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The risks and rewards of Resource-for-Infrastructure deals: Lessons from the Congo's Sicomines Agreement

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ABSTRACT

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THE SICOMINES AGREEMENT'S MEMORANDUM of understanding outlined a mammoth deal worth over US$ 9 billion. It was so large in scale that its value exceeded the Congolese government's budget during the year it was signed. While the Sicomines agreement had been drastically reduced from what was originally planned, it has remained highly contentious in academic and policy circles alike. This paper explores the Sicomines agreement and highlights the role risk has played from its inception a decade ago until now. This case reveals how, while simple on the surface, RFI deals carry significant risks for their signatories because of the long time horizon through which they operate. This has led the Sicomines agreement to experience many hurdles, both on the infrastructure delivery and resource extraction fronts. Resource-for-Infrastructure (RFI) deals generate upfront infrastructure investments to be repaid via future resource extraction. However, much can change in between. This paper employs financial modeling techniques to highlight the pitfalls of attempting to identify a "winner" in such ventures until they reach their conclusion. As this paper demonstrates through the Sicomines case, the expected benefits of RFI deals can change swiftly and unpredictably.

INTRODUCTION

THE DEMOCRATIC REPUBLIC OF CONGO (DRC) REPRESENTS the embodiment of the paradox of plenty. Despite its immense natural resource wealth, it remains one of the world's poorest countries. A long history of poor governance and civil unrest—often due to its resource riches—have left it in a precarious economic position. By the mid-2000s, the DRC had seen its infrastructure falling apart for multiple decades, in large part because of its tumultuous political situation since independence. Furthermore, a string of unsuccessful development projects had left it saddled with a massive debt burden, which it had virtually no hope of repaying.

After the assassination of President Laurent Kabila in 2001, his son Joseph—then 29—became the world's youngest head of state. Kabila—who trained at the People's Liberation Army National Defence University in Beijing—had honed his leadership skills as commander in the Congolese Land Forces during the Second Congo War. In the early years of his presidency, he focused on building peace and consolidating his power base. In 2006, three years after the war ended, he was elected president in the DRC's first democratic election in over four decades. As part of his election campaign, Kabila announced his ambitious *Cinq Chantiers* (Five Construction Sites) program, a key part of his post-war development strategy. The five sectors at the heart of his plan were infrastructure, job creation, education, water and electricity, and health. Following the election, he started looking for the funding to bring *Cinq Chantiers* to life.

In 2007, Kabila's government signed an enormous RFI agreement valued at a total of over US$ 9 billion with China Railway Engineering Corporation (CREC). As part of the deal, Congolese exploitation licenses 9681 and 9682, both located in the Kolwezi District, would be allocated to a Chinese consortium led by CREC (see Table 1 for the concessions' reserves). In exchange, the consortium would secure the financing of US$ 6.565 billion worth of infrastructure projects of a public goods nature, such as roads and hospitals, and invest about US$ 3 billion in the mining project itself. The mine's revenues would be used to reimburse the infrastructure financing. By 2009, after multiple rounds of negotiations, resulting in a number of interventions by third parties such as the Paris Club, a final agreement comprising an estimated US$ 3 billion worth of infrastructure projects was reached.

Gaining a grasp of the intricacies of the deal, and its impacts for the DRC, has proven difficult for third party analysts. As summarized below, the agreement has undergone a number of external challenges and amendments. Additionally, in large part because of its sheer importance for the Kabila administration, the deal has become heavily politicized, with multiple prominent opposition politicians hinting they would revisit, or even cancel, it if elected. Between 2012 and 2014, China Eximbank, the financier of the venture, pulled its funding from the deal, leading to speculation about whether the projects would go forth. Furthermore, since the deal's signature, the estimated reserves held by the licenses, their market value, and the political and economic situation of the DRC have changed. This has made the deal—frequently described as "leonine", or heavily skewed, in favor of the Chinese party—difficult to analyze, particularly when it comes to identifying its apparent "winners".

This paper explores the resource-backed finance and the benefits and drawbacks of RFI deals in particular. It then revisits the Sicomines agreement, and how it has progressed since its inception a decade ago. It highlights the role of risk in the unfolding of the Sicomines deal, and how risk has impacted the project's progress and the underlying value of its exchange. The paper concludes that, because of the risk inherent to RFI agreements, identifying a clear winner in such a venture before it reaches its conclusion represents a daunting endeavor. In fact, the models presented in this paper estimate that the value of this agreement for the Sicomines consortium decreased from about US$ 10 billion in 2008 to actually become negative in 2016—a dramatic drop to say the least.

RESEARCH METHODOLOGY

THE RESEARCH QUESTIONS THIS PAPER SEEKS TO ANSWER are as follows: (1) How have the Sicomines agreement's modalities played out over the decade since its inception? (2) Was the Sicomines RFI agreement one-sided in favor of the Chinese consortium? The paper hypothesizes that the key difference between RFI deals and traditional mining ventures is the risk component inherent to the former. Once this risk component is accounted for, it becomes difficult to pinpoint a clear "winner" in this agreement.

This paper represents an in-depth study of a critical RFI case, comprising field research and process tracing, complemented with quantitative risk analysis. The field-research for this paper, comprising semi-structured interviews, took place in August and September of 2016 in Kinshasa and Lubumbashi. This process started by interviewing existing contacts in the Congolese government, as well as foreign diplomats and individuals operating in the Congolese mining sector. These interviewees then provided further contacts, as well as assistance in securing meetings with them. Through this process, interviews were obtained with two ministers, a senator, individuals at the highest levels of various Congolese government agencies and regulatory bodies, and five upper-level managers of different mining ventures. In order to substantiate the information gathered through these interviews, meetings were also conducted with civil society actors, academics, and third-party analysts. In total, over 25 interviews were conducted as part of this research. Throughout this paper, the narratives gathered through these interviews are complemented by policy documents.

To test the key hypothesis of this paper—relating to the inherent risks of RFI deals—this paper employs net present value (NPV) modeling. The NPV—which is used to analyze an investment's profitability and attractiveness—calculates the difference between the present value (the current monetary worth of cash flows, calculated using a discount rate) of its present and future inflows and outflows of cash.

For the purpose of exploring whether the Sicomines deal was one-sided, the parties of the Sicomines agreement are identified as the consortium of Chinese enterprises and Eximbank on the one hand, and the Congolese government (including parastatal Gécamines) on the other. Gécamines holds a 32 percent stake in Sicomines,

but it did not invest funds in the venture, and its Chinese partners manage it. While the Congolese government (via Gécamines) will share in the Sicomines venture's potential profits, the most important benefit it draws from this agreement undoubtedly lies in its infrastructure component. To explore whether one of the parties has emerged as a clear "winner" in the Sicomines agreement, this paper considers the venture's NPV from the consortium and the Congolese government's respective points of view.

The project's expected NPV, from the point of view of the Chinese side of the Sicomines consortium and the Congolese government, including parastatal Gécamines, is calculated for two points in time—when the deal was signed in April of 2008, and when this fieldwork was concluded in September of 2016. In the models, the expected NPV of the deal for both parties under its RFI structure is compared to what it would have been under the DRC's 2002 Mining Code. It provides insights on the agreement that go beyond the information that can be obtained through interviews. The models employ publicly available information on the value of the infrastructure projects delivered as part of the Sicomines agreement, the extractive capacity of its deposits, data on the value of the minerals they hold, and information relating to extraction costs published for the Kamoto Copper Mine, which lies beside Sicomines (thus making their production costs roughly comparable). The models show the vast changes in the Sicomines consortium and the Congolese government's expected benefits between 2008 and 2016, highlighting the importance of risk in the evaluation of RFI deals.

BACKGROUND

RESOURCE-FOR-INFRASTRUCTURE AGREEMENTS

RISK CALCULATIONS PLAY AN IMPORTANT ROLE IN DETERMINING the interest rates of development financing. That said, certain countries' risk levels make it challenging for their governments to obtain credit—at almost any interest rate. Resource-backed financing has largely emerged in response to this constraint. In the words of Brautigam and Hwang: "Our explanation of commodity-secured finance below suggests that the purpose of this security is much less about locking up natural resources and more about reducing the risks of lending to poor and unstable countries".[1] Resource backing, they state, "allows projects to be financed at a reasonable interest rate".[2]

China's first experiences with resource-backed loans took place at home. In the 1980s, Japan made substantial infrastructure loans to China, which helped it develop its extractive sector, and the Daqing Oil Field in particular. In fact, the Japanese Ministry of International Trade and Industry explicitly pushed for Japan's first package of foreign aid loans to China to be mainly used to build railroads and ports to facilitate the export of Chinese oil and coal—to Japan.[3] These resource-backed loans helped China develop its infrastructure while also benefiting Japan's firms.

In turn, as China developed economically over the past decades, it itself rose to prominence as a provider of development finance. During that period, Chinese infrastructure projects mushroomed in Africa. This represents a key effect of China's "going global" policy, which has prompted the internationalization of its largest state owned enterprises (SOEs). As China's domestic market became increasingly saturated by overcapacity, many of its construction firms sought international contracts, often financed by the country's policy banks.

Under an RFI arrangement, a loan for current infrastructure construction is securitized against the net present value (NPV) of a future revenue stream from oil or mineral extraction, adjusted for risk.

Resource-backed finance represents a relatively small share of the number of loans made by Chinese policy banks in Africa. However, as these loans are often huge, they make up a substantial share of its portfolio.[4] The key difference between RFI deals—which have been largely employed by China's policy banks, including Eximbank and China Development Bank—and other resource-backed loans is that, according to Halland et al.'s definition, the money from RFI arrangements is spent exclusively on infrastructure projects.[5]

The World Bank report titled *Resource Financed Infrastructure: A Discussion on a New Form of Infrastructure Financing* states: "Under an RFI arrangement, a loan for current infrastructure construction is securitized against the net present value [NPV] of a future revenue stream from oil or mineral extraction, *adjusted for risk*".[6] It adds: "The emergence of the RFI model can be understood, in part, as a reflection of the gap in risk tolerance and expected return between the extractive and the infrastructure sectors".[7]

As part of RFI agreements, the infrastructure development loans are generally disbursed shortly after the signature of a joint infrastructure and resource extraction contract.[8] Furthermore, disbursements from these loans are generally made directly to the construction company to cover their costs. The revenues used to reimburse the loan are also generally disbursed directly from the firm to the financier (often a decade or more later). The loan's grace period depends on the time required to develop the concession, the investment size, and its rate of return.

Like resource-backed loans, RFI deals were first used extensively in Africa by the Angolan government. During the 1980s and 1990s, while Angola was at war, multiple banks extended profitable loans—backed by oil—to the Dos Santos government. By the end of the war, Angola has taken 48 such loans, most of which were arranged by Western banks like BNP Paribas, Standard Chartered, and Commerzbank.[9] In 2004, China Eximbank extended its first oil-backed loan to the Angolan government, a practice that has since grown and evolved substantially.

There are important tradeoffs that must be weighted when comparing infrastructure projects financed through ordinary loans or taxation and ones obtained via RFI arrangements. On the one hand, RFI arrangements provide guaranteed infrastructure investments, which happen quickly. For example, as reported by Kabemba, the Congolese government only turned to the Sicomines agreement after it perceived it had failed to secure the infrastructure financing it was expecting from western donors.[10] Furthermore, the deal saw a total of over US$ two billion invested on projects in the DRC in a relatively short time, in addition to the US$ 350 million

immediately injected into the Congolese government's coffers. Furthermore, such agreements may hold a second advantage. As the money used for infrastructure projects does not pass through the government, RFI deals can prevent the possibility that other types of political spending take precedent over infrastructure investments, as well as the possibility of mismanagement or embezzlement.

On the other hand, some risk factors might be particularly salient with regards to RFI deals because of their unique structure, and should be given consideration. First, projects delivered as part of RFI agreements can have a higher price tag than their counterparts financed via traditional means because they bind host governments to select firms or consortiums and often entail no competitive bidding procedures.

RFI deals are often less transparent than other infrastructure contracts. They have an omnibus character, whereby multiple financial and commercial agreements are weaved together.

Second, RFI deals can be prone to quality problems. As part of RFI projects, firms seeking opportunities in the extractive or infrastructure sector generally partner with financiers and submit unsolicited bids to host governments.[11] Therefore, if the host government wants to receive the funding, it must also bind itself to the attached firms. Furthermore, as the contractors handle the loans directly, the role played by host governments in the delivery of the projects is diminished, potentially leading to situations where effective oversight can fail to materialize. Halland et al. state: "For the infrastructure component of an RFI transaction, the government must take the primary responsibility for construction supervision. As discussed above, the lender for the infrastructure investment will look for repayment to the committed government revenue stream from the resource component, so it has little incentive to enforce quality standards beyond ensuring that loan disbursements are made in good faith upon submission of the relevant documents evincing milestone achievements."[12] Additionally, it is worth noting that because of their economic importance, RFI agreements can become politicized, thereby eroding host governments' incentives to effectively oversee the quality of the delivered infrastructure projects.

Third, RFI deals are often less transparent than other infrastructure contracts. They have an omnibus character, whereby multiple financial and commercial agreements are weaved together. Their sheer size makes them more difficult to interpret, and less transparent, than their counterparts. As argued by Paul Collier, some shortcomings of RFI deals are due to the monopoly on the supply side of these deals. As he states: "If there were several package deal providers—for example, if bilateral donors teamed up with their national resource companies and construction companies—then the value of RFI deals could be determined through competition even if internally they remained opaque".[13]

Finally, RFI agreements comprise important financial risks because of their structure and long time horizon. As a result, their underlying exchange can come to favor one party over the other over time.

THE SICOMINES AGREEMENT – AN OVERVIEW

THE DRC RECOGNIZED THE GOVERNMENT of the People's Republic of China in 1971. In the subsequent years, it was on the receiving end of several gifts from

Beijing—stadiums, hospital, and other buildings—in addition to modest lines of credit.[14] That said, the DRC did not figure too prominently in Beijing's list of strategic interests.[15] Furthermore, while commercial relations between China and the DRC have grown since the start of the 21st century, it was only in 2007—through the Sicomines Agreement—that China became a key development partner for the DRC.[16]

According to Johanna Jansson, CREC, seeking to expand into resource extraction activities, was the initiator of the deal.[17] She recounts that, according to a well-placed Chinese respondent, CREC first sent a negotiating delegation to Brazil, Chile, and Peru, and then to Zambia before setting its sight on the DRC's Katanga province.[18] As per Jansson, CREC was seeking a traditional mining agreement when it first contemplated the Katanga investment. However, during discussions about the establishment of a joint venture with Congolese state-owned enterprise (SOE) Gécamines, the Congolese negotiators suggested that an infrastructure component be included in the project. Several of Jansson's interviewees suggested that "the idea to design the agreement as a barter deal was inspired by the so-called 'Angola model', which the Congolese had witnessed at close quarters".[19]

Other sources have reported that the Congolese government was the originator of the deal, and that the Kabila administration approached the Chinese government upon learning about its agreements in Angola, and after the west had failed to deliver on its promised financial support to his government.[20] At least one Congolese government outlet also presents this version. According to a document published by *La Prospérité*, following the government's internal difficulties financing its *Cinq Chantiers* infrastructure development program, it looked to "different continents" for support.[21] According to the document, the team that succeeded in securing this financing left Kinshasa in February of 2007 for China—via South Africa and Indonesia—where it engaged in negotiations with the China Development Bank, CREC, Sinohydro, and China Eximbank. The negotiations took place in June of 2007.[22]

Finally, Brautigam reports that the deal might have originated much earlier. She reveals that, according to an interviewee who previously worked for CREC, the negotiations for the agreement started in late 2003 and experienced a breakthrough in 2006.[23] Brautigam's interviewee also reveals that, during the 1990s, CREC approached the Congolese government to offer its services as a contractor. The government responded that, while it did not have any money, it had "a lot of copper".

In any case, on September 17th 2007, the two parties signed a Memorandum of Understanding (MOU). This represented the first stage of negotiations of a deal granting the consortium a 68 percent stake in a new joint venture (JV) named the *Sino–Congolais des Mines* (Sicomines), with the DRC's Gécamines holding the other 32 percent.[24] In exchange, the Chinese consortium would provide the DRC with turnkey infrastructure projects of a public good nature—such as roads and hospitals—financed by Eximbank.[25] Interestingly—as the line of credit was to remain open ended—this is the only document that mentions a figure for the project's infrastructure component. The investment made to develop the mining concessions

themselves—later confirmed to be of US$ 3.2 billion—was not mentioned in any of the documents.[26]

A subsequent document—the *Convention de Collaboration*—was signed on April 22nd 2008 by the government of the DRC and Sinohydro (on behalf of Sicomines). The document specified that two tranches of infrastructure financing—reportedly worth US$ 3 billion each—would be disbursed, in addition to the loan mine development.[27] The financing would be disbursed to the contractor of each project. However, the Congolese government would act as a guarantor for the loans. The Congolese government also agreed that the project's feasibility studies should ensure Sinohydro an internal rate of return (IRR) of 19 percent. Otherwise, it agreed to adopt all measures likely to better the conditions of cooperation in order to reach the 19 percent IRR for Sinohydro.[28] Furthermore, this document outlined the deal's tax parameters, and stipulated that the Congolese parliament would need to pass a law safeguarding the provisions in the 12 months following the Chinese government's approval of the deal.

International financial institutions and civil society organizations flagged a host of issues following the signature of this agreement. Chief among the concerns they raised was the structure of the deal, which the IMF argued would saddle the DRC with

Table 1: Sicomines Agreement and Amendments

	Protocole d'Accord (2007)	Convention de Collaboration (2008)	Avenant No. 3 (2009)
Infrastructure Loan	US$ 6.565 B	Not Mentioned	US$ 3.0 B
Loan Terms	Not Mentioned	6-month LIBOR + 1%	6-month LIBOR + 1%
Mining Loan	Not Mentioned	Not Mentioned	Not Mentioned
Terms	Not Mentioned	70%: 6.1% 30%: 0% (shareholder loan)	70%: 6.1% 30%: 0% (shareholder loan)
Signing Bonus	Not Mentioned	US$ 350 M	US$ 350 M
Reserves	Cu: 8.05 M Tons Co: 202 K Tons Au: 372 Tons	Cu: 10.6 Tons Co: 627 K Tons	Cu: 10.6 Tons Co: 627 K Tons

(Government of the Democratic Republic of Congo)

Table 2: Ownership of Sicomines (as of September 2nd, 2008)

Source: Democractic Republic of Congo, 2008

Chinese Firm	Total Share Ownership (%)
China Railway Group (Hong Kong) Ltd. (CREC)	27.0
China Railway Resources Development Ltd. (CREC)	6.0
Zhejiang Huayou Cobalt Company Ltd.	5.0
Sinohydro Corporation Ltd.	26.0
Sinohydro Harbour Company Ltd.	4.0
Congolese Firm	**Total Share Ownership (%)**
Générale des Carrières et des Mine SARL (Gécamines)	20.0
Société Immobilière du Congo SPRL (Simco)	12.0

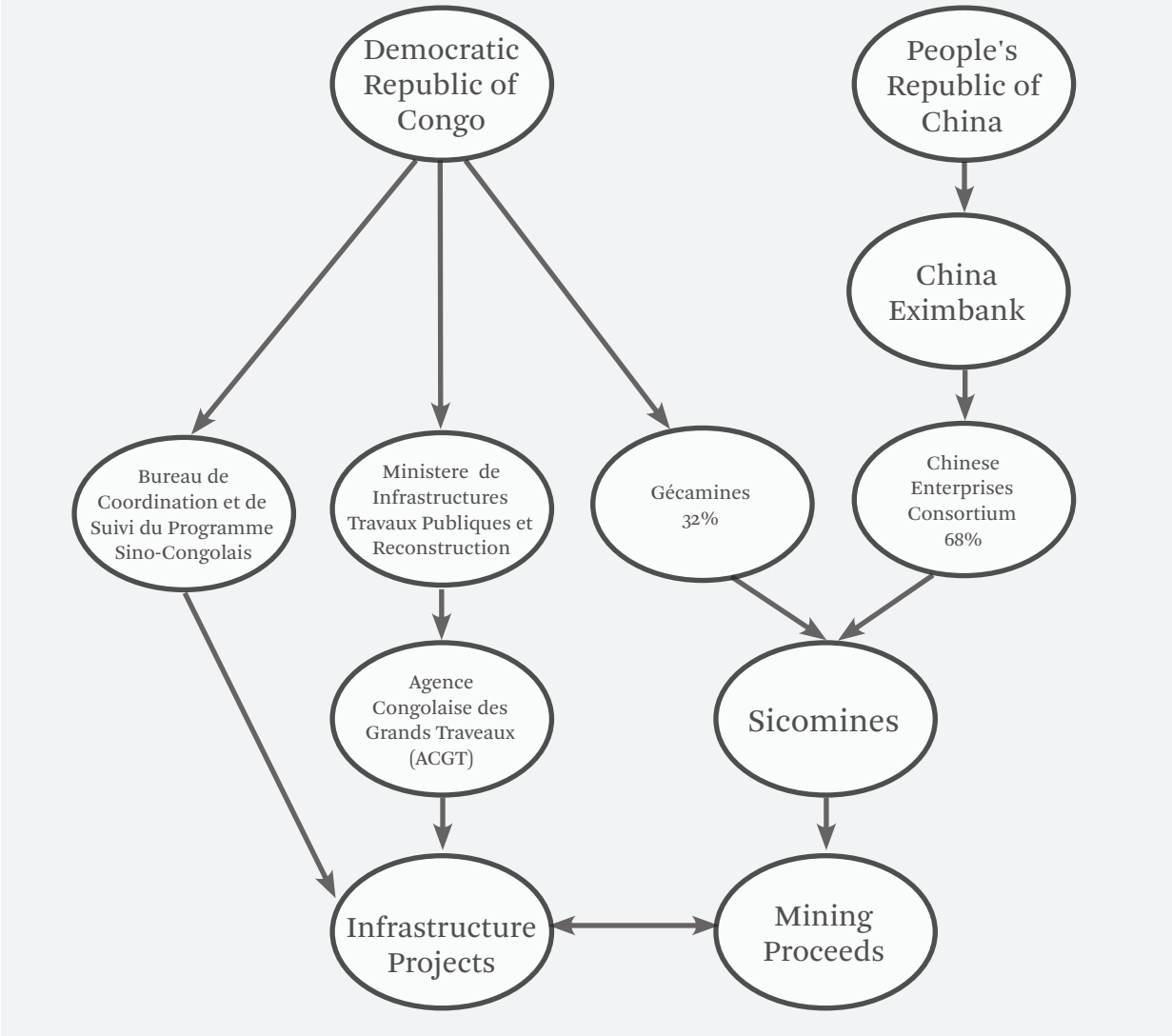
unsustainable debt.[29] The IMF perceived that taking on such a large loan would make the DRC's debt position unsustainable. This was a particularly salient issue since, at the time, the DRC was seeking to have over US$ 10 billion of debt forgiven.[30] Finally, with regards to the IRR modality, Global Witness stated: "The guaranteed nature of the internal rate of return set by the agreement is commercially highly unusual in that it removes the investment risk from the arrangement for the Chinese parties and instead makes it the responsibility of the Congolese government".[31]

Following this pressure, an *Avenant* (amendment) was made to the *Convention* (See Table 1). It capped the size of the infrastructure loans at US$ 3 billion, thereby reducing it by about half. It also removed the Congolese government's guarantee for the mining loan (but not for the infrastructure loan).[32] Two other amendments were added to the agreement in the same year, which saw different firms added to both sides of the venture, but with their total shares remaining unchanged at 68 percent and 32 percent, respectively (See Table 2).[33]

THE SICOMINES AGREEMENT: PARAMETERS

BASED ON THE 2008 AND 2009 AGREEMENTS, the financial parameters of the deal comprise three distinct phases. It is worth noting that during the first two phases the

Figure 1: Sicomines Structure (African Association for Defense of Human Rights, 2014)



agreements exempt Sicomines from any tax and customs obligations in the DRC. Instead, it will be paying for the infrastructure by reimbursing the loans used to finance public works, in addition to reimbursing its own mining investment loan.

- During phase one, all of Sicomines' profits are to be used to repay the Eximbank loans that financed "the most urgent infrastructure projects" carried out as part of the agreement, in addition to the interest accrued on these loans.
- During phase two, 85 percent of Sicomines' profits will be used to reimburse the JV's mining investment loan, and then the remaining Eximbank infrastructure loans, as well as their respective accrued interest.
- Finally, phase three will begin once the two Eximbank loans have been repaid. During phase three, Sicomines will be paying taxes to the Congolese government in accordance to the DRC's 2002 Mining Code.

THE SICOMINES AGREEMENT: PROGRESS

ALMOST FOUR YEARS AFTER THE THIRD AND FINAL agreement was reached, the Congolese parliament had yet to pass a law safeguarding the deal's exceptional provisions. Eximbank perceived this delay as worrisome. Furthermore, according to Malm, it saw the 25-year reimbursement period agreed upon in the 2009 deal as too long.[34] To diminish its risk exposure, Eximbank demanded to take over Gécamines' 32 percent stake in the deal and for the Chinese consortium's 68 percent share to be mortgaged until the loans were reimbursed.[35, 36] The Congolese government rejected these changes and, in early 2012, Eximbank rescinded its funding.[37]

Perhaps the most important setback experienced by Sicomines was the downward adjustment of the estimated deposits of its concessions.

The decision to halt funding of the project was reversed in 2014.[38] According to Malm, based on an interview with Ekanga, Eximbank's decision to resume its funding followed competition from the China Development Bank and the Bank of China, which had started negotiating with the Chinese consortium. During an interview for this research, Moise Ekanga, who heads the Congolese government's *Office for the Coordination and Monitoring of the Sino-Congolese Program*, confirmed that, before Eximbank rejoined the project as its financier, a deal was in place with the China Development Bank for the financing of the mining investment. The project has been moving forward ever since. Despite initial progress in the infrastructure development side of the deal, the mining side of the agreement has been plighted by important setbacks.[39]

MINING COMPONENT

PERHAPS THE MOST IMPORTANT SETBACK EXPERIENCED by Sicomines was the downward adjustment of the estimated deposits of its concessions. As part of the 2008 Convention, the deposits were estimated to contain 10.6 million tons of copper and over 600 thousand tons of cobalt.[40] In 2013, Reuters reported that the total estimated copper reserves of the concessions had been adjusted downwards to 6.8 million tons.[41] If, as interpreted by Reuters, the proven reserves represent the total reserves, this would mark a 35 percent downwards adjustment.

According to an interview with a senior executive of Sicomines, the consortium set up the exploitation plan of the mine to take place in two distinct phases. During phase one, the mine is expected to produce 125 thousand tons of copper per year. Phase two will commence when the mine is able to produce 250 thousand tons of copper per year, the concession's peak output (readjusted from the initially planned peak output of 400 thousand tons per year).

The key bottleneck for mine exploitation has been its access to electricity. The interviewed executive revealed that Sicomines was not able to access as much electricity from the Congolese grid as was agreed upon in its contracts, and that it was paying over 2.5 times the originally agreed upon price for the 25 MW per year it was getting. This constraint forced Sicomines to import electricity from neighboring Zambia, at a price 4.5 times higher than the electricity costs estimated in its 2010

feasibility study. According to the executive, that study estimated that 80 MW per year would be needed to operate the concession during phase one. The difficulties encountered in securing power also eventually forced Sicomines to turn to technologies less dependent on electricity (and more on diesel fuel). This led to the 80 MW estimate to be readjusted downwards to 54 MW. Similarly, the estimate for phase two—originally 180 MW—was readjusted to 150 MW.

The executive revealed that, due to the constraints posed by the lack of access to affordable electricity, phase two would be unattainable until the Busanga Dam becomes operational. The dam, located 65 km away from Kolwezi, will reportedly supply up to 170 MW of its 240 MW electricity production capacity to Sicomines.[42] Sicomines officials have estimated that its construction would take four to five years.[43]

Table 3: Infrastructure Projects Financed through Sicomines

Category	Location	Project
Government	Kinshasa	Refurbishment of the esplanade of the *Palais de Peuple*
Health	Kinshasa	Construction of the *Hopital du Cinquantenaire* (450 beds)
Transport	Kinshasa	Refurbishment of the *Boulevard du 30 Juin*
Transport	Kinshasa	Refurbishment of the *Avenue du Tourisme*
Transport	Kinshasa	Refurbishment of the *Boulevards Triomphal et Sendwe*
Transport	Beni-Luna	Refurbishment of the *Route Nationale - RN4*
Transport	Lubumbashi-Kasomeno	Grading of the *Route Nationale - RN5*
Transport	Lubumbashi-Kasomeno	Asphalting of *Route Nationale - RN5*
Housing	Kisangani	Factory to Build Prefabricated Houses
Communication	Country-Wide	Fiber-Optic Cables Donation
Energy	Country-Wide	Donation of Solar Panels

Source: Different sources report that different projects have been financed through the Sicomines agreement. The projects outlined in the table above are the ones that were reported by at least two distinct publicly available sources.

According to the same source, by the end of 2015, US$ 1.617 billion had been spent on developing the mining concession. Furthermore, by June 30th 2016, just under US$ 1.8 billion had been budgeted and commissioned for it, and over US$ 1.7 billion had been spent. According to a senior executive at the Ministry of Mines interviewed in Kinshasa, production at Sicomines started in earnest in November of 2015, with the mine having produced 31 thousand tons of copper by the end of June 2016, 7,835.89 tons of which were produced that very month. At that rate, the mine would produce 94 thousand tons of copper per year, well on its way to the phase one yearly target of 125 thousand tons.

INFRASTRUCTURE COMPONENT

THE INFRASTRUCTURE-FINANCING component of the deal is tied to the mine's production. The infrastructure loan is capped at US$ 1.053 billion until the start of phase two, when the balance of the US$ 3 billion loan will be made available. Many sources have revealed that US$ 800 million had been spent on infrastructure projects by 2015. However, the senior executive of Sicomines interviewed explained that while US$ 845 million had been committed for the 12 most pressing projects, only US$ 590 million had actually been spent. He also revealed that the vast majority of these funds had been spent between 2009 and

2012, as part of the initial wave of projects financed through the deal (See Table 3 for an overview of the infrastructure projects financed through the Sicomines agreement).

He indicated that the government was in the process of selecting eight new projects, which would be financed with the balance of phase one financing. This money had been intended to finance the US$ 660 million Busanga Dam project—which was supposed to be financed in equal parts by the mining and infrastructure loans. However, according to Moise Ekanga, the decision was finally made to employ a commercial loan to finance the dam. Therefore, the Busanga project will now be financed through a separate loan from Eximbank, and built by a newly minted JV named Sicohydro, of which Sinohydro and CREC own 75 percent, and the *Congolese Société Nationale d'Électricité* (SNEL), Gécamines, and another privately owned Congolese firm own the remaining 25 percent.

ANALYSIS

EXISTING ANALYSIS OF THE SICOMINES AGREEMENT

AS NOTED BY JANSSON, THE DRC'S 2002 MINING CODE was drafted with the intention to curtail the president's discretionary power with regards to negotiating stand-alone mining contracts with unique tax structures.[45] Interestingly, as she points out, the Sicomines agreement represented exactly such a stand-alone contract.[46] This is illustrated by the fact that it necessitated the passing of new laws recognizing its unique tax structure.

As mentioned above, the delay in drafting such a law was cited as instrumental in Eximbank pulling out its financing. Other concerns were voiced—particularly by civil society actors—about the Congolese government and Chinese contractors being able to deliver on their engagements, and about whether the social and economic impacts the project promised to generate would come to fruition.[47] This concern has been raised multiple times, in part because the deal was cemented shortly after Kabila's *Cinq Chantiers* program was unveiled. Therefore, many analysts worried that the agreement arose through political expediency rather than economic calculus and, therefore, would not deliver the promised impacts.[48]

Civil society groups also criticized the government's non-transparent management of the deal. For example, Global Witness stated that negotiations surrounding the deal were carried out in complete secrecy, and with no bidding process.[49] It added: "the deal itself was negotiated under the heavy influence of an unelected presidential adviser with no official portfolio, with little involvement from the Ministries of Budget, Finance or Economy".[50] An advisor in the Congolese Ministry of Finance, cited by Global Witness, stated that the DRC was in a very weak bargaining position when the deal was negotiated, and likened his country to a "sick man".[51] The transparency level of the agreement continues to be criticized by civil society actors. Jean Pierre Okenda, a Katanga-based adviser of Cordaid, said in 2015: "Even the minister of mines cannot ask Mr. Ekanga a question about that project".[51]

The notion that the deal was of a "win-win" nature has received much criticism. Civil society actors and academics have heavily criticized the deal's structure, and its negative impact on the DRC's coffers has been estimated to range between US$ 6.4 billion and US$ 20 billion.[52,53] To generate this figure, Marysse and Geenen make a back of the envelope calculation that employs Gécamines' historical production figures and the money it paid to the government as a baseline, and extrapolate it to reflect the Sicomines agreement. They fail to present an assessment of costs subtracted from revenues, but acknowledge: "in order to be able to evaluate the (in) equity of the contracts, one should compare the surplus realized by that production over and above the cost of production".[54] Finally, they justify their decision to not use a net present value discounting method by stating: "On the other hand, the prices of these minerals will probably continue to rise [... which] would by far outweigh any mistake made by not calculating the net present value of these quantities of minerals."[55] Marysse and Geenen state: "China takes the lion's share of the profits", and add, "in the long run, this is a highly unequal exchange and an agreement that is clearly balanced in favor of the Chinese parties".[56] They also highlight guarantees made by the Congolese government as part of the agreement, and argue: "the Chinese have hedged themselves against all possible economic and political risks".[57]

Other analysts adopt a more sanguine view of the agreement. They do so based on China and the DRC's compatibility in terms of needs—while the former has excess production capacity and a strong appetite for natural resources, the latter has a crippling infrastructure deficit. Chakrabarty states: "DRC is a post-conflict country facing enormous reconstruction challenges. China on the other hand has worked extensively on African infrastructure in the last decade and has become its pre-eminent infrastructure builder".[58] She stresses the sheer size of the investment and points out: "if the contentious issues are resolved and the deal is implemented successfully, this deal has the potential to make a huge impact on the country's infrastructure, which is a shambles [sic]".[59] In the same vein, Matti stresses: "the said deal represents a fundamentally different approach to mining investment and that, even if it does not 'break' the 'resource curse', it is likely to bring some benefit to the Congolese people".[60] Finally, April points out that, based on her interviews in the DRC, "the promise of an industrialization revolution through investment in infrastructure, public utilities, and services has gained great appeal among DRC nationals".[61]

Finally, some analysts such as Paul Fortin, who ran Gécamines from 2005 to 2009, have argued that the Chinese party was the vulnerable one in the Sicomines agreement because it has already engaged in construction works in the DRC (in the form of infrastructure investment), but has yet to recuperate its investment in the form of mining proceeds.[62]

The concerns raised by civil society actors regarding the agreement's lack of transparency, the DRC's weak bargaining position during the negotiations, and the risk that its political significance might impede the monitoring of public works projects—which reflect the drawbacks raised by Halland et al.—are certainly worth taking into consideration.

That said, analysis of the agreement carried out by Marysse and Geenen—which has led them to reach conclusions about the deal's ultimate "winners"—fundamentally misses the mark on four fronts.[63] First, it overlooks the fact that such an investment contains a substantial risk element, for which the investing parties—both the financiers and the contractors—expect to be compensated. Second, it ignores the long-term nature of the agreement, the fact that the financing takes place upfront, and the reality that mining proceeds can only be expected to materialize in the future. By overlooking that point, they fail to discount the future revenue flows to equal their net present value. This is particularly salient because Sicomines must reach the project's third phase in order to keep more than 15 percent of its profits. Third, it does not address the most obvious counterfactual for the Sicomines deal: the DRC's 2002 Mining Code. Had the two mining licenses granted to Sicomines not been allocated through an RFI agreement, their exploitation would have been subject to the mining code, which makes it an obvious point of comparison for any analysis of the deal. Finally, Marysse and Geenen fail to consider the 32 percent stake in Sicomines granted to Congolese SOEs as part of the deal, which represents an indirect transfer to the Congolese government.

Much of the existing analysis of the Sicomines agreement, including that of Marysse and Geenen, assumes that the Congolese government could have obtained the infrastructure projects it secured through the Sicomines agreement by borrowing the necessary funds via traditional financial vehicles, or by harnessing the necessary mining royalties and taxes. By extension, it also assumes that the Congolese government would have possessed the capacity and political will—over multiple decades—to continue the financing and development of these infrastructure projects.

Further analysis points out how the DRC benefits from this deal simply by virtue of obtaining infrastructure investments, such as Chakrabarty's, but this too misses key points. By failing to explore the value of the concessions the country conceded for the investments, it offers no insight as to their opportunity cost. Furthermore, it also fails to compare the government's revenues from Sicomines' RFI arrangement to what it would have obtained had it been subject to the 2002 Mining Code.

EXPLORING THE SICOMINES AGREEMENT'S RISK COMPONENTS

AN ADVISOR IN THE CONGOLESE MINISTRY OF FINANCE, cited by Global Witness, stated that the DRC was in a very weak bargaining position when the deal was negotiated, and likened his country to a "sick man".[64] Based on interviews conducted as part of this work, there appears to be a consensus that the Congolese party was in fact in a precarious position when it was signed, and that this transpired in the agreement. A member of Kabila's cabinet interviewed as part of this research said: "Natural resource wealth is useless if it stays in the ground" and added "The Chinese may have gotten more as part of this deal, but when the people are dying of hunger, who cares?" Another senior elected official—and member of Kabila's cabinet at the time of the deal's signature—echoed the same thoughts: "Did the Congo get robbed? It doesn't

matter. The situation was too dire to do nothing. The Congolese government gets 5-year mandates. It needed to deliver something *now*". The two candid politicians also stressed how, despite initial impressions, the deal had brought unexpected benefits to the DRC. One of them indicated that the Chinese are willing to take on much more risk than their Western counterparts, whom he argued are too cautious. He added that having both types of partners is optimal for the DRC. The other politician stated that Western actors, when approached to finance the *Cinq Chantiers*, wanted "zero risk", and that they were too scared to invest. He added that *les contrats chinois* (the Chinese contracts) "woke up" Western donors, and that the DRC had been able to secure more financing from them as a result.

It is hardly surprising that the Congolese government might have negotiated the Sicomines agreement from a position of weakness, given the fact that it did not have access to the necessary funds to carry out the infrastructure investments it was planning when the deal first emerged. However, this does little to address one of the central questions of this case: *Was the Sicomines resource-for infrastructure agreement one-sided in favor of the Chinese consortium*?

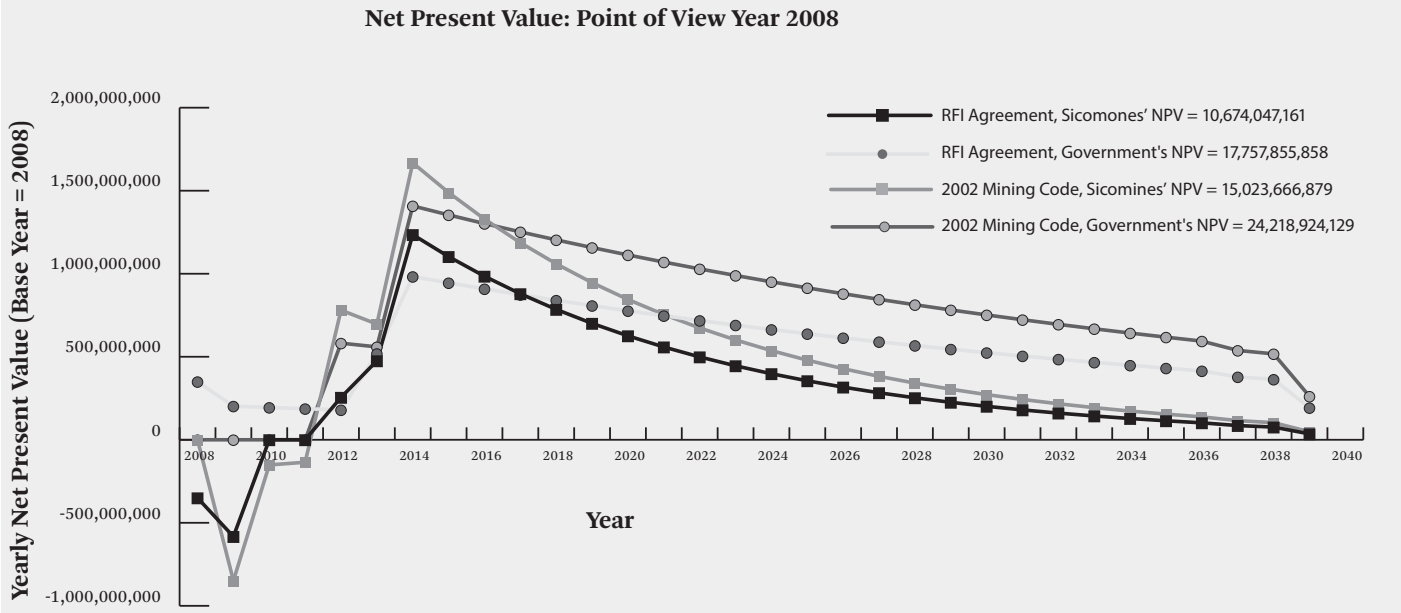
The models below capture the Sicomines agreement's NPV for the Chinese consortium and the Congolese government. To capture the deal's value for the consortium, the model captures the total NPV of the venture's yearly net profits in different scenarios. Meanwhile, the agreement's benefits for the Congolese government are calculated using the NPV of the value of the infrastructure financed through the deal, in addition to the signature bonus and tax revenues secured as part of the agreement, and the total revenues it would have collected from the concessions under the 2002 Mining code. In both cases, the conditions reflected were the ones prevailing in April of 2008, when the agreement was signed, and September of 2016, when the fieldwork for this paper was completed. The conditions modeled for 2008 reflect the deposit's estimated reserves, the expected timeline of the loans disbursement, the project's development and operation schedule, and the prevailing market prices of copper and cobalt. The conditions modeled for 2016 reflect the changes in these factors over time.

The models below do not consider another likely scenario that could have unfolded without the Sicomines venture—that the deposits would have remained in the ground. Calculating the NPV of this alternative for the Congolese state does not require extensive modeling—the net present value of zero future payments is zero.

The models presented below lead to four conclusions:

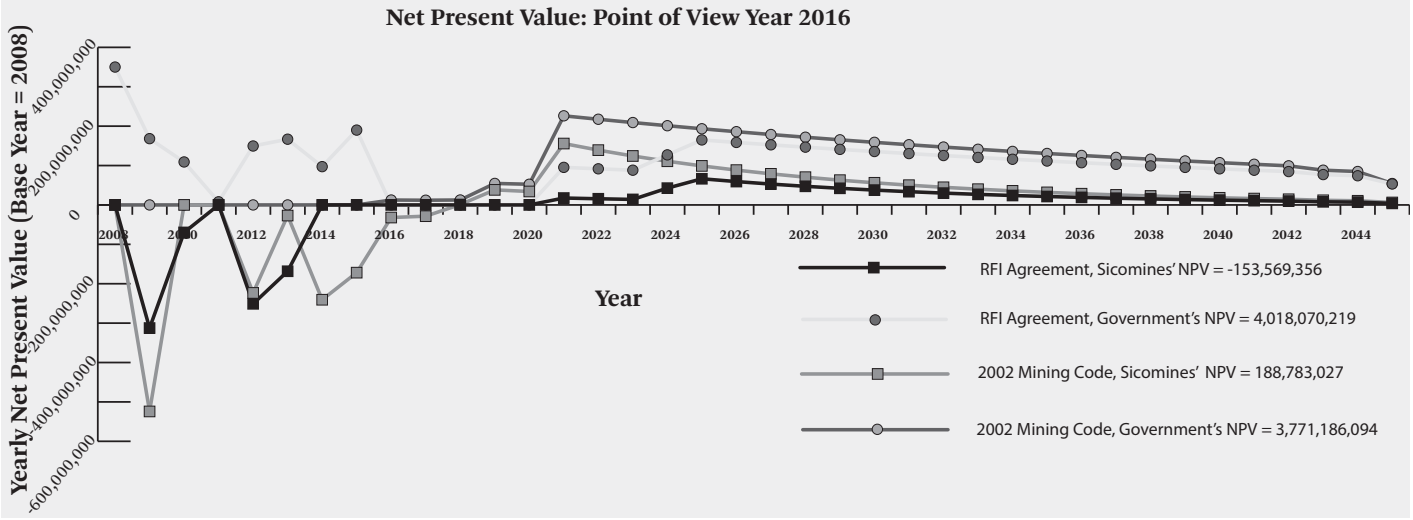
1. First, based on the information at hand in 2008, the estimated NPV of the deal for the Chinese side, under its RFI structure, was less than what it would have been under the 2002 Mining Code. This is because, in 2008, the operation phase of the concession was expected to be underway within a few years, which would have generated revenues with a substantial net present value. Under the RFI structure, these early revenues were to be used to reimburse the loans component of the project.

Figure 2a: Net Present Value Model of the Sicomines Agreement 2008*



*Figures 2a and 2b utilize a discount rate of 12 percent for the Sicomines consortium. A sensitivity analysis using different discount rates is presented in the Appendix.

Figure 2b: Net Present Value Model of the Sicomines Agreement 2016



2. Second, also based on the prevailing conditions in 2008, the estimated NPV of the venture for the Congolese government would have been much higher under the 2002 Mining Code than under the RFI agreement. This supports the claim that the Congolese government was in a position of weakness when they negotiated the deal. It also raises the possibility that the government valued a potential rapid influx of infrastructure projects more than their underlying financial value might suggest, perhaps due to an inability to obtain them otherwise.
3. Third, the project's estimated NPV—from the point of view of the consortium— decreased dramatically, from over US$ 10 billion in 2008 to a slightly negative net present value in 2016. This is because of the delays and setbacks experienced by the project, the dramatic decline in market prices of copper and cobalt during the interval, and the downward adjustment of the concession's estimated reserves. The models for 2016 also predict that Sicomines is less profitable as an RFI venture than it would have been under the 2002 Code, although its NPV would have been negative in either case.
4. Finally, the project's estimated NPV as an RFI agreement—from the Congolese government's point of view—also decreased dramatically between 2008 and 2016. In fact, it dropped by over US$ 13 billion, or by a factor of more than four. On the other hand, under the 2002 mining code, it would have been reduced by over US$ 20 billion—a reduction by a factor of more than six.

It also raises the possibility that the government valued a potential rapid influx of infrastructure projects more than their underlying financial value might suggest, perhaps due to an inability to obtain them otherwise.

To conclude, the models suggest that because of delays and setbacks experienced by the consortium, the Sicomines agreement does not appear as one-sided in favor of the Chinese consortium as many have argued. Based on the 2008 models, the Congolese government appears to have left a significant amount of money on the table. This no longer appears to be the case in the 2016 model, when the Congolese government's NPV from the agreement dwarfed that of the consortium. Furthermore, based on these estimates presented above, implementing the project as a RFI deal appears to have shielded the Congolese government from risk more so than the consortium.

As mentioned above, this paper's models do not present a likely counterfactual to the Sicomines venture—that the deposits would have remained untouched. This scenario's NPV, from the Congolese state's point of view, is zero.

EXPLORING THE SICOMINES AGREEMENT'S RISK COMPONENTS – FOR THE CHINESE

WHILE THE MODELS PRESENTED ABOVE SHOW the effects of some risks—relating to the size and value of the deposits at different points in time—it leaves much of the gamut of risks that can arise from operating a large scale mine in the DRC unexplored. The head of a Chinese mining firm (unrelated to Sicomines) interviewed as part of this research, which has been living in the DRC since 2005, summarized the risks of mining

in the country as economic, political, and cultural in nature. The "economic risk"—which the models presented above capture to a large extent—stems from the reserves found in mining concessions, the costs of extracting them, and the value they can fetch on the market. These risks, he said, apply to all mining projects, and can be anticipated to a certain degree. The "cultural risk", particularly salient in the DRC, arises from the corruption he stressed is endemic in the DRC. He insinuated that while this type of risk can be anticipated—since being hounded for "extra payments" is "nearly certain"—the extent of the problem is difficult to predict. Finally, he described "political risk" as the possibility of a regime change in the DRC, which is likely to derail mining operations and even jeopardize whole mining ventures. Therefore, while political risk always represents a looming threat in the DRC, the potential negative impact stemming from it ranges widely.

The models suggest that because of delays and setbacks experienced by the consortium, the Sicomines agreement does not appear as one-sided in favor of the Chinese consortium as many have argued.

The taxonomy of risks presented by this mining executive is particularly pertinent to the analysis of the Sicomines deal. First, as summarized above, the Sicomines venture has experienced "economic risks" in three ways. First, it saw its estimated reserves drop significantly. Second, its production costs rose through the higher-than-expected costs of electricity. Finally, the price of copper plummeted from about US$ 9,000 to US$ 5,000 per ton and the price of cobalt from US$ 115,000 to about US$ 27,000 per ton from the signature of the *Convention* in April 2008 to the time of this fieldwork in September of 2016. The downward reevaluation of the deposits was such that Reuters questioned Moise Ekanga about Sicomines' ability to repay the loans. He stated: "In the event that, at the end of the 25 years, the loan is not paid off by the copper production, we will sit down around the table and talk", adding that there was no plan to cut infrastructure financing.[65]

While it is difficult to obtain precise information on the "cultural risks" faced by Sicomines in the DRC, there have been multiple indications that the firm has faced at least some. Johanna Malm was quoted as saying: "Rather than unlocking Congo's massive resource potential for China, the project has underscored the deterrents to investment, from crippling power shortages to asphyxiating bureaucracy and corruption".[66] In fact, Malm stated, in response to the figures put forth by Budimbwa and Marysse and Geenen: "The accuracy of such estimates is compromised by the fact that in the DRC, many fees and taxes are settled informally in negotiated transactions between civil servants on the one hand, and citizens and companies on the other".[67]

Finally, in large part due to its critical role in the Kabila administration's *Cinq Chantiers*, Sicomines engenders significant "political risks". In fact, Johanna Malm has stated that "concerns about Congo's unstable political and business environment at one stage threatened to sink the deal".[68] These risks are still very real. Since its inception, multiple important politicians, including Laurent Nkunda, a former rebel leader turned politician, have expressed the intention of renegotiating the agreement.[69] Finally, the DRC's political risk is reflected by the fact that, in 2009, following the expropriation of First Quantum's Kolwezi project, UBS Investment Research increased

the discount rate it uses for all projects in the DRC from 12 percent (the rate employed in this paper) to 20 percent.[70]

The risks outlined above clearly highlight the variety of issues with the potential to derail the Sicomines venture. While the guarantees provided by the Congolese government in the 2008 *Convention* shielded Sicomines from some risks, it clearly did not protect it from the cultural and political risks outlined above. In other words, as opposed to what Marysse and Geenen claim, at no point had the Chinese party "hedged themselves against all possible economic and political risks".[71]

EXPLORING THE SICOMINES AGREEMENT'S RISK COMPONENTS – FOR THE CONGOLESE

THE CHINESE PARTIES INVOLVED IN SICOMINES are not the only ones facing important—yet difficult to quantify—risks as part of this agreement. Concerns were raised by a number of interviewees, both in the Congolese government and in civil society groups, about the quality of the infrastructure the DRC secured as part of this agreement. In fact, two roads built in Kinshasa as part of the agreement featured large sinkholes at the time of this fieldwork, creating traffic disruptions. Furthermore, a report published by the African Association for the Defense of Human Rights documented the infrastructure investments associated with the Sicomines agreement, and found that many of the projects were overpriced in comparison to equivalent projects financed by other actors.[72]

Most of the Congolese individuals interviewed as part of this research blamed the quality issues on the fact that Chinese firms were contracted for the projects. However, Farrell has empirically demonstrated that, among World Bank-financed projects, Chinese contractors carry out work of a quality equivalent to their Western counterparts'.[73] Therefore, the blame for these problems cannot be solely laid at the feet of Chinese contractors. A potential cause of such quality concerns—previously raised in the paper—could be the lack of competition underlying the project delivery. Another possibility is that the Congolese government has not monitored the projects delivered through the Sicomines agreement adequately, either because of political calculus or lack of capacity. While international consulting firms have monitored at least six of the projects delivered through the Sicomines agreement, at least three have been overseen by the Congolese Agency of Public Works. This could represent a concern if, as stated by a Katanga-based activist quoted by Global Witness, "Government inspection officials do not feel free to properly monitor the work of CREC for fear of being accused of being opposed to the *Cinq Chantiers*".[74]

This is echoed by Kabemba, who has stated that "most Congolese citizens appreciate the contribution of China [to the DRC's development] and welcome the agreement, but at the same time criticize the secrecy and lack of preparedness that accompanied its signing by the Congolese government".[75] An expert on the DRC conveys this feeling and is quoted by Lee as stating: "I'm not sure what to expect, beyond a bit of new pavement on some old roads. I 'trust' a corrupt, but efficient

government like Angola to squeeze value out of Chinese and Western companies. Not the DRC."[76]

POLICY RECOMMENDATIONS

THE RISK COMPONENTS PRESENT IN RFI VENTURES make it difficult to identify their winners and losers until they reach their conclusion. Furthermore, many of the concerns that have been voiced about the Sicomines agreement fail to address a key issue—the Congolese government did not have access to the necessary funds to carry out the infrastructure investments it was planning when the deal first emerged. As Wells argues, "countries need to evaluate RFI proposals in light of what they might otherwise receive for their resources—and what they would pay to finance associated infrastructure, *if financing were to come from other sources*".[77]

That said, concerns raised regarding the Sicomines agreement's relative lack of transparency and weak oversight mechanisms to ensure the quality of its infrastructure component are critically important. One would be hard pressed to argue that the Congolese people would have benefitted less from the Sicomines agreement if it had been implemented more transparently and with more consistent third party oversight mechanisms. The way in which this agreement played out in the Congolese context provides important lessons for future projects.

First, as argued by Paul Collier, some of the shortcomings of RFI would be addressed if there existed more competition on the supply side of such deals.[78] Fundamentally, RFI agreements are not so different from other infrastructure financing vehicles. The key difference is that RFI loans are repaid after a period of resource extraction. Therefore, it is unclear why other financiers shy away from funding infrastructure projects via RFI agreements (if they make sense from a financial perspective). Furthermore, because of the positive aspects of RFI addressed in this case study, such financing instruments could generate positive spillover effects in the resource-rich debtor countries where they are used (as long as the other recommendations, below, are followed).

Second, RFI deals must be made more transparent. The *omnibus* character of RFI deals makes them particularly difficult for third parties to analyze and monitor. This can potentially lead to a host of problems, including infrastructure projects of a suboptimal quality, as well as poorer resource exploitation practices among debtor countries.

Third, infrastructure projects financed by RFI projects must be subjected to the same third party quality controls as their counterparts financed through traditional means. This is particularly true because of the all-encompassing nature of RFI deals, which lends them political importance, and can in turn reduce debtor governments' incentives to control their quality.

Finally, in the assessment of RFI projects, risk calculations must be carried out assiduously and conservatively. While risk looms large in any infrastructure financing or resource extraction project, it is particularly salient in the case of RFI agreements.

Since, as part of RFI deals, the infrastructure loans are disbursed upfront, only to be repaid decades later, any significant risk exposure can jeopardize projects by dramatically reducing their net present value.

CONCLUSION

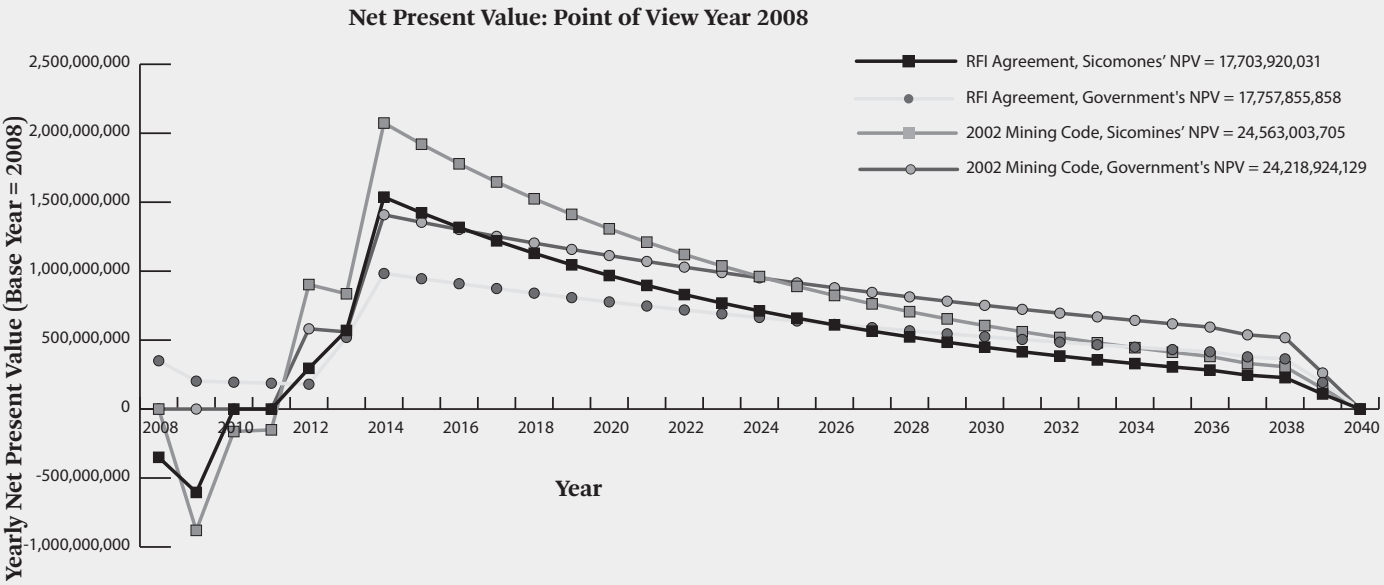
THE SICOMINES AGREEMENT HAS BEEN CALLED the "deal of the century", and many analysts have purported to identify its winner. This paper has demonstrated that the risk components of the venture make it virtually impossible to clearly identify its winner until it reaches its conclusion. What is clear, however, is that the deal has become much less lucrative for the Chinese side between 2008 and 2016, largely due to the downward reevaluation of the mine's estimated deposits, the downward spiral in copper prices, and the delays and setbacks that have plagued its operations. Furthermore, the model presented in this paper suggests that, at the time of the *Convention*'s signature in 2008, Sicomines would have represented a more profitable venture under the DRC's 2002 Mining Code than under the terms reached with the Congolese state.

It is also important to note that the nature of the political risks present in the DRC, which the final section of paper outlines, could drastically shorten the duration of this agreement, resulting in a situation that produces no winners at all (but where the Chinese party would be the biggest loser). On the other hand, if the infrastructure delivered as part of the Sicomines agreement is of sub-optimal quality, or is not properly maintained by the Congolese state, the ultimate losers will undoubtedly be the Congolese people. In fact, because of the volatile nature of commodity prices, the Sicomines agreement's winner could change multiple times until it reaches its conclusion in about 30 years time.

As multiple resource-rich countries experience difficulties securing infrastructure financing from traditional sources, RFI deals represent an interesting avenue that can ensure the delivery of public works in a relatively short timeframe. They allow countries to leverage future natural resource revenues to meet their immediate infrastructure needs. That said, to maximize the benefits they yield for host countries' populations, RFI agreements must become more transparent, and be subjected to the same oversight mechanisms as other infrastructure development projects. Finally, as this paper highlights, the broad gamut of risks RFI agreements comprise must be given full consideration by their respective parties, as well as by third-party actors who analyze them.★

APPENDIX

Figure 3a: Net Present Value Model of the Sicomines Agreement 2008*



*Figures 3a and 3b utilize a discount rate of 8 percent for the Sicomines consortium.

Figure 3b: Net Present Value Model of the Sicomines Agreement 2016

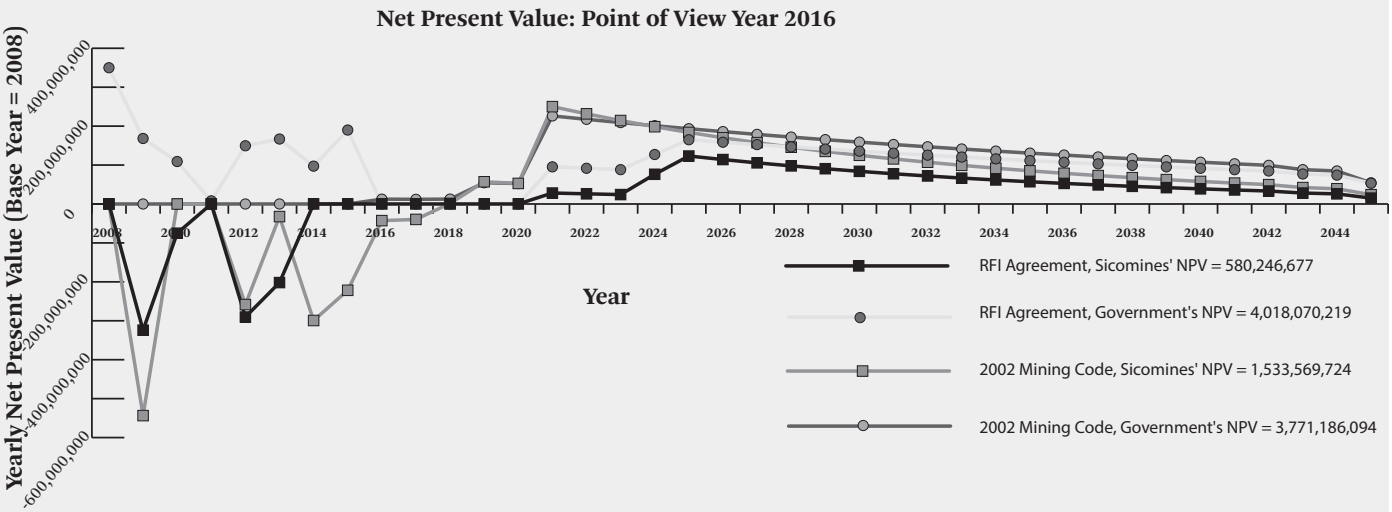
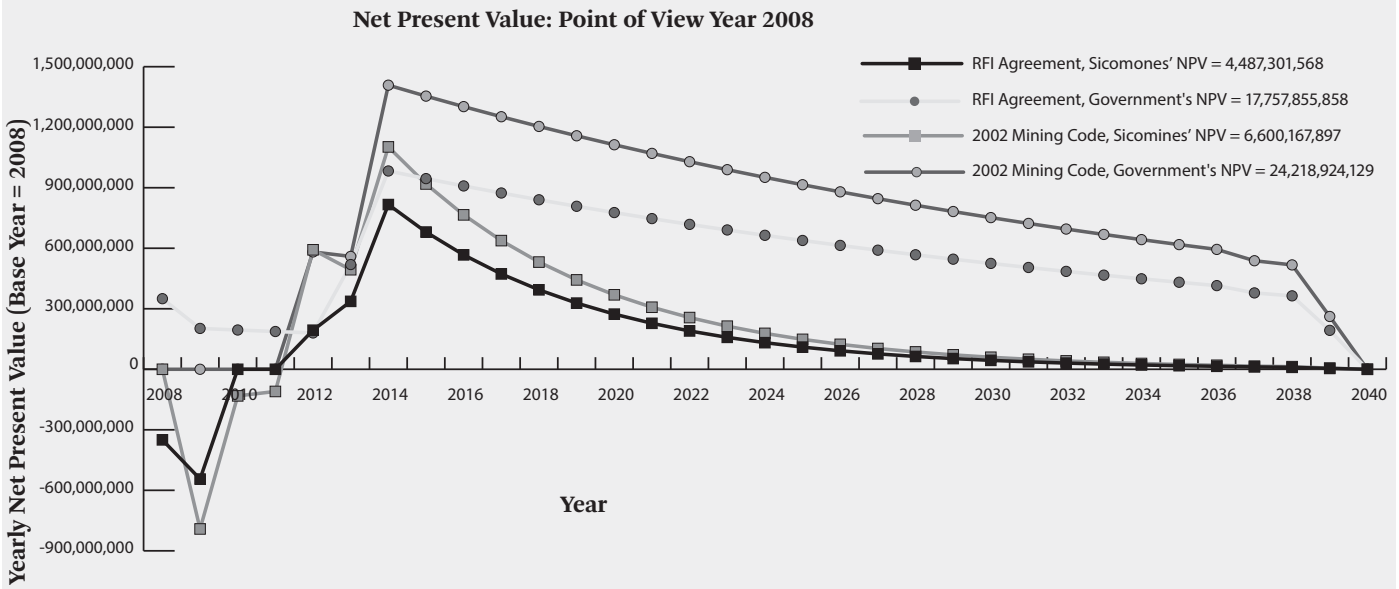
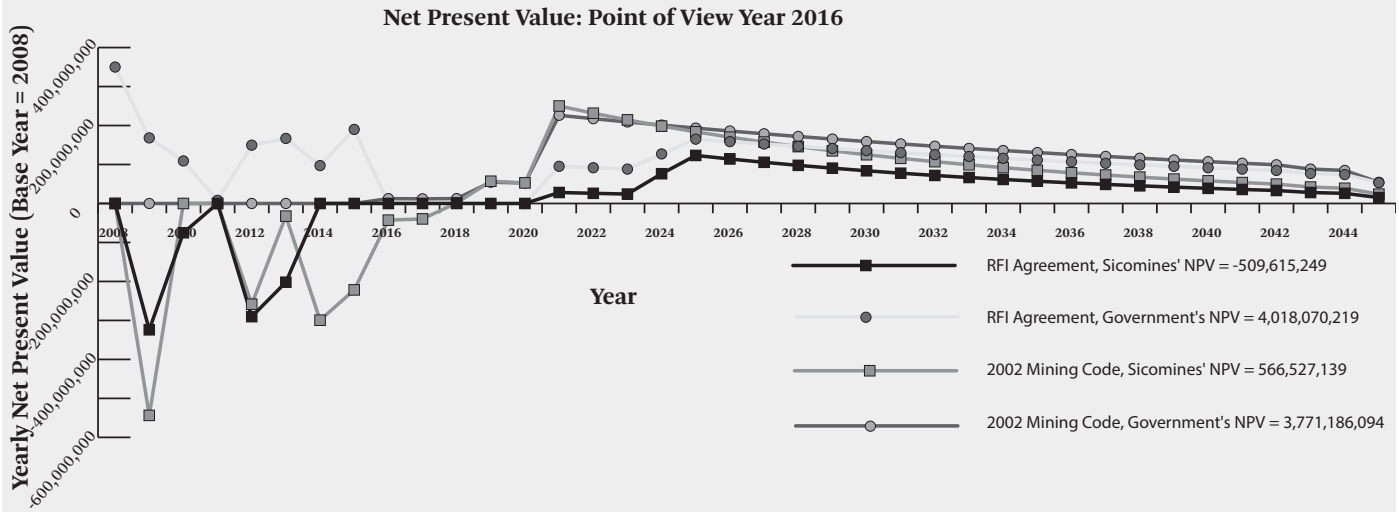


Figure 4a: Net Present Value Model of the Sicomines Agreement 2008*



*Figures 4a and 4b utilize a discount rate of 20 percent for the Sicomines consortium.

Figure 4b: Net Present Value Model of the Sicomines Agreement 2016



ENDNOTES

1. Deborah Brautigam and Jyhjong Hwang. 2016. "Eastern promises: New data on Chinese loans in Africa, 2000-2014." Working Paper No. 2016/4. China Africa Research Initiative, School of Advanced International Studies, Johns Hopkins University, Washington, DC. Retrieved from http://www.sais-cari.org/publications.
2. Brautigam and Hwang, "Eastern Promises," 17.
3. Deborah Brautigam, *The Dragon's Gift: The Real Story of China in Africa* (United Kingdom: Oxford University Press, 2009).
4. Brautigam and Hwang, "Eastern promises".
5. Harvard Halland; John Beardsworth; Bryan C Land; James Schmidt. 2014. *Resource financed infrastructure: A discussion on a new form of infrastructure financing*. A World Bank Study. Washington, DC: World Bank Group. http://documents.worldbank.org/curated/en/394371468154490931/Resource-financed-infrastructure-a-discussion-on-a-new-form-of-infrastructure-financing
6. Halland, Beardsworth, Land, and Schmidt, "Resource Financed Infrastructure," 4.
7. Halland, Beardsworth, Land, and Schmidt, "Resource financed infrastructure," 5.
8. Halland, Beardsworth, Land, and Schmidt, "Resource financed infrastructure."
9. Brautigam, *The Dragon's Gift*.
10. Claude Kabemba, "A Friend in Need? The Relationship as a Development Partnership" *Open Society Initiative for Southern Africa*. Oct. 5, 2012, http://www.osisa.org/books/regional/friend-need-relationship-development-partnership.
11. Halland, Beardsworth, Land, and Schmidt, "Resource financed infrastructure."
12. Halland, Beardsworth, Land, and Schmidt, "Resource financed infrastructure," 63.
13. Halland, Beardsworth, Land, and Schmidt, "Resource Financed Infrastructure," 71.
14. Johanna Jansson, (2011). *The Sicomines Agreement: Change and Continuity in the Democratic Republic of Congo's International Relations*. Occasional Paper No. 97, China in Africa Project. Johannesburg, ZA: South African Institute of International Affairs. https://www.africaportal.org/documents/6884/saiia_OP_97.pdf
15. Jansson, "The Sicomines Agreement," 2011.
16. Jansson, "The Sicomines Agreement," 2011.
17. Jansson, "The Sicomines Agreement," 2011.
18. Jansson, "The Sicomines Agreement," 2011.
19. Jansson, "The Sicomines Agreement," 2011, 11.
20. Kabemba, "A Friend in Need?"
21. La Prospérité, "5 chantiers, 5 ans après," May. 27, 2013, http://fr.africatime.com/republique_democratique_du_congo/articles/5-chantiers-5-ans-apres-moise-ekanga-na-jamais-vendu-le-pays-aux-chinois.
22. La Prospérité, "5 chantiers, 5 ans après."
23. Deborah Brautigam, "The Chinese-Congo Sicomines Project: New Analysis," *China in Africa: The Real Story* (blog), March 9, 2013 (11:17 a.m.), http://www.chinaafricarealstory.com/2013/03/the-chinese-congo-sicomine-project-new.html
24. Democratic Republic of Congo Government (2007). *Protocole d'accord Sino-Congolaise*. Retrieved from http://congomines.org/reports/274-protocole-d-accord-rdc-groupement-entreprises-chinoises-2007.
25. Democratic Republic of Congo Government, *Protocole d'accord Sino-Congolaise*.

26. Johanna Jansson, "The Sicomines agreement revisited: Prudent Chinese banks and risk-taking Chinese companies," *Review of African Political Economy* 40, no. 135 (2013): 152-162.

27. Democratic Republic of Congo Government (2008). *Convention de collaboration Sino-Congolaise*. Retrieved from http://congomines.org/reports/276-convention-de-collaboration-sino-congolaise-groupement-d-entreprises-chinoises-rdc-2008.

28. The internal rate of return—which is used to evaluate the attractiveness of a project or investment—represents the discount rate for which the NPV of all its cash flows equal zero.

29. Jansson, "The Sicomines Agreement," 2011.

30. Jansson, "The Sicomines Agreement," 2011.

31. Global Witness, "China and the Congo: Friends in Need," March, 2011, https://www.globalwitness.org/documents/13036/friends_in_need_en_lr.pdf.

32. Democratic Republic of Congo Government (2008). *Avenants 1 et 2 à la convention de joint venture*. Retrieved from http://congomines.org/system/attachments/assets/000/000/481/original/B31-Sicomines-2008-Convention-JV-_-Avenants-1-2.pdf?1430928919

33. Democratic Republic of Congo Government (2009). *Avenant No. 3 a la convention de collaboration relative au developpement d'un projet minier et d'un projet d'infrastructures*. Retrieved from http://www.congomines.org/system/attachments/assets/000/000/502/original/Sicomines-2009-Avenant3ConsortiumEntreprisesChinoises-RDC.pdf?1430928992

34. Johanna Malm, "When Chinese development finance met the IMF's public debt norm in DR Congo" (PhD Dissertation, Roskilde University, 2016). https://rucforsk.ruc.dk/ws/portalfiles/portal/57116566.

35. Malm, "Chinese Development Finance & IMF Public Debt Norm."

36. Interestingly, during the field research for this paper, Moise Ekanga revealed that Eximbank had also asked to take over Gécamines' stake in the Tenke Fungurume venture.

37. Malm, "Chinese Development Finance & IMF Public Debt Norm."

38. Malm, "Chinese Development Finance & IMF Public Debt Norm."

39. Thomas Wilson, "Congo, China Partners Near Deal for $660 Million Power Plant," Bloomberg. Oct. 15, 2015, http://www.bloomberg.com/news/articles/2015-10-15/congo-chinese-partners-near-deal-for-660-million-power-plant.

40. Democratic Republic of Congo Government, *Convention de collaboration Sino-Congolaise*.

41. Reuters, "Copper Reserves at China's Sicomines in Congo Less Than Hoped," May 24, 2013, http://www.theafricareport.com/Reuters-Feed/Copper-reserves-at-China-s-Sicomines-in-Congo-less-than-hoped.html.

42. Wilson, "Congo/China Partners $660 Million Power Plant."

43. Reuters, "China Firms to Fund Congo Hydro Power Plant to Lift Mining Output," Jun. 14, 2016, https://www.reuters.com/article/congodemocratic-mining-china/china-firms-to-fund-congo-hydro-power-plant-to-lift-mining-output-idUSL8N1962ES.

44. Different sources report that different projects have been financed through the Sicomines agreement. The projects outlined in the table above are the ones that were reported by at least two distinct publicly available sources.

45. Jansson, "The Sicomines Agreement," 2011.

46. Jansson, "The Sicomines Agreement," 2011.

47. Global Witness, "China and the Congo."

48. Global Witness, "China and the Congo."

49. Global Witness, "China and the Congo."

50. Global Witness, "China and the Congo," 10.

51. Aaron Ross, "China's 'Infrastructure for Minerals' Deal Gets Reality-Check in Congo," Reuters. Jul. 9, 2015, http://www.reuters.com/article/congodemocratic-mining-china-idUSL8N0ZN2QZ20150708.
52. Kalala Budimbwa, "Decrypt d'invité: Le "sinisme" du contrat le plus leonine," *Au Grand Beau et Riche Pays* (blog), July 31, 2008, http://congograndbeauetrichepays.over-blog.com/article-21942311.html
53. Stefaan Marysse and Sara Geenen, "Win-win or unequal exchange? The case of Sino-Congolese cooperation agreements," *The Journal of Modern African Studies* 47, no. 3 (2009): 371-396.
54. Marysse and Geenen, "Sino-Congolese Cooperation Agreements," 386.
55. Marysse and Geenen, "Sino-Congolese Cooperation Agreements," 389.
56. Marysse and Geenen, "Sino-Congolese Cooperation Agreements," 390-391.
57. Marysse and Geenen, "Sino-Congolese Cooperation Agreements," 391.
58. Malancha Chakrabarty, "Growth of Chinese trade and investment flows in DR Congo – blessing or curse?" *Review of African Political Economy* 43, no. 147 (2016): 116-130.
59. Chakrabarty, "Growth of Chinese Trade and Investment Flows," 128.
60. Stephanie Matti, "Resources and Rent Seeking in the Democratic Republic of the Congo," *Third World Quarterly* 31, no. 3 (2010): 401–413.
61. Funeka Yazini April, "Sicomines: A Successful Case of Mineral Industrialization in Africa," China Today, Jun. 6, 2016, http://www.pressreader.com/china/china-today-english/20160606/281522225357624.
62. Tony Busselen, "Guest post: Let's argue about the China-Congo Contract," *China in Africa: The Real Story* (blog), August 3, 2011 (9:23 a.m.), http://www.chinaafricarealstory.com/2011/08/guest-post-lets-argue-about-china-congo.html
63. Marysse and Geenen, "Sino-Congolese Cooperation Agreements."
64. Global Witness, "China and the Congo," 19.
65. Reuters, "Copper Reserves Less Than Hoped," 2013.
66. Ross, "China's Infrastructure for Minerals Deal Reality Check," Reuters.
67. Malm, "Chinese Development Finance & IMF Public Debt Norm."
68. Ross, "China's Infrastructure for Minerals Deal Reality Check," Reuters.
69. Malm, "Chinese Development Finance & IMF Public Debt Norm."
70. Northern Miner, "Freeport Reaches a Deal with the DRC," 2010, http://www.northernminer.com/news/freeport-reaches-a-deal-with-the-drc/1000389957/?type=HotSectors
71. Marysse and Geenen, "Sino-Congolese Cooperation Agreements," 391.
72. African Association for the Defense of Human Rights, "Mise en oeuvre de la convention de collaboration entre la RDC et le groupement d'entreprises chinoises," Nov. 2014, http://www.congomines.org/system/attachments/assets/000/000/630/original/ASADHO-RAPPORT-SUR-LES-INFRASTRUCTRURES-SICOMINES-1.pdf?1430929440.
73. Jamie Farrell. 2016. "How Do Chinese Contractors Perform in Africa? Evidence From World Bank Projects." Working Paper No. 2016/3. China Africa Research Initiative, School of Advanced International Studies, Johns Hopkins University, Washington, DC. Retrieved from http://www.sais-cari.org/publications.
74. Global Witness, "China and the Congo," 34.
75. Kabemba, "A Friend in Need?"
76. Peter Lee, "China has a Congo copper headache," Asia Times. Mar. 11, 2010, http://www.atimes.com/atimes/China_Business/LC11Cb02.html.
77. Halland, Beardsworth, Land, and Schmidt, "Resource Financed Infrastructure," 83.

78. Halland, Beardsworth, Land, and Schmidt, "Resource Financed Infrastructure."

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