geological Survey (USGS) and the European Commission’s Directorate-General for Internal Market, Industry, Entrepreneurship, and SMEs (DG GROW) regularly update their own lists based on national and strategic priorities. These lists are developed on the basis of two primary factors. The primary factors include (1) the minerals’ importance to economic and national security goals, such as their role in military and industrial applications, and (2) the vulnerabilities of supply chains to disruptions from events like natural disasters, social unrest, or international conflicts. For instance, the USGS and DG GROW’s most recent lists identify 50 “critical minerals” and 34 “critical raw materials,” respectively (Burton 2022; European Commission 2024).

However, a subset of these critical minerals, referred to as “transition minerals,” is needed to facilitate the clean energy transition (discussed in Section 1). Using the International Energy Agency’s (IEA) definitions, we identify five such minerals or groups of minerals: copper, cobalt, lithium, nickel, and rare earth elements (REE) (IEA 2021).

Lithium-ion batteries, essential to electric vehicles (EVs), rely on lithium, with nickel sulfate enhancing their storage capacity through improved chemical processes. While lithium has other uses, such as ceramics or lubricants, increased demand for batteries has been the major driver of global demand for lithium (IEA 2024a).

Copper-based wiring is crucial for efficiently transmitting electricity from renewable energy sources like wind and solar farms, and copper is used in lithium-ion EV batteries and in battery packs. Apart from its clean energy applications, copper is commonly used in transport and industrial machinery (IEA 2024a).

Cobalt, with its natural energy density and thermal stability, is a key component of superalloys used to improve battery storage capacity—a limitation currently hindering wider EV adoption (Seck et al. 2022). Cobalt's role in superalloys makes it important in the military and aerospace sectors, and it is also used in portable batteries for electronics (IEA 2024a).

REEs represent a group of 17 minerals that, despite their scarcity in nature, are essential to modern technological supply chains. Some uses of REEs include as superconducting magnets, which are used in certain types of wind turbines and electric engines (IEA 2023).

In this report, and in the accompanying dataset and mining case studies, we will primarily focus on copper, cobalt, lithium, nickel, and REEs.

1.1 Power, processing, and policy: China's expanding role in the global mineral economy and the race to respond

China has already assumed a dominant role in the midstream (processing) and downstream (product development) segments of transition mineral supply chains. It domestically refines most of the world's nickel (68%), cobalt (73%), and lithium (59%); produces large proportions of battery cell components, such as cathodes (70%), anodes (85%), and electrolytes (62%); and holds 78% of global electric vehicle (EV) battery manufacturing capacity (Castillo and Purdy 2022; IEA 2023). Raw minerals and components flow from all over the world to China, where state-owned and private companies process and manufacture the final products.

The global transition economy has benefited from China's role in processing transition minerals and producing green energy products. Products like solar panels and EV batteries produced by Chinese companies are often more affordable and widely available than those produced in other countries. In its 2023 market analysis report, the IEA acknowledged that "China's investment in clean energy supply has been instrumental in bringing down costs worldwide for key technologies, with multiple benefits for clean energy transitions" (IEA 2023).

However, the volatility of inputs—including raw and processed transition minerals—for battery production has become a significant challenge for Chinese

companies. Surging demand, supply chain bottlenecks, and pandemic-related production disruptions have driven the prices of key materials like lithium, nickel, and cobalt to unprecedented highs (Chang 2023). Price fluctuations have also exerted pressure on battery producers, as raw materials make up 60%–70% of their production costs. For example, between early 2021 and late 2022, the cost of lithium carbonate increased more than tenfold (Chang 2023). Battery producers have responded to these challenges by strengthening partnerships with upstream suppliers and investing directly in mineral extraction operations, domestically and internationally.

As compared to its positions in the midstream (processing) and downstream (product development) segments of the transition mineral supply chain, China has a weak position in the upstream (mining) segment, due to its limited domestic resource endowments. Only 3% of global copper reserves, 1% of global cobalt reserves, 1% of global lithium reserves, and 7% of global nickel reserves reside in China (IEA 2024a).

However, China holds a dominant position over all segments of the supply chain for REE minerals. It is home to 35% of global REE mineral reserves (IEA 2024a). It also accounts for 70% of global extraction and 87% of global processing of REE minerals (IEA 2024a). Although these minerals are globally dispersed, many countries are not willing or able to engage in costly, complex, and environmentally risky separation and refining processes.

REE minerals may be the proverbial canary in the coal mine. China has established a near-monopoly on the entire supply chain, giving it incredible power to direct—or withhold—these resources to other countries. It has also “weaponized” its position three times. In September 2010, the Chinese authorities banned REE exports to Japan following a maritime fishing dispute (Evenett and Fritz 2023; Interagency Task Force 2018). In December 2023, Beijing announced a ban on exporting REE extraction and separation technologies (Baskaran 2024). Then, in December 2024, it banned exports of key REEs, including gallium, germanium, and antimony, to the United States

after Washington imposed restrictions on the sale of cutting-edge chips and specialized chip-making equipment to China.

Mining its own natural endowments is not the only way China has secured access to transition mineral deposits. Analysis of China's official sector lending and grant-giving activities in the developing world (see Section 2) demonstrates that Beijing has used the power of the purse to extend its reach to overseas mineral extraction operations. At the same time, its access to these operations should not be exaggerated; it has only modestly increased its control of global mining operations from less than 0.2% in the early 2000s to approximately 3% in 2018.⁸

However, a dearth of data on transition minerals makes it difficult to derive similar estimates of Beijing's level of control over global transition mineral operations. To be sure, China's efforts to gain more access to transition mining operations in specific countries, such as the DRC, have garnered much attention. Chinese-controlled cobalt exports reportedly account for approximately 51% of total cobalt exports from the DRC (China-Global South Project 2023).⁹ China is also reportedly the leading destination for DRC cobalt production (China-Global South Project 2024).¹⁰ Additionally, there is some evidence that, after accounting for its ownership stakes in overseas cobalt mining operations, China's share of global cobalt mine production has increased from 2% to 14% (Gulley et al. 2019).¹¹

Notwithstanding China's limited control over global mining operations, Western policymakers have sounded the alarm about its increasingly dominant position

⁸ By way of comparison, in 2013, Australian companies controlled nearly 10% and Canadian companies 8% of the total value of global (non-fuel) mine production—two to three times more than China's current estimated global share (Ericsson et al. 2020).

⁹ Between 2000 and 2021, China extended more than \$13 billion of aid and credit to mining and processing operations in the DRC, 95% of which went to mining sites where Chinese SOEs owned stakes in the associated JV/SPVs. See the mining profiles available at aiddata.org/china-transition-minerals for more details.

¹⁰ In 2022, Chinese mining companies reportedly accounted for 76% of cobalt output in the DRC (Neema 2023).

¹¹ Gulley et al. (2019) derive these estimates by assessing the ownership stakes of joint ventures operating cobalt extraction facilities and calculating the proportional production from mines where China holds significant ownership interests.

in the global supply chain for transition minerals. Beijing's efforts over the past decade to own and operate more overseas facilities that produce transition minerals has raised questions about its long-term goals—and whether they are compatible with those of other world powers.

On one hand, establishing a larger footprint in overseas transition mineral extraction operations may reflect an attempt to secure essential inputs, reduce costs, and solidify dominance in markets such as EV production and clean energy technologies. Chinese companies use a common business strategy known as "backward integration"—buying upstream supply chains—to boost profits. The profit margins of mineral extraction companies are often more than double those of battery manufacturers. Mining companies frequently achieve margins of 50% or higher, while battery manufacturer margins typically hover around 20% (Chang 2023). Integration also mitigates the risk of supply disruptions, which is important given Chinese companies' substantial reliance on cobalt, copper, and nickel imports to feed their own production capabilities. Additionally, accomplishing the global NZE goal by 2050 will require moving significantly larger supplies of transition minerals into downstream production via high-tech energy solutions—an estimated 50% more copper and cobalt, 580% more lithium, and 75% more nickel—leading to six-fold increase in the demand for mining (IEA 2023). China itself has committed to NZE by 2060, further increasing its domestic need for raw mineral inputs to enable its own energy transition (Wei et al. 2022).

On the other hand, the lack of diversity in the global supply chain for transition minerals is a source of a growing concern for Beijing's peers and competitors. China's dominant role in processing transition minerals gives it the ability to manipulate prices or impose export bans (Evenett and Fritz 2023). There is also a growing awareness among rival countries that they have limited access to segments of the global supply chain for transition minerals (where China has not already established a foothold), which has led to renewed calls for increased domestic control and production of these minerals. White House National Security Advisor Jake Sullivan recently noted that the U.S. produces only 4% of

lithium, 13% of cobalt, and none of the nickel or graphite needed for EVs, while China processes over 80% of the world's transition minerals (Sullivan 2023).

In the absence of strong and consistent government support, many Western companies have exited the transition mineral extraction sector. Others have avoided entering the sector altogether due to strict environmental standards, the difficulty of accessing credit from official sector institutions, profitability concerns, and reputational risks associated with mining operations in developing countries.¹²

By contrast, Beijing has pursued policies that encourage—or even mandate—Chinese state-owned enterprise (SOEs) and private firms to enter and remain engaged in the transition mineral market. Chinese companies typically adhere to a less stringent set of environmental standards than their Western counterparts, which introduces fewer obstacles during project implementation (Cheng 2023). The ease and speed of accessing credit from China's state-owned creditors has also increased the probability that transition mineral projects will be green-lit. As a result, Chinese companies have gained greater access to the global supply chain for transition minerals, at a time when Western companies are pulling back from the sector.

Freeport-McMoran's 2016 withdrawal from the DRC is a case in point. After pouring billions of dollars into the Tenke Fungurume copper and cobalt mine and the Kisanfu copper and cobalt exploration project, the Arizona-based mining company found itself cash-strapped and deeply in debt, so it put its controlling stake in the two DRC mining operations up for sale.¹³ The only competitive bids came from Chinese companies, and ultimately both mining sites were sold to China Molybdenum, a state-owned subsidiary of China Minmetals that was actively seeking to expand its mining operations abroad. China Molybdenum financed the overseas asset acquisition with a \$1.59 billion

¹² A 2022 interagency working group report of U.S. supply chain vulnerabilities concluded that "[o]ver time, many domestic suppliers have lost business and/or exited the market due to unstable DoD procurement practices and competitive pressure from foreign nations, particularly China" (Hicks 2022).

¹³ The New York Times has described this site as "one of the world's most important untapped sources of cobalt" (Lipton and Searcey 2021).

syndicated loan from CDB, BOC, China CITIC Bank, and China Minsheng Banking Corporation. At the time, a number of concerned parties petitioned for Washington to intervene and retain U.S. control of Tenke Fungurume, but the government opted not to intervene and the sales were finalized (Lipton and Searcey 2021). A New York Times investigation later revealed that the “United States essentially surrendered the resources to China, failing to safeguard decades of diplomatic and financial investments in Congo” (Lipton and Searcey 2021).

While official U.S. national security strategies have highlighted the need to secure transition minerals since 2010, there is now a sense of urgency about the need to catch-up with China’s progress. Increasing levels of anxiety in Washington have galvanized policy action. At home, the American approach has involved stockpiling transition minerals, using the country’s domestic copper, lithium, nickel, and REE reserves, which are among the world’s largest by volume (Government of Canada 2023; Pistilli 2024). The passage of the Inflation Reduction Act in 2022 also included nearly \$66 billion in incentives to bolster domestic production of transition minerals. But critics have argued that the U.S. misstepped by deprioritizing upstream and midstream activities, with only “about 2%” of the announced investments supporting “mining and material processing facilities” (Turner 2023).

In the international arena, the U.S. and its allies have turned to trade barriers to protect their domestic industries. In 2024, the U.S. and Canada implemented new 100% tariffs on EVs imported from China, while the European Union announced a provisional tariff on Chinese EVs, going as high as 37% (Zhou and Gao 2024).

In addition to trade barriers, Beijing’s rivals have pursued a policy of “friendshoring”—leaning on alliances and partnerships—to create alternative supply chains (Bown 2022). One such measure is the Minerals Security Partnership (MSP), a series of bilateral agreements between the U.S. and a broad spectrum of leading allies, such as Japan and Canada, around principles for

mineral supply chains (Department of State 2022).¹⁴ Through this mechanism, the U.S. and its allies are expected to jointly issue loan guarantees and offer debt financing to partner countries for projects with transparent decision making, environmental protection, and alignment with local communities' priorities. Often referred to as the "NATO of Metals and Minerals," MSP directly addresses China's concentrated control over the sector. Through this framework, 10 projects so far have received support from MSP partner governments.¹⁵

Similarly, the G7's Partnership for Global Infrastructure and Investment (PGII) identifies "mining of metals and critical materials" as a strategic priority and calls for the establishment of "new global refining, processing, and battery manufacturing sites" with development financing (White House 2022a). One of the first PGII projects to be approved was the Lobito Corridor Project, which seeks to establish a railway route between copper and cobalt mines in Zambia and the DRC and the Lobito seaport in Angola. The U.S. International Development Finance Corporation (DFC) has also approved a \$30 million equity investment in TechMet—an Irish transition mineral and mining company—to expand its nickel and cobalt operations in Latin America that rely on environmentally and socially responsible clean energy technologies (DFC 2022).

Other countries have focused on bolstering their domestic industries to secure transition minerals. In April 2023, Japan's Ministry of Economy, Trade and Industry announced a plan to subsidize up to 50% of the cost of mine development and smelting for Japanese firms. The minerals eligible for subsidies include those critical for EV batteries, including lithium, cobalt, nickel, graphite, and REEs (Fujioka 2023; Chang 2023). In a similar vein, Canada blocked the attempted sale of REE stockpiles to a Chinese buyer in 2024, redirecting the sale to a Canadian company (Lorinc 2024).

¹⁴ MSP participants include Australia, Canada, Estonia, Finland, France, Germany, India, Italy, Japan, Norway, the Republic of Korea, Sweden, the United Kingdom, the U.S., and the European Union.

¹⁵ Projects receiving funding through the MSP framework have included (1) investment from South Korean private company POSCO into a Tanzanian graphite mine (Mahenge) run by Black Rock Mining and (2) support from the DFC for Lifezone, the owner of the Kabanga Nickel mine in Tanzania.

1.2 Decoding Beijing's transition mineral financing playbook with a new dataset

Beijing is a major source of financing for projects and activities around the globe that involve the specific minerals that are needed to facilitate a clean energy transition and achieve the global goal of net zero emissions by 2050. Yet its financial commitments for these transition mineral operations are opaque and poorly-documented.

In order to help policymakers better understand how China uses official sector financial instruments to bankroll transition mineral operations in developing countries, we have assembled the 1.0 version of AidData's Chinese Financing for Transition Minerals Dataset (CFTM 1.0), which systematically tracks China's official sector financial flows for transition mineral extraction and processing operations in low-income countries (LICs) and middle-income countries (MICs).

Building upon AidData's Tracking Underreported Financial Flows (TUFF) methodology and the 3.0 version of its Global Chinese Development Finance Dataset (GCDF 3.0), the CFTM 1.0 dataset tracks grant and loan commitments from Chinese government agencies and state-owned entities that have supported transition mineral extraction and processing operations in LICs and MICs. The five "focus" transition minerals covered by the dataset are copper, cobalt, nickel, lithium, and rare earth elements. The Appendix provides more details on the methodology used to compile the CFTM 1.0 dataset, while Box 1.1 above explains the special significance of these five "focus" minerals. In total, the dataset captures 93 loan commitments and 1 grant commitment worth \$56.9 billion from 26 official sector institutions in China over a twenty-two year period (2000-2021). We systematically searched for transition mineral projects and activities supported by official financial and in-kind transfers from China in 165 LICs and MICs, but ultimately identified transition mineral projects and activities in only 19 LIC and MICs, all of which are BRI participant countries.

The CFTM 1.0 dataset, which tracks the implementation of transition mineral projects and activities over a 25-year period (2000 to 2024), is designed to help

policymakers, journalists, and researchers understand how Beijing uses financial instruments to access and control the global supply of transition minerals in BRI participant countries.¹⁶

In the remainder of this report, we draw upon the CFTM 1.0 dataset to decode China’s “playbook” as it seeks to expand its control over the global supply chain for transition minerals with support from official sector financial institutions and instruments. The report seeks to answer the following questions:

- What is the nature and extent of China’s official sector involvement in the transition minerals supply chain?
- How has China’s involvement in transition mineral extraction evolved, and how have its strategic priorities shifted over time?
- Which Chinese official sector institutions have played central roles in supporting transition mineral extraction and processing operations in developing countries, and how have their roles evolved to meet China’s strategic priorities?
- What are the key similarities and differences between China’s international development finance program and its program for bankrolling transition mineral extraction activities in developing countries?
- How does China use aid and credit instruments to purchase ownership stakes in critical mineral sites, build infrastructure at these sites, and provide working capital to the companies operating the sites?

By shedding light on China’s playbook, this report offers new insights into the evolving landscape of transition minerals and the policy responses required to address the latest challenges.

Section 2 documents how, where, and to whom China provides official sector financing for transition mineral projects and activities in the Global South. Section 3 provides policy recommendations. The report’s appendix provides a

¹⁶ For more details regarding new variables in the dataset, see Section A.2 and the methodological documentation for the CFTM 1.0 dataset in the Appendix.

summary of the CFTM 1.0 data collection methodology. An associated series of mining project case studies, available at aiddata.org/china-transition-minerals, illustrate how Chinese financiers and companies have implemented Beijing's transition minerals strategy, including through collaboration with local stakeholders.

2. China's shadow playbook: Repurposing BRI financing instruments and institutions for transition mineral operations

China's Belt and Road Initiative (BRI) is often characterized as a sweeping global infrastructure program aimed at fostering connectivity and economic development. However, if you set aside the propaganda and press releases and simply follow the money, it becomes easier to detect other (unstated) priorities that Beijing is pursuing under the auspices of the BRI.

Transition minerals represent one such priority. Beijing has quietly but consistently sought to expand its access to transition minerals—key building blocks of the green energy economy—in a core group of 19 BRI participant countries. This dual-purpose approach exemplifies China's ability to use its massive stockpile of foreign exchange reserves to meet partner country infrastructure needs *and* pursue its own strategic priorities. In a discreet but purposeful way, Beijing has leveraged opaque BRI financing mechanisms and partnerships to expand and cement its control over key segments of the global supply chain for transition minerals. Although Beijing has shielded its "shadow playbook" for the pursuit of transition minerals in overseas markets from public scrutiny, this report seeks to explain several key features of the playbook in a simple but powerful way: by following the money.

In Section 2.1, we document how China's international financing strategy for transition minerals is guided by its development and industrial policies at home. In Section 2.2, we describe the basic anatomy of China's international financing apparatus for transition mineral projects in LICs and MICs, including the

creditors, the borrowers, and the Chinese companies (including investors and engineering, procurement and construction contractors) who bankroll and build such projects. Section 2.3 describes the specific financial tools that China uses to expand its control of the global supply chain for transition minerals, including the aid and credit instruments that it uses to purchase ownership stakes in critical mineral sites, build infrastructure at these sites, and provide working capital to the companies operating the sites. It also compares key patterns and trends in China's transition mineral financing portfolio with the broader BRI financing portfolio, while exploring the motivational factors that likely guide Beijing's international financing strategy for transition minerals.

2.1. Making transition minerals a national priority

China's expansion into the extraction and processing segment of the transition minerals supply chain abroad is part of several strategic initiatives announced by Beijing. In 1999, Beijing announced its "Going Out" strategy, which provided an official mandate for state-owned institutions to finance and implement overseas infrastructure and industrial production projects. A key feature of the strategy is lending from China's policy banks—China Eximbank and CDB—for overseas projects with Chinese firm participation (Dreher et al. 2022).

The "Going Out" strategy has been described as a "resource seeking" strategy because it involves the provision of international aid and credit to support overseas projects that facilitate the production and export of natural resources—including transition minerals—that China lacks in sufficient quantities at home but requires for long-term growth and competitiveness (Gulley et al. 2019; BBC 2007; Kaplinsky and Morris 2009; Jansson 2011; Dreher et al. 2022).

A key mechanism for the implementation of the "Going Out" strategy is the so-called "resource-for-infrastructure" (RFI) arrangement, where Chinese lenders extend loans for the construction and rehabilitation of infrastructure in the host country, and these loans are repaid with the cash proceeds from the host country's natural resource exports to China (Bräutigam and Gallagher 2014; Horn et al. 2021; Gelpern et al. 2023).

Beijing quickly identified transition minerals as a priority area for the implementation of RFI arrangements. In 2008, a major RFI deal was struck with the DRC: a consortium of Chinese SOEs was granted a majority ownership stake in a joint venture¹⁷ responsible for the Sicomines copper-cobalt mine, in exchange for infrastructure loans from China Eximbank.¹⁸ China Eximbank's lending for the development of the mine and an unrelated set of infrastructure projects was effectively collateralized against the mine's future revenues (export receipts).¹⁹ This feature of the deal calls attention to a broader pattern in China's overseas lending strategy via RFI arrangements: the pursuit of "package deals" that link the provision of aid and credit for infrastructure projects to (a) long-term concession agreements that provide exclusive rights to the profits generated by overseas mining assets, and/or (b) long-term offtake contracts that lock-in the sale of pre-specified quantities of mineral output to Chinese buyers over extended periods of time (Li et al. 2013, Bunte et al. 2018; Dreher et al. 2022; Brazys and Yung 2024).²⁰

Then, in 2013, Beijing launched the BRI—an ambitious bid to connect China to the world through rail, road, port, and pipeline projects. Xi Jinping characterized the BRI as the "project of the century" and called upon government agencies and state-owned entities—including policy banks, commercial banks, investment funds, and companies—to bankroll and build big-ticket infrastructure projects in

¹⁷ La Générale des Carrières et des Mines (Gécamines)—a Congolese parastatal—was granted a minority ownership stake in the joint venture.

¹⁸ Over time, the agreements in DRC have come under increasing scrutiny. In 2023, DRC's Finance Minister Nicholas Kazadi accused the Chinese consortium involved in the deal of neglecting to pay taxes in full and not disbursing infrastructure loans as agreed. The Extractives Industries Transparency Initiative (EITI) commissioned a study of the agreement, concluding that it represented "unprecedented harm in the history of the DRC" (EITI 2024). For more details on the DRC's RFI arrangement with Chinese lenders and its 2024 renegotiation, see the Sicomines mining profile published at addata.org/china-transition-minerals.

¹⁹ To be precise, the China Eximbank loans were underpinned by the following source of collateral: the mining rights and titles of the joint venture (SICOMINES SARL), including its rights and titles to the copper and cobalt deposits of Dikuluwe, Mashamba West, Junction D, Cuvette Dima, Cuvette Mashamba, and Syncline Dikuluwe Colline D.

²⁰ Beijing linked its approval of a \$3 billion China Eximbank loan for public infrastructure projects to a consortium of Chinese companies being granted exclusive rights to the profits generated by the Sicomines copper-cobalt mine (under a long-term concession agreement). This "deal sweetener" played a major role in the Congolese government's decision to grant a long-term concession for the Chinese consortium, as governing elites in the DRC have strong political incentives to fast-track the implementation of big-ticket public infrastructure projects (Jansson 2013).

developing countries. A substantial number of these projects have involved mineral extraction and infrastructure that facilitates the export of minerals to China (Bonfatti and Poelhekke 2017; Malik et al. 2021; Parks et al. 2023).

At the same time, China has pursued domestic industrial and development policies and strategies that make access to transition minerals a national priority. In 2015, Beijing announced “Made in China 2025”—an ambitious plan for upgrading Chinese manufacturing to dominate the technology-intensive “new industrial revolution” (PRC State Council 2025). It identified the need to prioritize “green development” by “strengthening the promotion and application of energy-saving and environmental protection” and propelling Chinese manufacturing toward higher value addition via the development of “new materials” (Kennedy 2015). A key target under “Made in China 2025” is the achievement of “independent assurance of [the supply of] 70% of core basic components and key basic materials by 2025” (PRC State Council 2025).

China’s own list of strategic minerals, the National Mineral Resources Plan for 2016–20, was published in 2016. It included the “focus” transition minerals—copper, nickel, lithium, cobalt, and REEs—and called for exploration and provision to strategic industries, specifically highlighting REEs as an area requiring continued oversight to ensure supply.²¹

More recently, China has doubled down on efforts to grow high-tech industries that rely on transition mineral inputs. In its 14th five-year development plan for 2021 to 2025 and its increased rhetoric on the “New Three” (新三样)—EVs, solar panels, and lithium batteries—Beijing has pushed transition minerals and their downstream products as strategic priorities. At the heart of Chinese industrial policy in this area is a desire to develop globally competitive advanced manufacturing and technology capabilities for the green energy transition (Zhou and Manberger 2024).

²¹ International cooperation via the BRI and in Latin America and Africa was also specifically highlighted as a means to develop mineral resources (IEA 2022).

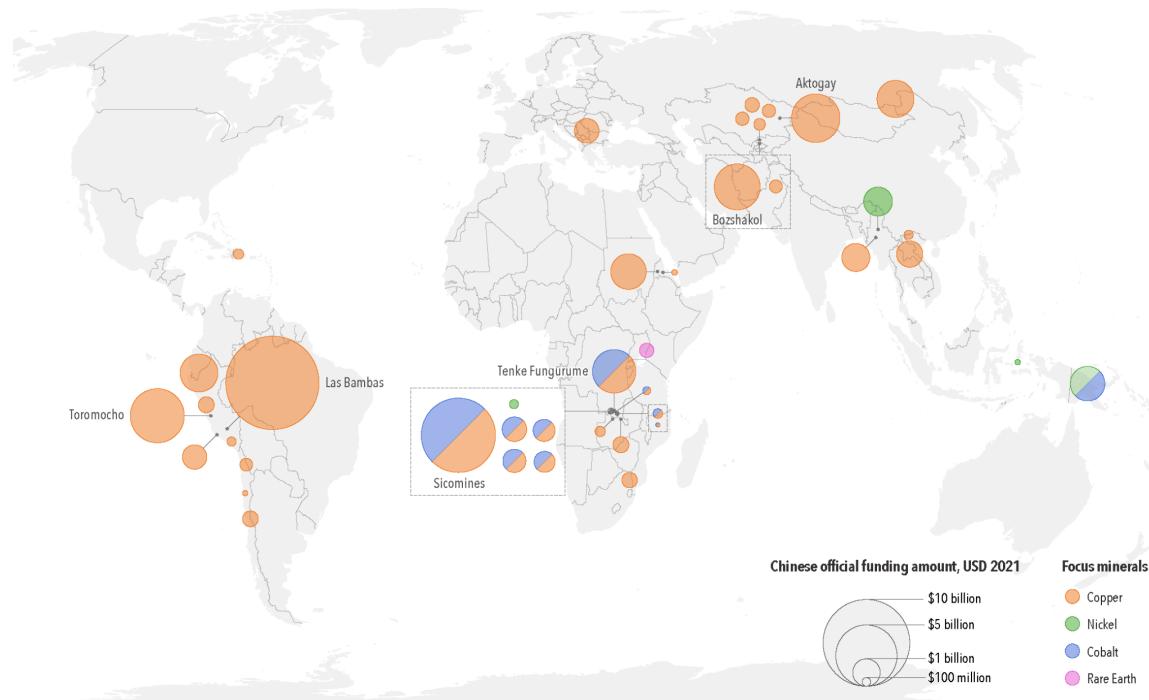
The release of “Made in China 2025” marked a watershed moment, in that it prioritized access to minerals deemed critical for the success of the country’s high-tech industries. It also invigorated China’s vast network of state-owned entities to finance and implement dozens of transition mineral projects across the developing world—all under the auspices of the BRI.

However, it is not yet widely known how official sector lenders and grant-giving institutions in China have operationalized these strategies and policies to support transition mineral operations in the Global South. Beijing’s critics argue that it plies foreign leaders in resource-rich countries with generous packages of aid and credit in order to secure long-term access to critical raw materials (Yujun et al. 2019; Russel and Berger 2020). This claim does not enjoy strong empirical support (Dreher et al. 2022), but a growing body of research suggests that Beijing has earned considerable goodwill among LIC and MIC leaders by addressing demands for growth-stimulating infrastructure and delivering projects within politically relevant timelines (Dreher et al. 2019; Anaxagorou et al. 2020; Custer et al. 2021; Parks et al. 2023; Blair et al. forthcoming). Whether this approach has helped Beijing expand its control over key segments of the transition mineral supply chain is an open empirical question.

2.1.1 A bird’s-eye view of Beijing’s transition mineral financing portfolio in the Global South

How has China’s official sector lending and grant-giving for transition mineral projects in LICs and MICs evolved under the mandates of the Going Out strategy, the BRI, and Made in China 2025?

Figure 2.1 Global distribution of China's official sector loans and grants for transition mineral operations in developing countries



Notes: This map shows the geographic locations of transition mineral projects supported by China's official sector financial commitments across all LICs and MICs between 2000 and 2021. The projects from the 1.0 version of AidData's CFTM dataset that have physical footprints or involve specific locations are represented. Goodman et al. (2024) describes the process by which these point, polygon, and line vector data are generated.

According to AidData's CFTM 1.0 dataset, Chinese government and state-owned institutions extended 1 grant commitment worth \$9 million and 93 loan commitments worth \$56.9 billion (in constant 2021 USD) between 2000 and 2021 to support the extraction and processing of five transition minerals across 19 low- and middle-income countries (see Figure 2.1).²² Beijing's heavy reliance upon loans highlights the (anticipated) commercial viability of these mineral extraction and processing operations. In most cases, borrowing institutions are

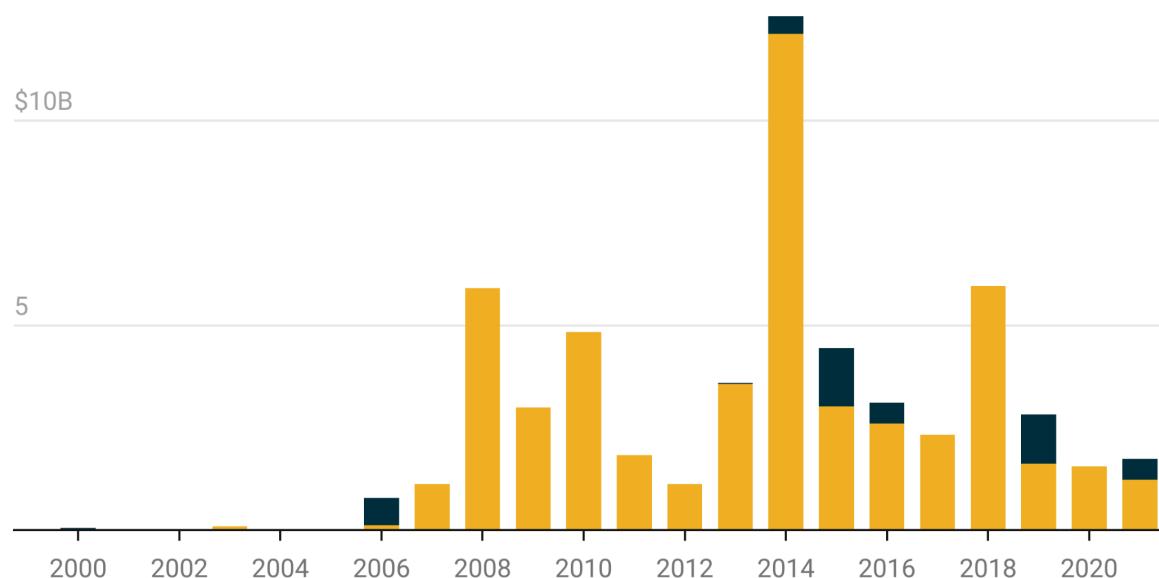
²² MOFCOM provided a grant in 2001 and China Eximbank provided a concessional loan in 2003 for the construction of the Sin Quyen Copper Mine in Vietnam, a mine that is owned and operated by a Vietnamese SOE. This is the only grant recorded in the CFTM 1.0 dataset.

expected to make principal and interest payments to Chinese creditors with revenues generated from the export (sale) of extracted and processed minerals.

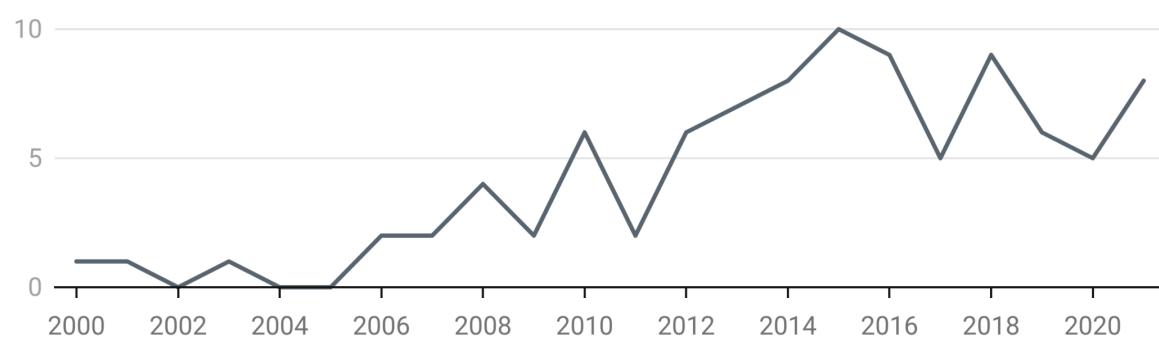
Figure 2.2 Composition of China's transition mineral financing portfolio by supply chain segment

Constant 2021 USD Billions

- Midstream (Processing)
- Upstream (Extraction)



Number of new loans and grants



Notes: These figures provide an overview of China's official financial commitments supporting overseas transition mineral projects in LIC and MIC countries between 2000 and 2021. The top figure presents the total financial commitments each year (reported in 2021 constant USD) and the bottom figure reports the number of individual loans and grants commitments each year.

Contrary to conventional wisdom, Beijing's effort to bankroll transition mineral projects in the developing world is not a new priority. As Figure 2.2 demonstrates, China was an early mover in the market. It first mobilized its official sector financing apparatus to support overseas transition mineral projects twenty-five years ago. Since 2000, China has devoted the vast majority of its financial support to upstream mining (extraction) operations, while limiting its engagement in midstream (processing) operations.

China's official sector financing commitments for transition minerals operations peaked during the first full year of the BRI (2014), with over \$12 billion in lending commitments that largely supported copper mining operations in Peru (\$10.4 billion), Ecuador (\$1.4 billion), and the DRC (\$0.25 billion).²³ At first glance, Figure 2.2 seems to suggest that transition mineral financing became a lower priority during the BRI era (2014-2021). However, we caution readers against this conclusion, because Figure 2.2 counts the full value of each financial commitment in the year that it was issued. In reality, Beijing disburses funds over multiple years after issuing a loan or grant commitment for a transition mineral project.²⁴

An alternative way of gauging China's level of engagement in the sector over time is to compare the number of new financial commitments during the pre-BRI era (2000-2013), the early BRI era (2014-2017), and the late BRI era (2018-2021). During the pre-BRI era, Beijing approved approximately two financial commitments per year, on average, for upstream transition mineral projects. This number tripled—to approximately six financial commitments per year, on average—during the early and late BRI eras. China also stepped up its support for midstream transition mineral projects between the pre-BRI and BRI periods.

²³ During the early BRI era, Chinese state-owned banks issued loan commitments worth \$1.85 billion for the Sulawesi Mining Power Station Project to bolster nickel processing capabilities in Indonesia, after the country banned nickel ore exports in 2014 (IEA 2024b). Due to China's investments in nickel processing in Indonesia, over 40% of global primary nickel supplies in 2023 came from this country (Chang 2023).

²⁴ Readers should also keep in mind that some of the large, year-on-year fluctuations in Figure 2.2 reflect major acquisition loan approvals to purchase equity stakes in overseas mining operations.

AidData's CFTM 1.0 dataset also suggests that copper mining is the central focus of China's official sector transition mineral financing portfolio. However, many minerals are not found in isolation, resulting in joint extraction. Cobalt, for example, naturally occurs with copper, so they are extracted together in the same mines. As such, Figure 2.3 captures the full value of China's official sector financial commitments for each type of transition mineral (i.e., the same financial commitments are assigned to multiple types of transition minerals, if a given mining site involves multiple transition minerals). It shows that China has provided \$47.3 billion for copper mining operations in LICs and MICs between 2000 and 2021 (representing 83% of all commitments). By comparison, it provided \$15.93 billion for cobalt mining operations, \$7.16 billion for nickel operations, \$3.16 billion for lithium operations, and \$270 million for REE mineral operations.

Figure 2.3 Composition of China's transition mineral financing portfolio by mineral type and supply chain segment

Constant 2021 USD Billions

- █ Upstream (Extraction)
- █ Midstream (Processing)

Copper

45.97

Cobalt

15.27

Nickel

3.67 3.49

Lithium

3.16

Rare Earth

Notes: This figure provides an overview of China's official sector financial commitments for each type of transition mineral. The figure includes all financial commitments that involve each type of transition mineral, so a financial commitment is included in multiple categories (bars) if the mineral extraction or processing site in question handles multiple transition minerals. As such,

summing financial commitment amounts across the five categories in the figure would result in double counting. All financial amounts are reported in 2021 constant USD.

Copper's unique importance as a focus mineral for Beijing can be seen from multiple angles. It secured more official sector loan and grant commitments for copper (81 in total) than for any other transition mineral (see Table 2.1). Also, nearly 90% of the recipient countries (17 out of 19 LICs and MICs) secured financial commitments for copper mining operations spread across 38 extraction sites and 2 processing sites (see Table 2.1).

Copper wiring is critical to the electric transmission technologies in industrial green energy products, so it is not surprising that Chinese state-owned lenders and donors have prioritized it. Two of Beijing's biggest bets in the copper extractives industry—the acquisition and development of the Toromocho and Las Bambas copper mines—have been in Peru. In 2007, the Aluminum Corporation of China (Chinalco) acquired a 100% ownership stake in the Toromocho Copper Mine, which became China's first overseas greenfield copper mine. Chinese state-owned creditors issued 10 loans worth \$3.9 billion between 2010 and 2017 to support the development of the mine and operations at the site. A consortium of Chinese companies then acquired Las Bambas, another greenfield copper mine, in 2014. Chinese state-owned creditors provided six loans worth \$11.5 billion between 2014 and 2020 to finance the acquisition, development, and operations of the mine.

Table 2.1 also highlights China's secondary focus on cobalt.²⁵ Beijing issued 25 official sector loans between 2000 and 2021 for 11 cobalt mining sites and one cobalt processing site in five developing countries. It provided funding for cobalt projects in Papua New Guinea (PNG), Indonesia, Russia, and South Africa, but it assigned a particularly high level of priority to the DRC. Chinese state-owned creditors approved 19 loan commitments worth approximately \$12.85 billion for cobalt-copper mines in the DRC between 2000 and 2021.²⁶ Some of the largest cobalt and copper mines in the world—including the Tenke

²⁵ Cobalt is often extracted with copper or nickel.

²⁶ AidData's CFTM 1.0 dataset also identifies two additional loan commitments worth \$339 million for the Kinsenda copper mine in the DRC (where cobalt is not present).

Fungurume mine and the Sicomines mine—are located in the DRC and operated by joint ventures between Chinese and Congolese SOEs.

Table 2.1 China's financial commitments for 5 types of transition minerals

Focus minerals	Loans and grants	Commitment amount (USD billions)	Mining sites	Processing sites	Host countries
Copper	81	\$47.3	38	2	17
Cobalt	25	\$15.9	11	1	5
Nickel	11	\$7.2	5	1	5
Lithium	3	\$3.2	1	0	1
Rare earth	1	\$0.3	1	0	1

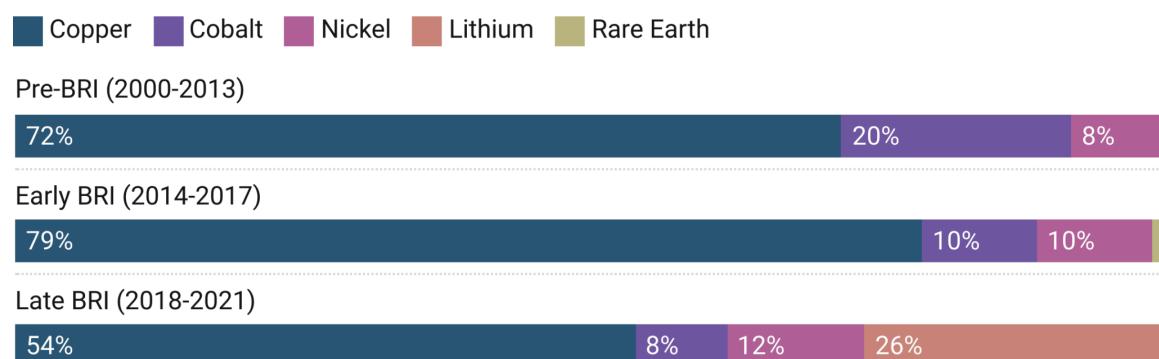
Notes: This table provides an overview of China's official sector financial commitments for each type of transition mineral. It includes all financial commitments that involve each type of transition mineral, so a financial commitment is included in multiple categories if the mineral extraction or processing site in question handles multiple transition minerals. As such, summing financial commitment amounts across the five categories in the table would result in double-counting. All financial amounts are reported in 2021 constant USD.

Over time, Beijing has consistently assigned a high level of priority to copper, cobalt, and nickel projects in the Global South (see Figure 2.4). However, during the late BRI era (2018-2021), China's overseas transition mineral financing portfolio shifted towards lithium projects. A case in point is the package of loans that ICBC, China CITIC Bank, and other Chinese and non-Chinese lenders provided in 2018 to facilitate Tianqi Lithium Corporation's acquisition of a 23.77% ownership stake in Sociedad Química y Minera de Chile S.A., one of the world's largest producers of lithium. This trend has continued in more recent years. In 2022 and 2023, Chinese state-owned creditors provided loans to help Chinese companies acquire the Bikita lithium mine in Zimbabwe and lithium mining rights in Argentina's Salta province. They also bankrolled the construction

of a lithium clay production plant in Mexico and a lithium-ion battery manufacturing facility in Turkey.²⁷

Figure 2.4 Composition of China's transition mineral financing portfolio by time period and mineral type

Percentage of transition mineral financing
Calculated using Constant 2021 USD



Notes: In order to estimate the percentages of official sector financing directed to each type of transition mineral, this figure assumes an even (50%-50%) split of grant and loan commitments to each mineral type when two minerals are involved.

According to AidData's CFTM 1.0 dataset, China's official sector financial support for REE minerals is quite small in comparison to other transition minerals (see Figure 2.4).²⁸ REEs represent a particular concern among G7 countries for energy transition and national security reasons. However, given that China is home to 35% of global REE mineral reserves and already holds a monopoly on the processing of these minerals (approximately 85-90% of global processing), it does not have a strong incentive to establish a large footprint in midstream or upstream REE operations abroad.

²⁷ These 2022 and 2023 financial commitments fall outside the temporal scope of AidData's CFTM 1.0 dataset. However, they will be included in a future iteration of the dataset.

²⁸ AidData's CFTM 1.0 dataset captures only one loan commitment for rare earth minerals mining, in Uganda. The mine development loan was extended to Guangzhou Dongsong Energy Group, a private Chinese mining and processing company. However, the mining site processes more than one type of mineral. Other minerals at the site include phosphate, iron, niobium and gold.

Beijing's provision of nearly \$60 billion of aid and credit for transition mineral operations in developing countries represents less than 5% of China's international development finance portfolio between 2000 and 2021. However, the significance of these financial flows lies in how China has deployed them to achieve its strategic ends. In Section 2.2, we turn our attention to how Beijing has used the BRI financing apparatus to provide strategic benefits to its private firms and SOEs, while expanding its control over the global supply chain for transition minerals.

2.2 Borrowers and financiers: Key players in Beijing's shadow playbook

The key to understanding China's playbook for the pursuit of transition minerals in overseas markets is to understand its players—in particular, the borrowers (entities that receive loans from official sector institutions in China) and the financiers (official sector institutions in China that provide loans).²⁹ Beijing has strategically repurposed its overseas lending apparatus to give its own companies a competitive edge and to expand its control of the global supply chain for transition minerals.

2.2.1 The borrowers: Anchoring China's global resource strategy

Under the Going Out policy and the BRI, China has provided more than \$1.3 trillion of aid and credit to developing countries, including \$825 billion for infrastructure projects (Parks et al. 2023). Beijing typically bankrolls smaller-scale infrastructure projects that do not generate substantial amounts of revenue—such as the construction and rehabilitation of hospitals, stadiums, convention centers, and presidential palaces—with grants or highly concessional loans. If debt is incurred for such projects, it is often forgiven or rescheduled on generous terms. However, when Beijing bankrolls large-scale infrastructure projects, it prioritizes revenue-generating projects—such as the construction and rehabilitation of oil refineries, power plants, and mines—that enable borrowing

²⁹ The CFTM 1.0 dataset provides details on one grant commitment and 93 loan commitments. Since the vast majority of China's official sector financing for transition mineral projects is provided via loans (99.98%), Section 2.2 specifically focuses on the borrowers of the 93 loans that dominate China's overseas transition mineral financing portfolio.

institutions to repay their debts. The borrowing terms of these loans are usually priced at or near market rates. Irrespective of the nature and size of the infrastructure project, the sovereign government of the host country—or a state-owned entity in the host country—is typically the recipient of the borrowed funds.

Chinese loans to government agencies and majority state-owned entities in host countries qualify as public debts, but not all public debts result from direct borrowings. In some cases, Chinese creditors provide loans to privately-owned entities or minority state-owned entities from host countries, which in turn, secure repayment guarantees from their host governments. Such loans are known as publicly-guaranteed debts. These loans and loans that are directly contracted by government agencies and majority state-owned entities in host countries are together known as public and publicly-guaranteed (PPG) debt. Beijing has traditionally provided most of its development finance to LICs and MICs through loans that qualify as PPG debt. Nearly 75% (\$947 billion) of China's international development finance portfolio between 2000 and 2021 qualifies as PPG debt (Parks et al. 2023).

However, with the passage of time, Beijing has redirected a larger share of its LIC and MIC lending portfolio to project companies, which are also known as special purpose vehicles (SPVs) (Malik et al. 2021; Parks et al. 2023). SPVs are independent legal entities established by sponsors (i.e., shareholders)—such as companies and governments—for specific purposes, such as owning and operating airports, seaports, toll roads, and mines.³⁰ Loans to SPVs are often characterized as “limited recourse project finance transactions” because lenders only have recourse to the liquid and illiquid assets of SPVs. They do not have recourse to the assets of the entities that own the SPVs (i.e., project sponsors). For host governments that want to undertake large-scale infrastructure projects without increasing levels of PPG debt and lenders that want to limit their exposure to repayment risk, limited recourse project finance is an attractive option. Loans to SPVs are typically used to acquire, develop, refinance, or otherwise support revenue-generating assets. The revenues generated by these

³⁰ JVs are SPVs with multiple owners (shareholders).

assets are not only used to repay creditors, but also to make dividend payments to project sponsors (SPV owners).

Between 2000 and 2021, China channeled 25% (\$315.2 billion) of its entire international development finance portfolio to SPVs, including joint ventures (JVs).³¹ 62% of this funding (\$195.5 billion) was provided during the BRI era (2014-2021).³² China relies even more heavily on limited recourse project finance transactions in the mining and industry sector: 44% of Beijing's financial commitments for mining and industry projects in LICs and MIC between 2000 and 2021 were channelled via SPVs (including JVs).³³

In the mining subsector (where revenue-generating projects are heavily concentrated), governments and companies often create project companies—either JVs with multiple owners or SPVs with individual owners—to develop, own, and operate specific mines. These project companies then draw upon equity contributions from their sponsors and debt financing from external creditors to establish or expand operations at the mining site.

Beijing's pivot from full-recourse sovereign debt transactions to limited-recourse project finance transactions is particularly visible in the way that it finances transition mineral operations in the developing world. According to AidData's CFTM 1.0 dataset, only 19% of China's official sector lending for LIC and MIC transition mineral operations qualifies as PPG debt. In comparison, 74% of China's overall lending to developing countries qualifies as PPG debt (see Figure 2.5). Beijing's cross-border financial commitments for transition mineral projects are dominated by non-PPG loans (worth \$46.2 billion, or 81% of China's official sector lending for transition mineral projects in developing countries). These loans represent debts that are usually not recognized as contingent liabilities of host governments.

³¹ This summary statistic is drawn from Figure 2.6.

³² These summary statistics are drawn from the 3.0 version of AidData's GCDF dataset (Custer et al. 2023; Parks et al. 2023).

³³ This summary statistic is drawn from Figure 2.6.

Figure 2.5 Composition of China's transition mineral lending portfolio by sectoral grouping and level of public liability

Percentage of China's overseas lending portfolio

Calculated using Constant 2021 USD

■ Public and Publicly Guaranteed (PPG) Debt ■ Non-PPG Debt

All Sectors



Industry/Mining Sector



Transition Mineral Subsector



Notes: This figure presents the composition of China's official sector lending portfolio in LICs and MICs across various sectors (as measured in 2021 constant USD). The data are disaggregated according to loans that do or do not qualify as public or public-guaranteed debt (PPG). PPG debt represents debt that host governments may eventually be liable for repayment and includes where either (1) the borrower is a government agency or a wholly- or majority-owned state entity, or (2) the borrower is a privately-owned entity or minority state-owned entity from the host country, and the borrower has secured a repayment guarantee from its host government. The "all sectors" and "industry/mining sector" categories represent official sector lending commitments captured in AidData's GCDF 3.0 dataset to those sector groupings, while the "transition mineral subsector" category represents official sector lending commitments for transition mineral projects in AidData's CFTM 1.0 dataset.

Beijing rarely uses PPG loans to bankroll transition mineral operations in the Global South due to its heavy reliance upon the limited recourse project finance model.³⁴ Nearly 80% (\$45.2 billion) of China's official sector lending for LIC and MIC transition mineral operations involved a SPV/JV borrower between 2000 and 2021 (see Figure 2.6). By comparison, only 25% of Beijing's total loan commitments for projects in the Global South—and 44% of its loan

³⁴ There are only two outliers in the CFTM 1.0 dataset, where host government entities directly received loans from Chinese state-owned creditors for mines with some level of Chinese ownership. (1) In 2006, a Chinese SOE provided a \$122 million loan to Gécamines, a DRC SOE, for the Luisha Mine—a majority Chinese-owned mine in which Gécamines held a minority stake (see Loan Event ID #2301). (2) In 2015, China Eximbank lent \$961 million to Russian state-owned bank Vnesheconombank for the Bystrinsky Copper Mine and Enrichment Plant—a majority Russian-owned mine with 13.3% shareholding by Chinese private sector firms (see Loan Event ID #1001).

commitments for mining, industry, and construction projects in the Global South—were channelled via SPV/JV borrowers over the same twenty-two year period.

Figure 2.6 Composition of China's transition mineral lending portfolio by sectoral grouping and use of JVs/SPVs

Percentage of China's overseas lending portfolio
Calculated using Constant 2021 USD

■ Involving a Joint Venture of Special Purpose Vehicle (JV/SPV) ■ No JV/SPV Involved

All Sectors



Industry/Mining Sector



Transition Mineral Subsector



Notes: This figure presents the composition of China's official sector lending portfolio (as measured in 2021 constant USD) in LICs and MICs between 2000 and 2021 across various sectoral groupings and according to whether loans were extended to JV or SPV borrowers. The "all sectors" category and the "industry/mining sector" category represent official sector lending commitments captured in AidData's GCDF 3.0 dataset to those sector groupings, while the "transition mineral subsector" category represents official sector lending commitments for transition mineral projects in AidData's CFTM 1.0 dataset.

Beijing's preference for channeling the majority of its LIC and MIC transition mineral lending to JVs and SPVs reflects more than just a desire to limit repayment risk. It also has a strategic rationale. While some SPVs are wholly-owned by a single entity, they commonly involve multiple shareholders. Typically, these JVs represent collaborative ventures between host country institutions—such as government agencies or SOEs—and Chinese companies seeking to invest in a mine and control its production and sales. Host country laws and political pressures may require the use of a JV to increase the likelihood that significant economic benefits from a mining project will accrue to the host country. However, the limited recourse project finance model also offers something to Beijing that the full recourse sovereign debt model cannot: the

opportunity to control the production and sale of transition materials that it lacks in sufficient quantities at home.³⁵

In addition to financing JVs and SPVs with some level of Chinese ownership, Beijing's official sector lending institutions provide direct support to Chinese companies that acquire, build, and operate overseas mining sites. This type of direct lending accounted for 16% of China's official sector financing for transition minerals operations in developing countries (\$9.2 billion) between 2000 and 2021. The majority of this financing (66% or \$6.1 billion) was designed to help Chinese companies acquire ownership stakes in overseas companies that control transition mineral operations. The remainder supported mining sites where Chinese companies already held ownership stakes—by developing and expanding mines (18% or \$1.7 billion), developing and expanding processing facilities (13% or \$1.2 billion), and supporting the day-to-day expenses of running mines and processing facilities (3% or \$0.2 billion).

Beijing clearly favors overseas transition mineral operations where its companies have skin in the game: 83% of China's official sector lending for the transition mineral subsector in LICs and MICs is earmarked for transition mineral operations that are partially or wholly owned by Chinese companies (see Figure 2.7).³⁶ These companies are not simply playing with "house money" (i.e., bank loans). They are investing their own money—via equity contributions—in the same overseas mining assets being bankrolled by Chinese state-owned creditors. In this respect, Beijing's international transition mineral lending portfolio stands apart from its larger overseas lending portfolio: only 16% of

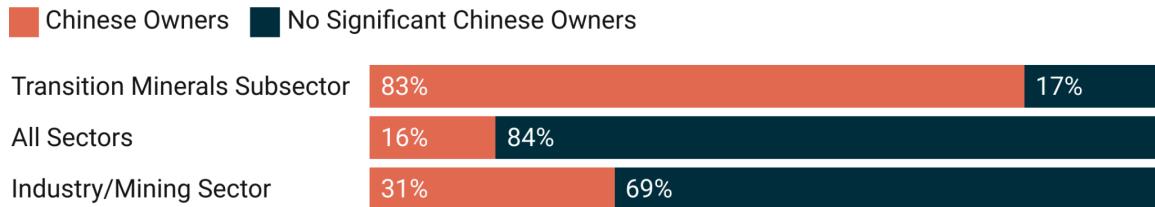
³⁵ There is an important exception: PPG loans collateralized against future revenues derived from long-term commodity offtake contracts with Chinese importers.

³⁶ To categorize China's official sector financial commitments for transition mineral operations according to the level of Chinese ownership or host government ownership (majority, significant, or none), the CFTM 1.0 dataset systematically categorizes the ownership of the mining site or processing facility that is targeted by the financial commitment. If the financial commitment is not tied to a specific mining site or processing facility, the CFTM 1.0 dataset assigns the level of Chinese ownership or host government ownership based on the characteristics of the entity that received the financial commitment. References in this report to Chinese owners and host government owners are references to the Chinese owners or host government owners of transition mineral operations, as captured in the CFTM 1.0 dataset.

total lending commitments from China to LICs and MICs is earmarked for recipient institutions with some level of Chinese ownership.³⁷

Figure 2.7 Composition of China's overseas lending portfolio for transition mineral operations with and without Chinese owners

Percentage of China's transition mineral lending portfolio
Calculated using Constant 2021 USD



Notes: This graph shows the composition of China's official sector lending portfolio (as measured in 2021 constant USD) in LICs and MICs across various sectoral views according to whether the lending supported projects with Chinese owners or not. The "all sectors" and "industry/mining sector" categories represent official sector lending commitments captured in AidData's GCDF 3.0 dataset to those sector groupings; footnote 37 explains how loans were categorized as supporting borrower institutions with or without Chinese owners from GCDF 3.0. The "transition mineral subsector" category represents official sector lending commitments for transition mineral operations in AidData's CFTM 1.0 dataset. Lending to Chinese-owned transition mineral operations reflects loan events where the "level of Chinese ownership" field was set to majority or significant Chinese ownership, including both Chinese government or private Chinese ownership.

The large volume of official sector lending that has supported Chinese-owned transition mineral operations highlights one of the most important ways that Beijing has established a foothold in the overseas transition mineral sector: by

³⁷ To identify grant and loan commitments directed to recipient/borrowing institutions with some level of Chinese ownership across China's international development finance portfolio, we developed a "Chinese Ownership Proxy" measure with the GCDF 3.0 dataset. A financial commitment was identified as supporting a Chinese-owned recipient/borrowing institution if it met one of two criteria: (1) the financial commitment involved a JV/SPV as the receiving agency and a JV/SPV Chinese Government Ownership field included a "Majority Chinese Government-Owned" or "Minority Chinese Government-Owned" designation; or (2) the financial commitment did not involve a JV/SPV as the receiving agency, but the Direct Receiving Agencies Type field included a "Chinese" designation, which signifies that China was the origin country of the direct recipient/borrowing institution. The "Chinese Ownership Proxy" measure was then utilized to calculate the proportion of funding allocated to projects associated with Chinese-owned recipient/borrowing institutions.

helping its firms overcome barriers to market entry with easy access to large-scale credit from state-owned banks.³⁸ The sector's capital-intensive nature sets a very high "price of admission." Acquiring a copper, cobalt, nickel, lithium, or REE mine requires a major upfront investment; a company seeking to purchase a majority ownership stake in such a mine might need several billion dollars of liquidity (freely available cash) to complete the transaction (see Table 2.2 in Section 2.3 below).³⁹ The development and operation of such a mine—after its acquisition—requires additional upfront investments and recurring capital expenditures to purchase heavy machinery and equipment and build access roads, electricity and water supply systems, and waste disposal systems. It is not unusual for a company to spend hundreds of millions or billions of dollars on the development of a mine before it achieves profitability.

Beijing helps Chinese firms pay the high "price of admission" by making access to credit conditional upon equity contributions from borrowing institutions. For example, if a Chinese firm wishes to acquire a majority ownership stake in an overseas mine for a cash consideration of \$1 billion, it would not be uncommon for Beijing's state-owned banks to offer the firm a \$700 million "acquisition loan" to provide 70% of the liquidity needed to purchase the asset. However, accessing this type of state credit would depend upon the Chinese firm (the borrowing institution) using its own money to cover the remaining cost of the asset acquisition (\$300 million). Likewise, Chinese state-owned creditors will finance capital investment projects in the transition mineral sector—such as the development or expansion of a mine—if borrowing institutions are willing to use a mix of debt and equity. Such projects are often financed with debt-to-equity ratios of 70:30 or 80:20. Beijing's state-owned banks want Chinese firms to use their own money (i.e., have skin in the game) in order to ensure that creditors

³⁸ The majority of the Chinese firms that benefit from such support are ultimately owned by the Chinese Government. AidData's CFTM 1.0 dataset demonstrates that 65% of China's official sector financial commitments for LIC and MIC transition mineral operations between 2000 and 2021 supported transition mineral operations controlled by majority Chinese state-owned institutions. As such, when Chinese state-owned creditors require that borrowers invest their own money—via equity contributions—in LIC and MIC transition mineral operations, the equity contributions are often being provided by majority Chinese state-owned institutions.

³⁹ See Section 2.3.1 for more details on mineral reserve acquisitions.

and borrowers have a shared incentive to ensure the profitability of the overseas investments that they pursue.

By making credit readily accessible to Chinese firms for overseas investments in transition mineral operations, Beijing is not only facilitating the entry of its firms into a key sector but also cementing its longer-term control over upstream and midstream segments of the global supply chain for copper, cobalt, nickel, lithium, and (to a lesser extent) REEs.

In mining sector JVs and SPVs, the primary output is raw or processed mineral ore, which is typically allocated among the owners based on their equity shares. These mineral ore allocations are formalized through so-called “oftake agreements” that specify how much of the mine’s output each shareholder receives. Each shareholder can then sell or direct its share of the output as it wishes.⁴⁰ The export sales of Chinese commodity producers under long-term offtake contracts are usually purchased by Chinese commodity importers (Bräutigam and Gallagher 2014; Norton Rose Fulbright 2021). Therefore, by owning and operating JVs and SPVs, Beijing is increasing its control over the flow of transition minerals from developing countries and ensuring a steady supply of critical inputs for its domestic companies and processing facilities.⁴¹ This strategy to lock-in access to substantial ore reserves over the lifetime of the

⁴⁰ By way of example, each shareholder of Minera Las Bambas—the joint venture that owns and operates Las Bambas copper mine in Peru—was assigned an offtake entitlement proportional to its shareholding percentage in the joint venture. MMG, the majority shareholder of Minera Las Bambas, subsequently signed an offtake agreement with China Minmetals, its parent company, that gave China Minmetals the right to purchase the majority of copper concentrate produced at the Las Bambas copper mine.

⁴¹ Approximately 83% of Beijing’s official sector lending for transition mineral projects in developing countries between 2000 and 2021 expanded China’s access to mineral outputs. Similar to previous analyses (Ericsson 2020, Gulley et al. 2019, Gulley 2022), we classify an official sector loan for a transition mineral operation as increasing China’s “access” to the mineral outputs at the site based on the ownership structure of the site that benefits from the proceeds of the loan. We assign the following types of companies to the “some level of Chinese ownership” category: (1) the JV, SPV, or company that controls the mine is majority- or wholly-owned by a Chinese company or a consortium of Chinese companies, or (2) a significant minority ownership stake in the mine is held by a Chinese company or consortium of Chinese companies. More detailed definition of private and state ownership can be found in the “Level of Chinese Ownership” field of AidData’s CFTM 1.0 dataset.

Chinese-owned and -operated mines may prove especially advantageous, given the projected surge in global demand for green energy transition inputs.⁴²

At the same time, public sector institutions in host countries play a non-trivial role in China's international portfolio of transition mineral projects. AidData's CFTM 1.0 dataset demonstrates that 32.6% of China's financial commitments for LIC and MIC transition mineral operations between 2000 and 2021 supported mining sites with some level of host government ownership (see Figure 2.8).⁴³

Figure 2.8 Composition of China's transition mineral financing portfolio by transition mineral operation ownership category

Percentage of China's transition mineral lending portfolio

Calculated using Constant 2021 USD

■ Majority Ownership ■ Significant Ownership ■ No Significant Ownership

Level of Chinese Ownership

72.8% 10.1% 17.1%

Level of Host Government Ownership

32.3% 67.4%

Notes: This figure presents the percentages of China's official sector financial commitments earmarked for transition mineral operations in LICs and MICs with varying levels of Chinese (government and private sector) ownership and host government ownership. A "majority" ownership designation is assigned when the entity in question holds an equity stake in a mine that exceeds 50%. A "significant" designation is assigned when a given entity holds an equity stake in a mine that does not exceed 50%. A "no significant" designation is assigned when there is no evidence that the entity in question holds an equity stake in the mine. The "Chinese Ownership" category considers the combined shareholding (equity stake) of all Chinese state-owned or Chinese private sector entities, while the "Host Government Ownership" category considers the combined shareholding of all host government-owned entities.

⁴² See Section 2.3.1 for more details on mineral reserve acquisitions.

⁴³ However, 60% of those financial commitments involved joint ventures with a single SOE from the DRC (Gécamines), which holds minority ownership stakes in six mining sites captured in AidData's CFTM 1.0 dataset. For a detailed overview of Gécamines' involvement, see the associated Sicomines mining site profile, available at aiddata.org/china-transition-minerals.

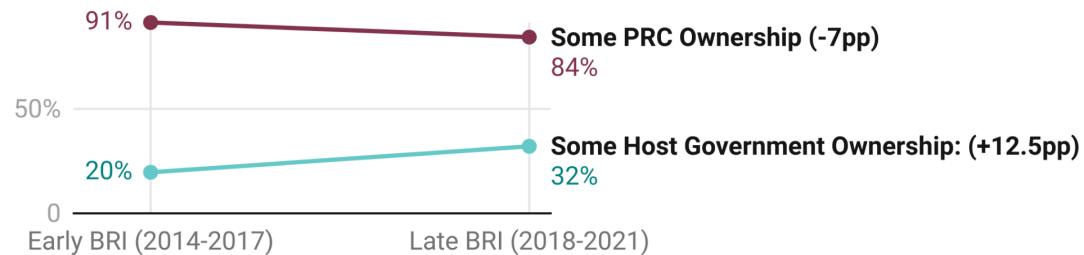
There are many reasons why host governments might wish to limit their ownership of transition mineral operations. Mining is a capital-intensive sector that presents high levels of risk and reward. Public sector institutions in developing countries are, in many cases, unwilling or unable to manage the large upfront costs, technical complexity, and environmental risks associated with mining operations. As a result, they often avoid taking equity stakes in mining projects and instead pursue legal arrangements that require the owners and operators of mines to generate public goods and public sector revenues—via royalties, tax payments, and corporate social responsibility (CSR) activities (Bunte et al. 2018).⁴⁴

Despite these barriers to entry, there is some evidence that public sector institutions in host countries are playing an increasingly important role in China's LIC and MIC transition mineral financing portfolio. Figure 2.9 demonstrates that, during the early BRI period, only 20% of China's transition mineral lending supported mining sites with some level of host government ownership. However, this figure increased to 32% during the late BRI period. In parallel, the share of Beijing's transition mineral lending to Chinese-owned mining sites in developing countries fell by 7 percentage points between the early BRI period and the late BRI period (see Figure 2.9). While these changes are relatively modest, they highlight an important trend: host governments in developing countries are seeking more control of their mineral resources.

⁴⁴ In other cases, the shareholders of a mining SPV or JV may grant the host government or a host country SOE a "free-carry" equity stake. The recipient of a free-carry equity stake possesses all the rights of a shareholder, including the right to receive dividend payments. However, it is not required to make equity contributions or shoulder the financial risks associated with the mining project.

Figure 2.9 Composition of China's transition mineral lending portfolio over time and by ownership category

Percentage of countries in China's transition mineral lending portfolio



Notes: This figure presents the percentages of China's official sector financial commitments earmarked for transition mineral operations in LICs and MICs with some level of Chinese (government and private sector) ownership or host government ownership across the early BRI period and the late BRI period.

There is a growing desire among resource-rich nations to derive greater value from their mineral wealth. Despite abundant reserves, many developing countries export raw ore for processing abroad—often to China—and forgo the additional revenue and jobs generated during the processing phase. In response, some governments in the Global South have implemented policies aimed at generating more value at home. For example, Indonesia's 2020 export ban on raw nickel ore led to a surge in domestic processing, prompting significant investments from China and other nations. Indonesia has since become the world's largest exporter of refined nickel (Chang 2023). Other countries have followed suit with similar bans, including Namibia, Ghana, Zimbabwe, and Malawi (Zyl 2024).

More generally, many host governments are renegotiating agreements to increase the benefits that accrue to local populations from extractive activities. Tax policies increasingly seek to channel revenues from mineral extraction into public coffers, yet tax avoidance remains pervasive. International mining companies often engage in “profit shifting” practices that effectively move profits to jurisdictions with lower tax rates to minimize their obligations. The International Monetary Fund (IMF) estimates that such practices cost sub-Saharan African countries with significant natural resource reserves an

average of \$600 million annually—and potentially as much as \$1.5 billion (Albertin et al. 2021).

In the DRC, the authorities recently accused Sicomines SARL—a Chinese majority-owned joint venture—of failing to meet its tax obligations and its infrastructure financing commitments under a 2008 RFI deal.⁴⁵ The Congolese government audited Sicomines SARL and found that it had only disbursed \$1 billion of the \$3 billion of infrastructure financing it had previously committed. After the audit, the authorities brought their Chinese partners back to the negotiating table and secured \$7 billion in additional infrastructure funding commitments—a significant concession for a government with an estimated annual budget of \$16 billion in 2024.⁴⁶

These events—and similar efforts by other LIC and MIC governments to capture more value-add from the transition mineral extraction and processing sites within their borders—raise an important question: will China’s official sector lending portfolio continue to be redirected to JVs and SPVs with host-government equity stakes? If so, will LIC and MIC governments be able to effectively manage these off-balance sheet liabilities (Malik and Parks 2021)?

Box 2.1 China’s bold push into Peru’s copper industry

Peru is the world’s second-most copper-rich country, possessing about 12% of global copper ore reserves (USGS 2024). AidData’s CFTM 1.0 dataset captures loan commitments that Chinese state-owned creditors issued to support five mining sites in Peru: Toromocho Mine, Las Bambas Mine, Marcona Mine, Antamina Mine, and Cerro Verde Mine. Altogether, China’s official sector lending institutions provided \$16.58 billion of credit to support these mines (with varying levels of Chinese ownership).

Two of the largest copper mines, Las Bambas and Toromocho, attracted 27% of China’s entire official sector financing portfolio for transition mineral operations in the developing world. Both sites were greenfield mines acquired and developed by Chinese

⁴⁵ The deal, which is known as “la Convention de Collaboration,” was revised five times between 2008 and 2024.

⁴⁶ It is expected that these infrastructure loans will be repaid with the cash proceeds from the JV’s copper and cobalt sales (EITI 2024).

companies, with commercial operations launching in 2015. Toromocho was the first overseas greenfield copper mine that a Chinese company ever developed.

Las Bambas has 4.9 million metric tons (Mt) of copper ore reserves and Toromocho has 6.7 Mt.⁴⁷ Together, the Chinese-owned mines control close to 10% of Peru's copper reserves and approximately 1.2% of global copper ore reserves. However, ore reserve estimates are not static; they can increase with further exploration or improved extraction technology. Planned expansion works at both mines, including the creation of a new pit at Las Bambas and further development of an existing pit at Toromocho, may unlock additional reserves.

China has also been active in financing infrastructure projects in Peru that complement and support its mining investments. In 2023, a Chinese bank syndicate lent \$975 million for the development of Chancay seaport; when operational, it is expected to be the largest deepwater port on South America's west coast and to cut shipping times from China by up to 20 days, enabling greater, cheaper, and faster copper exports (Thome 2024).

These efforts to acquire, develop, and operate copper mines in Peru call attention to Beijing's broader playbook for expanding its control of the global transition mineral supply chain. Further details regarding the financing, ownership, and operations at Las Bambas and Toromocho can be found in their respective profiles, available at aiddata.org/china-transition-minerals.

2.2.2 The financiers: The lenders that bankroll China's overseas transition mineral operations

AidData has documented how China's vast network of 791 official sector creditors and donors has reshaped the landscape of global development finance (Parks et al. 2023). Previous research has also demonstrated that Beijing uses a diverse set of financial institutions and instruments to address the perceived risks and rewards of different sectors and recipient countries (Malik et al. 2021; Dreher et al. 2022).

⁴⁷ According to 2024 estimates from the Las Bambas project company, the current copper ore reserves are 4.9 Mt. Older sources have estimated higher reserve numbers. The most recent ore reserve information for Toromocho is from 2019.

The mining sector in general—and the transition mining sub-sector in particular—involves high-risk, high-reward operations in some of the world's worst-governed and poorest regions. Yet the financial institutions and instruments that enable China to undertake overseas transition mineral operations in these jurisdictions are not well understood. AidData's CFTM 1.0 dataset seeks to fill this evidence gap. It captures 26 unique official sector creditors and donors in China that have supported copper, cobalt, lithium, nickel and REE mining operations in 19 developing countries.

Figure 2.10 China's leading official sector financiers of transition mineral projects

Constant 2021 USD Billions

China Development Bank (CDB)

\$16.85

Export-Import Bank of China (China Eximbank)

\$15.1

Bank of China (BOC)

\$5.8

Industrial and Commercial Bank of China (ICBC)

\$4.74

China CITIC Bank Corporation Limited

\$3.4

Notes: This figure identifies the official sector institutions in China that were responsible for approving the largest financial commitments for transition mineral projects between 2000 and 2021. All financial amounts are reported in 2021 constant USD.

Between 2000 and 2021, China's most active official sector financiers in the transition minerals space were CDB and China Eximbank (see Figure 2.10). CDB extended \$16.85 billion of credit for 36 transition mineral projects, while China Eximbank lent \$15.1 billion for 20 transition mineral projects. Together, these two policy banks accounted for \$32 billion or 56% of China's total official sector financing for transition mineral projects in developing countries over the same 22-year period. China's state-owned commercial banks have also played a

significant role. Three such banks—BOC, ICBC, and China CITIC Bank—issued loan commitments worth \$13.94 billion between 2000 and 2021, accounting for 24% of China’s official sector financing for transition mineral projects and activities in developing countries.

A significant portion of China’s lending for overseas transition mineral operations has come via syndication—an arrangement in which multiple creditors participate in a single loan agreement with a borrower. Syndicated lending is a way to reduce the level of risk borne by any individual creditor, while also reducing the borrower’s reliance on any one institution and allowing its debt financing needs to be met when no one creditor is willing or able to do so. As the BRI has progressed and Beijing has encountered an array of loan repayment and project implementation challenges, Chinese state-controlled creditors have scaled back their bilateral lending activities and scaled up their syndicated lending activities in the Global South (Parks et al. 2023). Syndication is effectively a de-risking shortcut: rather than relying on its own banks to vet borrowing institutions and proposed transactions, Beijing is increasingly outsourcing ESG risk and repayment risk management to lending institutions with stronger due diligence standards and safeguard policies (Parks et al. 2023).⁴⁸

Box 2.2 ESG challenges and the inherent risks of transition minerals

Given the inherent environmental, social, and governance (ESG) risks posed by mining activities, we assessed the risk factors and mitigation measures related to E, S, and G categories for each mining site, which will be expanded upon and presented in future iterations of the CFTM dataset. E, S, and G risk flags and risk mitigation flags were identified for individual mining sites whenever we found evidence that a specific risk or safeguard could be allocated to a specific site. Indicators were commonly identified via local media sources, international compliance or human rights agency reports, company websites, and academic journal articles.

Examples of environmental risks include air and water pollution. Environmental risk mitigation measures included Environmental Impact Assessments (EIAs) and the

⁴⁸ The major ESG risks associated with transition mining operations (see Box 2.2) create strong incentives for syndication (Parks et al. 2023).

construction of environmental harm mitigation infrastructure. Social risks at mining sites include forced evictions of nearby residents and labor violations. Some examples of social risk mitigation measures include Social Impact Assessments (SIAs) or investment in local communities. Governance risks at mining sites include issues related to the distribution of royalties and dividends to host countries, while governance risk mitigation measures include adherence to governance codes such as national or international financial reporting procedures.

We found that over 80% of the transition mineral projects encountered one or more varieties of ESG risk. We also identified an environmental, social, or governance risk at 39 of the 41 mining sites. The vast majority of funding, over 90%, was channeled to mining sites with at least one type of identified risk. Social and environmental risks were the most commonly identified, followed by governance risks.

However, ESG risks are sometimes difficult to allocate across mining sites, particularly in regions with highly concentrated mining activities. For example, the DRC's Kolwezi region, which has been deemed "unlivable" by African Resources Watch (AfreWatch), is home to numerous Chinese and non-Chinese mining projects. It is therefore not always possible to determine if a given ESG risk corresponds to a specific mining site.

Between 2000 and 2021, syndicated lending accounted for 41.4% of China's entire portfolio of official sector lending for transition mineral projects in LICs and MICs.⁴⁹ This figure has steadily increased with the passage of time—from 0% in 2000 to 79% in 2021 (see Figure 2.11).⁵⁰ Syndication with *non-Chinese creditors* has also become increasingly common. During the early BRI period, these types of arrangements accounted for less than 1% of China's official sector lending for transition mineral projects in the developing world. By 2021, this figure had sharply increased to 34% (see Figure 2.11).⁵¹

⁴⁹ The remaining 58.6% was provided via bilateral lending (\$33.39 billion).

⁵⁰ According to AidData's CFTM 1.0 dataset, bilateral lending commitments accounted for 100% of China's official sector lending commitments for transition mineral projects in LICs and MICs in 2000. This figure plummeted to 21% in 2021.

⁵¹ Between 2000 and 2021, 71% of China's syndicated lending commitments that involved non-Chinese financing participants were directed to transition mineral operations that did not have Chinese owners, which suggests a trend toward internationalization in the way that Beijing bankrolls transition mineral projects.

Figure 2.11 Composition of China's transition mineral lending portfolio by lending instrument type

Percentage of China's transition mineral lending portfolio
Calculated using Constant 2021 USD



Created with Datawrapper

Notes: This figure presents the composition of China's official loan commitments (in constant 2021 USD) for transition mineral projects in LICs and MICs by lending instrument type. Bilateral loans are extended directly from one Chinese financier to a borrowing institution. Syndicates with only Chinese entities represent syndicated lending agreements where Chinese financiers provided financing to a borrower through a syndicated loan. Syndicated with non-Chinese entities represents syndicated lending agreements where at least one participant in the syndicate was a non-Chinese financier.

To better understand China's syndicated lending playbook, AidData's CFTM 1.0 dataset extends its creditor coverage to 57 non-Chinese creditors and 3 privately-owned Chinese creditors that participated in syndicated loans with Chinese state-owned creditors. The dataset records lending commitments worth \$1.2 billion from privately-owned Chinese creditors and lending commitments worth \$6.4 billion from non-Chinese creditors. With these data, we now turn to an analysis of the financier ecosystem.

To reveal how various actors interact within China's transition mineral financing network, we use a network mapping approach—social network analysis (SNA)—to show connections between borrowers, Chinese state-owned creditors, and co-financiers (Joosse et al. 2025). We first use the CFTM 1.0 dataset to create a visual representation of these transactions, weighting connections by the size of financial flows to highlight each player's role and position within the network. The dataset helps identify which institutions play a central role in these partnerships and how relationships within the network have changed over time.⁵² For more details on SNA and how we have applied it to AidData's CFTM 1.0 dataset, see Box 2.3.

Box 2.3 Social network analysis

Social network analysis (SNA) is a methodology that focuses on the connections that bind actors in a network together. It is both a visualization tool and a set of measures that help uncover trends in those connections. Used as a complement to traditional statistical techniques, SNA is premised on the assumption that connected actors influence each other and, together, exhibit emergent patterns otherwise hidden from view (Skvoretz 2003). In contrast, traditional statistical techniques assume that actors make decisions in isolation from each other, not as part of a system where the actions of one stakeholder induces changes in the behavior of others (Wasserman and Faust 1994).

In the CFTM 1.0 dataset, financiers are categorized as either Chinese or non-Chinese entities, with detailed information on their headquarters and business operations documented. Using SNA, we mapped the relationships between financiers and borrowing institutions involved in China's transition mineral financing operations, enabling a visualization of financial flows that reveals how loans involving multiple creditors are structured. The complexity of syndicated loans and the involvement of JVs and SPVs adds further depth to the network, illustrating critical layers of interaction between Chinese and non-Chinese financiers.

⁵² For example, network analysis of AidData's GCDF 2.0 dataset has revealed that in the early days of Chinese development financing, when policy banks like CDB and state-owned commercial banks such as BOC had limited experience in developing countries, Western commercial banks like HSBC and Standard Chartered played critical brokerage roles via syndicated lending (Joosse et al. 2025).

The network charts in this report categorize stakeholders into three types:

(1) Chinese financiers, including state-owned policy banks, commercial banks, and state-owned companies; (2) non-Chinese financiers, such as Western and Japanese commercial banks; and (3) recipient organizations, typically borrowing institutions like SPVs and JVs, host government-owned companies, or Chinese state-owned companies.

Within the network, financiers and recipients appear as dots (nodes); financial transactions are represented by lines (ties). Node colors signify the type of organization: Chinese financier (salmon), non-Chinese financier (teal), or recipient organization (black). Lines between nodes represent the sources of financing and their relative size for each recipient organization. For Chinese and non-Chinese financiers, the size of the node reflects the total volume of financing they provided for transition minerals between 2000 and 2021. For example, if a specific JV received financing from one Chinese state-owned bank and two non-Chinese financiers, the black node representing the JV would connect to one salmon line and two teal lines.

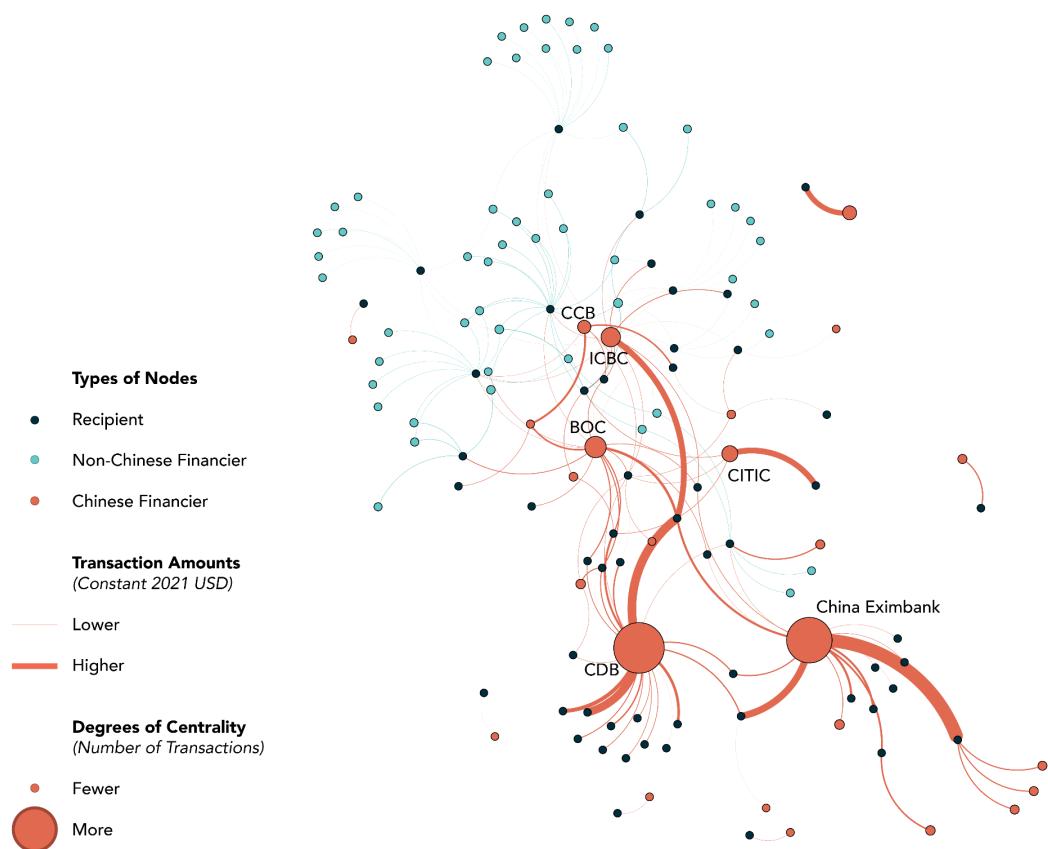
This visualization highlights the activity levels and power dynamics among financiers, as well as their relative embeddedness and positioning within the network. By analyzing these structures, we can identify the most and least well-connected stakeholders in the emerging financing network. While the analysis does not focus on ownership stakes or equity relationships, it underscores the centrality and connectivity of key financial institutions, particularly the evolving collaboration between Chinese and non-Chinese entities. These insights provide a deeper understanding of the financial ecosystem underpinning transition mineral projects and how Chinese and non-Chinese actors coalesce within this evolving sector.

Within the network analysis, we first include the various stakeholders, i.e., financiers, co-financiers and recipients, across three eras: pre-BRI (2000-2013), early BRI (2014-2017), and late BRI (2018-2021).⁵³ We divide financiers operating within the network into three primary categories: Chinese financiers,

⁵³ Research has shown that during these three periods the volume and character of Chinese development finance dramatically changed in line with the strategic needs of Beijing, from advancing Going Out, to developing BRI, to risk-proofing BRI (Parks et al. 2023). This report follows the same three periods to see how China's financing in transition minerals may have evolved similarly.

non-Chinese financiers,⁵⁴ and recipients. Between 2000 to 2021, transition mineral grants and loan commitments were extended by 86 unique Chinese and non-Chinese financiers to 59 unique recipients. See Box 2.3 for instructions on how to interpret the SNA map.

Figure 2.12 Network of China's financing for transition mineral operations in low- and middle-income countries, 2000-2021



Notes: This figure provides a network analysis map of China's official financial commitments to transition mineral projects between 2000 and 2021.

Figure 2.12 illustrates the financing network used by Beijing in LIC and MIC transition mineral operations. The network diagram displays several types of

⁵⁴ The 1.0 version of the CFTM dataset captures all financial commitments from official sector institutions in China for the five “focus” transition minerals. The dataset also captures non-Chinese financial commitments to syndicated loans involving at least one official sector lender from China.

funding arrangements common to China's engagement in the transition mineral sector. Over the 22-year period captured in the network map (2000-2021), Chinese stakeholders deployed one of four main combinations of stakeholders: (1) Chinese state-owned policy banks alone, (2) Chinese state-owned policy banks and state-owned commercial banks, (3) state-owned commercial banks alone, and (4) state-owned policy banks, state-owned commercial banks, and non-Chinese financiers.

Figure 2.12 highlights that, from 2000 to 2021, China's two policy banks (China Eximbank and CDB) were the largest and most connected players in terms of funding volumes, followed closely by three major state-owned commercial banks (BOC, ICBC, and CITIC Bank). During this period, Chinese financiers not only heavily collaborated among themselves to provide funding to the same borrowing institutions (often through syndicated arrangements), but also partnered with numerous non-Chinese financiers in syndicates. Although Beijing's policy banks favored partnership with other Chinese banks, Chinese state-owned commercial banks were much more likely to participate with non-Chinese financiers.

Non-Chinese financiers are generally smaller, indicating they are less central and connected compared to the largest Chinese financiers. In contrast to Chinese financiers, where a few key entities dominate the network with thick nodes and strong connecting lines, no single non-Chinese financier stands out as a preferred or consistent partner for China's official sector financiers in the transition mineral sector. This suggests that Chinese financiers did not consistently rely on specific non-Chinese institutions for co-financing these projects.

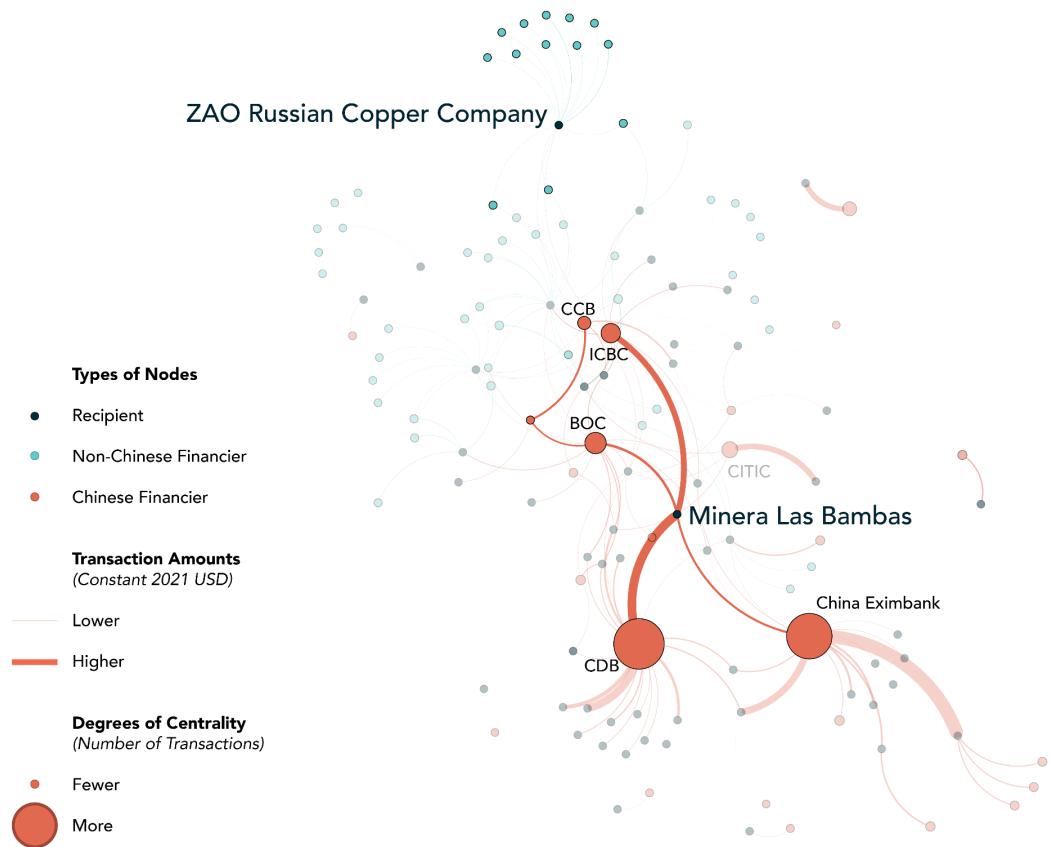
The cluster of 10 non-Chinese financiers (teal) in the upper-middle section of the network map calls attention to a \$250 million syndicated pre-export facility provided to ZAO Russian Copper Company for its working capital needs (see Figure 2.13 below). The facility involved contributions from 10 non-Chinese financiers, including Western and Russian commercial banks, a Russian state-owned bank, and Chinese state-owned commercial bank ICBC; because most actors in it, excepting ICBC, are not involved in other financing, Russian

Copper Company is very poorly connected to the rest of the network. By contrast, one of the most important borrowing institutions in the network is Minera Las Bambas, the Chinese-owned JV/SPV which owns and operates the Las Bambas mining site in Peru, which received \$9 billion in lending commitments from four Chinese state-owned creditors between 2014 and 2020.⁵⁵ CDB, China Eximbank, ICBC, and BOC formed a syndicate in 2014 to provide \$7.7 billion in financing across two loans to Minera Las Bambas to support the Chinese consortium's acquisition and development of the mine. These two syndicated loans together represent the most significant tie between lenders in the network, when considering the relative size of the transaction. In their commitment to support ongoing operations at the site, ICBC and BOC each later provided bilateral credit facilities to Minera Las Bambas in 2019, strengthening their ties to the site.⁵⁶

⁵⁵ In addition to that \$9 billion, another \$2.5 billion in financing was provided directly to MMG, one of the shareholders of Minera Las Bambas—the joint venture entity that owns and operates the Las Bambas Copper Mine—rather than to Minera Las Bambas directly. This \$2.5 billion of financing, captured in Record ID #103932 in the dataset, was provided by Top Create Resources Limited, a Chinese state-owned company, to MMG to finance its 62.5% share of equity contribution to the joint venture entity. Because MMG is the direct borrower in this case, in the social network map the transaction is separate from the financing provided to Minera Las Bambas directly.

⁵⁶ See the associated Las Bambas mining site profile, available at aiddata.org/china-transition-minerals, for additional information regarding its financing, ownership, and operations.

Figure 2.13 Network of China's financing for transition mineral operations at two selected mining sites



Notes: This figure provides a detailed look at China's official financial commitments to two mining sites. The top portion of the figure shows the financing structure for a \$250 million syndicated pre-export facility provided to ZAO Russian Copper Company for its working capital needs. The bottom portion of the figure presents the financing structure for the JV established at Las Bambas Copper mining (Minera Las Bambas).

China's official sector financing network for transition mineral operations in the developing world has not remained static over time. It has undergone a significant evolution. The release of Made in China 2025 in 2015 marked a pivotal moment, emphasizing the strategic importance of securing access to and control over transition minerals essential for advancing China's high-tech industry and achieving its global ambitions.

Figures 2.14, 2.15, 2.16, and 2.17 below illustrate the evolution of China's financing network across three distinct periods: the pre-BRI era, the early BRI era, and the late BRI era. Over this 22-year period, China's financing network evolved along three key dimensions: (1) the types of Chinese entities taking a leading role within the network, (2) the number of key actors within the network, and (3) the diversity of international collaborators involved in China's official sector financing program for transition mineral projects in LICs and MICs.

During the pre-BRI years, China's financing efforts involved limited engagement under the Going Out strategy. With only 2.9 unique Chinese financiers per year on average, China relied heavily on its two policy banks (China Eximbank and CDB) to bankroll transition mineral operations in the Global South. Additionally, its non-Chinese engagement with financiers was relatively limited, with an average of two non-Chinese financiers involved each year.

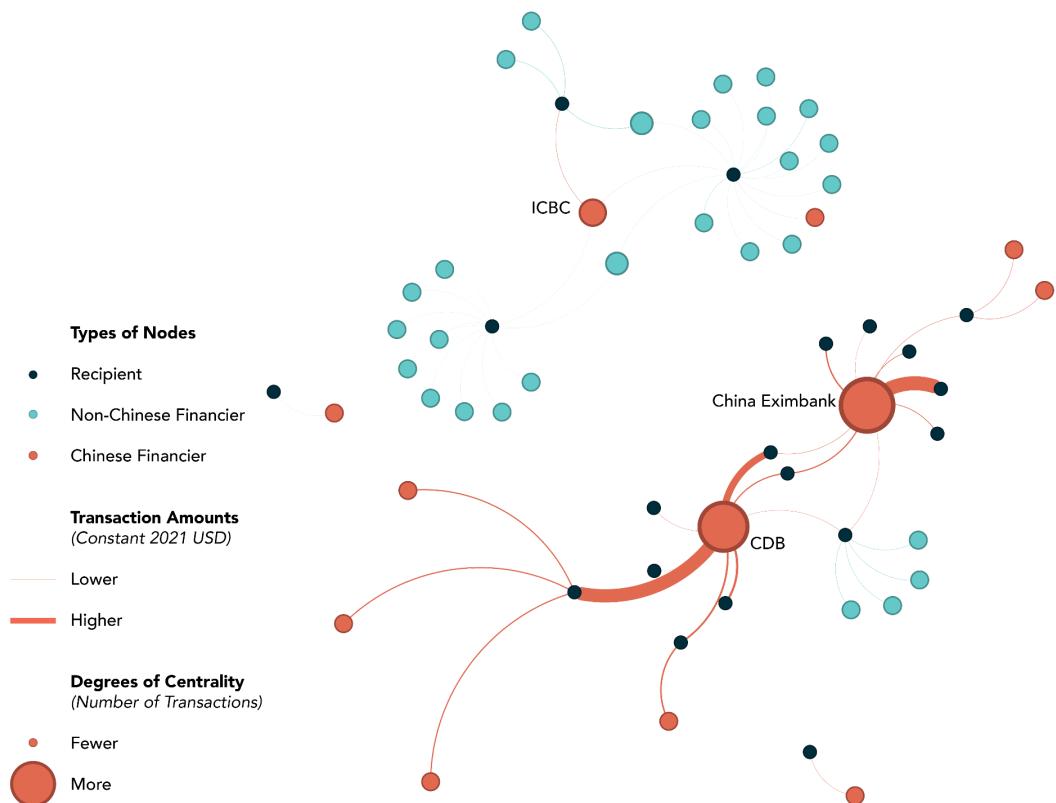
The centrality of China Eximbank and CDB during this time period (2000-2013) can be seen in the network map in Figure 2.14. These two banks provided the vast majority of their financing either bilaterally or via syndicated loans with other Chinese creditors. By contrast, ICBC, pictured near the top of the network map, was involved in three transactions during this period that were almost entirely co-financed by non-Chinese financiers. Besides the two policy banks and ICBC, there were a handful of transactions from state-owned companies to support their overseas investments.⁵⁷ The relatively small size of connecting lines (or ties) with these state-owned company financiers indicates that the lending from these companies was on a smaller scale than the lending from Chinese state-owned banks.⁵⁸ Additionally, the state-owned company financiers' ties to

⁵⁷ In all cases, the lending from state-owned companies was directed to support overseas investments in which the company or one of its subsidiaries held a significant equity stake.

⁵⁸ Lending from state-owned companies rarely exceeded \$1 billion in the dataset. The most significant tie between a state-owned company financier and a borrowing entity is a \$2.5 billion loan from Top Create Resources Limited to MMG to support its equity stake in the joint venture entity which owns and operates the Las Bambas Copper Mine. Top Create Resources Limited is a substantial shareholder of MMG, and both companies are subsidiaries of China Minmetals. This loan represents support for the parent company's acquisition of an indirect equity stake in the Las Bambas site.

only one node each, in most cases, shows that these were usually one-off events to support a single borrowing entity.⁵⁹

Figure 2.14 China's pre-BRI (2000-2013) financing network for transition mineral operations in the developing world



Notes: This figure provides a network analysis map of China's official financial commitments to transition mineral projects for the pre-BRI period (2000-2013).

During the early BRI years, China's official sector lending institutions were tasked with advancing two ambitious initiatives: the BRI and Made in China 2025.

⁵⁹ There is only one case in which a state-owned company provided financing to more than one borrowing entity directly, meaning that it is tied to more than one node. CITIC Metal Co. Ltd. provided loans to both Kamoa Holding Limited (the joint venture entity that owns and operates Kamoa-Kakula Copper-Cobalt Mine) and Ivanhoe Mines (the private sector company that owns and operates Platreef PGM-Nickel Mine). CITIC Metal owns an equity stake in both operating companies at these sites, and as such, the lending provided by CITIC Metal supports its own overseas investments.

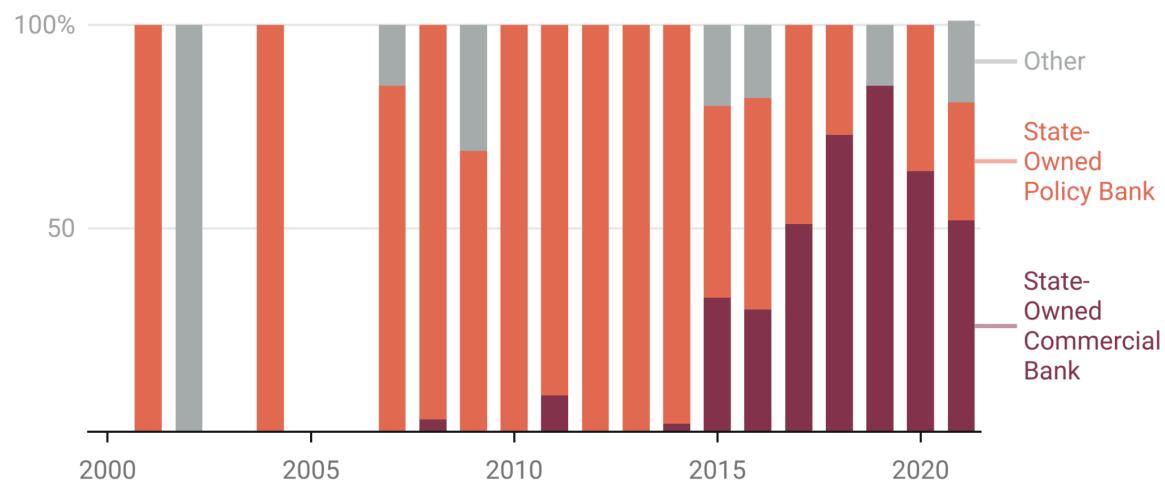
During this period, China's state-owned institutions responded rapidly, leading to a significant increase in the number of unique financiers and recipients involved annually. The average number of Chinese official sector financiers per year rose from 2.9 in the pre-BRI years to 7.8 in the early BRI years. This change reflected a deliberate strategy from Beijing to broaden the scale and diversify its transition minerals financing network by involving a wider range of financiers. For example, a typical transition mineral loan in the DRC during the pre-BRI period was provided as a bilateral loan to a JV/SPV borrower—with 85% of all lending (4 out of 5 loans) to the country consisting of bilateral loans and the remaining 15% involving syndicated lending with other Chinese financiers. In the early BRI period, this trend reversed, with 75% of all lending for transition mineral operations in the DRC being syndicated. These loans involved two to three Chinese banks providing a loan to a JV/SPV at each mining site.

Figure 2.15 provides further insights regarding the nature of the diversification process. Instead of relying heavily on its policy banks, Beijing scaled back its financing from these traditional lenders and scaled up its financing via state-owned commercial banks. The policy banks provided 89% of China's transition mineral financing commitments to developing countries during the pre-BRI era, but this figure plummeted to 46% during the early BRI period and 14% during the late BRI period. In parallel, the share of China's transition mineral financing via state-owned commercial banks sharply increased from 2% during the pre-BRI era to 39% during the early BRI period and 74% during the late BRI period.⁶⁰

⁶⁰ Beijing's pivot from policy bank lending to state-owned commercial bank lending took place in tandem with its pivot from bilateral lending to syndicated lending. AidData's GCDF 3.0 dataset demonstrates that China's state-owned commercial banks are more heavily engaged than its policy banks in syndicated lending to LICs and MICs. In 2021, 84% of China's state-owned commercial bank lending to LICs and MICs relied on syndicated loan instruments and the remaining 16% relied on bilateral loan instruments. By comparison, only 36% of China's policy bank lending to LICs and MICs relied on syndicated loan instruments and the remaining 64% relied on bilateral loan instruments (Parks et al. 2023).

Figure 2.15 Composition of China's transition mineral lending portfolio by type of financier

Percentage of China's transition mineral lending portfolio
Calculated using Constant 2021 USD

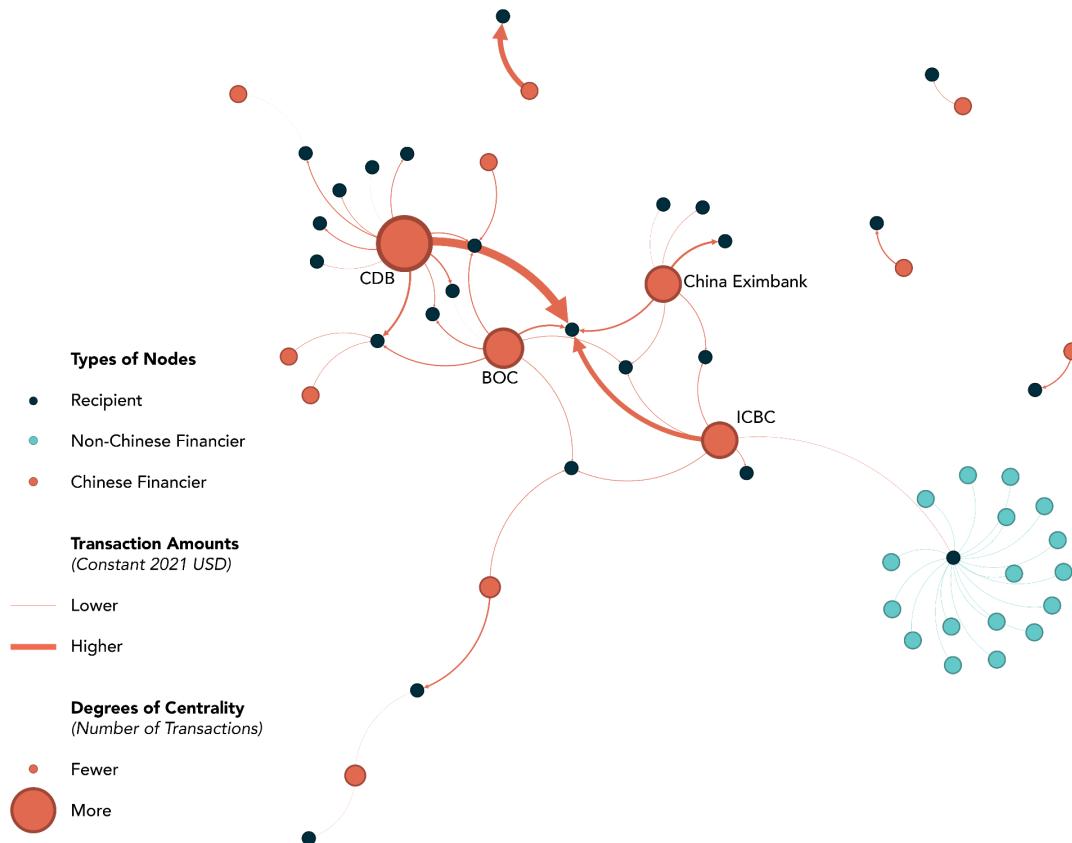


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Notes: This figure provides the percentage of Chinese official financial commitments supporting transition mineral projects by type of financier (in constant 2021 USD) to LICs and MICs between 2000 and 2021.

In examining China's financing network for LIC and MIC transition mineral operations during the early BRI period, we see this trend emerge in a different visualization. In Figure 2.16 below, two state-owned commercial banks have swelled to sizes comparable to China's policy banks, and all four make up the center of the network. Additionally, the teal cluster of nodes in the middle right section of Figure 2.16 shows that ICBC participated in a diverse lending arrangement with 17 non-Chinese funders (in support of a non-Chinese joint venture for the Cerro Verde copper mine in Peru).

Figure 2.16 China's early BRI (2014-2017) financing network for transition mineral operations in the developing world

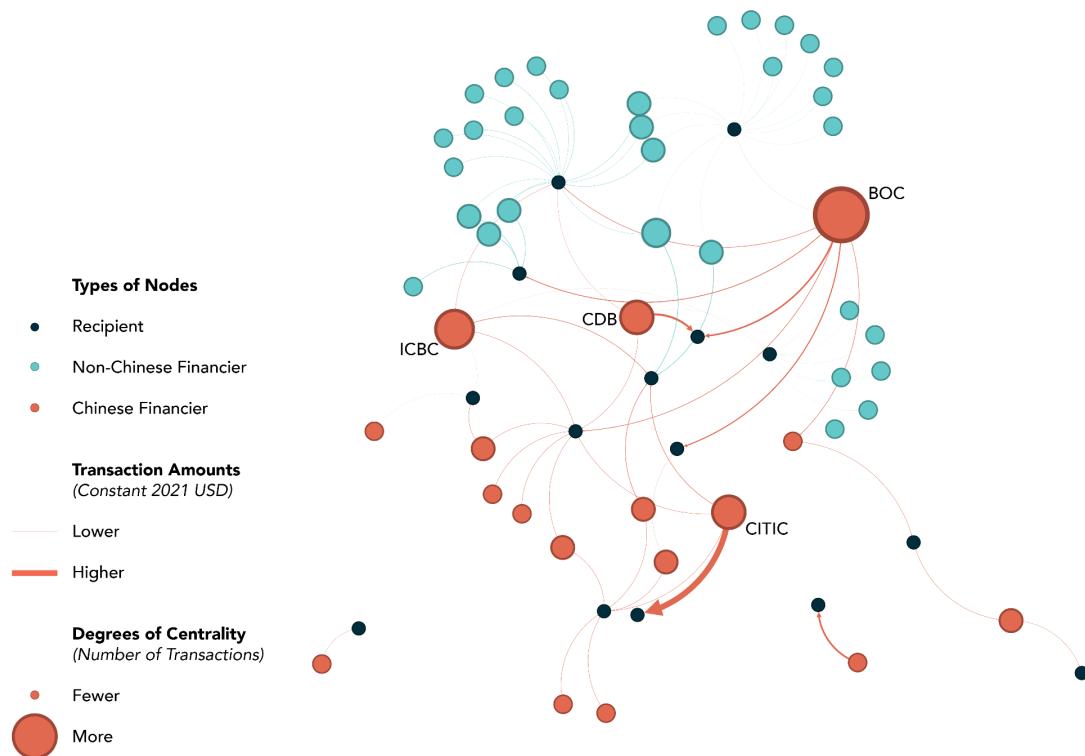


Notes: This figure provides a network analysis map of China's official financial commitments to transition mineral projects for the early BRI period (2014-2017).

Then, in the final time period representing the late BRI years (2018-2021), Beijing further increased the diversity of its Chinese financiers—moving to an average of 12.3 financiers per year (up from 7.8 during the early BRI years). Similarly, it increased its engagement with non-Chinese lenders, collaborating with nearly eight non-Chinese lenders per year during this time period. Both of these evolutions likely reflect Beijing's efforts to reduce its exposure to repayment risk, especially in the wake of the global economic slowdown caused by the COVID-19 pandemic (Parks et al. 2023).

Figure 2.17 highlights key features of this transition. During the late BRI period, the dominant role of China's policy banks was entirely surpassed by state-owned commercial banks, particularly BOC, followed closely by ICBC, CITIC Bank, and China Construction Bank (CCB). BOC not only emerged as a consistent financier for transition mineral projects, but also became a leading co-financier, collaborating with both Chinese and non-Chinese creditors. Additionally, there is a noticeable increase in the number of non-Chinese participants in the network that are repeatedly involved in multiple transactions, reflecting China's growing involvement in syndicated lending arrangements with external entities.

Figure 2.17 China's late BRI (2018-2021) financing network for transition mineral operations in the developing world



Notes: This figure provides a network analysis map of China's official financial commitments to transition mineral projects for the late BRI period (2018-2021).

The increase in funding from state-owned commercial banks has gone hand in hand with a rise in syndicated lending over time. However, two distinct types of syndicates have emerged: those composed solely of Chinese financiers and those with a broader range of participants, often including non-Chinese lenders, where Chinese banks hold a minority role. As state-owned commercial banks have gained prominence, there has been a strong preference for syndicates made up entirely of Chinese banks. By contrast, when a financial commitment supports a transition mineral operation with no Chinese ownership, syndicates tend to include a more international mix of lenders.

2.3 Tools of influence: China's financial tactics and risk management strategies

Beijing's playbook for securing transition minerals in the developing world has evolved, but some of its financial tactics and risk management strategies have remained consistent over space and time. It begins with the provision of credit to facilitate market entry for Chinese SOEs and private firms, often through acquisitions of mining assets. Once a foothold is established, China's official sector creditors act as "relationship bankers," offering a series of consecutive loans for the development and expansion of mines and working capital to sustain the operations at those mines. During the BRI era, syndicated loans also became a key mechanism through which Beijing's state-owned banks managed risk while providing robust support for transition mineral operations in the Global South. Beijing's rivals have struggled to provide comparable levels of financial support to their own companies, which has undermined their competitiveness in the sector. Beijing has become a pace-setter in the transition minerals sector, forcing other countries to rethink how they can increase their market share. We now turn to the question of how these tools have been deployed in the service of China's broader geoeconomic strategy.

2.3.1 Going upstream: Securing access to critical resources via acquisitions and mine development

For Chinese firms seeking to establish or expand transition mineral operations abroad, access to capital is paramount. Beijing has demonstrated that it is willing and able to mobilize its official sector lending mechanisms to meet the market entry, start-up, expansion, and day-to-day operational funding needs of its companies and their local partners. In the CFTM 1.0 dataset, we have assigned Beijing's official sector loans for LIC and MIC transition mineral operations to four different categories of financial instruments: mine acquisition loans, mine development loans, processing loans, and working capital loans.⁶¹

- Mine acquisition loans provide short-term liquidity to an entity that is seeking to obtain an equity stake in a company that operates a mineral extraction site. This objective can be achieved by acquiring an equity stake in the operating company itself, typically a JV or SPV, or by acquiring an equity stake in the mining operator's parent company. In some cases, host governments will first grant Chinese companies legal permission to engage in mineral exploration activities at a given location (via exploration permits), and then approve the acquisition of the asset—with the backing of Chinese state-owned financiers—if the mine is expected to achieve commercial viability. Mining acquisition loans are typically, but not always, provided to Chinese SOEs.⁶²
- Mine development loans support capital investments in overseas mines, including initial construction activities, mine expansion activities and related infrastructure such as tailings facilities. These types of mining

⁶¹ To enable aggregate analysis, the CFTM 1.0 dataset includes a "Primary Mining Activity" field that records the primary purpose of the activity supported by the financial commitment. In cases where the financial commitment may involve another subsidiary purpose that meets the definition of one of the other categories, multiple categories are identified in the "Mining Activity Detail" field. For the purposes of aggregate analysis, AidData uses the "Primary Mining Activity" field for analysis in this and subsequent sections of the report.

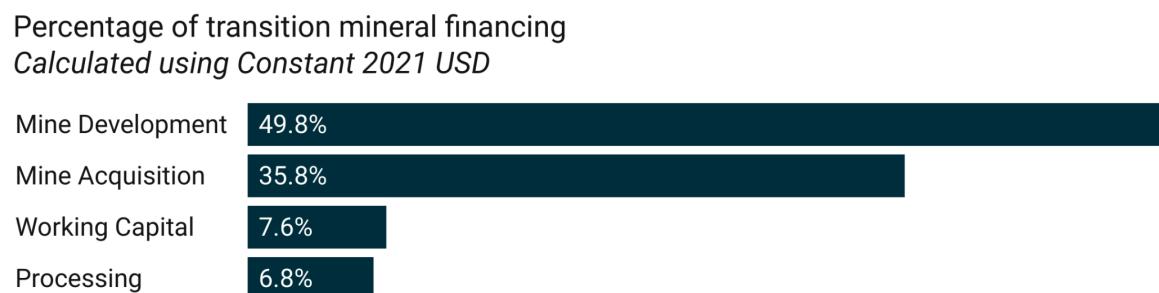
⁶² Between 2000 and 2021, China's official sector lenders provided \$20.4 billion of credit to Chinese companies to support acquisitions. 87% (\$17.7 billion) of these lending commitments were earmarked for transition mineral operation acquisitions that would ultimately become partially- or wholly-owned by Chinese SOEs. 13% (\$2.6 billion) of these lending commitments were earmarked for transition mineral operation acquisitions that would ultimately become partially- or wholly-owned by Chinese private sector entities.

operations are considered to be upstream activities, as they focus on mineral extraction.

- Processing loans finance the construction or improvement of facilities that process minerals. These types of midstream activities include the development of crushing, grinding, sizing, classifying, concentrating, and dewatering facilities.
- Working capital loans provide funds for a borrower's day-to-day operational costs but not for making capital investments or facilitating the acquisition of long-term assets. These loans are categorized as upstream when they primarily support mining operations, and are categorized as midstream when they primarily support processing operations.

According to Figure 2.18, Beijing's most commonly used official sector lending instruments are those that facilitate the acquisition of mines and those that support capital investments in mining extraction. Beijing also provides credit for the development of mineral processing facilities and the day-to-day operational needs of mining operators, but these lending instruments are less frequently used. Between 2000 and 2021, mine development loans (worth \$28.4 billion) accounted for approximately 50% of China's official sector financing for transition mineral operations in developing countries. Mine acquisition loans (worth \$20.4 billion) accounted for an additional 36%. Together, the loans extended for these two purposes represented nearly 86% of total China's official sector financial commitments for transition mineral operations in developing countries. These summary statistics suggest that Beijing is focused on gaining access to raw ore materials that can feed its domestic processing facilities, rather than bringing its comparative advantage in mineral processing to new overseas markets.

Figure 2.18 Composition of China's transition mineral financing portfolio by purpose



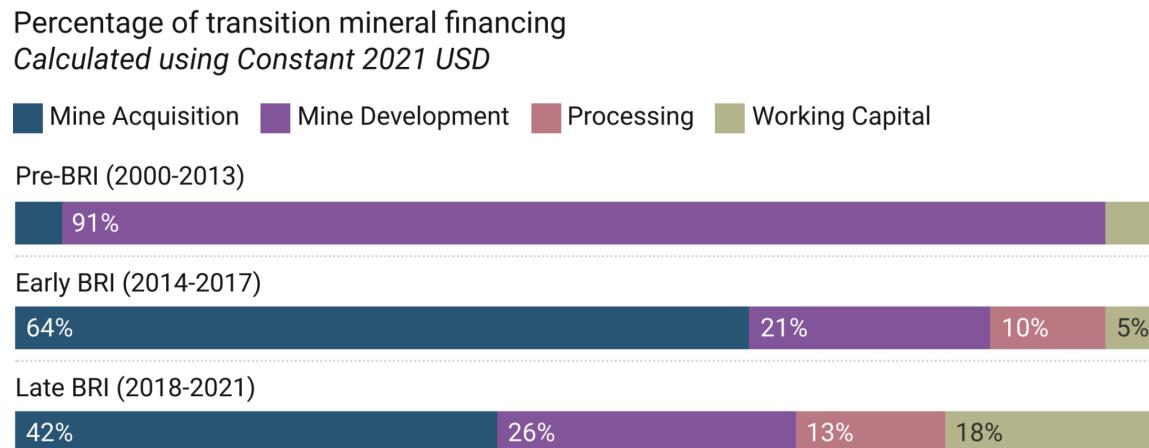
Notes: This graph shows the percentages of China's official sector transition mineral financing portfolio in LICs and MICs that were earmarked for different purposes between 2000 and 2021.

However, demand for these different financial instruments has evolved over time. Figure 2.19 demonstrates that mine acquisition loans became particularly popular during the early BRI period (2014-2017) and late BRI period (2018-2021).⁶³ By contrast, they accounted for a very small percentage (4%) of China's official sector financing for transition mineral operations in LICs and MICs during the pre-BRI period (2000-2013). These changes are consistent with the notion that Chinese creditors and companies responded to Beijing's Made in China 2025 policy by prioritizing the acquisition of strategic overseas assets.

Figure 2.19 also provides evidence that Chinese creditors and companies prioritized mine development during the pre-BRI period, but redirected their focus toward the midstream activities and day-to-day operational needs of mine owners/operators during the early and late BRI periods. This finding calls attention to the full-service and long-term nature of financing provided by Beijing's state-owned policy banks and commercial banks for transition mineral operations. Chinese companies frequently describe these creditors as "relationship banks" because they provide consistent support—with different types of lending instruments—to support the evolving needs of mine owners/operators over time.

⁶³ According to Figure 2.19, mine acquisition loans accounted for 64% of China's official sector financing in LICs and MICs during the early BRI period (2014-2017). This figure fell to 42% during the late BRI period (2018-2021).

Figure 2.19 Composition of China's transition mineral financing portfolio by purpose and time period



Notes: This graph shows the percentages of China's official sector transition mineral financing portfolio in LICs and MICs that were earmarked for different purposes between 2000 and 2021. The summary statistics are disaggregated according to the primary purposes of the financial commitments and across three time periods: pre-BRI (2000-2013), early BRI (2014-2017), and late BRI (2018-2021).

AidData's CFTM 1.0 dataset also demonstrates that Beijing is highly selective in the way that it allocates credit to support new market entrants. All of its financial commitments for the acquisition of equity stakes in existing copper, cobalt, nickel, lithium and REE sites between 2000 and 2021 supported Chinese companies. Beijing also favors companies that it controls: 87% of its acquisition lending for transition minerals in LICs and MICs supported mining sites with Chinese SOE owners, while only 13% supported mining sites with Chinese private owners. Beijing is similarly selective about how acquisition loans are organized and by whom: 98% of its acquisition lending exclusively involved Chinese creditors, while only 2% involved syndicated lending arrangements with non-Chinese creditors.⁶⁴

⁶⁴ There is only one acquisition loan from a Chinese state-owned creditor that involved a syndicated arrangement with non-Chinese participants: one of the three loans extended to Tianqi Lithium Corporation in 2018 to acquire a 23.77% ownership stake in Sociedad Química y Minera de Chile S.A. included five bank participants, two of which were non-Chinese creditors (BNP Paribas S.A. and Société Générale).

Mine acquisition loans allowed Chinese companies to gain ownership stakes in 14 mining sites across 10 host countries. Chinese companies obtained majority ownership stakes in eight of these mining sites and significant minority ownership stakes in the six remaining mining sites.⁶⁵

Beijing's most popular acquisition target among the five "focus" transition minerals was copper (see Figure 2.20). Twelve of the 14 mine acquisitions bankrolled by Chinese state-owned creditors involved copper as a primary byproduct, although four of the 12 also included cobalt as a byproduct. The remaining acquisitions focused on nickel and lithium extraction sites. Table 2.2 highlights the top four mine acquisition loans extended by Chinese state-owned creditors between 2000-2021.

Figure 2.20 Number of official sector loans from China supporting mine acquisitions by type of transition mineral



Notes: This figure presents the number of official sector loan commitments from China between 2000 and 2021 that supported new mine acquisitions in LICs and MICs. The data are disaggregated according to the type of transition mineral that was acquired. The figure includes all financial commitments for mine acquisitions that involve each type of transition mineral, so a financial commitment is included in multiple categories (bars) if the mineral extraction or processing site being acquired handles multiple transition minerals. As such, summing loan counts across the four categories (bars) in the figure would result in double counting.

⁶⁵ In AidData's CFTM 1.0 dataset, "significant" Chinese ownership indicates that there is evidence that a state-owned company or privately-owned company from China holds an equity stake in the mining project which does not exceed 50%. More details can be found in the Appendix.

Table 2.2 Top mine acquisitions by Chinese lending volumes

Acquisition description	Acquisition year	Level of Chinese ownership of acquired company/mine	Value of official sector loans enabling acquisition (USD billions)
The Las Bambas copper mine in Peru was wholly acquired by a consortium of Chinese companies	2014	Majority (state-owned)	\$10.2 ⁶⁶
Tianqi Lithium Corporation acquired a 23.77% stake in Sociedad Química y Minera de Chile S.A (SQM), a Chilean-based company that is one of the world's largest producers of lithium	2018	Significant (state-owned)	\$3.16
CMOC acquired a 56% stake in the Tenke Fungurume copper-cobalt mine in the DRC in 2016, increasing the stake to 80%	2016-2017	Majority (private sector)	\$2.47
Zijin Mining wholly acquired Nevsun Resources, leading to the acquisition of a 55% equity stake in the Bisha copper-zinc mine in Eritrea	2018	Majority (state-owned)	\$1.66

Notes: This table presents the largest acquisitions of transition minerals assets in LICs and MICs financed with loan commitments from Chinese state-owned creditors between 2000 and 2021. Aggregate loan commitments are measured in billions of 2021 constant USD.

Beijing also selectively allocates credit to mining sites with outsized potential. Its largest acquisition loans targeted mining sites with some of the largest ore reserves—including the Las Bambas copper mine (4.9 Mt copper ore reserves) and the Toromocho copper mine (6.7 Mt copper ore reserves) in Peru, as well as the Tenke Fungurume mine (TFM) (7.9 Mt copper ore reserves and 0.8 Mt cobalt reserves) and the Sicomines mine (8.1 Mt copper and 0.5 Mt cobalt) in the DRC. These mines account for 10.2% of Peru's total copper reserves and 20% of the DRC's copper and 21.7% of its cobalt reserves, respectively (USGS 2024).⁶⁷

Another tool that Beijing uses to establish a foothold in overseas transition mineral operations is *subsidized* credit. AidData's CFTM 1.0 dataset uses the

⁶⁶ The acquisition financing package for Las Bambas includes a \$2.5 billion loan from Top Create Resources, a Chinese SOE, to MMG to finance its equity stake in the Minera Las Bambas JV. The remaining financing was provided by Chinese state-owned banks to Minera Las Bambas.

⁶⁷ For more details on these acquisitions, see the corresponding mining site profiles available at aiddata.org/china-transition-minerals.

OECD-DAC concessionality calculator to determine the “grant element” of each official sector loan commitment from China that supported a transition mineral operation in the developing world. This measure, which varies from 0 percent to 100 percent, captures the extent to which a given loan is priced at or below market rates. A higher grant element indicates that a loan is being provided on more concessional (generous) terms. The OECD-DAC has historically designated loans with a grant element of 25% or higher as “concessional loans.” According to Table 2.3, China’s official sector lending commitments for LIC and MIC transition mineral operations usually meet or exceed the OECD-DAC’s 25% grant element threshold for concessionality. Table 2.3 also suggests that Beijing does not discriminate in its use of subsidized credit: on average, borrowing institutions with varying levels of host government ownership and Chinese ownership receive loans with nearly identical borrowing terms.

Beijing’s use of subsidized credit underscores the fact it is following its own playbook, rather than the rules and norms that guide its Western competitors in liberal market economies. Every country has an incentive to support its national exporters with subsidized credit. Therefore, after World War II, OECD member countries put in place a set of export credit disciplines to prevent a race-to-the-bottom dynamic, in which countries would compete on the cost of credit rather than the price and quality of their exporters’ goods and services. Under a so-called “Gentlemen’s Agreement” on Officially Supported Export Credits, OECD member countries agreed in 1978 to “tie their own hands” and voluntarily abide by a set of international rules that limit the provision of subsidized credit to domestic companies with overseas operations. However, Beijing never agreed to participate in the “Gentlemen’s Agreement” on Officially Supported Export Credits, and it has used concessional lending instruments to help its firms gain a competitive edge over Western firms in the overseas transition mineral sector.

Table 2.3 Borrowing terms of China's transition mineral lending portfolio

Lending to transition mineral operations by ownership	Interest rate	OECD grant element	Maturity (years)	Grace period (years)
<i>Chinese</i>				
Majority or significant	4.2%	25.6%	12.3	3.4
None	5.1%	23.9%	13.3	3.0
<i>Host government</i>				
Majority or significant	4.8%	23.7%	13.8	4.0
None	4.4%	25.7%	12.1	3.0
<i>Lending to all sectors</i>				
All projects across GDCF 3.0	4.2%	27.6%	12.0	4.4

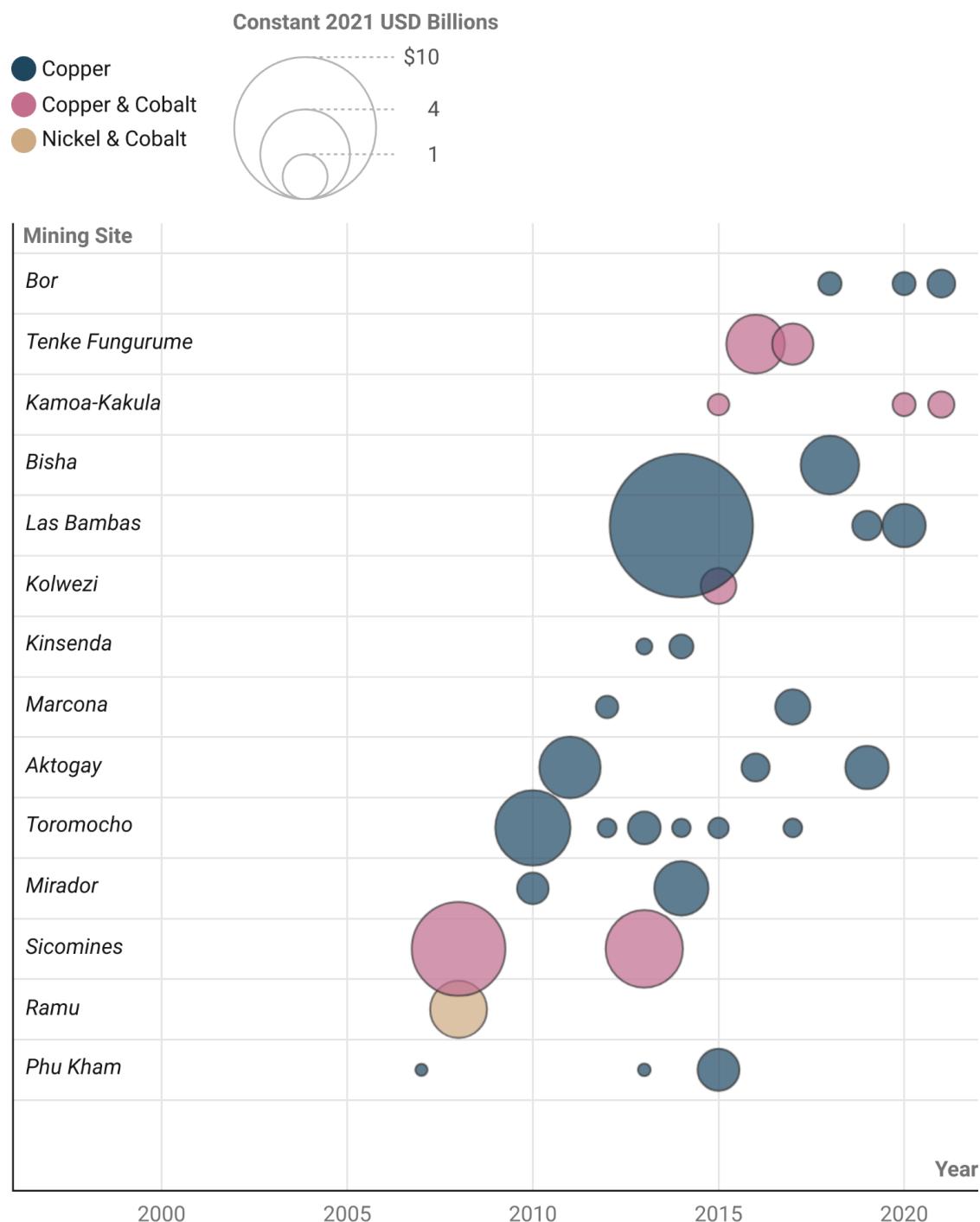
Notes: This table presents weighted average borrowing terms that applied to China's official sector lending commitments for the transition mineral subsector and all sectors in LICs and MICs between 2000 and 2021. The average borrowing terms are weighted by the loan commitment volumes (measured in constant 2021 USD) in each ownership category. The summary statistics are disaggregated according to the ownership characteristics (Chinese ownership or host government ownership) of the transition mineral operations. Chinese ownership includes Chinese state-owned enterprises and privately-owned Chinese enterprises.

2.3.2 Serial financing: Relationship banking for Chinese companies

Beijing seeks to provide continuous, long-term financial support to Chinese companies that own and operate overseas mineral extraction and processing sites. Rather than providing scattered or sporadic support, it has focused the bulk of its aid and credit on a limited set of high-value mining sites. Between 2000 and 2021, it channelled 66% of its official sector lending commitments for transition mineral operations to 14 major mining sites in 8 countries: the Toromocha, Las Bambas, and Marcona mines in Peru; the Tenke Fungurume, Kamoa-Kakula, Sicomines, Kolwezi, and Kinsenda mines in the DRC; the Bor Mine in Serbia; the Aktogay mine in Kazakhstan; the Phu Kham mine in Laos; the Mirador mine in Ecuador; the Bisha mine in Eritrea; and the Ramu mine in PNG.

At each of these mining sites, Chinese state-owned lenders have provided consistent, ongoing support—by issuing a series of consecutive loan commitments—at various stages of the investment process (e.g., mine acquisition, mine development, and mine operation). On average, the set of mining sites that benefited from serial lending received 3.6 separate official sector loan commitments from China between 2000 and 2021. Figure 2.21 below documents this pattern of serial lending by visualizing the flow of loans to each of the 14 mining sites over time.

Figure 2.21 China's financial commitments by transition mineral site and year



Notes: This graph shows Chinese official financial commitments to 14 transition mineral sites that received more than one commitment between 2000 and 2021. All values represent constant 2021 USD.

AidData's CFTM 1.0 dataset also demonstrates that serial financing is a tool that Beijing largely reserves for *Chinese-owned* copper, cobalt, lithium, nickel and REE operations in the developing world. Between 2000 and 2021, 91% of the serial financing that Beijing provided for transition mineral projects in LICs and MICs supported Chinese-owned mining sites. Serial financing is typically provided in one of two ways. For Chinese-owned JVs and SPVs that have already acquired mines, credit is usually earmarked for mine development and general operating expenses. However, for existing mining sites where Chinese companies do not yet possess ownership stakes, the first loan in a series of consecutive loans is typically an acquisition loan to help purchase majority or minority ownership stakes, followed by additional credit facilities to support the development of mines and their day-to-day operational needs.

China's serial financing approach capitalizes on one of its key strengths: the wide array of institutions that the "party-state" can mobilize and coordinate to support transition mineral operations in developing countries.⁶⁸ Rather than relying on a single export credit agency or development finance institution to provide continuous support for the same mining site, there is significant burden-sharing and risk-pooling across a large network of 26 official sector creditors and donors that have come together to support transition mineral projects in the developing world.

Beijing's "bench strength" makes it easier for Chinese firms to sustain their overseas operations and quickly adapt to changing conditions on the ground. At a given mining site, it is not unusual for a rotation of different financiers to step in and extend different types of loans at different stages of the investment process. For example, the Toromocho Project was the first greenfield investment in an overseas mine by a Chinese enterprise (see Box 2.1 in Section 2.2 above). Over seven years, three different Chinese state-owned creditors provided eight loans for the construction of a lime plant, the construction of electricity supply

⁶⁸ The term "party-state" refers to an entity that consists of Chinese government bodies and organs of the Chinese Communist Party (CCP). For more on the Chinese party-state, see Shue (2018) and Kardon and Leutert (2022).

systems, the construction of a water treatment plant, and working capital for the day-to-day operations of the mining operator (Minera Chinalco Perú S.A.).⁶⁹

2.3.3 Limiting liability: How China limits repayment risk in its overseas transition mineral financing portfolio

Chinese lenders want to be repaid. However, transition mineral operations in developing countries pose large and complex risks over long time horizons. AidData's CFTM 1.0 dataset provides a unique source of evidence on the repayment risk mitigation measures (so-called "credit enhancements") that Chinese lenders have adopted in cross-border lending agreements for these operations.

One way to reduce the risk of financial loss is to secure a sovereign guarantee (i.e., a guarantee that the host government will repay the lender if the borrowing institution fails to meet its repayment obligations). In the transition mineral sector, sovereign guarantees often support SPVs and JVs that are minority- or majority-owned by Chinese entities. Indeed, 30% of China's PPG lending for LIC and MIC transition mineral operations involves the provision of sovereign guarantees to such entities. An additional 24% of China's PPG lending for LIC and MIC transition mineral operations involves direct support to host country SOEs for mining sites with Chinese owners and host government owners. Together, 54% of China's PPG lending for LIC and MIC transition mineral operations represents direct or contingent liabilities of host governments (see Figure 2.22). These types of arrangements are attractive to Chinese lenders, in that they limit their exposure to repayment risk. They are also attractive to the Chinese owners of SPVs and JVs from a risk-sharing perspective, since host governments effectively assume financial responsibility for transition mineral projects that are insufficiently profitable. However, such arrangements have recently fallen out of favor. During the late BRI period, Chinese state-owned creditors did not issue any PPG loans for Chinese-owned transition mineral operations in LICs and MICs (see Figure 2.23).

⁶⁹ See the associated Toromocho mining site profile, available at aiddata.org/china-transition-minerals, for additional information regarding its financing, ownership, and operations.

Figure 2.22 Composition of China's PPG lending portfolio with and without Chinese owners

Percentage of China's transition mineral lending portfolio
Calculated using Constant 2021 USD

■ Chinese Owners ■ No Significant Chinese Owners

All Sectors

6% 94%

Industry/Mining Sector

9% 91%

Transition Mineral Subsector

54% 46%

Notes: This graph presents the percentages of China's official sector PPG lending portfolio (measured in 2021 constant USD) supporting projects with or without Chinese ownership to LICs and MICs between 2000 and 2021. The "all sectors" and "industry/mining sector" categories represent official sector lending commitments captured in AidData's GCDF 3.0 dataset to those sector groupings; footnote 37 in Section 2.2.1 above explains how loans were categorized as supporting borrower institutions with or without Chinese owners from GCDF 3.0. The "transition mineral subsector" category represents official sector lending commitments for transition mineral operations in AidData's CFTM 1.0 dataset. Lending to Chinese-owned transition mineral projects reflects loan events where the "level of Chinese ownership" field was set to majority or significant Chinese ownership, including both Chinese government or private Chinese ownership.

Figure 2.23 Composition of China's PPG and non-PPG transition mineral lending portfolio over time by PRC ownership type

Percentage of China's transition mineral lending portfolio
Calculated using Constant 2021 USD

- █ PPG lending to operations with PRC owners
- █ PPG lending to operations without PRC owners
- █ Non-PPG lending to operations with PRC owners
- █ Non-PPG lending to operations without PRC owners



Notes: This figure presents the percentages of China's official sector lending portfolio (measured in 2021 constant USD) supporting transition mineral operations in LICs and MICs with and without Chinese ownership during the pre-BRI, early BRI, and late BRI periods. Lending for Chinese-owned transition mineral operations reflects loan events where the "level of Chinese ownership" field was set to majority or significant Chinese ownership, including both Chinese government or private Chinese ownership. The "no known Chinese ownership" category includes borrowing institutions where no evidence of Chinese ownership is identified.

Apart from sovereign guarantees, the parent companies that hold ownership stakes in overseas mining JV/SPVs can provide repayment guarantees to lenders. Table 2.4 below provides evidence that only 4% of China's official sector lending commitments for all projects in LICs and MICs are backed by repayment guarantees from Chinese entities, yet 25% of China's official sector lending commitments for LIC and MIC transition mineral operations are backed by repayment guarantees from Chinese entities. This unique feature of Beijing's overseas transition mineral lending portfolio highlights an important point: that Chinese companies have substantially more skin in the game in the transition mineral sector than they do in other sectors.⁷⁰

⁷⁰ Even within the industry, mining, and construction sector, only 10% of China's official sector lending commitments for projects in LICs and MICs are backed by repayment guarantees from Chinese entities (see Table 2.4).

However, collateralization is by far the most commonly used credit enhancement. Between 2000 and 2021, 57% of China's official sector lending portfolio for transition mineral operations in the developing world was collateralized (see Table 2.4).⁷¹ This approach to risk mitigation is consistent with the limited recourse project finance model—where lenders have recourse to the liquid and illiquid assets of the JVs and SPVs that own and operate mining sites.⁷² Here again, we see that Chinese entities have significant skin in the game: whereas 18% of Beijing's official sector lending commitments for LIC and MIC transition mineral operations are backed by sources of collateral from Chinese entities, this figure drops to 3% in the broader industry, mining, and construction sector and 1% across all sectors (see Table 2.4).

Table 2.4 Composition of China's transition mineral lending portfolio with credit enhancements from Chinese-owned entities

	All sectors	Industry and mining sector	Transition mineral subsector
Collateralization (%)	48% of lending is collateralized, 1% of lending is supported by collateral from a Chinese entity	66% of lending is collateralized, 3% of lending is supported by collateral from a Chinese entity	57% of lending is collateralized, 18% of lending is supported by collateral from a Chinese entity
Guarantee provided (%)	16.7% of lending is guaranteed, 4% of lending has a Chinese guarantor	21% of lending is guaranteed, 10% of lending has a Chinese guarantor	43% of lending is guaranteed, 25% of lending has a Chinese guarantor

Notes: This table presents the percentages of China's official sector lending portfolio (measured in 2021 constant USD) supporting projects that benefited from different types of credit enhancements, including those provided by Chinese-owned institutions. The "all sectors" and "industry/mining sector" categories represent the official sector lending commitments from

⁷¹ China's official sector loans for transition mineral operations in developing countries are often collateralized with the cash proceeds from the mineral sales generated by specific mining projects (sites).

⁷² Credit insurance is used less frequently in the transition mineral sector than in other sectors. Whereas only 5% of China's official sector lending commitments for LIC and MIC transition mineral projects are backed by credit insurance, this figure increases to 7.3% in the broader industry, mining, and construction sector and 14.1% across all sectors (see Table 2.4). In nearly all cases of transition mineral lending backed by credit insurance in AidData's CFTM 1.0 dataset, the insurance provider is the state-owned China Export & Credit Insurance Corporation (Sinosure).

AidData's GCDF 3.0 dataset that correspond to those sector groupings, while the "transition mineral subsector" category represents official sector lending commitments for transition mineral operations in AidData's CFTM 1.0 dataset. In both datasets, the presence of a Chinese collateral provider (pledgor) or a Chinese guarantor is based on loan records where China is identified as the origin country of the collateral provider or the guarantor institution (in the "Collateral Provider Agency Type" and "Guarantor Agency Type" fields).

3. Policy recommendations

As Western policymakers in liberal market economies seek to develop competitive strategies and partner with the private sector, they must first ensure that they have a solid understanding of Beijing's playbook and its competitive strengths and weaknesses. This report has drawn upon a newly-developed dataset—that systematically tracks China's official sector financial commitments for copper, cobalt, nickel, lithium, and REE mineral extraction and processing operations across 165 low-income countries and middle-income countries over a twenty-two year period—to separate fact from fiction and document the ways in which China leverages a massive stockpile of foreign exchange reserves to expand its control over key segments of the global supply chain for transition minerals.

Our analysis demonstrates that Beijing has a coherent strategy to help its companies—in particular, its SOEs—achieve market entry and expand market share in the overseas transition mineral sector. While mining companies in Western countries often have difficulty securing credit to establish and expand transition mineral operations in developing countries, Beijing eases this burden for its companies by consistently offering subsidized credit at various stages of the investment process, including mine acquisition, mine development, and mine operation. Its approach raises the question of whether Western policymakers need to equip their development finance institutions and export credit agencies with additional resources and authorities to “level the playing field.”

Our findings suggest that there are at least four ways that the U.S. and its G7 allies can more effectively compete with Beijing in the overseas transition mineral sector:

1. **Diversify global mineral extraction investments:** Beijing has leveraged a wide array of official sector financing institutions and instruments to expand its control over the upstream (extraction) segment of the global supply chain for transition minerals, a trend that will likely continue. To address this challenge, China's competitors should prioritize upstream investments that would diversify access to copper, cobalt, lithium, nickel, and REE minerals. They should also consider complementary investments in transportation infrastructure to facilitate the export of such minerals.
2. **Create competitive financing arrangements:** Private sector companies in liberal market economies have weak incentives to invest in transition mineral projects in developing countries that pose large and complex risks over long time horizons. Beijing has outmaneuvered its rivals with a state-centric model that provides "patient capital" to Chinese SOEs at various stages of the investment process (e.g., mine acquisition, mine development, and mine operation). It has also differentiated its value proposition to host governments via "deal sweeteners." If the export credit agencies and development finance institutions of G7 and OECD countries wish to gain market share in the overseas transition mineral sector, they need to develop competitive financing arrangements that are responsive to the needs and preferences of host countries.⁷³ They also need more capital, more authority, and more flexible and diverse financial instruments to match China's scale and agility.

⁷³ China's competitors often assume that decision-makers in LICs and MICs will favor their financing institutions and instruments due to strict adherence to stringent ESG safeguards. The White House's description of the Minerals Security Partnership (MSP) is a case in point (White House 2022d). However, surveys of thousands of governing elites across LICs and MICs suggest a preference for working with Chinese state-owned entities because of their demonstrated ability to expeditiously complete large-scale infrastructure projects without overly cumbersome ESG safeguards (Parks et al. 2023; Custer et al. 2024; Blair et al. forthcoming).

3. Focus on “full life-cycle” support: To challenge China’s dominance in the sector, G7 countries and other competitors should emphasize financing packages that not only facilitate acquisitions of mines and build mineral infrastructure but also provide funding for the ongoing operational needs of the companies that operate overseas mines. A long-term, serial lending arrangement similar to China’s model would increase the long-term viability of the transition mineral operations that are supported.
4. Understand host government costs and benefits: China’s financing model for transition minerals in developing countries often bypasses host government ownership. As such, it not only reduces the financial liabilities of host governments, but also the financial returns that they can reap from their own mineral assets. Those who make and shape policy in Western capitals should advocate for transparent agreements that ensure host governments receive favorable terms, paying special attention to royalties, dividends, taxes, offtake arrangements, CSR activities, and ESG protections. By promoting equitable partnerships, China’s competitors can better differentiate their value proposition from that which is offered by Beijing.

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5. Appendix: AidData's Chinese Financing for Transition Minerals Dataset, Version 1.0

This report is based on a new dataset, AidData's Chinese Financing for Transition Minerals Dataset, Version 1.0 (CFTM 1.0). It is being released alongside a set of mining site profiles. Together, the report, the CFTM 1.0 dataset, and the mining site profiles—available at aiddata.org/china-transition-minerals—represent the first systematic attempt to understand Beijing's strategy to control key segments of the global supply chain for transition minerals.

A.1 AidData's approach to dataset creation

The CFTM 1.0 dataset builds upon AidData's Global Chinese Development Finance Dataset, Version 3.0 (GCDF 3.0), which captures China's official sector financial commitments between 2000 and 2021 for projects across 24 sectors in 165 LICs and MICs. AidData constructed the CFTM 1.0 dataset by following a multi-step process. The first step was to identify a set of keywords that, if present in a given project's "description" field within AidData's GCDF 3.0 dataset, might indicate copper, cobalt, nickel, lithium, or REE mineral extraction and processing activities. We used the following keyword search terms: cobalt, copper, lithium, manganese, nickel, zinc, molybdenum, silicon, chromium, uranium, rare earth, iron ore, ore, gold, platinum, soda ash, potash, coal, alumina, aluminum, iron, grinding, crushing, flotation, leaching, crushers, mills, separators, metallurgy, resource depletion, waste management, refine, smelter, tantalum, niobium, tin, bauxite, tungsten, vanadium, gallium, germanium, drilling, blasting, exploration, excavation, underground mining, open-pit mining, tailings, heap leaching, beneficiation, ore processing, ore dressing, cyanide leaching.⁷⁴ After applying these keywords, we identified 225 candidate records in the GCDF 3.0 dataset. We then conducted a manual review process to identify and remove any false positives. We also reviewed the candidate records against the five "focus" minerals

⁷⁴ We identified these terms after conducting a literature review of mineral extraction and processing methods, the environmental and social impacts of mining projects, and broad market demand trends related to transition minerals.

identified by the IEA (IEA 2021), and only retained the records related to copper, cobalt, nickel, lithium, and REEs. This pruning procedure resulted in 137 records, each of which captures a financial commitment from an official sector institution in China for an activity involving one or more transition minerals in an LIC or MIC. These records were then updated with new information, including over 50 additional variables and fields.

The AidData Record IDs included in the CFTM 1.0 dataset correspond to the AidData Record IDs from the GCDF 3.0 dataset, which was published in November 2023. However, the CFTM 1.0 dataset provides the latest information available about these projects (as of January 2025).⁷⁵ The CFTM 1.0 dataset also includes several new loan commitments for transition mineral projects that were identified after the publication of the GCDF 3.0 dataset. The procedures that we followed to construct the dataset are described in greater detail in the CFTM methodology documentation, available in the dataset download.

To empower users to draw a wide range of insights from the dataset, we have developed four distinct “data views”:

- **Financial Contribution Level:** This data view is organized by financial contribution. Each row is assigned a unique AidData Record ID and captures one financial contribution from a single Chinese state-owned creditor or donor. Each creditor’s contribution to a loan commitment is captured in a separate row, even if it was part of a larger syndicated loan commitment (“loan event”). This data view is consistent with the way in which the GCDF 3.0 dataset is organized, although it includes several new variables and fields, as well as some new records that were not captured in the GCDF 3.0 dataset.
- **Loan Event Level:** This data view is organized by “loan event.”⁷⁶ Each row is assigned a unique Loan Event ID and captures all creditors that participated

⁷⁵ These updates will be reflected in the publication of the next version of the GCDF dataset.

⁷⁶ To ensure comprehensive coverage across the entire CFTM 1.0 dataset, the “loan level” data view includes one grant record and two debt rescheduling records, in addition to all the loan records. The loan event IDs for the grant and debt rescheduling records include a “G” or “DR” at the end of the ID, respectively. The “Flow Type” field assigns records to either “Loan,” “Grant,” or “Debt Rescheduling” categories, to enable users to filter the data according to their analytic needs.

in a single loan agreement—including Chinese state-owned creditors, Chinese private sector creditors, and non-Chinese creditors—and the overall size of their (syndicated) loan commitment.

- **Organization Role:** This data view provides a catalog of all organizations—including financiers, co-financiers, recipients, and implementers—involved in grant- and loan-financed transition mineral projects. It is particularly useful for applications that involve social network analysis of the CFTM 1.0 dataset. Each row records the identity of the involved organization, the corresponding loan event (where applicable), and the nature of the role that the organization played in the loan event or the project/activity supported by the loan event (where applicable). If an organization played more than one role in a given loan event, then there are multiple rows with one organizational role per row.
- **Organization Ownership:** This data view identifies the fractional ownership (equity) stakes that organizations hold in transition mineral operations supported by official sector financial commitments from China. It captures all of the shareholders and their corresponding ownership (equity) stakes in percentage terms, with a minimum threshold of a 1% ownership stake applied. The process for assembling the data is described in greater detail in the CFTM 1.0 methodology documentation, available in the dataset download.

A.2 New variables

In addition to the “data views” described in the previous section, the CFTM 1.0 dataset introduces over 50 variables and fields that are not included in the GCDF 3.0 dataset. These variables and fields provide new insights about China’s involvement in the transition mineral operations in LICs and MICs.

The CFTM 1.0 methodology documentation includes detailed definitions of all new variables and fields, which can be grouped into the following categories:

- **Loan level details:** The CFTM 1.0 dataset introduces a new “Loan Event ID” variable, which enables analysis at the loan level by grouping together all of

the financial commitments (contributions) of Chinese state-owned creditors to a single loan contract as well as information about the commitments (contributions) of Chinese private sector and non-Chinese co-financiers. The CFTM 1.0 dataset identifies 93 unique loans, including 60 bilateral loans and 33 syndicated loans.⁷⁷

- **Syndicated loan participant coverage and contributions:** To improve the analysis of syndicated loans, the CFTM 1.0 dataset includes several new variables related to co-financiers and co-financing amounts. It records the name, origin, and type of each organizational participant in each syndicated loan. In total, the dataset captures the syndicated loan contributions of 26 Chinese state-owned creditors, 3 Chinese private sector creditors, and 57 non-Chinese creditors. The contributions of non-Chinese creditors and Chinese private sector creditors are worth \$7.6 billion across 14 syndicated loans. The dataset also captures the percentage of financing committed by each syndicated loan participant and the name, origin, and type of each organization that served as a lead arranger for each syndicated loan.
- **Mining sector activity coverage:** The CFTM 1.0 dataset includes two variables—“Primary Mining Activity” and “Mining Activity Detail”—that assign each “loan event” to one or multiple activity categories. The four categories relate to (1) the acquisition of equity stakes in mining (and/or processing) companies, (2) the development of mineral extraction infrastructure, (3) the construction or improvement of facilities that process minerals, and (4) support for the day-to-day operational costs of the companies responsible for transition mineral operations. To facilitate analysis, the “Primary Mining Activity” variable assigns records to a single category that aligns with the primary purpose of the financial commitment. A complete list of all activities supported by the financial commitment is recorded in the “Mining Activity Detail” variable.
- **Mining site names and features:** Whenever possible, the CFTM 1.0 dataset assigns each record to a specific mining site. It identifies 41 unique mining sites in LICs and MICs that received official sector financial commitments from China related to mine acquisitions, the development and expansion of

⁷⁷ Loan event IDs are also assigned to two debt rescheduling records (loan event IDs 901DR and 2001DR) and one grant record (loan event ID 3501G)

mineral extraction infrastructure, the development and expansion of mineral processing infrastructure (at the mining site), and support of the day-to-day operational needs of the companies responsible for transition mineral operations.⁷⁸ The dataset includes a range of details for each mining site that relate to the features of the mine and its operations, including the name of the site, the type of exploitation at the site (e.g. surface or underground), the primary minerals and mineral by-products extracted from the site, and whether the activities supported by the financial commitment are greenfield or brownfield activities.⁷⁹

- **Temporal granularity:** The CFTM 1.0 dataset includes several new variables to enable temporal analysis that is unique to the mining sector, including the start year of commercial operations, the year in which the mining site was acquired by the owner of the mine (at the time of the loan event), and the year in which the mining site was acquired by a subsequent owner (if applicable). In addition, the CFTM 1.0 dataset includes several variables from the GCDF 3.0 dataset related to the timeline for the financing and implementation of the project, including the calendar day when the financial commitment was issued, the calendar day when project implementation began, and the calendar day when the project was completed.
- **Ownership and implementation details:** The CFTM 1.0 dataset includes several new variables that identify the roles played by different organizations in the operation and ownership of copper, cobalt, nickel, lithium, and REE extraction and processing operations. These variables include the company responsible for the mineral operation, the shareholders that possess ownership (equity) stakes in the company responsible for the mineral operation, the fractional ownership (equity) stakes (in percentage terms) that these shareholders possess in the company responsible for the mineral operation, the controlling shareholder of the company responsible for the

⁷⁸ On average, each mining site secured 2 official sector financial commitments from China, though this figure varies from from a minimum of 1 to a maximum of 10.

⁷⁹ There are 16 loan events (involving 34 AidData records) in the dataset that are not allocable to a specific mining site, which include processing operations that do not source minerals from one specific mining site, working capital loans to mining/processing companies that have several different operations (and thus cannot be assigned to a singular mining site), and loans for the acquisition of stakes in mining/processing companies that have several different operations (and as such cannot be assigned to a single mining site).

mineral operation at the time of the official sector financial commitment from China, and the previous owner and subsequent owner of the company responsible for the mineral operation (whenever applicable). Additionally, the dataset includes two variables that characterize the level of Chinese ownership of each transition mineral operation, including categories for Chinese private sector ownership and Chinese government ownership, and the level of host government ownership. The level of ownership varies from "No Significant Ownership" to "Significant Ownership" (for shareholders with equity stakes that do not exceed 50%) and "Majority Ownership" (for those shareholders with equity stakes that exceed 50%). The dataset also identifies the name, origin, and type of each organization involved in on-the-ground operations.

- Expanded coverage of borrowing terms and conditions: The CFTM 1.0 dataset provides granular information about each loan's borrowing terms and conditions, including the maturity, grace period, commitment fee, management fee, and grant element, and a flag for whether it is known that the interest rate is fixed or variable. For loans that are known to have variable interest rates, the dataset identifies the base (reference) rate (such as LIBOR or EURIBOR), the most specific reference rate tenor that is identified in the record (such as 6-month LIBOR or 3-month EURIBOR), and the additional interest (margin) charged above the reference rate.

In addition to developing these new fields and variables, we incorporated new details regarding the environmental, social, and governance (ESG) risks and risk mitigation measures associated with the mining sites in the record descriptions and, for selected cases, in the detailed mining site profiles (available at aiddata.org/china-transition-minerals). Mining projects are inherently risky (see Box 2.2 in Section 2.2.1), and the new information incorporated in the record descriptions and mining site profiles helps document the array of challenges these projects face.