BUILDING DEVELOPMENT FOR A NEW ERA

CHINA'S INFRASTRUCTURE PROJECTS IN LATIN AMERICA AND THE CARIBBEAN

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EDITED BY

ENRIQUE DUSSEL PETERS | ARIEL C. ARMONY

SHOUJUN CUI

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Published by Asian Studies Center, Center for International Studies, University of Pittsburgh, and Red Académica de América Latina y el Caribe sobre China

Manufactured in Mexico

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ABOUT THIS PROJECT

This book is the result of a truly global partnership between three institutions: the University of Pittsburgh, the Universidad Nacional Autónoma de México (UNAM), and the Renmin University of China. The book grows out of an international conference—"China, the United States, and Latin America: New Actors and Changing Relations"—held in October 2016 at the School of International Studies at Renmin University in Beijing.

Multiple actors at each institution supported this publication financially and intellectually. At UNAM, the Centro de Estudios China-México, School of Economics (Cechimex) played a crucial role in supporting the research associated with several of these papers. In particular, professor Enrique Dussel Peters played a key role as both an editor and as an intellectual contributor in shaping its focus and argument.

At Renmin University, both the Center for Latin American Studies (CLAS) and the School of International Studies provided funding for the initial conference. CLAS director Shoujun Cui worked to identify key authors within China and to secure funding. Together with his staff, he hosted a well-organized and thought-provoking conference on their campus. Additional financial support for the Beijing conference was provided by the Institute of Latin American Studies, Chinese Academy of Social Sciences, and the Chinese Association for Latin American Studies.

Finally, at the University of Pittsburgh, two centers associated with the University Center for International Studies (UCIS)—the Asian Studies Center (ASC) and the Center for Latin American Studies (CLAS)—organized the US participants and supported the publication of this volume. At the University of Pittsburgh, special thanks are owed to Ariel Armony, vice provost for Global Affairs, for his ongoing sponsorship of this project and his role as a coeditor with professors Dussel Peters and Cui. James Cook, ASC acting director, and

Scott Morgenstern, CLAS director, worked to support the organization of the conference and the production of this volume. We would also like to acknowledge the support of the University of Pittsburgh's Confucius Institute. Special thanks to Ignacio Mamone, Yu Xiao, Leo Schwartz, and Rafael Khachaturian for their extraordinary assistance and insights at different stages of this project.

This project is conceived as part of a larger initiative to examine the evolving ties between China and Latin America and the Caribbean. The collaboration between the University of Pittsburgh and UNAM is focused on addressing the need for rigorous, systematic, and innovative studies that shed light on the new dimensions of China–Latin America relations. A previous publication, *Beyond Raw Materials: Who Are the Actors in the Latin America and Caribbean-China Relationship?* (Friedrich-Ebert-Stiftung 2015), coedited by Armony and Dussel Peters, examined the features and characteristics of the most important actors in the bilateral relationship. A more recent publication, "Effects of China on the Quantity and Quality of Jobs in Latin America and the Caribbean" (International Labor Organization 2017), coauthored by Dussel Peters and Armony, is the first study of the impact of economic relations between China and Latin America on jobs in the region.

All of the organizations involved in this project would like to offer their warm thanks to each of the authors who contributed to this book. Their pioneering work drives the expansion of an emerging field of study, with significant implications for the future of the relationship between China and Latin America.

INTRODUCTION

Ariel C. Armony, Enrique Dussel Peters, and Shoujun Cui

China's increasing international presence in all imaginable fields continues to impress experts and the general public; the differences between the Trump administration and short-, medium-, and long-term policies of the Xi Jinping administration seem to further push China toward a more active global role. Latin America and the Caribbean (LAC) are not an exception: China's role in the region has increased outstandingly, from language, culture, and economic exchange to bilateral, regional, and multilateral ties.

It is in this context of China's increasing global presence in LAC that this book makes a detailed contribution on its infrastructure projects in the region. Infrastructure projects—a topic that we have highlighted earlier (Dussel Peters and Armony 2017)—are the latest and most ambitious phase in the increasingly complex relationship between LAC and China; that is, the latest phase in a process that began with trade in the 1990s and continued with Chinese loans and outbound foreign direct investment (OFDI) since 2007–2008. Beginning in 2013, infrastructure projects have become a critical new phase. The recent Nineteenth National Congress of the Communist Party of China reiterated the importance of infrastructure projects, such as the One Belt One Road Initiative, for China's global strategy. In what follows, infrastructure projects will be clearly differentiated from trade, financing, and OFDI, since they are mainly a service and the property of the respective infrastructure project belongs to the entity that initially requested the respective service.

Contributions to this book present a specific understanding of infrastructure projects. Funding for these projects can be private or public, and includes sectors such as construction, telecommunication, transportation, and energy, among many others. In all cases, however, a service supplier transfers the infrastructure at the end of the specified time frame. Thus, substantial differences exist between infrastructure projects and foreign direct investment. In some cases, firms such as Huawei and Hutchinson Ports Holding might even invest in telecommunications and ports sectors, but their investment is still

classified as an OFDI since these firms do not offer a service and keep the ownership of their product.

Chinese infrastructure projects in LAC are of utmost relevance from several perspectives. First, Chinese firms in the second decade of the twenty-first century offer an increasing variety of services—from design to manufacturing, financing, technology, supplying firms, and additional postconstruction services—under the heading of turnkey projects. The One Belt One Road Initiative launched in 2013 is, from this perspective, coherent with the effective potential of Chinese firms globally and specifically in LAC. The initiative also reflects China's public-sector interest in leaving its own imprint on the current process of globalization, and specifically vis-à-vis other Western countries, particularly the United States. Second, LAC represents an important learning opportunity for Chinese firms, which do not usually seek the highest labor, safety, and environmental standards, while already competing with local, national, regional, and other firms globally. Third, and as discussed in several of the chapters in this book, there is a large "infrastructure gap" in most LAC countries. In other words, as a region LAC should be spending around 5 percent of its GDP in infrastructure, while effective spending has been well below 3 percent of GDP in the last two decades. Therefore, this is an area of utmost importance for the future of the region.

This book attempts to facilitate an understanding of Chinese infrastructure projects in LAC in a systematic manner and based on case studies in the region. As contributions to ongoing research and discussions, the chapters allow for certain conclusions and invite future research. First, the differences between the Chinese infrastructure projects in LAC that we examine in this book and other phases of recent interaction between LAC and China are not only relevant from an empirical and conceptual perspective but also particularly for policy making; that is, it is necessary to understand the different elements behind each project in order to generate conclusions and well-informed policies. Second, in most of the analyzed cases, LAC countries have so far not been able to understand the conditions and challenges posed by Chinese firms in LAC. Although they have been able to increase their economic, financial, technological, and service capacity, these firms are also in a dynamic learning process and in most cases still working under a Chinese-centered organizational and managerial culture. Thus, they do not respond adequately to the specific contexts that they encounter in the localities and countries in LAC. Third, the analyses presented in the nine chapters highlight the enormous potential for growth and expansion as well as the challenges ahead for Chinese firms. More specifically, a small group of Chinese firms, practically all of them in the public sector, have the possibility of improving their understanding of

the respective countries where they are implementing infrastructure projects. Yet the case studies reflect that the same Chinese firms—Huawei, Sinohydro, China Railway Construction Corporation, and others—operate in a pragmatic way in terms of suppliers, use of technologies, and in their relationship with the respective governments in LAC countries. Finally, the contributions in this book are explicit invitations for Latin American and Chinese researchers, among others, to pursue further research in this direction. These analyses and case studies are a starting point for additional research on infrastructure projects in the region. The case studies presented in this book will be a useful basis for such an endeavor.

REFERENCE

Dussel Peters, Enrique, and Ariel C. Armony. 2017. "Effects of China on the Quantity and Quality of Jobs in Latin America and the Caribbean." *ILO Technical Reports* 2017/6, 1–101.

BUILDING DEVELOPMENT FOR A NEW ERA

1

CHINA-COSTA RICA INFRASTRUCTURE PROJECTS

Laying the Groundwork for Development?

Monica DeHart

INTRODUCTION

When Costa Rica established diplomatic relations with the People's Republic of China in 2007, then-president Oscar Arias Sánchez justified the move by noting "China is going to be an economic power very soon, and I want Costa Rica to be the first Central American country to establish relations" (personal interview, July 28, 2011). This statement speaks to what many saw as a major about-face from Costa Rica's over fifty years of collaboration with Taiwan based on the common values of democracy and development cooperation, in favor of an instrumental effort to tap into China's global economic power (Feigenblatt 2009). To reward this shift, China donated to Costa Rica a $100 million, 35,000-seat stadium and purchased $300 million in bonds. Soon after, Costa Rica and China began negotiations for a free trade agreement that was signed in 2010 and came into force in 2011, enabling 60 percent of the two countries' trade products to enter the other's market duty-free, with another 30 percent of product tariffs reduced over the next fifteen years (COMEX n.d.). Instead of the extractive relationship that has characterized Chinese relations with many other Latin American partners (see ECLAC 2013; Ray, Gallagher, and Sarmiento 2016), the Chinese-Costa Rica relationship was thus built on a foundation of regional diplomacy, trade, and infrastructure.

That said, since 2007 Chinese infrastructure collaborations with Costa Rica have been the source of as much controversy as celebration. The range of

Chinese projects in Costa Rica has included the national stadium described above, an oil refinery, a highway expansion, the construction of a police academy, and proposals for both Special Economic Zones and distribution centers to service global suppliers. Each of these projects represents different forms of financing and construction, and has been subject to a variety of public debates, some of which have been fatal to the projects themselves. Some of those projects have been successfully completed and offer a model of what China can bring, whereas others have been abandoned and provide a cautionary tale of Chinese corruption. What is more, these projects have unfolded against a history of Taiwanese infrastructural engagement that many Costa Ricans remembered as collaborative and personalistic, thus shaping the expectations for and the assessments of this new generation of Chinese projects. This chapter offers an overview of select infrastructure projects in order to highlight and analyze the unique forms that Chinese infrastructure efforts have taken in Costa Rica and the debates they have engendered about national identity and a Chinese threat.[1] It argues that despite the apparent win-win combination of China's well-endowed state-owned infrastructure resources and Costa Rica's strong need for infrastructure, China-Costa Rican infrastructure collaborations suggest many challenges for the road forward.

THE COSTA RICAN CONTEXT

Despite its relatively small population of 4.9 million, Costa Rica is a middle-income country with a positive economic profile (World Bank 2016). Costa Rica's 2014 GDP per capita of $14,374 ranks fourteenth within Latin America and eighty-second in the world (OECD 2016). More important still, that GDP is rising, with 2015 figures comparable to Mexico in terms of economic development (US & Foreign Commercial Service and US Department of State 2016). Costa Rica is a member of the Central American Common Market and became a member of the Central American Free Trade Agreement in 2006, boasting a strong history of regional integration and open markets (Arce Alvarado 2016). It has a solid track record attracting foreign direct investment, especially in the high-tech manufacturing sectors. In 2016, 297 multinational corporations (largely US) were responsible for creating 12,300 new jobs (CINDE 2016), representing $2,850 million inward flows (UNCTAD 2016). And while export-oriented firms in Costa Rica possess well-developed links with global value chains, domestic firms have tended to reflect low value-added activities, employ unskilled workers and often operate in the informal economy (OECD 2016). Therefore, Costa Rica's 2010 free trade agreement with China was in

many ways an extension of its efforts to more deeply integrate itself in the global economy rather than a dramatic shift from previous policies.

Within Central America, Costa Rica is often celebrated as a success story for its stable democracy and respect for human rights, its relatively strong middle class, its high level of education (97% literacy), and its support for environmental protections (UNESCO 2015a, 2015b). These attractive domestic factors, combined with Costa Rica's strategic geographic position, have thus long served to sell Costa Rica as an important hub for trade. Costa Rican politicians have noted, for example, that by moving operations to Costa Rica, Chinese firms can cut shipping time to the United States and avoid US trade restrictions by gaining access to Costa Rica's free trade benefits with the world's largest economy (Leff 2011). As President Laura Chinchilla noted back in 2013: "We can offer China the door to the Latin American region to export its goods and services. . . . There are many opportunities for Chinese investment in Costa Rica's energy, telecommunication and infrastructure sectors" (Li 2013; see also Hamlin 2013). Nonetheless, Costa Rica's major infrastructure deficiencies threaten to stall the nation's economic development and undermine its aspirations to occupy a strategic position within the region as a hub for global trade. For example, some observers have noted that not only does much of Costa Rica's infrastructure need major upgrading, but key infrastructural projects have been delayed and/or canceled due to legal and procedural challenges (US & Foreign Commercial Service and US Department of State 2016). Therefore, a significant dimension of Costa Rica's economic motivation for partnering with China has been its desire to construct the infrastructure with which it can leverage its regional advantages into more global economic flows.

Until 2007, it was Costa Rica's relationship with the Republic of China (hereafter Taiwan), not the People's Republic of China (hereafter China), that served as the source of much of its infrastructural investments and aspirations. Given Taiwan's diplomatic interests in Central America and the Caribbean (where six of the twenty-three states that continue to recognize Taiwan are located), Taiwan concentrated its efforts in Central America on providing development aid and investment, rather than commercial and business opportunities (Esteban Rodríguez 2008). Taiwan historically proffered substantial development aid, loans, infrastructure projects, and technical assistance (Cheng and Córdoba 2009; Córdoba 2005) in order to maintain its strategic ally in the region. Since 1991, those efforts were the work of Taiwan's International Cooperation and Development Fund supervised by the Ministry of Foreign Affairs (MOFA). The organization provided loans for public works, social investment programs, agricultural development projects, private-sector de-

velopment, and emergency recovery projects. Among its more notable infrastructure contributions, in early 2003 Taiwan donated $27 million dollars to construct the Friendship Bridge (Puente de la Amistad), a modern, cable-stay bridge, over the Tempisque River connecting the Costa Rican mainland with the Nicoya Peninsula.

An important characteristic of these programs was their emphasis on personalistic relations and technical projects. In the case of the Friendship Bridge, for example, the construction for that project was led by the private Taiwanese firm MAA, but executed by a team of Taiwanese and Costa Rican engineers and laborers, all of whom resided in the town near the project. Therefore, for technical staff involved in the bridge project, it was not only Taiwan's development largesse, but also this more collaborative model of infrastructure work that provided people with a personal investment through local jobs created and the development of relationships among foreign technicians and locals (personal interview, July 6, 2013). This connection explains in part why despite longstanding critiques of Taiwan's corruption and influence peddling within Costa Rican politics ("Fishman cree que" 2003), after 2007 many people renamed the bridge "Backstab Bridge," to critique the instrumental, economic motivations that they felt drove Arias's unilateral decision to abandon Taiwan in favor of the PRC.

Taiwanese development efforts in Costa Rica further reinforced this sense of a collaborative, intimate relationship between the two partners. Grounded in specific local resources and industries—vegetable production extension, bamboo cultivation, aquaculture technology, or seed supply—and executed through "technical missions," these development projects were often remembered by the Costa Ricans involved with them as prioritizing local needs and working in a collaborative way that helped to build local skills (personal interview, June 21, 2013). Although these views may reflect a degree of nostalgia, they also speak to the practice of embedding Taiwanese projects within local communities and working with local organizations. These experiences thus shaped views of Taiwanese aid as an informed partnership rather than a top-down "China Model," based solely on state-to-state negotiations, the use of foreign state-owned firms, and the application of standardized techniques. As one Costa Rican scholar told me, "Taiwan had a theory of development. It knew the difference between Costa Rica and Central America, and between Central America and Africa" (personal interview, August 3, 2012). These nostalgic views occlude the instrumental diplomatic interests that were driving Taiwanese intervention (Cheng and Córdoba 2009; Esteban Rodríguez 2013) and the high levels of Taiwanese corruption through which those diplomatic interests were pursued (Alexander 2014). However, they matter for how Costa

Ricans evaluated and made sense of China's development collaborations after 2007. And from that perspective, assessments of the success of the new relationship with China have been mixed.

Since the diplomatic switch in 2007, Costa Rica's trade relations with China have grown significantly, with the 2010 free trade agreement between the two countries helping to make China Costa Rica's second most important trading partner (Dussel Peters 2014; Song 2017). The Economic Commission on Latin America's 2016 Economic Outlook (CEPAL 2015) highlights the strength of China-Costa Rica trade relations, as evidenced by continued expansion of trade protocols that allow for strategic Costa Rican products to enter the Chinese market and a 2015 Memorandum of Understanding between the two countries that commits to developing a joint feasibility study for the creation of a Special Economic Zone in Costa Rica (COMEX 2015b). Although Costa Rica suffered a drop in GDP as a result of the 2009 economic recession, experts anticipate that the economy is "set to accelerate in 2017" as global growth and export markets expand (OECD 2016, 9).

The nature of Chinese-Costa Rican trade relations highlights some areas of concern for Costa Rica's longer-term development aspirations, and these concerns have gone on to shape debates about infrastructure. Whereas Costa Rican exports to China constituted $848 million in 2007, those numbers dropped to $81 million by 2015; meanwhile Chinese imports grew from $763 million to $1.94 billion in 2015 (COMEX 2016). This trade imbalance contributed to Costa Rica's growing trade deficit of $527 million by January of 2017 (Central Bank of Costa Rica 2017). What is more, while 76 percent of Costa Rican exports to China in 2011 consisted mainly of electronic conduits and semiconductors, the departure of US firm Intel's chip manufacturing plant from Costa Rica in 2014 significantly transformed trade relations (COMEX 2015a; Song 2017). It is estimated that Costa Rica's GDP fell below 3 percent in 2015 as a result of the Intel departure and its impact on exports (OECD 2016:9). Consequently, since 2014 the composition of Costa Rican trade flows to China has shifted to consist mainly of electrical circuits, meat and leather, prosthesis parts, and copper, while top Chinese imports to Costa Rica included mobile telephones, computer components, motorcycles, and televisions (COMEX 2015a). Although its free trade agreement with China is now responsible for allowing over 90% of all Costa Rican export products to enter the Chinese market without tariff, that same agreement is facilitating a massive inflow of Chinese manufactured goods. And while Costa Rica's trade relationship with the United States has continued to grow, reflected in part by the increasing importance of optical and medical instrument production in Costa Rica (COMEX 2015a), and the promise of special economic zones and

logistics campuses, some Costa Rican critics have questioned whether Costa Rica's relationship with China reflects the key to economic power within the global economy or a retrenchment of peripheral inequality.

Costa Rica's desire to improve its global economic profile has not been limited to trade agreements, but has also focused centrally on improving transport and energy infrastructure. To that end, in 2012, Costa Rica received a $200 million loan from the Inter-American Bank for the construction of the Reventazón hydroelectric dam, a project sponsored by the Costa Rican Institute of Electricity (ICE) (IDB 2012). Through that project and others, Costa Rica has sought to bolster its renewable, clean energy production capacity. In an effort to further enhance its regional importance, in 2015 Costa Rica contracted Dutch firm APM Terminals to upgrade its Pacific Coast container port capacities in Limón. Nonetheless, when it comes to reinforcing domestic infrastructural capacity, Costa Rica has looked longingly to China to help compensate for what the OECD has identified as Costa Rica's "decades of insufficient and ineffective [domestic] spending" and its poor transport infrastructure in particular as "one of the main obstacles to faster economic growth and higher competitiveness" (Pisu and Villalobos 2016, 6–7). Therefore, the future of Chinese infrastructure financing in Costa Rica has crucial significance for the country's ability to continue to expand and leverage its strategic domestic assets and geographic advantage. Unfortunately, collaborations with China to date have suffered many detours and offer no promise of a smooth road forward (see also Dussel 2014).

CHINESE INFRASTRUCTURE PROJECTS IN COSTA RICA

The 2007 establishment of diplomatic relations set in motion the first generation of Chinese-Costa Rican infrastructure initiatives, including the national stadium and the Moín oil refinery. But it was President Xi Jinping's visit to Costa Rica in 2013 that laid the groundwork for the next generation of Chinese-Costa Rican collaborations, including nine new deals. Collectively these projects have ranged from outright gifts to joint ventures to Chinese bank loans that mandate use of Chinese state-owned construction firms.

THE NATIONAL STADIUM

It was clear from China's first public works project in Costa Rica—the national stadium—that it was going to do things differently than Taiwan. Although

perhaps not an infrastructure project strictly speaking, the stadium has nonetheless represented both a powerful indication of the capital, the engineering know-how, and the industrious labor that China could bring, as well as the potential threat China might pose to local sovereignty.

Following on the heels of the June 2007 diplomatic switch, Costa Rica's national stadium was negotiated as part of the era of new bilateral relations. The stadium was designed and constructed by a Chinese state company, Anhui Foreign Economic Construction Group (AFECC), with the stipulation that all labor and materials for the project come from China. Built by approximately 700 imported Chinese laborers, AFECC housed Chinese laborers in a separate compound and scheduled them to work round-the-clock shifts for twenty-one months, commencing in March 2009 (Murillo 2009). Upon its inauguration in March 2011, the resulting state-of-the art structure in the capital, San José, was admiringly referred to by many locals as the "Nido Tico" or "Costa Rican Nest" to invoke its perceived counterpart, the famous Beijing "Birds Nest" stadium. Following completion of the construction, nineteen Chinese engineers remained in Costa Rica to provide ongoing consultation on the stadium's maintenance and to help smooth over some basic infrastructural challenges, like insufficient water pressure for the upper-level restrooms and damages that the inaugural fireworks caused on the stadium's roof. In 2013, four more Chinese engineers arrived to help train Costa Rican technicians in essential stadium maintenance functions and to translate the stadium manuals, which were written in Mandarin (Fonseca 2013).

Public perceptions of the stadium's significance as a Chinese infrastructure project have drawn attention to three main aspects. For many wealthier Josefinos that I interviewed, the stadium was hailed as a "First World stadium" that they felt reinforced Costa Rica's elevated status in the region and connected it to flows of global popular culture, vis-à-vis concerts from visiting celebrities and international soccer teams, which they could now access. They saw the stadium structure itself as just one example of the technical engineering prowess that China could bring. The efficiency and competency of the Chinese labor on view there was frequently contrasted to the slower and less efficient work habits of Costa Rican laborers (DeHart 2012).[2] Therefore, in both its construction and in the symbolic import of the final product, the stadium seemed like a positive harbinger of things to come.

For more working class and conservative Josefinos, however, the stadium looked like a Chinese Trojan horse rather than a true gift, prompting the question "What will China want from us in return?" Indeed, even in some mainstream media, coverage of the stadium's inauguration ended with questions about the potential "residual cost" Costa Rica would pay in the com-

ing years (Williams 2011). For these commentators, China always pursued its own interests, so any gift must come with material and/or symbolic strings attached. For example, some wondered about how this the donation might impact Costa Rica's stance on human rights issues in the global arena, given what they perceived as China's authoritarian and illiberal government. When Oscar Arias postponed the Dalai Lama's 2008 visit to Costa Rica, many read this move as a confirmation of Costa Rica's new deference to Chinese political interests (Murillo 2008). Furthermore, some Costa Ricans worried about how this gift would shape economic relations. One stadium inauguration participant articulated these concerns, noting "If the Chinese give, they expect something in return. We are close to agreeing to a free trade deal with China and this [stadium] is nothing but a sweetener" (Freedman 2011). Just a few years later, as work on the refinery project was being negotiated, opposition party congressional representatives expressed a similar critique, noting "We know there's no such thing as a free lunch and from this point of view we are questioning why Costa Rica is opening its doors for China and in exchange for what" (Cota 2013).

These fears were exacerbated by a scandal that emerged out of the stadium construction process. In July 2010, media photographs of Chinese stadium workers and equipment operating across the street from the stadium at a private condominium construction site prompted public outcry and an official complaint by the Costa Rican Chamber of Construction. In its defense, Chinafecc, the construction company in charge of the condominium project, and a subsidiary of the Chinese construction firm, AFECC, had petitioned Costa Rican immigration officials for forty visas to use Chinese workers from the stadium in the condominium construction effort. The Ministry of Labor ruled against the visa extensions and noted that in the original agreement all of the visas were only for the twenty-three-month stadium construction period; however, that did not bar Chinafecc from requesting the transfer of workers from the stadium to private projects after the fact ("Empresa china" 2010). This scandal convinced many Costa Ricans of the truth of their "Trojan horse" critique, as the gift of the stadium appeared to enable the invasion of the local labor market by foreign Chinese workers. Although none of the original Chinese stadium labor was allowed to stay on, the legal battle highlighted the precarious ground on which Chinese labor might be accepted as part of infrastructure construction.

Finally, the stadium highlighted what, for some, was the potentially problematic development model that China offered. As Eduardo Lizano, prominent Costa Rican economist and former head of the nation's Central Bank put it, "The stadium was a gift. China gave it but did not teach Costa Rican

engineers how to build one like it. There was no transfer of skills or education on how to execute something like it here" (personal communication, August 3, 2012). The efficient labor and high-tech engineering evident in the stadium construction were impressive, but ultimately they did not represent the kind of "real" development that many people attributed to the collaborative, personalistic infrastructure partnerships with Taiwan.[3] What's more, popular local conceptions of the hyper-efficient, obedient workers (Murillo 2009) symbolized China's cultural distance from Costa Rica rather than the collaborative connections attributed to Taiwan or something to be emulated per se.

In the end, because of both its massive material presence within the center of the city and the high-profile debates it engendered, the stadium has been a constant point of reference for Costa Rican citizens to articulate both their modern identity and their anxieties about sovereignty vis-à-vis China. For some the stadium represented the resources and status China could bring, whereas for others the stadium reflected China's top-down, quid pro quo business style, placing in question the potential hidden costs of China's development gifts.

THE MOÍN REFINERY

Costa Rica's need to renovate its oil production facilities was also part of Arias's initial conversations with Hu Jintao in 2007; indeed, the original "Act of Relations between Costa Rica and China" signed in 2007 affirms that Costa Rica will assume priority as the site of a Mesoamerican refinery project (MOFA 2007). Therefore, it was no surprise that China and Costa Rica's first big joint infrastructure project was the proposed renovation of the Moín oil refinery on the Pacific Coast of Costa Rica in Limón. The expansion of the refinery's production capacity was originally justified as an important means of modernizing Costa Rica's energy sector and increasing oil production to bring down the domestic price of petroleum. Unlike the hydroelectric dam which Costa Rica's government-run electricity provider ICE designed and executed with traditional international financing (IDB 2012), however, the refinery project sought to build on China's financing and engineering know-how to reflect a new model of Chinese-Costa Rican bilateral cooperation.

In November 2008, China's National Petroleum Company (Sinopec) signed a cooperation agreement with Costa Rica's energy company, Recope, to take on the $1.3 billion project, to which the Chinese Development Bank was to contribute a loan of $900 million (China Aid Data 2011). The goal was to increase production from 18,000 to 60,000 barrels per day, allowing for

the savings of $530 million over twenty-five years and producing cleaner fuel (Bermúdez Vivez 2012; Villalobos Clare 2013). By 2009, Sinopec and Recope formed a 50–50 joint venture firm, Soresco, to oversee and finance the renovation, with Costa Rica contributing the remaining $300 million to the project (Dyer 2016; Recope 2011). The project was estimated to create somewhere between 1,000 and 5,000 jobs annually during the three years of construction, of which 75 percent would be filled by Costa Ricans, 10 percent by Latin Americans, and 15 percent by Chinese (Bermúdez Vives 2012). However, despite those optimistic aspirations, the project quickly began to falter.

In June 2011, Soresco contracted Huanqiu Contracting and Engineering Corporation (HCEC) to conduct the first feasibility study, which was presented in May 2012 (Recope 2012). That study was evaluated first by Honeywell, whose recommended improvements to the proposal provoked another round of evaluation by Worley Parsons in 2012 to further refine the project plan (Recope 2012). Although Xi Jinping's visit to Costa Rica in May 2013 bolstered bilateral commitment to the project, by June of that same year growing public outcry over the revelation that HCEC was a subsidiary of Sinopec (Fernando Lara 2016) provoked a comptroller general's office investigation into a possible conflict of interest that violated the terms of the Recope-Sinopec agreement. Many Costa Rican politicians and public interpreted the use of a Chinese firm for the feasibility study as evidence of a Chinese effort to exploit the project for its own benefit. Forthcoming revelations about budget irregularities, inflated Recope payments to Soresco and expensive Soresco employee trips to China, seemed to confirm corruption and provoked the June resignation of Recope's executive president, Jorge Villalobos (Dyer 2013). Thereafter, despite several efforts to develop alternative plans, including a new feasibility study and the possibility of incorporating biofuels, the project reached its final demise in 2016, when the refinery's modernization was officially and very publicly scrapped.

Long before the project's death knell, however, both local media sources and Costa Ricans more generally had begun to refer to the project derisively as *la refinería china* (the Chinese refinery) and to question how this project aligned with Costa Rican national identity. Indeed, during interviews as well as in informal conversation, people would often roll their eyes in exasperation as they mentioned "the Chinese Refinery," saying "this is what we get for doing business with China." Yet, as the scandal deepened, the main problem was not China. During the growing firestorm around the project in June 2013, opposition leader, Ottón Solís of the Citizens' Action Party framed the public critique of the project in terms of what it communicated about Costa Rica's national identity, noting: "In this lamentable business, the Chinese decide ab-

solutely everything and the Costa Rican government, in the style of a banana republic, obeys and pays what it is charged" (Solís 2013, 38A). By rehearsing here Costa Rica's historical relationship to nineteenth-century US fruit companies and its role as an outpost of US imperialism, this critique questioned how this cooperative joint venture represented not modernization but rather a return to the days of peripheral dependency and foreign exploitation.

Another line of critique reinforced this opposition, while also taking up the environmental implications of the project and how they represented or betrayed Costa Rica's "green" progressive environmental identity. Mónica Araya, a climate change consultant and Costa Rican delegate to the United Nations, who was allegedly fired by the Costa Rican government for her public critique of the refinery project (Mata 2013, 5A), published an opinion editorial in June in which she framed the dilemma as follows: "Costa Rica confronts a decisive moment in its relationship with China. We have the opportunity to demonstrate that in the 21st century we will consolidate our national commitment to a model of development that protects natural resources and generates low emissions. A refinery is incompatible with the global transition toward cleaner economies. . . . Building the refinery is a step backward" (Araya 2013, 6–7).

The oil refinery, rather than simply a material means of modernization, thus became an important site for constructing ideas about national identity and global power relations (DeHart 2015). First, the debate singled out China as a powerful and potentially corrupt opportunist, using its own subsidiaries to construct a favorable business deal based on the extraction of Costa Rica's resources. Second, the scandal set up a critique of the backward-looking, neo-dependent, fossil fuel-based development model that China offered. In that sense, the Chinese refinery became the foil against which formulations of a green, autonomous, and progressive Costa Rican nation were asserted.

Finally, the project also illustrated the challenge posed by what some observers have identified as Costa Rica's cumbersome legal and bureaucratic processes (US & Foreign Commercial Service and US Department of State 2016). In this case, Chinese negotiators endured several rounds of proposed "alternative" plans that kept the project alive between 2013 and 2016, only to see the project eventually canceled. As a representative of China's diplomatic corps explained way back at the start of that project: "Law and democracy are important, but in business there's a problem here in Costa Rica because the functionaries work very slowly and there are many obstacles. . . . For example, right now China is cooperating with Recope. . . . to construct a refinery to enhance the level of oil production because Costa Rica's technology is not very advanced. China wants to help, but the pace is very slow because different

institutions have to investigate and approve . . . It takes a long time" (personal communication, July 27, 2011). In the end, the refinery project demonstrated how national interests, fears of corruption, and cumbersome bureaucracy could stymie even the most hopeful infrastructure joint venture. In this sense, debates about the refinery affirmed how infrastructure works as a potent expression of national identity whose value cannot be measured simply in barrels or kilowatts.

HIGHWAY EXPANSION ROUTE 32

Despite these challenges to China-Costa Rica bilateral projects, the bleak condition of Costa Rica's transport infrastructure and its desire to bolster its strategic regional economic position paved the road for the next round of Chinese collaboration. Therefore, one of the big announcements of Xi Jinping's May 2013 visit to Costa Rica was a commitment to fund the expansion of highway Route 32: a crucial artery connecting Costa Rica's capital with its Caribbean Coast and the port of Moín. The project would expand to four lanes a 107-kilometer stretch of the road to Limón, which serves as a hub for crucial shipping routes and the site of a one million-dollar port renovation project. Indeed, when ground broke on the Moín Container Terminal port project (executed by the Dutch firm APM Terminals) in March 2015, President Solís described the project not as an end in itself but "the beginning of many more projects, including the . . . Route 32 highway expansion" (Dyer 2015). Given that the port project promised to create 700 construction jobs and another 600 terminal operational positions after its completion, Solís also told local workers to build on their native English and engineering skills in order to take full advantage of the job opportunities the new terminal would bring. Ominously, he ended by recommending that learning Chinese alongside English was key for these young workers' success (Dyer 2015).

In this case, it was China's financing as well as its industrious, efficient construction capacity—as displayed in the stadium—that made it desirable as a partner. However, this time rather than a gift or a joint venture, China's Export-Import Bank agreed to finance $395.75 million of the roughly $485 million project (CONAVI 2016; Pisu and Villalobos 2016, 19). Furthermore, the agreement stipulated that the Chinese loan would be tied to a commercial contract with a Chinese state-run construction company, China Harbor Engineering Company (CHEC) (CONAVI 2016). The Costa Rican Legislature approved the loan in 2014, with construction originally slated to begin in July

2017 and last forty-two months (Grajales Navarrete 2016). In the meantime, debates over this project have again placed in relief what some see as the tension between ample and efficient Chinese infrastructure assistance and the simultaneous potential for unfair business practices and even corruption by the Chinese.

The Route 32 highway upgrade was originally warmly received by Costa Ricans, long tired of travel delays for themselves and their port-bound merchandise. When asked about their views on the project, many even embraced, rather than balked at, the prospect of Chinese labor for the project, recalling how efficient and competent Chinese construction on the stadium had been. Indeed, even Costa Ricans who were opposed to the stadium commented on how industrious the Chinese stadium laborers were. By contrast, people would regularly point to the ineptitude of the Costa Rican Ministry of Public Works and Transport (MOPT-CONAVI) in its failed efforts to repair highway segments and bridges just outside of San Jose. In January 2017, a local satirical news site captured this sentiment in a comic piece which announced that Costa Rica's president had arranged to have twenty Chinese workers sent over for one week to accomplish work on another stretch of road whose closure and repair by Costa Rican crews was estimated to last close to two months (Elexpulsiorcr 2017).

Problems with the highway expansion project quickly erupted, and they have plagued the project's progress in what has become another protracted bureaucratic process extending through two administrations. First, in 2014 Costa Rican legislators stalled approval of the project over allegations by Grupo Consenso—a local group of private sector associations and engineers—that the project costs were inflated, the interest rate was too high, and the clause for resolving contract disputes through a PRC-based arbitration body was unacceptable (Central America Data.com 2014). More damning still, the group objected to the obligatory contract with CHEC, whose holding company (China Communications and Construction Company) had been barred from World Bank projects over corruption charges (CentralAmericadata 2013; World Bank 2011). For these reasons, in March 2014 five Costa Rican firms submitted a collective proposal to take over the highway project, highlighting that the proposal would allow "a 100% national project with Costa Rican labor" (Fornaguera 2014). Though this initiative did not go forward, the problems remained.

In 2015, the project remained stalled as Costa Rican lawmakers balked at what was widely acknowledged to be a poorly constructed original technical plan, whose lack of detail meant that the cost of construction was likely to rise

considerably beyond the original price estimate, as indeed it soon did (Ruiz 2015). The project stagnated again pending the results of the environmental feasibility study which, when published in 2016, was promptly rejected by the Costa Rican National Technical Secretary of Environment (SETENA) for serious omissions in geotechnical and social impact analyses (SETENA 2016). President Solís announced the project's approval in January 2017, but these hang ups have exasperated both the Costa Rican public and the Chinese construction firm, whose representative Theresa Wu noted, "We are always here accelerating the projects. Our main goal is to control the rhythm by which this [project] advances so that once we have the conditions, we can start immediately" (CRHoy 2016).

The highway project continues to advance vis-à-vis the requisite preconstruction studies of appropriate land expropriation and subcontracts for bridges along the route. However, these delays highlight ongoing suspicions about the integrity of Chinese business partners, even as their capital, engineering and labor prowess are coveted as a solution to local transport infrastructure problems. Furthermore, they emphasize what the Chinese have critiqued as Costa Rica's overbearing bureaucratic and legislative obstacles which played a role in the death of the refinery project. In many ways, these issues are mutually reinforcing: distrust of China—both its labor and environmental standards as well as its potential corruption—feeds more scrutiny and vetting by Costa Rican lawmakers, and those project delays feed efforts by the Chinese to expedite the project in ways that can then lead to hasty, underprepared contracts and studies. Both end up confirming why rather than a win-win partnership, Costa Rica fears ending up the loser.

SURVEYING THE ROAD AHEAD

China and Costa Rica's collaboration on infrastructure projects to date has been shaped by bilateral diplomatic, transport, and energy interests; however, they have not necessarily cemented the stable China-Costa bilateral partnership to which both countries aspire. Projects such as the Route 32 Highway expansion or the Moín refinery have tried to foment Costa Rica's strategic geographic positioning as a regional trade hub through increased transport and energy capacity. These projects, like the stadium before them, have hoped to draw on Chinese capital, engineering prowess, and even labor efficiency; however, they have been marred by long stalls in the construction process, brought on by both Costa Rican legal delays and allegations of Chinese corruption. Furthermore, projects such as the refinery have raised larger questions about

Costa Rica's sovereignty and national identity that place in relief whether and how Costa Rica's relationship with China can be a source of modernization versus new forms of dependency.

These infrastructure projects have also highlighted the difference between what many Costa Ricans remember as Taiwan's personalistic, collaborative model for infrastructure collaboration relative to a top-down approach that favors Chinese contracts and labor over local resources. Rather than solely an imposition, this pattern reflects a combination of local desire for the fast and efficient construction as well as Chinese loan stipulations. Nonetheless, its effect has been to further emphasize the difference in Costa Rican perceptions of how China and Taiwan do business; after all, while Taiwan was well-known for its corruption (Alexander 2014; Córdoba 2005) that feature of its development partnerships was not perceived as the same kind of threat posed by China's unscrupulous business dealings. And this difference is not negligible, given local fears about Chinese incursions into the local labor market or Chinese reliance on fossil fuel, rather than renewable energy sources. Therefore, challenges to Chinese-Costa Rican infrastructure projects have not only failed to expedite Costa Rica's launch, but also exposed important rifts that will have to be addressed before future projects can advance.

Looking forward, this pattern suggests a few possibilities. It is likely that Costa Rica will continue to look to China to help update its infrastructure. Costa Rica's transport system is its Achilles heel in relation to its regional trade aspirations; therefore, it needs major investment in its infrastructure in order to continue to grow its global engagement. As some analysts have noted, it has become time-consuming and expensive for many developing nations to do infrastructure projects with the World Bank or the Inter-American Development Bank due to the extensive evaluations and legal processes they require; China, is seen as more flexible and completes infrastructure projects relatively quickly (Dollar 2017, 12). In Costa Rica in particular, the history of the stadium project remains strong evidence of what Chinese capital, engineering, and labor can do. Therefore, the Costa Rican government will have to make hard choices about how it values access to Chinese capital and the expedience of Chinese firms relative to protecting local labor.

More recently the two nations have discussed the possibility of Chinese investment in Special Economic Zones and logistics campuses that could exploit the country's rich human resources and strategic geographic location. These kinds of investments will be crucial to continuing to build Costa Rica's specialization in high-tech production and light manufacturing. Without proper transport infrastructure, however, the impact of those projects would be limited. Therefore, despite Costa Rican suspicions about Chinese business

practices, the nation may have to embrace Chinese infrastructure investment in order to mitigate fears of becoming nothing more than a primary goods producer and "banana republic." To accomplish this, Costa Rica will have to develop a more long-term infrastructure vision and streamline legal vetting processes so as to smooth the road forward and convince Chinese investors to come along for the journey.

NOTES

1. In addition to policy statements, project agreements, and statistics on China-Costa Rica relations, research for this chapter draws on extended ethnographic research in Costa Rica between 2011 and 2015. That fieldwork includes over fifty formal, qualitative interviews with prominent diplomats, politicians, business leaders, union leaders, engineers and project administrators, and everyday citizens, both ethnic Chinese and non-Chinese. It also includes extensive field analysis of the projects themselves, countless informal conversations with Costa Ricans about these projects, and local media representations of the same.

2. Indeed, many interviewees praised the industrious Chinese laborers who, in their iconic orange jumpers, were seen working night-and-day, "moving like ants" across the construction site.

3. This kind of collaborative, capacity-building infrastructure support has also been associated with Intel Corporation which built a $300 million research and manufacturing campus in Costa Rica in 1997. The experience not only brought in new foreign direct investment and a new processing plant but also, given the way that Costa Rican firms were integrated in the construction process, created "better know-how for faster, better and more secure" methods that could be brought to bear on other projects (MIGA 2006, 5). The Intel experiment thus not only realigned Costa Rica's manufacturing and export structure (from agricultural to circuit and microchips), but also reshaped Costa Rica's platform as an investment location (including technical education, incentives law, regulation, and infrastructure) and produced dramatic impacts on Costa Rica's education system, knowledge base, and business culture (MIGA 2006, 5).

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2

CHINA-ECUADOR RELATIONS AND THE DEVELOPMENT OF THE HYDRO SECTOR

A Look at the Coca Codo Sinclair and Sopladora Hydroelectric Projects

Paulina Garzón and Diana Castro

THE RELATIONSHIP BETWEEN CHINA AND ECUADOR

When the first *chifa* (a popular name given to Chinese restaurants in some Latin American countries) appeared in Ecuador in 1926, it would have been difficult to imagine that in 2016 China would become Ecuador's largest bilateral debt holder, and that the largest number of contracts in strategic sectors would be delivered by Chinese companies (Garzón 2014). The China-Ecuador relationship began in 1972, after China was fully accepted into the United Nations, when Ecuador formally broke relations with Taiwan and began talks to negotiate trade agreements with China. A year later, Ecuador sold 20,000 tons of bananas to China for the first time (Terán Samanamud 2014). In January 1980, Ecuador and China established diplomatic relations and China opened its embassy in Quito. Ecuador did the same in Peking (present-day Beijing) in 1981, and by the mid-1990s the presence of Chinese oil companies as subcontractors in the oil sector started to grow. However, it is only since the mid-2000s that the relationship took off under the banner of the South-South cooperation.

There were two central factors that spurred the transition to an intense bilateral relationship. First, China's incorporation into the World Trade Organization on December 11, 2001 led to the opening of new markets, the enhancement of its industrial development, and the demand of a large quantity of raw materials. And second, the election of President Rafael Correa on No-

vember 2006, who promised to promote a foreign relations strategy politically and economically independent of the United States.

As expected, the relationship between China and Ecuador could not have come at a better time. In 2007, President Correa broke relations with the World Bank (*El Universo* 2007), and a year later defaulted on Ecuador's foreign debt (Faiola 2008), opening the doors to a fruitful relationship with China. It is not surprising that during Correa's first visit to China in November 2007, fourteen bilateral agreements were signed (MREMH 2016). Since then, the Ecuadorian president and several ministers have visited China, and the two countries have signed numerous bilateral agreements. These include memoranda of understanding, letters of intent, and credit lines that include but are not limited to the financing of construction for different types of infrastructure. In Ecuador, Chinese firms are mostly involved in infrastructure construction but also in natural resource exploration, technical training, cultural exchange, information and communication technologies, and foreign aid. Currently, Ecuador has two permanent commercial offices for the promotion of investment and exports in Beijing and Shanghai.

In January 2015, during the China–Community of Latin American and Caribbean States (CELAC) Forum in Beijing, Ecuador and China announced the establishment of a "strategic association." In November 2016, this association was upgraded to an "integral strategic partnership," the highest level of relationship that China has with any country in the world. The document describing this partnership, entitled "Joint Statement on Establishing Comprehensive Strategic Partnership between the People's Republic of China and the Republic of Ecuador" (November 2016), stated that bilateral relations were entering a new stage of accelerated development and established four commissions: a Steering Committee for Cooperation on Production and Investment Capacity, a Joint Commission for Economy and Trade, a Joint Committee on Agricultural Cooperation, and a Joint Commission on Science and Technology.

From the Chinese side, many government, business, and cultural visits have been made to Ecuador. In 2015 Ecuador received the high-ranking official visit of Foreign Minister Wang Yi, but it was in November 2016 that a dream came true for the Ecuadorians. The Chinese President Xi Jinping visited Quito on his way to Lima to participate in the Asia-Pacific Economic Cooperation Summit.

This was a significant event for the government of President Correa that happened at a time when the country was going through a difficult situation due to the drastic drop in the price of oil in international markets. Before Xi Jinping's visit, the Ecuadorian government had cut social spending, increased taxes, laid off public employees, and frozen payments to many of its contrac-

tors, including several Chinese companies. To make things worse, in April 2016 Ecuador suffered one of the most devastating earthquakes in its history, which caused a loss of approximately $3.3 billion (*El Universo* 2016). Coupled with these challenges and overwhelmed with Chinese-held debt, Ecuador had to seek new credit providers and return to the traditional financial markets, including the World Bank.

It is difficult to predict the future of the China-Ecuador relationship. China has been essential as a means for Ecuador to access capital and boost its economy, and Ecuador has been an important customer for Chinese firms and banks, but many things have changed over the years. Ecuador's debt to China is increasingly under public scrutiny and its credit rating on capital markets continues to worsen. The Chinese government, on the other hand, is putting pressure on Chinese banks to maximize their profits, and a borrower such as Ecuador is no longer as attractive as it was when the price of oil was high and its economy relatively healthy.

CHINESE LENDING

China's lending to Ecuador started in 2010 and by 2016 had become its most important lender and contractor. China generally makes three types of loans to Ecuador: 1) public debt loans for construction of infrastructure projects (mostly hydropower, but also in the transportation and education sectors) whose financing package is conditional on hiring Chinese companies, labor, equipment, supplies, and technology; 2) freely available public debt loans, whose financing is not conditioned, and are freely available for use; and 3) financial advances for the sale of oil, which officially do not meet the definition of foreign debt because their payment is given in advance through commitments to buy and sell oil. According to the Ministry of Finance, in 2012 "this [the anticipated oil sales] brings serious problems to the taxpayer 'since the operations are commercial and not public debt contracts and therefore have no sovereign guarantee'" (Hoy 2012). Some of these agreements have been registered by the Ministry of Finance as public debt loans while others have only been registered as commercial transactions between PetroChina International Corporation and Petroecuador. Unfortunately, the lack of official public information on anticipated oil sales does not allow a definitive classification between commercial transactions and public debt loans.

Considering only the first two categories, which are officially recorded as public debt by the Ministry of Finance, from December 2009 to March 2017 the

TABLE 2.1. MOST IMPORTANT LENDERS TO ECUADOR (2009–AUGUST 2016)

Banks	2009	2010	2011	2012	2013	2014	2015	2016	Total (US$ millions)
IDB	50	525	710	318	525	630	1490	16	4,260
IBRD	-	-	-	-	305	-	182	328	815
CAF	110	1,315	175	317	396	605	759	-	3,677
LARF	480	-	-	514	-	617	-	-	1,611
Chinese Banks	1,000	2,682	3,571	2,000	691	509	85	3,168	13,706

Sources: Ministry of Finance Ecuador, Public Debt Bulletins (2009–August 2016) and Carolina Landivar "El Síndrome Chino" CORDES (2012).

IDB: Inter-American Development Bank; IBRD: International Bank for Reconstruction and Development (World Bank); CAF: Development Bank of Latin America; LARF: Latin America Reserves Fund.

Ecuadorian external public debt increased from $11.8 billion (7.3 percent from GDP) to $26.4 billion (26.3 percent from GDP). While in 2009, China owned just 0.31 percent ($4.7 million) of the total external debt, by March 2017 it increased to 30.3 percent ($8 billion), which amounts to almost the total loans offered by all multilateral banks combined (31.2 percent) (see table 2.1).

From 2010 to March 2017, twenty credit agreements have been negotiated with China for a total of $12.29 billion (table 2.2) of which $4.29 billion have been paid and $8 billion remain outstanding. The China Development Bank (CDB) has been the largest lender with a total of $6 billion, followed by the China EximBank with a total of $4.45 billion. Approximately 70 percent of Chinese loans have an interest rate that ranges from 6 percent to 7.25 percent and 65 percent of Chinese loans have a less than eight-year term. The interest rates and terms of Chinese banks are far less attractive than those provided by the multilateral banks, whose interest rates typically vary from 2 percent to 4 percent and from twelve to twenty-five years. Even loans received from BNDES (National Development Bank of Brazil) or the Korea EximBank typically have interest rates between 2 percent and 4 percent and a term of ten and twenty-five years, respectively. The only interest rate comparable to the average interest rate of Chinese loans is that of loans that Ecuador received from the EximBank of Russia with an interest rate of 7.5 percent.

TABLE 2.2. CHINA LOANS TO ECUADOR, 2010–2016

	Date	Lender	Executor	Amount (US$ millions)	Purpose	Term (years)	Years of grace	Interest rate
1	2010-06	China EximBank	Coca Codo Sinclair	1,682.7	Construction of Coca Codo Sinclair hydroelectric project	15	5.5	AF 6.90%
2	2010-08	China Development Bank (CDB)	Ministry of Finance	1,000.0	Multisectoral Investment Program for Annual Investment Plan (AIP), Budget 2010–2011	4	0.5	AF 6.00%
3	2011-06	China Development Bank (CDB)	Ministry of Finance	1,400.0	Projects from Annual Investment Plan (AIP) 2011	8	2	AF 7.16%
4	2011-06	China Development Bank (CDB)	Ministry of Finance	600.0	Projects from Annual Investment Plan (AIP) 2011	8	2	AF 6.25%
5	2011-10	China EximBank	CELEC EP	571.3	Construction of Sopladora hydroelectric project	15	4	AF 6.35%
6	2012-12	China Development Bank (CDB)	Ministry of Finance	1,400.0	Investment Program for Economic Infrastructure	8	2.3	AF 7.19%
7	2012-12	China Development Bank (CDB)	Ministry of Finance	300.0	Investment Program for Economic Infrastructure	8	2.3	AF 7.19%
8	2012-12	China Development Bank (CDB)	Ministry of Finance	300.0	Investment Program for Economic Infrastructure	8	2.3	AF 6.87%
9	2013-02	China EximBank	EPMMOP	80.0	Project for Simon Bolívar Avenue	20	5	AF 2.00%
10	2013-04	China EximBank	MEER - CELEC EP	312.4	Construction of Minas-San Francisco hydroelectric project	15	4	LIBOR a 6 Months +4.00%
11	2013-07	Bank of China Limited and Deutsche Bank China	SENAGUA	298.8	Projects Cañar and Naranjal for Flood Control	14	4	LIBOR a 6 Months +3.50%
12	2014-10	China EximBank	MEER - CELEC EP	509.2	Project 500KV Transmission System and Associated Works	15	3	LIBOR a 6 Months +4.20%
13	2014-11	Bank of China Limited and Deutsche Bank AG, Hong Kong Branch	MTOP	311.9	Finance the payment of up to 85% of the amount of the commercial contract for the execution of 10 highways in the country	13	3	LIBOR a 6 Months +3.50%

14	2015-03	Bank of China Limited and Deutsche Bank AG, Hong Kong Branch	MTOP	85.7	Finance the payment of up to 85% of the amount of the commercial contract for the execution of 3 highways in the country	13	3	LIBOR a 6 Months +3.50%
15	2016-01	Industrial and Commercial Bank of China Limited (ICBC)	EP Petro-ecuador	970.0	Financing Priority Projects and/or Programs	5	0	LIBOR a 3 Months +6.20%
16	2016-02	China EximBank/ Shanghai Pilo	EP Yachay	198.2	Project City of Knowledge-Yachay (Phase I: Infrastructure)	20	5	AF 3.00%
17	2016-04	China Development Bank (CDB) Loan "A"	Ministry of Finance	1,500.0	Infrastructure Projects and/or Programs, AIP 2016	8	2	AF 7,.5%
18	2016-04	China Development Bank (CDB) Loan "B"	Ministry of Finance	500.0	Infrastructure Projects and/or Programs, AIP 2016 (to pay contractors from approved projects)	8	2	AF 6.7%
19	2016-11	China EximBank	EPA	102.5	First stage of Santa Elena Hydraulic- Aqueduct Project	20	5	AF 3.00%
20	2016-12	Bank of China Limited	Ministry of Education	167.3	200 Millennium Educational Units (prefabricated)	12	2	LIBOR a 6 Months +3.50%

Authors' elaboration. No pre-2010 Chinese loans are registered.

Sources: External Public Debt Statistical Bulletins (2010–2016). Ministry of Finance, Undersecretariat of Public Credit.

CELEC EP: Corporación Elécrica del Ecuador; EPMMOP: Empresa Pública Metropolitana de Movilidad y Obras Públicas; MEER: Ministerio de Electricidad y Energía Renovable; MTOP: Ministerio de Transporte y Obras Públicas; EPA: Empresa Pública de Agua; EP: Empresa Pública.

Most Chinese loans have between a two- and four-year grace period. Loans for infrastructure projects (hydroelectric plants and dams) have the highest grace periods because the estimated time for these projects to start generating profits (hydroelectric) or allow savings in the face of flood disasters (hydro canals) was considered to be longer than other projects. This would mean that if the Ecuadorian government took advantage of these grace periods, hydroelectric financing should have begun to be paid in 2015 (Sopladora) and the first semester of 2017 (Coca Codo Sinclair and Minas San Francisco).

BILATERAL TRADE

In the commercial sector, the relationship between the two countries has grown asymmetrically. In Ecuador's import market, China went from being the tenth largest trading partner in 2000 (accounting for 2.21 percent of imports), to the second largest trading partner in 2015 (with 19 percent of imports) only after the United States (23 percent). In Ecuador's export market, on the other hand, China's role is minimal. In 2000, only 1.2 percent of Ecuadorian exports were destined for China, and by 2015 this number rose to 3.94 percent (World Bank n.d.).

Moreover, the trade balance shows a pattern that perpetuates the traditional role of Ecuador as an exporter of raw materials and importer of manufactured goods and technology. In 2015, Ecuadorian exports to China reached only $722.97 million and consisted of animals—fish, crustaceans, and mollusks (26.32 percent); fuel—crude petroleum and oil (21.99 percent); vegetables—edible fruit, nuts, and citrus fruit peels (18.38 percent); food products—flours and meals of meat and fish (8.91 percent); and stone and glass (8.42 percent). On the other hand, Ecuadorian imports from China reached $4,073.76 million and consisted of machinery and electric equipment (41.73 percent), metals (16.90 percent), chemicals (7.44 percent), transportation (6.63 percent), textiles and clothing (5.89 percent), among others (World Bank n.d.). The trade balance deficit for Ecuador in 2015 was $3,350.79 million (see figure 2.1).

In 2014 and 2015, oil occupied third and second place, respectively, in the country's export basket, which was a drop compared to the period from 2008 to 2013 when oil ranked first (around 80 percent of total exports to China). This drop can be explained by falling oil prices at the end of 2014, which led to the fall in the total amount (in monetary terms) of oil exports recorded, although not necessarily the quantity of oil shipped.

CHINESE DIRECT INVESTMENT

In 2015, Chinese foreign direct investment (FDI) in Ecuador represented 10 percent of country's total, while Dutch FDI represented 22 percent, US 14 percent, and Peruvian 13 percent, making these four countries its top investors. Historically, more than 95 percent of Chinese FDI has been allocated to the mining and oil sectors, though in 2015 15 percent of Chinese FDI was allocated to service providing (BCE 2017).

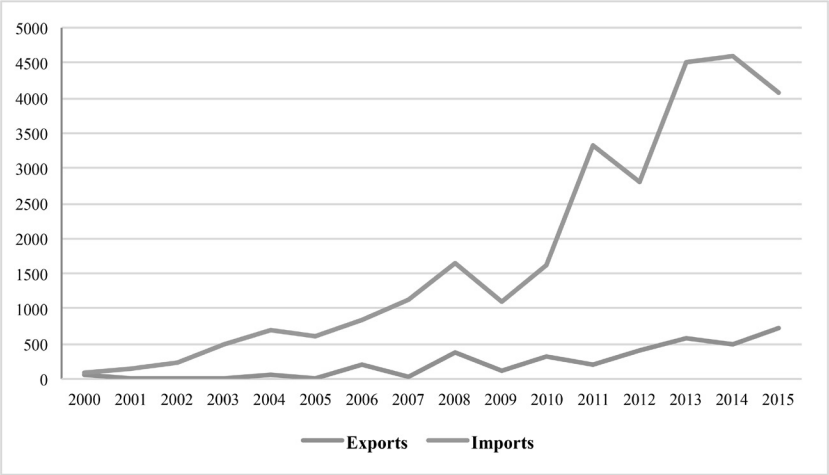

FIGURE 2.1. ECUADOR'S TRADE BALANCE WITH CHINA, 2000–2015 (US$, MILLION)

Since 2006, the China National Petroleum Corporation (CNPC) and China Petrochemical Corporation (SINOPEC) have been granted five oil concessions: Tarapoa block, 14, 17, 79, and 83 blocks. SINOPEC operates block 43 as a subcontractor of the stated-owned company Petroecuador EC. The blocks 43, 79, and 83 blocks are new operations, which are a source of controversy because the location is partly inside the Yasuní National Park. More than 800,000 people petitioned the Ecuadorian government not to allow oil development in the park because of environmental and social issues (BBC 2014). These two Chinese companies also operate an oil storage and transfer station in Lago Agrio and a heavy crude oil pipeline (Garzón 2014) and have invested approximately $2.5 billion in Ecuador since January 2015 (Ministry of Hydrocarbons 2015). Additionally, Ecuador and China are discussing the investment and development of the Pacific Refinery, a $10 billion project (*People's Daily* 2016).

In the mining sector, the company EXSA (a consortium of two state owned firms: China Railway Construction Corporation Limited and Tongling Nonferrous Metals Group Holdings Co. Ltd.) has operated the San Carlos Panantza and Mirador projects since 2012. Together both companies should invest (development of the mine plus operating expenses) approximately $20 billion during the life of the project, according to the National Mining Development Plan (quoted in Garzón 2013).

China and Ecuador's Hydro Infrastructure Sector

In 2008, the Ecuadorian government decided to diversify its energy matrix as a national priority. It was not the first time that a government had made this a priority. In the 1970s, the Ecuadorian Institute of Electrification identified the need to transfer to a renewable energy matrix and encouraged the exploration of watersheds with hydroelectric energy potential. However, this process stalled in the 1990s when structural reforms led to a private business model in which thermoelectric power stations became the main source of electricity. In the new century, the weaknesses of such models were manifested in a lack of diversification of energy sources, obsolete infrastructure, high electrical losses, serious inefficiencies in the processes of energy transformation and transportation, and poor quality of service (MICSE 2016a). President Correa's government proposed to change this scenario through the construction of large hydroelectric projects.

To that end, the 2008 Ecuadorian Constitution restores the active participation of the state in the energy sector and management of water resources. Article 313 of the new Constitution states that "The State reserves the right to administer, regulate, monitor, and manage strategic sectors . . . which come under the decision making and exclusive control of the State . . . [and among which is considered] energy in all its forms." In addition, Article 413 emphasizes the importance of ensuring environmental sustainability in the expansion of energy sources. It declares that "The State shall promote energy efficiency, the development and use of environmentally clean and healthy practices and technologies, as well as diversified and low-impact renewable sources of energy that do not jeopardize food sovereignty, the ecological balance of the ecosystems, or the right to water."

In addition, the government developed a Master Electrification Plan, 2012–2021 (MEER 2012) and allowed a new type of financing for public works in which commercial contractors bring a financier committed to provide a loan to the government to cover at least 75 percent of the projects. Along these lines, is it also useful to keep in mind that the Ecuadorian government reformed the Organic Law of the National Procurement System in 2008, allowing the government to sign contracts with public firms without a bidding process. Generally speaking, these types of laws are common; however, in Ecuador they have disproportionally benefited Chinese investors, both the main contractors and those involved in the supply chain.

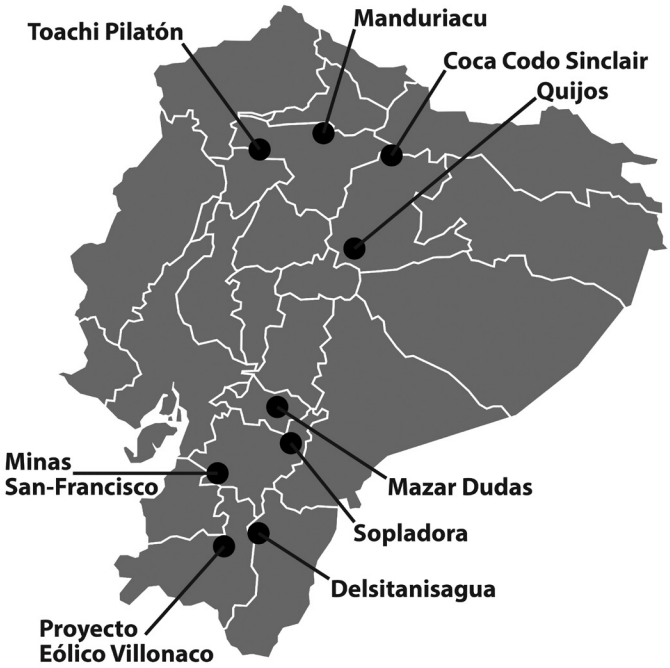

FIGURE 2.2. LOCATION OF EMBLEMATIC HYDROELECTRIC PROJECTS

The "Chinese" Hydroelectric Projects

During the last seven years, the China EximBank and the China Development Bank helped Ecuador finance approximately $3 billion to build seven of the eight hydro projects built by the following Chinese firms: Coca Codo Sinclair, CCS (1,500 MW),[1] Sopladora (487 MW), Minas-San Francisco (270 MW), Toachi-Pilatón (254 MW), Delsintanisagua (180 MW), Quijos (50 MW), and Mazar-Dudas (21MW) as well as one wind power project, Villonaco (16MW) (Castro 2014, 58). The sum of the hydroelectric energy production of the mentioned projects aimed to add 2,762 MW to the Ecuadorian energy matrix by the end of 2017. This would not only double the electricity capacity installed in the country but also diversify the sources of electricity, because while in 2006, 53 percent was hydroelectric and 46 percent thermal, by 2018 90 percent is expected to be hydroelectric and only 8 percent thermal (National Energy Agenda 2016; see also figure 2.2).

Chinese investment in dams and power plants (like CCS and Sopladora) that were long just a dream of prior governments became a reality, and a cen-

TABLE 2.3. REDUCTION OF CO2 EMISSIONS AND SAVINGS OF HYDROELECTRIC PROJECTS

Project	Reduction of CO2 emissions (million tons/ year)	Proportion of vehicles (thousands)	Equivalent vehicle park	Savings on fuel imports (US$ million)
Coca Codo Sinclair	4.43	2,239.61	4 times Quito	450
Paute-Sopladora	1.40	707.78	Quito + Cuenca	233
Minas-San Francisco	0.65	328.61	3 times Cuenca	108
Toachi-Pilatón	0.56	283.11	2 times Cuenca	93
Delsitanisagua	0.71	358.94	3 times Cuenca	118
Manduriacu	0.18	91	2 times Riobamba	30
Quijos	0.18	91	2 times Riobamba	30
Mazar-Dudas	0.06	31.85	1/2 Sto. Domingo	11
	8.17	4,131.9		$1,000 Approx.

Source: Saturday Weekly Broadcast No. 416 (March 21, 2015).

tral piece of the energy transition. According to President Correa, in 2017 "Ecuador will have one of the cleanest energy matrices in the world [as a result of the transition from fossil fuels and gas to hydropower]" (Presidency of the Republic of Ecuador 2016). Back in 2014 (when CCS and Sopladora were still under construction), energy production by sector was the following: fossil fuels and gas, 94 percent; hydro energy, 4 percent; sugar cane, less than 2 percent; firewood, less than 1 percent; and solar and wind, 0.03 percent (MICSE 2015).

New hydropower projects were also presented as a way to generate extra income for Ecuador through reducing the imports of refined petroleum products and from exporting electricity. President Correa informed Ecuadorians that the country will save approximately $1 billon from no longer importing oil fuels and will instead collect money for about 8.17 million tons of CO_2 avoided emissions per year (table 2.3).

However, the government's intentions to put in place a more efficient, diversified, and clean energy matrix is challenged by three key issues: environmental implications, construction and consumption costs, and overproduction.

First, the large hydropower projects, especially tropical hydropower projects, bring significant environmental risks (Gallagher, Kamal, and Wang 2016). Only one of the six energy projects financed by China is a wind project, representing just 1.2 percent of total Chinese financing for energy projects (Garzón 2014). Moreover, the Ecuadorian government's promotion of a new mega-refinery project, the Pacific Refinery, which will be the biggest refinery on the Pacific Coast and its controversial decision to exploit the Yasuní National Park—one of the most biologically diverse and fragile environments in the world—represent an important step backwards in environmental protection.

Second, in all hydroelectric projects there is a variation between the original estimated cost and the final cost.[2] The projects with the lowest percentage increase are Coca Codo Sinclair (7 percent), Sopladora (9 percent), and Toachi Pilatón (14 percent); while the projects with the highest increase are Manduriacu (68 percent) (the only project built and financed by Brazil), Mazar-Dudas (66 percent), and Delsitanisagua (55 percent). Evidently, projects of this magnitude may be subject to reasonable adjustments, but two particularly worrying projects are Toachi Pilatón (China International Water & Electric Corp, CWE), which is now under the scrutiny of the Anti-Corruption Citizen Commission, and Quijos y Mazar-Dudas (China National Electric Engineering Co., CNEEC) whose contracts were terminated due to noncompliance issues (Arroyo and Pérez 2016).

In the last two cases, the company CNEEC was declared a Defaulting Contractor by the Public Procurement Service (SERCOP) and CELEC EP due to technical deficiencies and delays in the schedule. According to the contracts, Mazar-Dudas was expected to start operations in late 2015 and Quijos in March 2016; however, in December 2015, when CELEC EP decided to end unilaterally the contracts (Resolution No. CELEC-EP-0165-15), the projects recorded completion of 86 percent and 46 percent, respectively. The projects remain paralyzed and the government has announced that the guarantees that CNEEC should pay for the noncompliance are being processed and a new company is being sought to complete the projects.

Of the eight projects, only three are operating (CCS, Sopladora, and Manduriacu), while the others are delayed even though the Master Electrification Plan stipulated that all projects would be completed before the end of 2016. Although there is no official information about the deadlines for the completion of the works, the Minas-San Francisco, Toachi-Pilatón, Delsintagua, and Mazar Dudas projects appear to have progressed beyond 80 percent by January 2017, whereas Quijos is only 46.7 percent completed (see table 2.4).

TABLE 2.4. COST OF HYDROELECTRIC PROJECTS

Project	Executor	Contractor	Financing		Costs			Works status
			Lender	Credit granted (millions)	Estimated original costs (millions)	Estimated final costs (millions)	% variation	
Coca Codo Sinclair	CELEC EP. CCS	Synohidro Corporation	China EximBank	1,682.7	2,675.0	2,851.0	7%	In operation (November 2016)
Paute-Sopladora	CELEC EP-Hidropaute	China Gezhouba Group Company Limited (CGGC)	China EximBank	571.0	882.0	963.0	9%	In operation (August 2016)
Minas–San Francisco	CELEC EP-Enerjubones	Harbin Electric International	China EximBank	312.5	509.0	684.0	34%	Under construction (progress 91.5% January 2017)
Toachi-Pilatón*	CELEC EP-Hidrotoapi	China International Water & Electric Corp (CWE)	Russia EximBank	123.2	517.0	589.0	14%	Under construction (progress 94.46% January 2017)
Delsitanisagua	CELEC EP-Gensur	China Hidroelectricidad Ingeniería Consultorio (HidroChina)	China Development Bank (CDB)	185.0	216.0	335.0	55%	Under construction (progress 80.59% January 2017)
Manduriacu**	CELEC –EP-Enernorte	Odebrecht	Brazilian Development Bank	90.2	135.0	227.0	68%	In operation (January 2015)
Quijos	CELEC EP-Ennorte	China National Electric Engineering Co. (CNEEC)	China Development Bank (CDB)	9.5	115.9	155.0	34%	Under construction (progress 46.72% January 2017)
Mazar-Dudas	Hidroazogues-CELEC EP	China National Electric Engineering Co. (CNEEC)	China Development Bank (CDB)	41.6	50.0	83.0	66%	Under construction (progress 86.53% January 2017)
				3,101.7	5,099.9	5,887.0		

*Project financed by Russia and built by Chinese company. ** Project financed and built by Brazil.

Sources: Financing: Annual Debt Bulletins (2010–2016), Ministry of Finance; estimated original costs: Master Plan of Electrification 2012–2021, MEER, CONELEC; estimated final costs: Enlace Ciudadano No. 416 (March 21, 2015); status of works: MEER website.

TABLE 2.5. INSTALLED POWER AND COSTS OF PUBLIC AND PRIVATE HYDROELECTRIC PLANTS

	Project	MW of power	Unit Cost ($/kW)
PUBLIC	Coca Codo Sinclair	1,500	1,901
	Paute-Sopladora	487	1,977
	Toachi-Pilatón	254	2,328
	Minas-San Francisco	270	2,478
	Delsitanisagua	180	2,887
	Manduriacu	65	3,661
	Mazar-Dudas	21	3,952
PRIVATE	Angamarca	66	1,500
	Apaqui	36	1,400
	Angamarca Sinde	33	1,576
	Sabanilla	30	1,700
	Topo	23	1,969
	Sigchos	17	1,500
	Total, MW	Average $/kW	
Public	2,827	2,741	
Private	205	1,608	
Difference	1,379%	41%	

Source: Calculations based on Villavicencio (2015). "El cambio de matriz energética bajo sospecha." Revista Plan V.

Moreover, according to independent research, the KW cost/unit produced by private hydro plants in Ecuador is cheaper than those developed through the public sector (financed and built by Chinese banks and construction companies, respectively) (Villavicencio 2015). The overall cost of projects executed by the public sector (on average $2,741/kW) compared to the cost of projects executed by the private sector (on average $1,608/kW) is 41 percent higher (see table 2.5).

Third, the Ecuadorian government has been questioned for launching a "construction fever" of hydroelectric projects that, together with new thermal and solar projects, will represent an increase in generation capacity of about 4,230 MW in 2017 (maximum generation demand in 2013 was 3,250 MW) (Villavicencio 2015). This implies that the country will have an excess of electricity that would be destined for export.

Ecuador exported electricity to Colombia for the first time in February 2016 due to an energy crisis in Colombia provoked by the closure of the Guatapé dam and the hydroelectric generation reductions from the El Niño phenomenon. The 230 kW and 500 MW capacity interconnection line between Ecuador and Colombia has allowed daily shipment volumes to reach peaks of up to 7,000 MW/h (MICSE 2016). Exports expanded in May 2016 to Peru when the first phase of the CCS project began operating. The interconnection line between the two countries has a capacity of 40MW which allows the supply of energy to the area of Tumbes-Zorritos (northern Peru) (CELEC EP 2016)

However, Colombia and Peru are promoting and developing mega hydroelectric projects as well; primarily to meet their domestic demand, but also with the goal of exporting to neighboring countries. In Antioquia, Colombia, for example, local authorities have proposed to promote the mega project Hidroituango, which along with other projects would seek to take advantage of an estimated generation capacity of 5,585 MW, and would cover 70 percent of Colombian electricity demand (*El Tiempo* 2017). On the other hand, it is important to remember that the Chinese government supported the development of the Magdalena River Master Plan in Colombia, which includes the construction of several dams (Gestión 2017). In addition, and although Peru is facing a crisis of overproduction, last November Peru also signed two agreements with China—one to develop the Guabán River Basin and another to facilitate the participation of the Chinese company Three Gorges to research the potential development of water resources in Southern Peru (*La Prensa* 2016).

BRIEF REPORT ON THE COCA CODO SINCLAIR AND SOPLADORA PROJECTS

COCA CODO SINCLAIR

The Coca Codo Sinclair (CCS) is the biggest hydropower project in Ecuador and aims to produce 1,500 MW of electricity. It is located in the Napo and Sucumbíos provinces in the Amazon region by the Coca River Basin near "El Salado." The project consists of a system of 25km of tunnels (longer than the tunnels for the Quito metro) built up to 500 meters under the mountains. These tunnels are projected to transport approximately 220 cubic meters of water per second and channel it through two pressure pipes 620 meters long to the engine room, where eight generators will produce 1,500 megawatts of electricity. The entire project occupies an area of 3,600 square kilometers (Viola 2017).

In October 2009, Coca Sinclair S.A. (later COCASINCLAIR EP) signed an Engineering, Procurement and Construction (EPC) contract with Sinohy-

dro Corporation.[3] The turnkey contract states that "all professional services to be provided by the Contractor . . . [are] execution management, engineering, procurement management, superintendence, construction management, and the start-up costs of the project" (Commercial Contract of CCS Project 2009, Clause 12.3 Definitions). Under the contract, Sinohydro has sixty-six months to finish the work and is responsible for subcontracting and importing all required equipment, technology, materials, and services if they are not available in Ecuador, if quality and amount are insufficient, or if costs (including importing rights) are less than Ecuadorian costs.

The start of construction was conditional on the closing of financing within a six-month period (until April 2010); however, the agreement was signed in June 2010 in Beijing when the China EximBank provided the loan to COCASINCLAIR EP for $1.68 billion to cover 85 percent of the $1.97 billion total cost initially estimated in the contract. The loan had an interest rate of 6.9 percent with a fifteen-year term that included a sixty-six-month grace period, the same period stipulated for the construction of the project (Statistic Bulletin No. 156). Construction started in July 2010 and should have been completed by January 2016. However, the project's completion was delayed until November 18, 2016—the day the project was officially and virtually inaugurated by Chinese President Xi Jinping from Quito.

Since the beginning of construction in 2010 until its completion in 2016, costs have varied significantly. Such costs were projected at $2.24 billion by COCASINCLAIR EP (Villacís 2015), $2.67 billion by CONELEC, and $2.85 billion by the National Secretary of Development and Planning and confirmed by President Correa in his Saturday Weekly Broadcast in March 2015 (Villavicencio 2015). This is a 7 percent variation between the initial cost estimated by CONELEC and the final cost estimated by SENPLADES. In April 2015 the manager of COCASINCLAIR EP, Luis Ruales, pointed out that both estimations are correct, the cost presented by CONELEC refers to the construction work while the SENPLADES estimation covers the total cost of the project including additional work, social compensation issues, and taxes (*El Comercio* 2015). However, others argue that the increase in the project cost was in part due to the fact that the negotiation of the loan took eight months longer than expected. This delay was due to the Ecuadorian negotiators refusing to accept the harsh conditions of the China EximBank, including the type of trusts and guarantees that were against the Constitution of Ecuador (Castro 2014).

The CCS project, presented by the government as the "largest investment in the country's history" and as the most important for the energy matrix transition, will provide an average amount of 8,734 GWh/year covering 30 percent of national demand. In addition, it is expected to produce savings of

TABLE 2.6. COCA CODO SINCLAIR PROJECT

PROJECT DETAIL		
Location	Napo and Sucumbios, Coca River Basin	
Status	In operation	
Startup	November 2016	
Sector	Public	
Type	Hydroelectric plant	
Power (MW)	1,500	
Average energy (GWh/año)	8,734	
COMMERCIAL CONTRACT OF CONSTRUCTION		
Call for Tenders	International Open (with a "Special" Regulation)	
Parties	Contracting party	CocaSinclair EP (Ecuador)
	Contractor company	Sinohydro Corporation (China)
Type of Contract	EPC "Turnkey"	
Place and date	Quito, October 5, 2009	
Execution period	66 months	
Start date		July 2010
Scheduled End		January 2016
Actual end (starts operation)		November 2016
Total Amount/Investment	Commercial Contract: $1,979.7 million (without taxes)	
	MEER: $2,245 million	
	CONELEC: $2,275 million	
	SENPLADES: $2,851 million	
Construction conditioned to financing	Yes. Beginning of works conditioned to closing of financing	
Deadline for closing financing	6 months, until April 2010	
FINANCING AGREEMENT		
Financing	China EximBank: $1,682.7 million (85%)	
	Ecuadorian government: $297 million (15%)	
Place and date of agreement	Beijing, June 4, 2010	
Term	15 years	
Grace period	5.5 years	
Interest	6.90%	
Negotiating Ecuadorian Commission	Minister Coordinator of the Strategic Sectors, Jorge Glass; Minister of Finance, Patricio Rivera	

Sources: Based on Coca Codo Sinclair Commercial Contract (2009); CELEC EP website; Annual Debt Bulletins, Ministry of Finance.
MEER: Ministerio de Electricidad y Energía Renovable; CONELEC: Consejo Nacional de Electricidad; SENPLADES: Secretaría Nacional de Planificación y Desarrollo.

$600 million per year, while generating a surplus of energy for export (CCS website). It is finally operational after six years of construction, and presented as the greatest achievement of Correa's government regarding the major infrastructure projects it has undertaken since 2008 (see table 2.6).

Critical Challenges

In terms of labor, the CCS project has required a significant amount of manpower. The Commercial Contract allows the hiring of Chinese foreign personnel—up to a maximum of 1,000 people in the peak season, but states that Sinohydro must prioritize the hiring of Ecuadorians. For most types of activities, the contract has a minimum requirement that 10 percent of labor must be composed of Ecuadorian workers, except in these areas: development of detail engineering (24 percent); unskilled labor (100 percent), and construction and qualified labor (64 percent). Coca Codo Sinclair EP estimated that the project would create approximately 6,000 direct jobs and 15,000 indirect jobs (CELEC EP/Coca Codo Sinclair website). However, according to more recent data, the project has generated a total of 7,891 jobs, distributed as follows: 5,406 Ecuadorian workers (67.7 percent); 1,629 Chinese workers (20.6 percent); 4 Colombian workers (0.05 percent); and 852 subcontractors (no nationality provided - 10.7 percent) (CELEC EP, *Letter No. CELEC-EP-CCS-2016–0661-OFI*).

According to CELEC EP, the construction of CCS has benefited the population affected by the project in Napo and Sucumbíos with a total investment of US $25 million towards conservation, health, education, sanitation, social and economic programs, electricity, infrastructure and roads.[4] Based on data from an independent research study, the population located in the project area generally has a positive perception of the presence of Sinohydro in its territory. This perception is mainly explained by the increase in employment and the business opportunities that arose due to the influx of workers in the area. Thus, 62 percent of the interviewees stated that the project was good, 15 percent bad, 13 percent neutral; 10 percent did not respond (Viola 2017).

According to another academic study that conducted interviews with employees of the Municipality of Quijos and local entrepreneurs, interviewees indicated that at the beginning of the project they were told that this project would benefit the entire population of the Chaco (town near the project) since there would be an influx of more than 5,000 workers who would need lodging and food. Many people went into debt to open small hotels and restaurants, but the company built its own camps where most of the workers were housed and fed. According to the interviewees, some local people left their lands to look for temporary work in the project in order to pay their loans and had to

start all over when they returned, by preparing their lands for agriculture and borrowing to buy chickens, pigs, and cows (Garzón, Salazar, and Andrade 2015b). As expected, the construction process had peak periods in the hiring of workers, and it is expected that the number of workers will be reduced due to the project becoming operational.

Regarding the environmental impacts, the project advocates argue that CCS is the most significant work to ensure energy sovereignty; and that it is environmentally clean, since the main works are underground. Hence, CELEC EP argues that the project will reduce CO_2 emissions by 3.45 million tons per year, or 4.43 million tons according to President Correa (CELEC EP/Coca Codo Sinclair website). Therefore, it will displace inefficient thermoelectric generation, which is equivalent to the pollution produced by 2.2 million light vehicles (Saturday Weekly Broadcast No. 416, 2015).

It is important to keep in mind, however, that the dam was built on the Coca River, 20 kilometers upstream of the San Rafael waterfall, the largest and most impressive waterfall in Ecuador. Several investigations have arisen around the negative impacts of this project and the lack of reliable environmental studies. Environmental scientists argue that the hydrological studies that were used to determine the river water flow are out of date and that they have changed substantially. These scientists calculate that the river Coca now maintains a flow between 80 and 100 cubic meters per second, but the project was designed to generate 1,500 MW of electricity from 222 cubic meters of water per second. Thus, the project will require every drop of water from river to ensure the expected electricity production. If the government fulfills its promise to maintain an adequate amount of water for the waterfall, CCS will not produce more than 400 MW most of the time (Finer and Terry 2010). These types of concerns are not limited to those of environmentalists, although the figures differ greatly. In an October 2015 interview, Ecuadorian technical personnel at the project site pointed out that "power capacity and the dates to finish the project are more political declarations than reality . . . [indicating that] CCS will have a stable production of 800 MW, and for only 4 hours a day will be able to generate 1,500 MW" (Garzón, Salazar, and Andrade 2015a).

Regarding technology transfer, the CCS Commercial Contract explicitly mentions that "the contractor undertakes to promote the transfer of technology to COCASINCLAIR EP . . . and, in general, to all national companies that participate as their contractors and subcontractors in the execution of the project" (Clause 3.3). In addition, this transfer includes both technology and know-how, and the copyright for all designs, reports, and software will be fully delivered to COCASINCLAIR EP through an irrevocable, nonexclusive, and royalty-free license (Clause 3.3). However, the contract does not provide

a specific procedure concerning technology transfer per se. Despite such requirements, research on the subject argues that Sinohydro has refused to deliver the software stipulated in the contract, in addition to having repeated delays in the delivery of detail engineering, so that the work did not start on time (Villavicencio 2013).

Furthermore, under Annex V of the contract, one of the main objectives of the project is to promote the development of national enterprises. This requires that Sinohydro must subcontract national contractors to provide services (indicated on Annex N.1 of the contract) for a minimum of 15 percent of the total price of EPC. In the October 2015 interview, the project personnel also mentioned that "we expected to learn a lot in CCS, but we have not." Workers also said that the "quality of the work" in Agoyan (a hydro project built by Ecuadorians) was better (Garzón, Salazar, and Andrade 2015b). Researchers in Ecuador also suggested that 75 percent of the materials used in the project have been imported from China (quoted in Villacís 2015).

CCS is known in Ecuador as "the crown jewel," but this mega-project has faced the most serious challenges of hydropower project construction in Ecuadorian history. These include the deaths of sixteen workers (independent research concludes that the CCS project has a critical level of insecurity) (Cordova 2014); six orders of suspension and a warning of termination of the contract from the project's auditing firm due to engineering failures and lack of compliance; breaches of deadlines and insufficient personnel; two inspections by the National Assembly and a report of the State Comptroller for violations of workers' rights (*Vanguardia* 2012);[5] ninety-two labor claims (eighty against Sinohydro Corporation and twelve against COCASINCLAIR EP); fourteen civil lawsuits against Sinohydro Corporation; and eleven claims for general damages (seven against Sinohydro and four against COCASINCLAIR EP) (Council of the Judiciary of Ecuador).

Finally, it is difficult to evaluate the extent to which the Ecuadorian government goals regarding CCS have been achieved because of lack of public information and contradictions in the public information available.

SOPLADORA

Sopladora is the second biggest hydro project financed by China in Ecuador. It is located in the Azuay and Morona Santiago provinces in the Amazon region. It is part of the Paute Hydroelectric Complex, comprised of Mazar (170 MW), Molino (1,100 MW), Sopladora (487 MW), and Cardenillo (596 MW). These projects together have a generation capacity of 1,800 MW and will cov-

er approximately 13 percent of national consumption (CELEC EP/Unidad Hidropaute website). As the third station of the complex, it does not have a dam because it is designed to capture the turbinated waters from the mill. The plant covers a direct connection consisting of a flow bypass tunnel that connects two discharge tunnels to an underground interconnection chamber. This chamber will provide the necessary volume to guarantee the entry of 150 cubic meters of water per second for the operation of the generation system which consists of three turbines each producing 165 MW, held in the underground powerhouse at a net height of 361.9 meters (MEER/Sopladora website).

In October 2010, CELEC EP-Business Unit Hidropaute signed a commercial contract (amended in March 2011) to commission China Gezhouba Group Company-FOPECA S.A.[6] for the construction of civil works, detail engineering, manufacturing, supply, installation, and testing electromechanical equipment of Hydroelectric Paute-Sopladora. The contract was not the EPC type as in CCS, which indicates that the contracting company had to be subject to the plans, technical specifications, and the reference parameters presented by CELEC EP. The final offer was accepted for a total value of $672.2 million with a financing commitment of 85 percent of the total amount over a period of almost four years.

Although the contractor submitted the letter of intent, which committed to a loan from China Eximbank in September 2010, negotiations between the Ecuadorian and Chinese government were delayed and it was only in October 2011 that the financing contract was closed (six months after construction work began) (Castro 2014). The China Eximbank provided CELEC EP-Business Unit Hidropaute $571 million to cover 85 percent of the total cost of the project, from a total of $672 million (cost fixed in the commercial contract without taxes or additional works) (Commercial Contract of Sopladora 2010). The loan has an interest rate of 6.35 percent and a fifteen-year term with a four-year grace period (Statistic Bulletin No. 180, 2011). According to independent research, Ecuador's minister of finance questioned the excessive insurance costs of the loan and declared that the interest rate was too high, especially at a time when Ecuador was in a favorable macroeconomic situation and was able to look for better deals. That minister was removed from her post and the loan contract was immediately signed by the new minister (Castro 2014).

The actual construction started in April 2011 and the project should have been completed by March 2016, but the contractors applied for an extension until the end of 2016 and the plant was officially inaugurated on August 25, 2016. Similar to other hydroelectric projects, the estimated costs for Sopladora have varied. Costs were projected to be $755 million by the Ministry of Energy and Renewable Electricity, $882 million by CONELEC (*Plan Maestro de*

Electrificación 2012–2021 2012), and $963 million by the National Secretary of Development and Planning and confirmed by President Correa in his Saturday Weekly Broadcast (Saturday Weekly Broadcast No. 416, 2015). Therefore, there is a variation of 9 percent between the initial cost estimated by CONECEL and the final cost estimated by SENPLADES.

Of the eight hydroelectric plants constructed by the government of President Correa, Sopladora was the second to begin operations, after Manduriacu. It is the third largest plant after Coca Codo Sinclair and Molino, and the second largest built by this administration. The power produced by the plant is 487 MW and will contribute 2,770 GW annually to the National Interconnected System (CELEC EP/Unidad Hidropaute website). At its inauguration in August 2016, President Correa said that the implementation of Sopladora will result in annual savings of $280 million, which implies that the financial investments might be recovered in five years. Despite the announced high profitability that Sopladora would generate, and its importance as an emblematic project, President Correa reported that it would begin a privatization process of the Sopladora for thirty years. The decision was made after the earthquake last April when the government announced the sale of several public assets in order to address the economic consequences of the tragedy (Sopladora Inaugural Speech, President Correa). The announcement became official in November (Saturday Weekly Broadcast No. 499), when President Correa indicated that the government had already hired the services of an international investment bank to evaluate each asset. In addition, he said the privatization of Sopladora would not limit the regulatory power of the Ecuadorian state because the operation would allow the private sector to participate in up to 49 percent of the shares (Saturday Weekly Broadcast No. 499, 2016) (see table 2.7).

Critical Challenges

In terms of job creation, according to President Correa, Sopladora has generated around 3,400 jobs; 746 of which were local workers, 2,000 from different parts of the country, and 512 foreigners, meaning 8 out of 10 workers were Ecuadorians. Unlike the CCS contract, Sopladora's commercial contract does not specifically stipulate minimum foreign or national contracting rates and only stipulates that the contractor follows the provisions of the specifications and complies with national labor regulations. In addition, the contract stipulates that, if necessary, it is permitted to increase working hours, including weekends and overtime. However, it does not mention anything about decent

TABLE 2.7. SOPLADORA PROJECT

PROJECT DETAIL		
Location	Azuay and Morona Santiago, Paute River Basin	
Status	In operation	
Startup	August 2016	
Sector	Public	
Type	Hydroelectric plant (without dam)	
Power (MW)	487	
Average energy (GWh/año)	2,800	
COMMERCIAL CONTRACT OF CONSTRUCTION		
Call for Tenders	International Open (with a "Special Regime")	
Parties	Contracting party	CELEC-EP-Hidropaute
	Contractor company	China Gezhouba Group Company-FOPECA
Type of Contract	Limited to technical specifications of Reference terms	
Place and date	Quito, October 20, 2010 (prinicipal contract) Quito, March 23, 2011 (amended contract)	
Execution period	47 months	
Start date		April 2011
Scheduled End		March 2015
Actual end (starts operation)		August 2016
Total Amount/Investment	Commercial Contract: $672.2 million (without taxes)	
	MEER: $755 million	
	CONELEC: $882 million	
	Enlace Ciudadano: $963 million	
Construction conditioned to financing	No. Beginning of works not conditioned to closing of financing (from amended contract).	
Deadline for closing financing	6 months, until October 20, 2011	
FINANCING AGREEMENT		
Financing	China EximBank: $571 (85%)	
	Ecuadorian government: $100.8 million (15%)	
Place and date of agreement	Beijing, October 18, 2011	
Term	15 years	
Grace period	4 years	
Interest	6.35%	
Negotiating Ecuadorian Commission	Minister Coordinator of the Strategic Sectors, Jorge Glass; Undersecretary of Public Credit of the Ministry of Finanace, William Vásconez	

Sources: Based on Coca Codo Sinclair Commercial Contract (2009); CELEC EP website; Annual Debt Bulletins, Ministry of Finance.
MEER: Ministerio de Electricidad y Energía Renovable; CONELEC: Consejo Nacional de Electricidad; SENPLADES: Secretaría Nacional de Planificación y Desarrollo.

wages and overtime pay. It was not possible to have access to the detailed specifications of the project, so the specific provisions, and whether they have been met, are unknown.

Regarding environmental issues, Sopladora is the only hydroelectric power station in the country completely underground, and because of this the environmental impact is thought to be lower. This means that it will not store water like Molino and Mazar and, therefore, will take advantage of the existing infrastructure to minimize the fragmentation of rivers and reduce road construction (CELEC EP/Unidad Hidropaute website). This fact also implies that there will be no need to flood or affect large tracts of land and surrounding communities, and therefore the impacts on water flow and communities is much lower (Castro 2014).

The plant is expected to reduce CO_2 emissions by approximately 1.4 million tons per year, replacing energy imports and generating $233 million a year in fossil fuel savings (Saturday Weekly Broadcast No. 416, 2015). In addition, the contract meets international mechanism commitments, such as registration of the project in the Clean Development Mechanisms (MDD) program (Article 12 Kyoto Protocol), Environmental Management Plan, and Environmental Guarantee, among others.

In relation to technology transfer, Sopladora's commercial contract specifies that the contractor must adhere to the technical specifications and terms of reference; consequently, the Ecuadorian counterpart determines the reference standards and is responsible for the supervision of the project. In addition to reviewing the lists of items to be imported and implemented, the government also must monitor the technical standards of maintenance provided by the manufacturers: their quality, technical guarantees and supply, and must supervise this maintenance (Castro 2014). Specifically, the contractor undertakes to perform detailed engineering of electromechanical equipment; to train national personnel for testing, operation, and maintenance of equipment and systems; and to design, manufacture, and assemble electromechanical equipment in accordance with modern technical engineering. The contractor must also provide adequate conditions of safety, quality, reliability, availability, and operational stability, and provide a technical guarantee of all equipment incorporated, valid up to one year after provisional acceptance (Commercial Contract of Sopladora 2010).

According to the project's auditing company, Gezhouba Group Company FOPECA S.A. failed to comply with the contract on several fronts, including: compliance with chronograms and deadlines, safety conditions for workers, the condition of the machinery, environmental compliance, and handling of hazardous materials, among others, and ignored the notifications and recom-

mendations proposed by the auditors (Report of the Comptroller General of the State 2013). Moreover, seven workers died while working on the project due to security flaws (*El Comercio* 2014).

On the positive side, the project included the construction of roads that, according to official information, have benefited 800,000 people and several programs to compensate local communities, involving climate change adaptation, road rehabilitation, livestock and agriculture production, education, and tourist and food services entrepreneurial projects (MEER website).

CONCLUSIONS AND RECOMMENDATIONS

Despite the fact that China has been a vital force in helping Ecuador access financial resources and build infrastructure, and that the partnership has been upgraded to an "integral strategic partnership," both countries have experienced major changes in their economies that will be integral to the future of the bilateral relationship.

Ecuador does not have the promising economy it had when Chinese financing began, when the price of oil bordered on $100 a barrel. The Ecuador of today has been hit by deep political divisions, corruption scandals, and the burden of rebuilding extensive areas and roads in the coastal region that were destroyed by one of the worst earthquakes in history. At the same time, Chinese banks, due to the deceleration of the Chinese economy, are becoming more cautious lenders and are less willing to help their political allies in times of need. Chinese "discretional" loans to countries like Ecuador and Venezuela are not only less frequent but less significant; and some of these loans are even tied to the payment of government contractors (notably Chinese companies). In brief, Ecuador is trapped once again in the vicious cycle of debt: contracting new debt to pay the old.

Almost ten years after Ecuador received the first Chinese loan, it is difficult to determine the extent to which Ecuador has been able to take advantage of China's intervention in order to achieve not only a sustainable and cleaner energy matrix, but also an economically sustainable borrowing model. This first study addresses both of these topics and provides enough information to question the delivery of the promised economic, environmental, and social benefits by the CCS and Sopladora projects. Without a doubt, all areas merit further investigation, but based on our preliminary findings we suggest the following recommendations at the policy and project level.

POLICY LEVEL

1. Ecuador's transition to a clean and sustainable energy matrix involves much more than building dams. It also requires the evaluation of the Ecuadorian government's plans in the energy industry. These plans include the development of new oil blocks and related infrastructure (especially those located in national parks); setting goals and terms for the development of sustainable and environmentally friendly nonconventional energy sources, such as solar and wind; the establishment of national and local green energy initiatives; and the planning of energy resource use, among others.
2. Ecuador and China agreed to establish an "integral strategic association." However, just last November a very brief official document on this association became publicly available. It would be ideal if the "integral strategic association" were a living document, in that it could be reviewed periodically and in a participatory manner (e.g., every two years). The integral strategic association would be an excellent forum for China and Ecuador to discuss, with a holistic approach, the implications and characteristics of Chinese financing and how China can channel its knowledge and experience to support Ecuador. In recent years, China has taken impressive steps towards greening its economy and promoting renewable energy. For example, the latest green policies of the Chinese banking system include a commitment to close coal production plants and provide state support to establish the largest solar panel factory in the world. These are just a few examples of the steps China has taken to promote renewable energy, many of which would be tremendously valuable to Ecuador.
3. There is abundant scientific information regarding the negative environmental impacts of large dams. "Particularly in the tropics, organic matter rotting in their reservoirs account for 4 percent of all human-made climate change, equivalent to the climate impact of aviation" (International Rivers 2014). In fact, the Eximbank of the United States prohibited funding for such projects in light of this evidence (Garzón 2014).[7] The Ecuadorian government and its strategic allies supporting the development of a clean and sustainable energy matrix need to fully examine the environmental implications of hydroelectricity projects in the medium and long term.
4. Transparency and participation are key to inclusive and sustainable development in Latin America. Even though China plays a central role in the public financing and development of infrastructure and extractive industries, most Chinese stakeholders are completely distanced from Ecuadorian civil society. Moreover, accessing information from Chinese and Ecuadorian institutions on contracts and other agreements with Chinese banks

and companies is an extremely difficult task. The narrative surrounding "South–South cooperation" leans heavily on transparency and participation. Civil society in Latin America has high expectations and a long history of public participation in defining development models and influencing the conduct of international financial institutions and transnational corporations. Given these expectations, and the growing influence of civil society, it is especially important that political decisions with long-term consequences (exceeding typical government terms) achieve a substantive level of social consensus to ensure that they endure. Inclusive development between China and Ecuador must therefore include greater transparency and more efforts to engage with civil society actors, including academics, local communities, citizen organizations, business associations, indigenous organizations, NGOs, and the media. This is important not only now because hydroelectric projects are moving from the construction phase to the operation phase, but especially due to the possibility of new mining and oil exploration projects that are expected in the coming years. The lack of channels for dialogue, consultations with the communities, and institutional arrangements for conflict management are liable to aggravate existing conflicts in the territories granted to Chinese firms.

PROJECT LEVEL

1. The benefits of the CCS and Sopladora projects have been presented and evaluated by President Correa in his Saturday broadcasts and brief information can be found in public institution websites and media channels. However, in order to have substantive and updated information on the project's implementation, including the goals of each project, the companies should have an open database that is easy to access by the public. The open database should include, but not be limited to, areas like procurement, community programs, and job creation and retention. In the same spirit, the Ecuadorian counterparts should also make information publicly available, such as project and complementary works costs, technology transfer, and loan and construction contracts (except for proprietary information that cannot be disclosed according to Ecuadorian law).
2. With regard to environmental and social assessments, we recommend the following: 1) projects must have Strategic Environmental and Social Assessments (SESA), which should include indirect and cumulative impacts in the short, medium, and long term; 2) SESA and its corresponding Management Plans should be updated at each stage of the project cycle; 3) en-

vironmental licenses, permits, and audits should be easily accessible by the public; and 4) participatory monitoring bodies, both for environmental and social aspects, should be established, which could include local government bodies, affected communities, and/or other civil society organizations.

3. Various Chinese entities have enacted environmental and social guidelines for their operations outside of China. Many of these guidelines contain advanced precepts regarding corporate social and environmental responsibility and best international practices and community participation, for example the Green Credit Directive (China Banking Regulatory Commission 2012); Guidelines for Environmental and Social Impact Assessments of China Eximbank's Loan Projects (Eximbank de China 2007); Guide for Social Responsibility of Chinese International Contractors (China International Contractors Association 2012); and the Guidance on Environmental Protection in Foreign Investments and Cooperation (Ministries of Commerce and Environment in China 2013). We suggest that these Chinese guidelines be integrated into the environmental and social regulatory framework of projects financed by Chinese banks or built by Chinese contractors in Ecuador.

NOTES

This chapter was initiated by the China-Latin America Sustainable Investments Initiative, a project hosted by the Bank Information Center, Washington, DC.

1. MW stands for megawatt, a unit of power.

2. Data for initial estimated costs taken from the Master Electrification Plan, 2012–2021. Data for final costs taken from President's Saturday Weekly Broadcast No. 416 (March 21, 2015).

3. Online consultation on the Superintendence of Companies, Securities. and Insurance of Ecuador website. Sinohydro has established two branches in Ecuador: Sinohydro Corporation with a capital of $100,000; and Sinohydro Corporation Limited with a social capital of $50,000. Both have authorized legal existence until 2999 (November 1, 2016).

4. CELEC's reply to request for information (October 4, 2016).

5. According to "The Report: Coca Codo Sinclair" published by Vanguardia (2012), six suspension orders were issued to Sinohydro Corporation which meant a paralyzation of the project for thirty days by the controlling company and COCASINCLAIR

EP in April 2012. These orders were: (1) Suspension of works in the catchment site; (2) Suspension of work on the lower branch of the pressure pipe; (3) Start of work on the upper branch of pressure pipe; (4) Suspension and general excavations of the engine room and the transformers cave; (5) Suspension of work in zones IV and V; and (6) Evaluation of staff.

6. Online consultation on the Superintendence of Companies, Securities and Insurance of Ecuador website. China Gezhouba Group Company Limited established in Ecuador as a branch company in 2009 with authorized legal existence up to the year 2099. Fopeca S.A. is an Ecuadorian company founded in 1974. It has a subscribed capital of $29,282,170 and an authorized capital of $47,564,340. Its legal existence is authorized until 2026.

7. The US Consolidated Appropriations Act promulgated in January 13, 2014 states that "it is the policy of the United States to oppose any loan, grant, strategy or policy of such institution to support the construction of any large hydroelectric dam" (http://docs.house.gov/billsthisweek/20140113/CPRT-113-HPRT-RU00-h3547-hamdt2samdt_xml.pdf).

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3

CHINESE INFRASTRUCTURE PROJECTS IN MEXICO

General Context and Two Case Studies

Enrique Dussel Peters

The Mexico-China relationship has increased substantially in the last two decades: from Confucius Institutes to bilateral and multilateral agreements to outstanding dynamics in terms of trade and foreign direct investments. Chinese infrastructure projects are the most recent offering by the Chinese central government to engage with the world. In Latin America and the Caribbean (LAC), China's presence is materialized by the announcement of hundreds of infrastructure projects. These projects have an important impact on the region as a whole and Mexico in particular.

The socioeconomic relationship between Latin America and the Caribbean, and explicitly between Mexico and China, has been analyzed in depth in recent years by Chinese and Latin American academics, particularly by the scholars at the Chinese Academy for Social Science and its Institute for Latin American Studies, as well as by the Center for Chinese-Mexican Studies (CECHIMEX) at the National Autonomous University of Mexico (UNAM) and the Academic Network of Latin America and the Caribbean on China (Red ALC-China). Based on the analyses conducted at these and other institutions, this chapter deepens the knowledge of the Mexico-China relationship in terms of China's infrastructure projects in Mexico. The analysis is based on the assumption (Dussel Peters and Armony 2017) that Chinese infrastructure projects present a new level of socioeconomic interaction and complexity, with a new potential for cooperation—as well as conflict—and development for the future. It is thus relevant to understand both the current level of socioeconomic interaction, particularly in terms of trade and foreign direct investment (FDI), and the specifics of existing infrastructure projects.

THE CURRENT STATUS OF THE BILATERAL MEXICO-CHINA RELATIONSHIP: TRADE, FINANCING, AND FDI

The Mexico-China socioeconomic relationship has increased substantially in the past decades, since the beginning of diplomatic relations in 1972 (Anguiano Roch 2015) and with China's accession to the World Trade Organization (WTO) in 2001. Seven important factors contribute to understanding the current bilateral Mexico-China relationship.[1] There has also been a recent explicit academic debate on the "new triangular relationship" between the United States, Mexico, and China from political and economic perspectives that is relevant to the bilateral Mexico-China relationship (Dussel Peters, Hearn, and Shaiken 2013; Fernández de Castro and Cándano Laris 2012).

First, since 2003, China has been Mexico's second largest trading partner (table 3.1); in 2016, China accounted for 9.85 percent of Mexico's trade—significantly above its level of less than 1 percent until 2000—while trade levels with the United States fell from above 81 percent in 1999 to 63.37 percent of total trade in 2016. Table 3.1 shows this impressive growth in bilateral trade: Mexico became China's twenty-fourth largest trading partner in 2016, after being the fifty-second in 1995.

Second, minerals, wood, and copper products have substantially increased Mexico's share over exports to China; in addition, and as shown in table 3.2, China has increased its share over Mexican exports in these items to levels above 20 percent. While Mexican exports to China in auto parts and automobiles have been strong recently, China has also become the main destination of Mexican exports in other chapters of the Harmonized Tariff System,[2] such as minerals and food waste industries. Mexican imports coming from China, on the other hand, were dynamic in light manufacturing such as umbrellas and toys, and have substantially displaced the United States as China's main trading partner. In other, more sensible imports, such as electronics, auto parts, and optical instruments, the growth in the share of Mexican imports from China has been impressive: They have substituted for imports from the United States in electronics and will probably do so soon in the remaining chapters of the Harmonized Tariff Schedule (see table 3.3).

Third, in terms of the composition of trade, less than 10 percent of Mexico-China trade refers to intra-industry trade;[3] since 2003, more than 70 percent of Mexican imports from China were of a medium and high technological level, while Mexican exports to China never achieved levels above 50 percent of total exports to China. In other words, there is an important and increasing technological gap in trade.[4] In addition to these trends, it is important to understand that Mexico has a substantial and increasing trade deficit with China: in 2015, the import-export relationship was 13:1 (Zapata 2016). These

TABLE 3.1. MEXICO AND CHINA: POSITION OF SELECTED COUNTRIES IN RESPECTIVE TRADE (1995-2016)

CHINA															
	Exports					Imports					Trade				
	1995	2000	2010	2015	2016	1995	2000	2010	2015	2016	1995	2000	2010	2015	2016
Argentina	42	43	39	37	42	32	33	32	41	43	36	37	35	41	42
Brazil	25	26	15	21	23	18	25	9	9	9	20	26	10	14	17
Germany	5	5	5	5	5	6	5	6	6	6	6	6	6	6	6
Hong Kong	1	2	2	2	2	5	6	25	28	36	2	3	3	2	2
Japan	2	3	3	3	3	1	1	1	5	2	1	1	2	3	3
Mexico	46	24	23	18	17	44	44	31	31	29	52	35	29	27	24
South Korea	4	4	4	4	4	4	3	2	1	1	5	4	4	4	4
United States	3	1	1	1	1	2	4	5	2	4	3	2	1	1	1
MEXICO															
Canada	2	2	2	2	2	4	4	6	6	6	3	2	3	3	4
China	41	19	3	3	3	12	6	2	2	2	17	6	2	2	2
Germany	7	4	7	6	3	3	5	5	4	4	4	5	5	5	5
Japan	3	5	8	8	5	2	2	3	3	2	3	4	4	3	3
Spain	5	3	4	7	6	9	11	11	12	12	5	7	8	8	9
United States	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Source: Own elaboration based on UN-COMTRADE for 1993-2015 and GTA (2017) for 2016.

TABLE 3.2. MEXICO: SHARE OF CHINA AND THE US IN TOTAL EXPORTS OF EACH CHAPTER (1993-2016)

		1993	2000	2010	2016	1993	2000	2010	2016
		China				United States			
Total		0.05	0.19	1.41	1.45	82.75	88.16	80.07	80.94
26	Minerals	0.00	2.41	53.12	37.31	39.32	36.97	6.39	0.54
47	Wood	0.00	0.00	33.61	23.85	99.98	86.70	56.19	59.64
74	Copper	0.00	2.15	30.19	22.92	63.64	90.36	45.17	55.45
37	Photographic products	0.00	0.15	1.87	14.24	38.44	77.14	39.54	32.77
23	Waste of food industries; also for animals	0.00	0.15	4.00	12.08	86.88	56.95	15.68	10.43
87	Automobiles	0.00	0.02	1.24	1.33	81.38	88.74	79.36	83.56
85	Electronics	0.02	0.04	0.42	1.00	97.56	97.13	83.88	87.63

Source: Own elaboration based on UN-COMTRADE for 1993-2015 and GTA (2017) for 2016.

TABLE 3.3. MEXICO: SHARE OF CHINA AND THE UNITED STATES IN TOTAL IMPORTS OF EACH CHAPTER (1993-2016)

		1993	2000	2010	2016	1993	2000	2010	2016
		China				United States			
Total		0.70	1.58	15.13	17.96	74.03	73.22	48.25	46.40
Selected chapters according to their share in Mexican imports from China									
66	Umbrellas and others	12.95	59.26	90.63	84.85	72.70	22.04	4.50	10.73
67	Prepared feathers and down	1.07	66.56	82.88	80.90	69.12	23.52	3.95	3.27
95	Toys and games	4.51	36.23	66.24	73.74	72.57	45.26	19.86	11.19
65	Headgear and others	3.00	20.26	61.29	65.93	73.33	46.15	17.33	17.60
46	Manufactures of straw	0.07	58.24	79.63	62.30	72.93	22.78	1.68	4.40
Selected imports from Mexico according to their imports from China									
85	Electronics	0.51	1.96	29.89	34.60	82.28	76.55	26.58	25.69
84	Autoparts	1.30	1.64	23.99	23.79	66.23	66.87	40.57	38.32
90	Optic instruments	0.45	2.52	20.25	22.45	72.05	72.77	40.11	38.42
87	Automobiles	2.42	0.23	3.33	5.95	71.61	72.18	54.87	50.03
39	Plastics and others	0.43	0.97	5.91	8.10	92.28	89.14	74.75	68.29

Source: Own elaboration based on UN-COMTRADE for 1993-2015 and GTA (2017) for 2016.

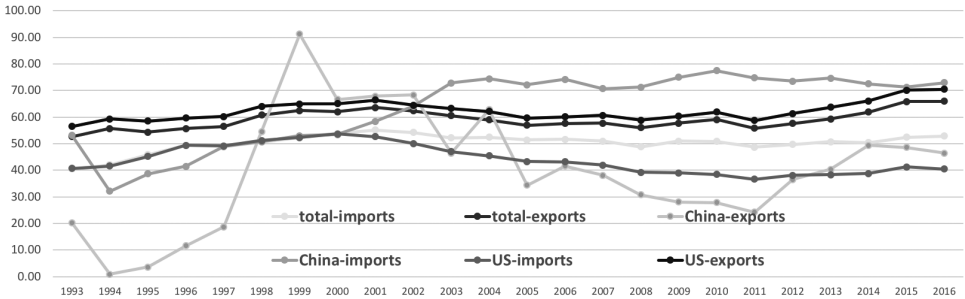

FIGURE 3.1. MEXICO: TRADE BY MEDIUM AND TECHNOLOGICAL LEVEL (AS A PERCENTAGE OF RESPECITIVE TRADE), 1993–2016

recent spectacular developments have not been acknowledged sufficiently in Mexico by academic, public, and private institutions, particularly in terms of its policy implications and institutional repercussions. For example, neither the Foreign Ministry nor the Secretariat of Economy have created specialized units on China as a result of this performance.

Fourth, Mexican exports have been substantially displaced by Asian and Chinese exports in its principal market, the United States.[5] Since 2000, the Mexican share of the US market in products like yarn and textile garments, furniture, toys, electronics, and other light manufacturing industries has been reduced substantially, whereas auto parts and automobile chains have been the main exception in this process. China has played an important role in this reduction, but so have Vietnam, Bangladesh, and other Asian countries (Dussel Peters and Ortiz Velásquez 2016a, 2016b; Wu 2010).

Fifth, despite important statistical differences regarding Chinese outbound FDI in Mexico, based on Mexican official statistics, accumulated Chinese OFDI (overseas foreign direct investment) accounted for less than $500 million or 0.1 percent of total accumulated Mexican FDI until 2016, substantially below absolute levels for countries such as Argentina, Brazil, and even Panama (Dussel Peters and Ortiz Velásquez 2017).

Sixth, Mexico and China have created a group of important bilateral institutions such as the Bilateral Commission, the High-Level Group, the Economic High-Level Group, and the Investment High-Level Group, among others (Oropeza García 2016). In addition, since 2013, Mexico and China have agreed on establishing an "integral/comprehensive strategic association" in the long

run, reinforced in 2015 within the CELAC (Community of Latin American and Caribbean States)-China context (Cui and Pérez García 2016). These bilateral institutions so far have not been able to cope with the concrete challenges in the relationship, particularly in terms of engaging public, private, and academic institutions as well as alleviating tensions in the bilateral relationship in terms of trade, loans, or specific infrastructure projects, as we will analyze below. The implementation of initiatives, strategies and instruments has been a particularly weak spot for these institutions since 2013.

Seventh, the new administrations of Xi Jinping and Peña Nieto have not only intensified high-level meetings (holding six meetings from 2013 through 2016), but also established the "Action Program Between the United States of Mexico and the People's Republic of China to Enhance a Comprehensive Strategic Association in 2013" (SRE 2014; Ventura Valero and Meléndrez Armada 2016). The Mexico-China Fund has the goal of deepening trade through financing. The capital fund offers $2.4 billion administered by the International Financial Corporation of the World Bank. Both the Mexican government and the China Development Bank supplied the resources. In addition, the Industrial and Commercial Bank of China has just been allowed to initiate activities in Mexico (Zamora Torres 2016).

In light of the Trump administration's criticism of Mexico and the president's overall doubts and request for renegotiation of the North American Free Trade Agreement (NAFTA), there has been a widespread call for "diversification" toward Asia, and in particular toward China. These calls, however, in most cases do not take into account that Mexico's trade has already substantially diversified toward Asia and China and do not consider the previously analyzed challenges that the bilateral relationship has created in the past two decades.

TWO CHINESE INFRASTRUCTURE PROJECTS IN MEXICO

According to the China Global Investment Tracker (CGIT 2017), Chinese infrastructure projects have accounted for more than 1,280 projects worldwide, totaling almost $700 billion; until 2016, Latin America and the Caribbean (LAC) had accounted for 107 projects and almost $60 billion; and Venezuela, Argentina, Ecuador, and Bolivia have participated significantly in these projects.[6]

The former general context of the socioeconomic bilateral relationship between Mexico and China is crucial for understanding Chinese infrastructure projects in Mexico. Until 2017, only three Chinese infrastructure projects in Mexico have been recorded: the private Dragon Mart project that started in

the mid-2000s and was canceled in 2015 (Dussel Peters and Ortiz Velásquez 2015); the high-speed rail project proposed in 2015; and the hydroelectric power plant that began in 2015. The latter two are analyzed in detail below.

The goal of these cases studies is to understand the implications of infrastructure projects in terms of development and overall for the Mexico-China relationship.[7] In both cases, the general and technical background of the infrastructure project is relevant to evaluating the respective results and challenges and to understanding the increasing complexity in the LAC-China relationship in such projects.

In both cases, it has been difficult to obtain specific information; the contracts are confidential and the analyses thus depend on secondary sources. In addition to in-depth and extensive literature reviews and official information, interviews and the visit of the Chicoasén II project in Chiapas in 2016 have been particularly important.

THE HIGH-SPEED TRAIN FROM MEXICO CITY TO QUERÉTARO

The projected high-speed train from Mexico City to Querétaro has so far been the most relevant Chinese infrastructure project proposed in Mexico and in the region; Mexico's federal government represented by the Secretariat of Communication and Transport (SCT) was the client of the service. A consortium of five firms led by the China Railway Construction Corporation (CRCC)— together with Constructora y Edificadora GIA, Prodemex, GHP Infraestructura Mexicana, and TEYA (part of Grupo Higa)[8]—participated in the public bidding process for the high-speed train. On November 3, 2014, this consortium won the bidding process with a budget of $3.8 billion. The financing of 85 percent of the contract amount by the Chinese EximBank (for twenty years with a 3.22% fixed interest rate) played an important role in the bidding process (Senado de la República 2014).

SCT and the President of Mexico, Enrique Peña Nieto, revoked the bidding process on November 6, 2014. This took place just before Peña Nieto's trip to China, as a result of a corruption scandal that involved his wife, his closest adviser Luis Videgaray Caso, and Grupo Higa.

In mid-January 2015, Mexico re-opened the bidding process, initially stipulating that Grupo Higa and the same consortium could not participate again, although SCT later allowed all firms to participate. Two weeks later, the Secretariat of Finance and Public Credit announced the "indefinite suspension" of the project as a result of budget cuts in 2015 and financing problems, which was partially the result of the international decline of oil prices. The project has not been discussed since then.

The Chinese central government, in the words of Prime Minister Li Keqiang, regretted the initial temporary suspension of the project in November 2014. The later response was harsher and caused significant tensions in the bilateral relationship. The National Development Reform Commission demanded to "protect the legitimate rights of Chinese companies and adopt active measures to promote pragmatic cooperation between the two countries," since CRCC already invested resources in the project in the amount of $60 million, particularly on the design of the project and by sending hundreds of workers and delegations to Mexico to develop the project (Celis 2015; *China Daily* 2015). Since then, there has been a legal demand to financially compensate the CRCC, which so far has not been successful. CRCC's shares fell by more than 15 percent in the days that followed the announcement of the "indefinite suspension" of the project.

The 210-kilometer railway had received all the required environmental permits (SCT 2014) and was to function for at least thirty years; ten municipalities were to be affected by the construction in three Mexican states (México, Hidalgo, and Querétaro). The project was projected to be completed in five years, generating more than 20,000 direct jobs and an additional 40,000 indirect jobs, first in a construction stage and then due to substantial positive environmental effects (Cámara de Diputados 2015, 11). The train would have transported up to 426 passengers in eight wagons with a daily capacity of transporting up to 29,000 passengers; the average speed of the journey would have been 180 kilometers per hour, reaching speeds of up to 300 kilometers per hour.[9] The project was not only relevant to the expansion of the train network in Mexico but also for saving time and resources to passengers and Mexican society in general: in addition to saving two-hours on each trip and using fewer circulating vehicles, the project would allow for a 95 percent decrease in annual CO_2 emissions.

Details of the specific participation of CRCC and the Mexican firms have not been discussed,[10] although it could have been expected that the Mexican firms would be responsible for most of the civil construction, public relations, and other activities related to the project, while CRCC would have been responsible for the design, as well as supply of technical and technological requirements of the project, including trains, wagons, and different systems for the functioning of the train line. Based on the expected costs and budget of the project (Modelística 2014) and the three main modules—railway line, railway rolling stock and equipment and other components—more than 60 percent of the project costs were dedicated to the railway line, while the railway rolling stock accounted for around 10.7 percent of the budget of the three modules of the project (table 3.4). Thus, the bulk of employment, suppliers, and budget would have been supplied by Mexican firms and Mexican workers, although

TABLE 3.4. HIGH-SPEED INFRASTRUCTURE PROJECT: INVESTMENT COSTS (IN 4 YEARS)*

	US$ million	Millions of Mexican pesos	Percentage
Infrastructure	2,115	28,128.56	64.54
Road	343	4,566.78	10.48
Electrification	173	2,297.21	5.27
Security and communication	264	3,515.47	8.07
Railway rolling stock	351	4,662.27	10.70
Right of way	31	409.48	0.94
Total	3,277	43,579.77	100.00

* using an exchange rate of 13.3 Mexican Pesos for each $US dollar.
Source: own calculations based on Modelistica (2014:Anexo 5).

there are no specifics on the potential transfer of technological capabilities of CRCC to Mexican firms.

As a public firm owned by the central government, CRCC has an annual income close to $100 billion annually and employs more than 250,000 workers (CRCC 2016); compensation, from this perspective, is legally sensible for the Mexican government and CRCC, but economically irrelevant and symbolic for CRCC in terms of sending a strong signal to the Mexican government,[11] as well as to other governments internationally.

In qualitative terms, it is important to understand that the definitive cancellation of the high-speed train project from Mexico City to Querétaro in January 2015 generated an important impact in the bilateral Mexico-China relationship. The cancellation of the project caused disappointment and a general lack of trust by Chinese authorities; throughout 2015 and in part of 2016, this distrust has affected many other fields of the bilateral relationship, including other potential infrastructure projects and Chinese FDI.

THE HYDROELECTRIC PLANT IN CHICOASÉN II

On January 9, 2015 the Comisión Federal de Electricidad (CFE), a firm owned by Mexico's federal government, created in 1937 and with the experience of constructing thousands of infrastructure projects since then, announced that a consortium of firms, led by Sinohydro Costa Rica[12]—including Omega Con-

strucciones Industriales, Desarrollo y Construcciones Urbanas, and CAABSA Infraestructura—won the public bidding process for the "289 CH Chicoasén II" process for around $405 million (CFE 2015). This project has been much less known than other Chinese infrastructure projects in the region. Two firms that participated in the bidding process for constructing a hydroelectric power plant in Chiapas along the Grijalva River in the south of Mexico, a subsidiary of Ingenieros Civiles Asociados and the consortium led by Sinohydro Costa Rica, together with Omega and CAABSA, were declared winners in January 2015.

In addition to the construction of the plant with three sophisticated turbines,[13] accounting for 240 MW and an annual generation of 631 GWh (supplying electricity for around 236,000 households), the project included a number of channels and auxiliary recipients to drain water (933.62 meters), as well as a cement wall achieving a maximum level of 188 meters of height.

As a result of the project, which was the subject of environmental investigations[14] and government evaluations, 143 households would have been moved. During the construction phase, the project would generate 4,000 jobs—2,000 direct and 35 when the power plant begins working. In addition to the substitution of the generation of electricity with oil, the power plant would also include 142 "associated constructions" (social and productive units) in the municipality of Chicoasén, with around 20,000 inhabitants (Melgar Bravo 2016). Nevertheless, there is widespread local resentment against CFE and these kinds of mega-projects in the region, partially because of the poor quality and high price of electricity, as other areas around the projects do not have any electricity infrastructure. Alleged human rights violations have also been registered.[15]

Since July 12, 2016, the construction process has been halted and the full project and investment is close to being completely canceled. There are several reasons why.

First, the State of Chiapas, one of the poorest in Mexico, is institutionally weak: political parties and social and local associations are atomized and represent very particular and local interests; also, state-level institutions have little incentives and interests in enforcing the law and allowing for a public dialogue among the affected institutions.

Second, while there is a widespread consensus that the project is relevant and positive for the State of Chiapas and the respective communities in the municipality of Chicoasén, different interest groups—particularly trade unions, *ejidatarios* or the landowners where the plant will be built, and transportation organizations—have disagreed. In some cases, they have even resorted to violence, in order to renegotiate already existing agreements and/

or to represent the respective workers and transportation units. There is a general belief in Chicoasén that the project is not employing workers locally, and that the local benefits are very limited. In addition, at least three trade unions—Confederación Autónoma de Trabajadores y Empleados de México (CATEM), Confederación de Trabajadores de México, and Sindicato Único de Trabajadores Electricistas de la República Mexicana— are in disagreement regarding labor representation and union fees. In addition, landowners have requested a renegotiation of property prices, generating a source of important local uncertainty. Finally, there are technical, political, social, and financial disagreements with the project in terms of the integration of transportation units, considering that around 1.5 million tons of earth have to be moved in the first construction phase of the project. While community and smaller transportation units wish to participate in this process, CFE and Omega agree that, in general, trucks with double traction and with a load of between 7 and 17 tons are required, as smaller trucks do not fulfill the economic and technical requirements.

Third, most of the civil construction in this first phase has been directed by the Mexican firms and particularly Omega, while Sinohydro Costa Rica has accompanied this process, together with CFE, with more than 150 engineers; Sinohydro is already building the General Electric turbines in Tianjin and has been responsible for the "cage" and construction of the site where the turbines will be integrated.[16] Consequently, since it was begun, the project has faced twenty-three stoppages. The latest and longest began in July 12, 2016 and is still underway. At the same time, Omega canceled the employment of 800 workers, and there is a serious concern that the entire project might be canceled, with significant social, political, and financial costs for all participants. Since the project has been halted, at least three concerns have arisen that can affect the project in case it is reinitiated. First, interviews highlighted that on-site equipment and machinery has been stolen und destroyed.[17] Thus it will probably not be easy to resume work immediately, even if trade union disputes are solved. Second, the Mexican firms in charge of the civil construction—particularly Omega[18] and CAABSA—want to renegotiate the contract or even to cancel it, since they have begun with the civil construction in 2015 and have not been paid. Third, and probably the most disturbing structural issue, massive stoppages since the beginning of the project in January 2015 reflect substantial institutional weaknesses in the region; in other words, even if this trade union stoppage could be solved, it is probable that new ones will follow.

TABLE 3.5. HYDROELECTRIC INFRASTRUCTURE CHICOASÉN II PROJECT: PROGRAMMED AND REAL ACCUMULATED PROGRESS (UNTIL JULY OF 2017) (PERCENTAGE OVER TOTAL PROJECT)

	Programmed					Real progress in July 2017
	December 2015	July 2016	September 2016	December 2016	July 2018	
General progress	4.84	15.91	42.45	54.59	100	17.72
Deviation work	—	—	99.14	100.00	100	43.27
Containment work	—	—	12.39	—	100	6.29
Work of generation	—	—	19.54	—	100	3.71
Excess flow capacity work	—	—	6.05	—	100	1.64
Associated work	—	—	46.23	—	100	30.24

Source: Own elaboration based on CFE (2016/a).

As a result, according to CFE (2016), in July 2017 the project should have had an accumulated programmed advance of between 55 percent (December 2016) and 100 percent (July 2018), but the real advance is at 17.72 percent; the deviation work of the project, particularly different channels, should be completed by now, but are in real terms at 43.27 percent; the construction of units and buildings for the generation of electricity should reflect substantial advances, but are at 3.71 percent (CFE 2016).

Senators from the State of Chiapas have been asking the respective actors to initiate a dialogue since mid-2016, when the last stoppage occurred (Robledo 2016), although they do not have any legal instruments to implement concrete actions in this direction or to require the different actors to resolve the stoppage and continue the project. At the end of June 2017, there was an apparent agreement among the public officials of the State of Chiapas, trade unions, and the local community to solve the impasse; as of the end of 2017 there have been no further developments on the project. CFE and state level authorities agreed to pay landowners (Mandujano 2017). It is uncertain when the project will be finished and if the Mexican construction firms will continue participating.

CONCLUSIONS AND RESEARCH PROPOSALS

The One Belt One Road Initiative has massively benefited Chinese infrastructure projects worldwide, particularly since 2013. In Mexico, Chinese infrastructure projects reflect the increasing complexity of bilateral relations with respective countries in Latin America and the Caribbean. After trade, financing and foreign direct investments, infrastructure projects in Mexico pose substantial opportunities in the design, coordination, and financing of technological parts of the projects, as well as in their relationship with specific suppliers, clients, and a great variety of services. In other words, they represent the full potential of the bilateral relationship, as well as its contradictions and challenges: China offers turnkey projects, including all necessary parts of these infrastructure projects, but poses massive challenges in terms of local and national integration and development.

The three Chinese infrastructure projects in Mexico have so far reflected substantial difficulties and a slow learning process by all actors. Two of the projects have been definitively canceled and the third—the hydroelectric power plant Chicoasén II—is on the brink of being canceled, although there is still the possibility of reinitializing the project.

The experiences learned in these infrastructure projects are significant in terms of opportunities and challenges. First, despite Mexico's requirements for infrastructure and China's significant supply of increasingly sophisticated infrastructure projects, the two countries have been unable to come to agreement in the last decade. Corruption and a general lack of understanding from both sides have been the main reasons.

Second, the two examined infrastructure projects in Mexico reflect a rather high level of integration by Mexican firms and suppliers, including most of the labor force; in both cases, the direct share of the Chinese firms was estimated to be under 20 percent of the total cost of the respective project, in addition to the key responsibility and the coordination of the full project. Contrary to other LAC countries, in Mexico, Chinese firms have preferred to subcontract to Mexican firms and to use Mexican labor power and supplying firms, particularly in construction, although the technological transfer in the more sophisticated segments of the projects has been low. Thus, in the case of Mexico, Chinese infrastructure projects offer a rather important development potential through generated linkages in the analyzed projects.

Third, Mexican authorities and institutions have not dedicated sufficient attention to Chinese investment (Dussel Peters 2016) and particularly to Chinese infrastructure projects. These require multifaceted support, such as finding the ideal suppliers; developing relationships with clients, business

organizations, local and regional communities, and other businesses; and understanding public-private relationships and formal and informal relationships. The Chicoasén II project is a good example in which Mexican authorities—particularly at the state level—have been completely absent, while local and federal institutions have not effectively supported the project. If Mexican public institutions are interested in attracting Chinese infrastructure projects, they will have to train and dedicate specialized units to support these firms; otherwise, these failures will continue to occur.

Fourth, Chinese firms have also been slow to understand "how to do business" in Mexico. For example, in the case of the high-speed train project, they were not able to identify and develop contacts with politically and economically heterogeneous institutions and persons—political parties from left and right, trade unions, business organizations, human right activists, academics, local, regional and national NGOs—to design a wide institutional network to guarantee the continuation of the project. CRCC, for example, searched for Mexico's public sector at the highest level, but did little additional work to contact institutional alternatives. Unless the Chicoasén II project gets quickly reactivated, it is possible that a group of local private and public institutions will again unify themselves against the project, similar to the Dragon Mart case. It has been difficult, and expensive, for Chinese firms to understand the local modus operandi, including corruption.

There are apparently major incentives for Mexico's public sector and Chinese firms to overcome these constraints, specifically based on Mexico's future infrastructure requirements and the increasing capacity of Chinese firms to offer them.

Chinese public firms' infrastructure projects should rapidly and explicitly increase their learning process in Mexico and the region. While elsewhere in the world Chinese infrastructure projects are mostly successful, a few failures internationally and in Mexico have important firm-level costs, including "losing face" and prestige in LAC, China, and Mexico and at the bilateral level (e.g., as a result of the failure of the high-speed rail, Mexico's bilateral relations with China were highly affected for at least two years).

Both affected sides, including public sectors and firms, should create explicit policies and instruments to minimize these costs, including a better understanding and socialization of these failures and disruptions. Intra- and interfirm channels to spread these experiences—formally and informally—could be one option. Another, more ambitious alternative would be to allow a more systematic and detailed analysis and research of failures and successes—both by government officials and firms in Mexico and China—to enhance such a learning and dynamic process.

It is in the interest of all participating parties to minimize future economic and political failures.

NOTES

1. For an in-depth analysis from a Mexican perspective, see Dussel Peters (2016) and Dussel Peters and Ortiz Velásquez (2016a, 2016b).

2. The Harmonized Tariff Schedule (HTS) registers trade in chapters (two digits): each chapter is divided into headings (four digits), which are again divided in products (six digits) and up to more than 17,000 products at the ten-digit level.

3. In addition, Mexican exports present a high share of capital and intermediate goods: in 2015, 73.69 percent and 77.64 percent for total exports to the United States and China, respectively. Capital exports to China, however, only accounted for 9.74 percent to China and 31.2 percent to the United States, as a result of the composition of Mexican exports to China.

4. This technological gap is much wider for the rest of Latin America and the Caribbean, particularly for countries such as Argentina, Brazil, and Peru (Dussel Peters 2016).

5. There is an interesting and relevant discussion regarding the displacement of Mexican exports to the United States, either by Chinese and/or Asian exports (see Dussel Peters and Gallagher 2013; Watkins 2015).

6. These data sets require a detailed review. As discussed by Dussel Peters and Ortiz Velásquez (2017), of the case-by-case reviews of China's infrastructure projects based on CGIT, from the 107 infrastructure projects, only 83 have been actually realized, while the rest have either been announced and/or not begun and/or canceled for different reasons.

7. Mexico has an enormous deficit in infrastructure projects: infrastructure spending has been below two percent of GDP between 2008 and 2015 (Infralatam 2017), while the requirements to modernize and upgrade infrastructure require around five percent of GDP (CAF 2014).

8. Formally the bidding process (international bidding Nr. LO-009000988-I-55-2014) to construct a railway line, railway rolling stock, equipment, and other components required by the High-Speed Railway Project.

9. There has been a discussion about the effective relevance of the project as a high-speed train in such a short distance and with several stops, which was perceived as more of a prestige symbol than a cost-effective project that would travel at lower speed.

10. The information was requested by Aristegui Noticias but denied by the National Institute for Transparency and Access for commercial and confidentiality reasons.

11. Initially, the Mexican government accepted the possibility to reimburse costs for wages, tickets, and other costs related to 150 Chinese engineers for eighteen months. The legal aspects still have not been settled. While the CRCC initially in-

sisted on the payment of the invested capital during the initial stage of the project, it is particularly interested in the legal possibility and political support to be able to participate in future biddings in Mexico. Thus, it has been less insistent on receiving a reimbursement than in being allowed to continue participating in future bidding processes in Mexico.

12. Sinohydro, which is part of Powerchina, participated through its subsidiary in Costa Rica as a result of the existing free trade agreement between Costa Rica and Mexico.

13. Turbines for the Chicoasén II project are manufactured by Alstom in China and in a manufacturing site close in Tianjin.

14. From an environmental perspective, it is important to highlight that CFE accounts for four hydroelectric plants along the Grijalva River (Malpaso, La Angostura, Chicoasén, and Peñitas), and the environmental impact regarding flooding and other similar issues are relatively minor.

15. The NGO Centro de Derechos Humanos Fray Bartolomé de las Casas A.C. reported on abuses by CFE and Sinohydro Costa Rica, Omega Construcciones, Desarrollos y Construcciones Urbanas, and CAABSA Infraestructura since 2012, particularly for threats and arbitrary intent of deprivation of life, criminalization of protests, and the internal division of communities. Attorney Arturo Luna Ortega, representative of landowners, was detained by state police, accused of mutiny on October 21, 2015, and imprisoned for three months (Centro de Derechos Humanos Fray Bartolomé de las Casas 2016, 2). The local legislator María Olvera Mejía has also accused CFE for not paying 3,300 hectares to the owners of Chicoasén (Contralínea.com.mx 2016; López 2016).

16. As a result of the existing budget, the direct participation of Mexican firms in the project, particularly through the construction and civil engineering processes, is at least 80 percent, whereas Sinohydro's participation focuses on the "cage," subcontracting of the turbines to GE, and the overall coordination and design of the project.

17. The author held interviews with representatives of CFE and Sinohydro/Chinapower, as well as public officials in Chiapas and Chicoasén in 2016.

18. Since the end of 2016, Omega had bought most of the shares of CAABSA in the Chicoasén II project and remains the main Mexican shareholder of the project in charge of the civil construction.

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4

ARGENTINA'S INFRASTRUCTURE GAP AND FINANCIAL NEEDS

The Role of China

Leonardo Stanley

ARGENTINA-CHINA BILATERAL RELATIONS

Three decades of growth at annualized two-digit rates placed China as the world's second largest economy. One defining feature of this achievement lies in the massive program of infrastructure investment, which sustained the aforementioned records while increasing the economy's competitiveness (Straub et al. 2007). The massive accumulation of external surplus is another distinctive feature of China's ascension, which transformed the country into the world's largest creditor (Cheung and de Haan 2013).

The importance of infrastructure was reaffirmed after the 2008 global financial crisis, when the Chinese government introduced a huge fiscal stimulus package (Lardy 2012) emphasizing investment, which increased the capacity of Chinese infrastructure firms. Furthermore, in order to gain competitiveness, authorities favored an industry concentration process. After decades of being ranked among the world's largest recipients of foreign direct investments, in 1999 the Chinese government initiated the go-out policy to promote Chinese investments abroad. This policy transformed the Middle Kingdom into a net capital exporter (Shambaugh 2013).[1] State-owned banks accompanied this outbound path from the onset. A "big pockets" trend (large financial resources from China's developmental banks supporting the go-out policy), which has been particularly active in Africa (Brautigam 2009), is gaining momentum in Latin America (Dussel Peters 2013). Finally, the outbound investment boom led by Chinese infrastructure firms is also helping authorities in their effort to internationalize the RMB (Liu et al. 2017; Zhang 2016).

TABLE 4.1. CHINA'S RELEVANCE AS TRADE PARTNER OF ARGENTINA

Year	Exports to China			Imports from China			Trade Balance
	US$ MM	Share	Rank	US$ MM	Share	Rank	US$ MM
1995	$285.7	1.4%	17th	$607.90	3.0%	8th	–$322.20
1996	$607.4	2.6%	9th	$697.90	2.9%	8th	–$90.50
1997	$871.0	3.3%	5th	$1,005.60	3.3%	8th	–$134.60
1998	$681.8	2.6%	8th	$1,167.50	3.7%	8th	–$485.70
1999	$507.9	2.2%	11th	$999.10	3.9%	8th	–$491.20
2000	$769.2	3.0%	6th	$1,156.70	4.6%	4th	–$387.50
2001	$1,109.1	4.2%	5th	$1,065.20	5.2%	3rd	$43.90
2002	$1,098.5	4.3%	4th	$330.20	3.7%	4th	$768.30
2003	$2,452.9	8.3%	4th	$720.20	5.2%	4th	$1,732.70
2004	$2,628.3	7.6%	4th	$1,401.80	6.2%	3rd	$1,226.50
2005	$3,158.2	7.9%	4th	$2,239.50	7.8%	3rd	$918.70
2006	$3,506.1	7.5%	4th	$3,121.90	9.1%	3rd	$384.20
2007	$5,166.6	9.2%	2nd	$5,092.90	11.4%	3rd	$73.70
2008	$6,397.5	9.1%	2nd	$7,104.40	12.4%	2nd	–$706.90
2009	$3,668.2	6.6%	3rd	$4,822.60	12.4%	3rd	–$1,154.40
2010	$5,858.7	8.5%	2nd	$7,648.80	13.5%	2nd	–$1,790.10
2011	$6,176.3	7.4%	2nd	$10,573.30	14.3%	2nd	–$4,397.00
2012	$5,165.4	6.4%	2nd	$9,954.30	14.6%	2nd	–$4,788.90
2013	$5,762.4	7.6%	2nd	$11,312.40	15.2%	2nd	–$5,550.00
2014	$4,650.0	6.8%	2nd	$10,761.50	16.5%	2nd	–$6,111.50
2015	$5,388.0	9.5%	2nd	$11,776.00	19.7%	2nd	–$6,388.00

Argentina-China relations were reestablished forty-five years ago,[2] centered on a highly biased commercial pattern. The rise of China in the past decade contributed to the reestablishment of an export-led, natural resource growth model for Argentina, resembling the one observed a century ago under the auspices of Great Britain (Bolinga 2015; Bulmer and Thomas 1994; Oviedo 2015).[3] China's rise replaced old commercial partners, including European countries and the United States, to become Argentina's second trading partner after Brazil.[4] The commercial relationship with China accounted for 17 percent of Argentina's imports ($10.7 billion), and 6.5 percent of its exports ($4.5 billion). By contrast, Argentina's relevance for China's commerce remains minimal: 0.31 percent (forty-first position) as an origin for imports,

and 0.40 (thirty-sixth position) as a destination for exports (Bolinga 2015). In terms of export basket composition, while more than 5,000 products are coming from China, exports from Argentina are mainly associated with three products: soybeans (56.2 percent), soybean oil (13.4 percent), and crude oil (15.0 percent).[5] Furthermore, since 2008 Argentina has accumulated an important trade imbalance, a pattern that irritates Argentinean tradable producers (see table 4.1).

In terms of foreign direct investment, China and Chinese companies have invested in Argentina, though little investment from Argentina has entered China. Stocks figures, however, remain poor. According to Argentina's Central Bank's (BCRA) direct investment database, China holds $674 million in stocks.[6] However, China's capital outflows are underestimated as most of them go to different tax havens and offshore financial centers first and are later redirected to the targeted country.[7] According to official figures for the 2006–2015 period, Argentina has accumulated $19.7 billion of Chinese overseas foreign direct investment (OFDI),[8] including direct investments and merger and acquisitions operations. Beyond some atypical operations,[9] most investments are resource seeking, essentially directed to acquire assets from the mining and oil and gas industries,[10] as well as agrobusiness. This traditional pattern, however, might be altered in the future if participation in infrastructure-related projects by Chinese firms is maintained and investments in engineering and public works keep growing. The infrastructure projects listed here should not be qualified as a direct investment, but as an export of services—a special contract with the firms that guarantee the funds.[11] Despite the recent irrelevance of official Chinese investment flows to Argentina, unofficial figures place China as the leading foreign investor in Argentina (for 2016),[12] outpacing the combined flows coming from the United States and the European Union.

The 2001 default and the fact that the country was cut off from global capital markets for more than a decade allowed China to become Argentina's lender of last resort. The latest swap arrangement,[13] signed in 2014, permitted the BCRA to increase its foreign reserves (*Wall Street Journal* 2014) and for the funds to be used (by the new government) later in order to liberalize the exchange rate. EXIMBANK has also favored the country with a $4.2M credit line, mainly directed to finance bilateral trade operations. Last but not least, on September 17, 2015, the People's Bank of China (Chinese central bank) officially announced the opening of an RMB clearinghouse in Buenos Aires, through the Industrial and Commercial Bank of China (ICBC), a measure associated with China's strategic objective to internationalize the RMB.

The importance of trade, investments, and financial flows is also reflected by the emergence of a profuse institutional net, including a series of special

agreements that illustrate China's economic and strategic interest (Strüver 2016; Zhongping and Jing 2014).[14] Argentina signed the first such agreement in 2001, the "21st century-oriented comprehensive cooperative partnership," often referred to as "cooperative partnership" [CP] agreement. Three years later, Presidents Hu Jintao and Néstor Kirchner signed the "strategic partnership" (SP) agreement in Beijing, as well as five other deals expanding cooperation in the fields of space technology, education, tourism, railways, and trade. This SP agreement placed Argentina in a new stage in its relationship with China (Uriburu Quintana 2012). Ten years later, during Chinese President Xi Jinping's visit to Argentina, the two governments approved twenty agreements, including the aforementioned swap agreement between the two countries' central banks and financing for the two projects analyzed here. In addition, the two presidents agreed to sign a new framework (the Comprehensive Strategic Partnership [CSP]), which confirmed Argentina's relevance for political leaders in Beijing (Strüver 2016).[15] The bilateral relationship would be deepened under Mauricio Macri's government in several aspects—a transformation particularly observed after the 2016 US presidential elections.[16] Despite previous statements, the new government decided to ratify the CSP with China originally signed by the administration of Cristina Fernández de Kirchner (CFK).[17] Additionally, the Macri administration has moved forward with the infrastructure program initiated by the CFK government, although now it advances a more ambitious agenda.[18]

INFRASTRUCTURE

A huge investment effort allowed Chinese engineering and construction companies to develop capabilities on different fronts (financial, logistical, and technological), and soon after began to expand abroad. Alongside internal consumption, the new growth model favored OFDI, infrastructure-related industries at the core of this "go global" policy (Chen and Wei 2015; EY 2016; Yu 2014). One Belt One Road (OBOR) is transforming this original policy into a massive initiative (EY 2016; Zhang 2016).[19] Active government support (i.e., industrial policy, global initiative) transformed ideas into reality (Dussel Peters 2011). For example, a savvy technological transfer program permitted local firms to catch up with foreign partners (Chen and Wei 2015). A vast program of industry restructuring has also contributed to the transformation of local engineering and public work firms—which were outdated and suffered from excess capacity—into global leaders. Infrastructure firms and contractors benefited from the Chinese government's deep pocket strategy, funded

by development banks and vital for gaining public works initiatives overseas (Sanderson and Forsythe 2013).

In a short time span, China has become a global player in infrastructure-related industries: railways, nuclear power, hydroelectric dams, etc. (Chan 2016; Chen and Wei 2015; EY 2016; International Rivers 2012; Kratz and Pavlicevic 2016; Walker and Qin 2015). In addition, China has become a net creditor and a leading worldwide investor, playing a growing role in the realm of financing development (Cheung and de Haan 2013; Sanderson and Forsythe 2013; Stanley and Fernández Alonso 2017; Zhange 2016). This helps to explain Xi Jinping's remarks on the relevance of infrastructure overseas projects for China's increasing international presence.

Argentina, on the other hand, still has large infrastructure needs as the rate of investment remained far below replacement requirements for years. According to the United Nations Economic Commission for Latin America and the Caribbean, yearly average infrastructure investments over GDP figures from 2000 to 2015 were just 2.7 percent, far below the recommended 6 percent threshold needed to close the gap.[20] Unfortunately, Argentina lacks the entrepreneurial expertise to meet infrastructure demands, which opened opportunities for China. Alongside the launching of a vast infrastructure program, Argentinean government officials initiated a series of visits to China, resulting in new/renewed agreements.[21] The list included several projects (up to $25 billion in public works) to be implemented by the national government or by provincial administrations. Some among them qualify as the largest outward investments undertaken by Chinese firms.[22] Investments and contracts might also be considered strategic for Chinese firms' overseas expansion. Consider, for example, the Belgrano Cargas project or the $15 billion credit in the nuclear sector, which would permit the export of homegrown pressurized water technology for the first time in Latin America. Chinese investments in transport, energy, or other public works–related industries would certainly transform Argentina. As noted by Argentinean ambassador to China Diego Guelar, Chinese involvement in energy-related works would delineate Argentina's energy matrix for the next forty years (*Cronista* 2017).

In addition to these projects, the Argentinean government has recently announced a new arrangement with China, totaling $7.6 billion in new projects, including the construction of new dams (Chihiuido I in the Patagonian province of Neuquén [$2.2 billion], El Tambolar in San Juan [$1.1 billion], Los Blancos in Mendoza, Quines in San Luis [$300 million]), the Potrero del Clavillo reservoir between Tucumán and Catamarca ($1 billion), a new freight project for the San Martín rail line (belonging to BCyLSA, and including purchase of wagons and locomotives, but also renovation work [$2 billion]),

TABLE 4.2. CHINESE PROJECTS IN LATIN AMERICA

	Jurisdiction	Amount (US$ billions)	Location
Railways freight	N	4.5	NOA
Renewable energy, dams	N	6.5	Santa Cruz
Renewable energy, nuclear plants	N	15.0	Buenos Aires
Renewable energy, wind power	P	0.8	Chubut / La Rioja
Renewable energy, solar	P	0.35	Jujuy
Gas distribution	P	1.8	Córdoba
Water works and related	P	0.4	Entre Ríos

and waterworks at Cuenca del Salado in Buenos Aires Province ($1 billion). Additionally, the government is negotiating a national public housing plan ($3 billions), a potable water and wastewater expansion plan (in the metropolitan area of Buenos Aires), a water pipeline in Formosa, as well as a series of irrigation projects in Neuquén, Río Negro, and Chubut ($800 million) (*La Nación* 2016a). The financial resources involved in these projects constitute a large part of Argentina´s 2017 National Budget, establishing China as the main source of infrastructure funding.

From an environmental perspective, the most challenging project seems to be the hydroelectric one. The direct social impact seems to be minimal, as (almost all) projects are observed as beneficial for social development and economic integration. Business opposition remains unimportant as few industries are affected—an attitude ultimately explained by the process of deindustrialization observed in the recent past. In perspective, local public works and infrastructure firms will remain weak as Chinese firms continue to gain support in government infrastructure projects, particularly if they come with foreign funds. In this sense, the vast infrastructure program designed by the former administration and continued (practically unaltered) by the present one could be considered a "silver bullet" for any attempt to reactivate the local industrial base, as experienced by those working in the renewable energy sector. The perpetual urgency for short-term results pushes politicians to foster investments, but also to disregard the creation of long-term capabilities. The infrastructure gap pushes further in that direction, as China's involvement

permits authorities to fill the gap sooner. Obviously, China profits from Argentina's technical and financial constraints and political interests. Chinese firms keep entering the country, in sectors previously reserved to local groups.

CASE 1: HYDROELECTRIC DAMS

Chinese companies are now the biggest global dam builders, with increasing presence in the Latin American region (Freeman 2017; International Rivers 2012). Dam-construction firms' worldwide expansion closely aligns with the substantial financial help coming from Chinese developmental banks. Engineering capabilities and funding resources position China as a natural partner for Argentina.

For Argentina, hydropower generation remains an unopposed developmental issue. Energy planning is one of the few federal long-term policies in scope and vision. The dams are to be constructed in the Santa Cruz River, but one government after another postponed their construction, not only due to budgetary shortcomings but fundamentally because they found the project could not sustain a cost-benefit analysis.[23] Regardless, the arrival of Néstor Kirchner to office (born in Santa Cruz, he became the first president from the Patagonia region) brought the hydro project back into the spotlight. In order to finally commence construction, the national government opened an international bidding process. After a series of twists and turns, including a number of failed rounds, a final round undertaken in 2013 prequalified four consortia. The government finally decided on Represas Patagónicas, an international consortium formed by Argentine firms Electroingeniería and Hidrocuyo and Gezhouba Group from China.[24] According to the contract, the dams' construction is expected to take five and a half years; that is, they are expected to start operating by the end of 2022. This will be the largest overseas project undertaken by Gezhouba.

The Condor Cliff and La Barrancosa (CC and LB thereafter) dams' total cost is estimated to be $4.7 billion, an amount to be financed by a consortium of Chinese financial institutions. The loan agreement was signed between the Ministry of Economy of Argentina and the following Chinese financial institutions: China Development Bank (CDB), Industrial and Commercial Bank of China Limited (ICBC), and Bank of China Limited (BC). Certification payment represents almost three-quarters of total credit, which would be delivered to Argentina.[25] The remaining one-quarter will pay supply contractors and will be deposited at Chinese financial entities into an escrow account. Finally, signing parties accorded to a ten-year repayment period, starting at

TABLE 4.3. CHINESE DAMS IN LATIN AMERICA

Country	Project	Total capacity	Company	Financing
Argentina	Néstor Kirchner		Gezhouba	China Development Bank, China EximBank
	Jorge Cepernic		Gezhouba	China Development Bank, China EximBank
Colombia	Pescadero Ituango Hydropower Plant	2,400 MW	Sinohydro	
Costa Rica	Reventazón Project	305 MW	Sinohydro	
Ecuador	Sopladora	487 MW	Gezhouba	China EximBank
	Coca Codo Sinclair	1,500 MW	Sinohydro	China EximBank
	El Reventador Hydroelectric Project	520 MW	Sinohydro	China EximBank
Guyana	Amalia Falls Hydroelecric Project	150 MW	China Railway Engineering Co.	China Development Bank
Honduras	Patuca I	unknown	Sinohydro	China EximBank
	Patuca II	unknown	Sinohydro	China EximBank
	Patuca III	100 MW	Sinohydro	China EximBank

Source: International Rivers (2012)

TABLE 4.4. CC-LB PROJECT DATA

	Original Tender	After renegotiation
Amount in US$ billions	4.7	4
Q of turbines	11	8
Generation capacity (MW)	1,760	1,460
Ownership	Santa Cruz Province	Nation
Construction (months)	66	80

the end of 2022 and attached to electricity dispatch sales. However, work did not resume following the decision of the Supreme Court of Justice (see below). The national government already made interest payments in the amount of $61 million (*La Nación* 2017).

However, the Macri administration placed the entire project under review. Renegotiation entailed a series of changes in the original contract, with signing parties accepting to reduce the number of turbines (to eight from eleven) and downsizing the generation capacity to be installed (from 1,760 MW to 1,460 MW), but obtaining from Gezhouba the construction of the connecting distribution line from the dams' site to the interconnection at the national grid. Furthermore, under a new schedule, the dams would be completed in 80 instead of 66 months. Finally, the new agreement permitted the reduction of the original loan to $4 billion and transferred the project to the national sphere, where it previously belonged to the province of Santa Cruz.

With eight turbines and 1,460 MW of generation capacity,[26] the CC and LB project would become one of the largest hydro complexes in operation, adding 15 percent to the actual renewable generation figures and bringing renewable energy sources up to 40 percent of the total. From an economic perspective, the electricity produced by the dams would permit Argentina to substitute actual imports of diesel and liquefied natural gas. This implies $1.1 billion per year in savings, freeing public funds for alternative uses. The CC and LB dams would also generate important regional benefits, including the enlargement of the agro-productive frontier and the possibility of localizing energy-intensive industrial projects. When under construction, the project will employ more than 5,000 workers, most of them local inhabitants. Two local firms are entering into the project as Gezhouba's partners, as stipulated in the original contract: ElectroIngeniería (EI) participates in the construction phase, whereas Hidro-Cuyo will become responsible for the dams' operations and electrical and mechanical maintenance.

Initially, the project was highly criticized. Political opposition was strong, including Mauricio Macri's political party (PRO) and its Unión Cívica Radical partners in *Cambiemos*. Energy experts were also highly critical of the project, particularly when it came to economic costs associated with the transmission line (around $2.5 million, not being originally considered), but also for some technical deficiencies (i.e., inability of the national distribution system to efficiently transport the energy being generated by the dams).[27]

A large group of environmental NGOs denounced the huge environmental costs and the potential risk the hydroelectric complex could pose to the pres-

ervation of glaciers in the Argentino Lake basin. In particular, environmental groups lead by the Fundación Ambiente y Recursos Naturales (FARN) campaigned for a new, detailed, and independent environmental impact assessment (EIA),[28] as the dams "will alter the watercourse of the Santa Cruz Rivers, will turn over 50 percent of it into surface water bodies, and will clearly affect its volume and leave 47,000 hectares of our Patagonia under the water." Reaction in the national media was uneven but mostly from *La Nación*, a right-wing newspaper and now a multimedia conglomerate, which maintained a highly critical position toward the dams, including China's involvement in the project.[29] For the Macri administration, most of the critiques were solved at the renegotiation table, although the environmental conflict remains acute.

On December 21, 2016 the Supreme Court of Justice decided unanimously to suspend work on the dams until after the EIA process and a hearing were fulfilled, as required by the 1994 Law 23879, which requires a prior environmental impact assessment for the construction of national and transnational hydropower plants (FARN 2017). According to the Supreme Court, the government did not fulfill its obligations under the law. In particular, the Supreme Court asked for both an independent assessment and for the involvement of Congress, a political procedure that forces a broad majority to approve the deal. This latest requirement would certainly delay the decision, but it also would bring more actors into the debate, an objective desired by judges at the Supreme Court. The national government remains committed to keeping the project alive,[30] and expects to reinitiate works in 2018. Finally, although the EIA process was fulfilled, and the authorities decided to advance construction in October 2017, the government has yet to conduct the required public hearing.[31]

It is worth noting that for China, both the Santa Cruz dams and the Belgrano Cargas (discussed in the next section) are considered key projects and are strongly backed by the Chinese Communist Party.

The "cross default" clause included in the financial agreement signed with CDB, ICBC, and BC has become a controversial topic (FARN 2017). According to this clause and independently of the causes, if one project is being canceled (i.e. the Santa Cruz dams), the banking conglomerate automatically suspends the financing of the Belgrano Cargas.[32] In a letter sent on March 10, 2016, Chinese banks warned the Argentinean government that "delays or cancellations will result in an event of default under the KCHP Facility Agreement and will trigger the cross-default clause in the Belgrano Cargas Facility Agreement." Therefore, while the hydroelectric complex is already dependent on a proper feasibility analysis, it also depends on the receipt of funds for other infrastructure works.

CASE 2: BELGRANO CARGAS FREIGHT

In the early twentieth century, Argentina had the largest rail network in South America, financed and managed primarily by British investors (Lewis 2015). The large-scale foreign capital used to build and maintain the railroads greatly enhanced Argentina's export-dominated economy. But in 1948, Argentine President Juan Perón nationalized the railroads, initiating an era of continuous pitfalls and mismanagement. Forty years later, the Argentinean rail system was almost bankrupt. This situation opened the door to a privatization process, introduced in the 1990s by President Carlos Menem, that focused on the fiscal issues rather than on improving the system. The national railways system became divided in three different markets: public passengers in the metropolitan area, inter-urban public passengers, and freight.[33] Promised investments remained below necessities and the system was prone to accidents. The 2012 rail disaster at the Buenos Aires Once station, killing 51 people and injuring more than 700, would become a political turning point: investments were not only needed but now socially demanded.

The freight network was partitioned into six vertically integrated concessions, each for thirty years with an optional ten-year extension (Kogan and Thompson 1994).[34] As for the Belgrano line privatization, after a series of failed attempts the government finally decided, in 2006, to create a new company: SOFSE, a public-private partnership that included private companies from Argentina (Macri group, Roggio group, EMEPA), one nonrailway company from China (Sanhe Hopefull Grain & Oil), and trade union representatives, including delegates from industry (Unión Ferroviaria and La Fraternidad) and, inexplicably, a representative from the truckers' trade union (Mutual de Camioneros).[35] As the experiment failed, national authorities chose to replace this public-private partnership with a new company: Belgrano Cargas y Logística (BCyLSA), now a state-owned enterprise.[36] At the same time, the government was rescinding all concession contracts with former private operators, which led BCyLSA (or TNC, as it is commercially named) to become a combined three freight operators company (comprised of the former Belgrano, Urquiza, and San Martín lines).[37]

Despite the original interest, investment did not match the network's needs and the railway freight market remained largely underexploited. When compared to other countries in the region, the magnitude of the Argentinean freight market is almost nonexistent: 22 million tons per year as opposed to 465 in Brazil, 100 in Mexico, and 44 in Colombia.[38] By mid-2012, half of the network remained operational (almost 5,000 kilometers of the 9,892 kilometers), with railways freight sales collapsing from 1.74 million tons in 1999

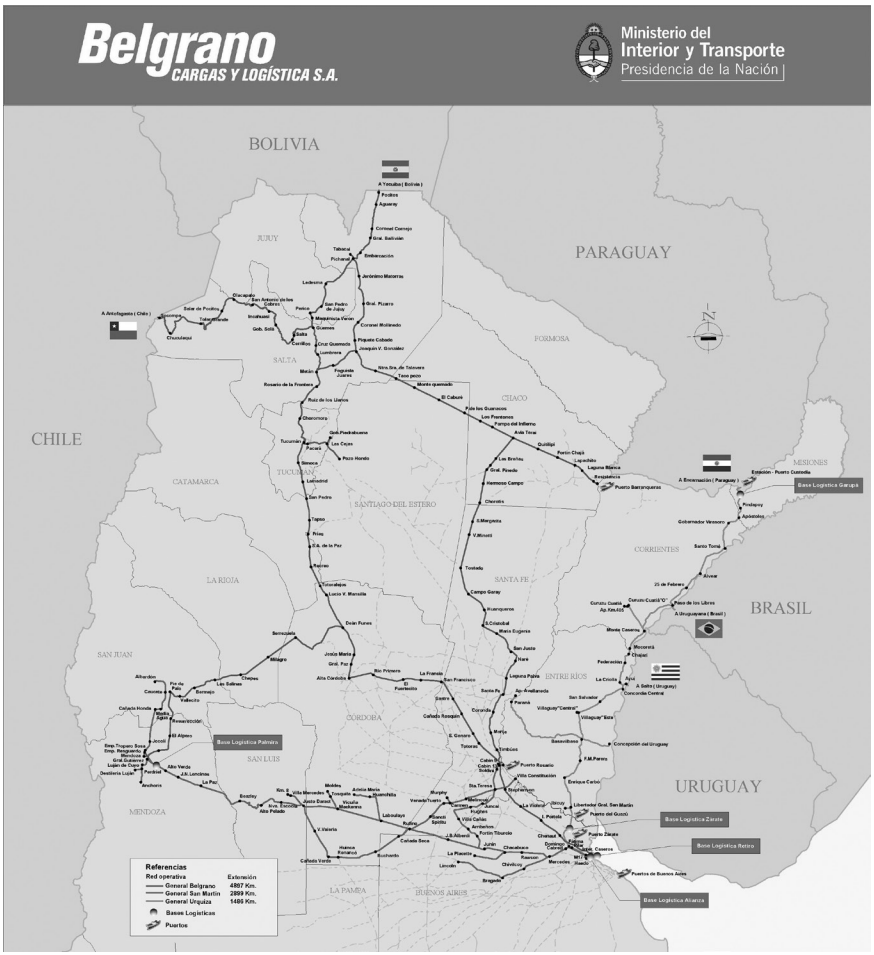

FIGURE 4.1. BCyLSA MAP

to less than 369,000 tons. For the Belgrano Cargas network, freight traffic plunged from 3.3 million tons in 1998 to 500,000 tons in 2006 (Barrow 2016). Despite the dismal perspective, these figures also reflect a huge potential for those confident in railways' future: a 100-car train unit could load about three million gallons compared to a freight of 7,865 by a large semi-truck.[39] In order to finally tackle the freight problem, Argentinean authorities began to seek alternatives to modernizing the old railways network, and China emerged as a natural partner. Hu Jintao and Néstor Kirchner signed the first memorandum of understanding in 2004, involving the railway sector.

TABLE 4.5. BCyLSA PROJECT DATA

Concept	Units	Amount (US$M)	Contract (%)	Notes
Locomotives	107	230.8	0%	Ziyang Locomotive Co., a subsidiary of China Railway Rolling Stock Corporation (CRRC). First locomotive completed in September 2016
Freight wagons	3,500	419.4	14.3%	500 arrived in October 2016
Concrete sleepers / ties and rails	2,326,140	427.4	65%	808,000 broad gauge / 1,526,140 narrow gauge
Heavy machinery, spare parts, and others		63.8	22.0%	
Freight wagons, spare parts	2,000	62	100%	Completed
Containers		6.8	0%	
Tools		21.6	0%	
TOTAL		1,235.3		

Following CFK's visit to Beijing in July 2010, the Argentinean government obtained a $10 billion loan agreement toward the development of the railway system. China North Railways was the first company to enter Argentina after signing a $20 million contract with the Argentinean government directed to supply diesel locomotives and coaches for long-distance services. In January 2013, the CFK government awarded a $546 million contract to Qingdao Sifang Locomotive & Rolling Stock, a subsidiary of China Southern Rolling (CSR), to supply 55 train sets, totaling 409 electric multiple units—cars to replace all existing trains on the Mitre and Sarmiento lines. CSR later acquired the Argentinean rolling stock manufacturer Emprendimientos Ferroviarios. Two years later, the first batch of 25 diesel multiple units (DMU) arrived in Buenos Aires (from a total of 81), as part of the upgrade of the Belgrano Sur railway order that qualified as China's biggest DMU in South America. Finally, in September 2016, the first fifty wagons for the Urquiza freight railways (a BCyLSA subsidiary line) arrived in Argentina, built by China Machinery Engineering Corporation (CMEC). In December 2013, President CFK

and CMEC CFO Zhang Chun signed a new agreement directed to revive the BCyLSA network.[40] Six months later, on the occasion of the state visit of Chinese President Xi Jinping to Buenos Aires, Argentina and China signed a $247 billion loan agreement.[41] Finally, in July 2016, Chinese authorities and the new Argentinean administration of Mauricio Macri ratified the 2013 agreement (Decree 869/16).

Operationally, the firms involved in the agreement are BCyLSA and CMEC.[42] CMEC would sell capital goods (locomotives, wagons, spare parts, etc.) as well as materials associated with public works contracts (concrete sleepers, etc.) The Chinese Sinosure Company will act as the insurance agent. Eighty-five percent of the $2.47 billion contract would be financed by a consortium of Chinese banks, with the majority (90.5 percent) granted by the CDB and the remaining by the ICBC.[43] The Argentinean government will finance the remaining 15 percent.

Funds would be shared equally between two main destinations: public works (railways renovation and reparation) and capital goods (locomotives, wagons, sleepers, etc.) On the one hand, funds going to capital goods are directed to the purchase of locomotives and wagons, as well as sleepers and other materials. In particular, the contract stipulates the shipment of 107 locomotives (40 corresponding to the Belgrano Cargas) and 3,500 wagons for TNA, to be constructed by China Railway Rolling Stock Corporation (CRRC).[44] As is usual practice for contracts involving Chinese bank funding (Brautigam 2009; Mattlin and Nojonen 2011; Sanderson and Forshyte 2013; Stanley and Fernández Alonso 2017), all capital goods to be used in the project would be coming from China (Uriburu Quintana 2016). On the other hand, railway renovation and reparation work remains the operational responsibility of TACYL-BCyLSA. Public works have already started. They comprise rail work renovation and repair totaling 1,511 kilometers divided into three main stages. The first stage will recuperate 530 kilometers of rail works at Santa Fe, Chaco, and Santiago del Estero ($380 million), estimated to be finished by the first quarter of 2018. The second stage will cover 354 kilometers of rail works at Santa Fe and Salta Provinces, initiated during 2016 and to be finished by 2019 ($280 million). Finally, the third stage is expected to start in the first quarter of 2018: 623 kilometers of rail works covering Santa Fe, Salta, Tucumán, and Jujuy Provinces ($430 million). Consequently, the government expects to transport 4,327,263 tons by 2019 (from 847,282 tons transported in 2015), a 419 percent increase.

Independently of the signed agreement, the national government is already investing in the railway in order to make two international cross-border lines operative: one connecting Argentina with Chile, and another with Bolivia. Chile and Argentina have signed a cooperation agreement some years ago, in order to take full advantage of the railway corridor connecting Salta, Argentina

TABLE 4.6. COST REDUCTION IN FREIGHT TRANSPORT AND BENEFITS TO NORTHERN PRODUCERS

		Soybean	Corn	Wheat	
FAS price	US$ / tonne	$271.80	$169.190	$157.820	
Northwest production, by type of crop	M tonnes	5.3	8	1	
Northwest production, total value	US$ M	$1,440.54	$1,353.52	$157.82	$2,951.88
		by track / at present	by train / after BCyLSA	Cost savings	(%)
Freight costs	US$ / tonne	$0.064	$0.040	$0.024	
Distance, average trip	km	830			
Transport costs, total	US$ / tonne	$53.12	$33.20	$19.92	
Soybean, total TC	US$ M	$76,521.48	$47,825.93	$28,695.56	
Corn, total TC		$71,898.98	$44,936.86	$26,962.12	
Wheat, total TC		$8,383.40	$5,239.62	$3,143.77	–37.50%
Free alongside, value (FAS) at 01/17/2017				$58,801.45	

through the Socompa border crossing to the Chilean ports of Antofagasta/Mejilllones on the Pacific. This will generate important freight transport cost reductions—up to one-third—which are particularly beneficial to Argentinean northwest producers. After eight years of inactivity, in April 2016 FERRONOR (the Chilean operator) started to use this corridor. In the north, the Argentinean-Bolivian corridor has already obtained a $354 million investment loan and financed 59 percent by FONPLATA (a multilateral agency), while the remaining 41 percent is being granted by Salta and Jujuy Provinces.

The BCyLSA Project might help transform the freight transport in Argentina, particularly benefiting northwest producers, including large and active transnational agrobusiness companies (Dreyfus, ACA, COFCO, Renova, and Ledesma). Regional producers would benefit directly as freight railway rates are cheaper. According to a recent analysis from Rosario Chamber of Commerce economists J. Calzada and A. Sesé, freight costs will be reduced

by $19.92 per ton, which equals a 25 to 30 percent reduction in export taxes. This reduction might turn northwest production of soybean, wheat and corn market profitable, thereby increasing traditional exports from nontraditional regions. While stakeholders are directly benefited by an important reduction in transport costs, the replacement would also generate important environmental benefits, as railways reduce transport fuel intensity.

From an institutional perspective, a series of legal amendments now favor stakeholders' participation—in particular, the bypassing of an open access clause in the new Railways Law (27.132/2015), allowing third-party companies to use the railway system. This legal change permits agro-business firms to manage their logistics, and even to invest in wagons, grain storage, and other facilities' connections, as well as secondary rail lines. This legal modification has led private companies to announce a $200 billion investment plan, as transport coordination help dramatically reduce their freight costs (*La Nación* 2016c). One of the key projects relates to the construction of a private railway extension, which would permit TNA to arrive at Timbues port (Santa Fe province), which is not actually connected by train. The objective behind this is to increase railways freight transportation by six—from 1 to 6 million tons.

As public works are completed, and the system once again becomes operative, BCyLSA would be able to join neighboring countries (Brazil, Chile, Paraguay, Uruguay, and Bolivia) and operate a strategic route connecting the Atlantic and the Pacific Oceans. Investment needed to put the project into operations is large, but not exorbitant. Furthermore, in contrast to the Two-Ocean project being endorsed by Peru and Brazil, the one connecting Bolivia, Chile, and Peru might be economically more convenient, henceforth attracting international investors besides China. Argentina enters into this project through the C14 corridor, which will enhance the whole regional railway hub by interconnecting northern producers from Brazil, Peru, and Bolivia with the Atlantic route (Rosario, Buenos Aires or Montevideo). From an economic perspective, this alternative route connecting the two oceans presents lower costs (as rails are already sunk, thus there is no need to expropriate new lands) than the Brazil-Peru competing project and no environmental side effects. The contract might signal China's involvement in Latin America freight market, although its relevance goes far beyond pure business because of the strategic relevance it has for China: a pathway to Pacific ports.

Finally, the September 2016 trip of the Argentinean minister of transportation Guillermo Dietrich to Asia, including China and Japan, should be noted. Macri's administration promised an ambitious infrastructure package, totaling US $10 billion in railways in the metropolitan area, as well as $12.5 billion in routes, $1.92 million in ports, and $1.4 million in airport infrastructure. Argentina seeks to attract investors, install plants, and increase technol-

ogy transfers; therefore, Chinese involvement could be advantageous for this development effort.[45]

CONCLUSION

The Argentina-China relationship evolved from one centered on trade to one of a multidimensional character. The original and uneven commercial pattern (raw materials for manufacturing goods) is now being expanded as capital flows continue to gain relevance. If all infrastructure works are completed and projected public works finally undertaken, China's presence in Argentina is due to increase. As discussed in this chapter, the relationship goes beyond economic flows and stocks, as it has evolved toward a complex contractual setting. This institutional web, comprising a large list of general and sectoral agreements, could become less beneficial than expected. Argentina's perpetual institutional weaknesses and recurrent economic urgencies might put the South American country at the mercy of some yet-unknown challenges. If past events are indicative of a pattern, Chinese negotiators have already demonstrated their toughness (Donaubauer et al. 2015; Uriburu Quintana 2017).[46] Although communicated as a win-win association, Argentina's main political actors know they face an asymmetric relationship.[47]

This context makes the infrastructure package interesting from a political economy perspective. As already observed, the incoming government of Mauricio Macri was highly critical of China, and before his election, the presidential candidate set his renegotiation ambitions too high.[48] Not only did Macri commit to review and possibly veto the dams' contract, but he also expressed technical concerns over the general agreement signed by the CFK administration (Wang 2016). The new administration also committed to transform the inherited economic model, from one based on consumption to an investment-led growth model. Once in power, the Cambiemos coalition started to seduce foreign investors. It is surprising that China would be the first to come into the picture by bringing financial assistance in order to float the Argentinean peso. Suddenly, some voices within the Cambiemos coalition began to timidly question the Santa Cruz dams project, one of the key projects arranged on the occasion of President Xi's visit to Argentina.

China's "implicit conditionality" is another factor to consider. As previously noted, the likelihood of China suspending all infrastructure project financing was real and considered by Argentinean authorities (included the Supreme Court) when analyzing the dam project's feasibility. As observed by Mattlin and Nojonen (2011), this type of conditionality was also exerted over other sovereign countries (e.g. Indonesia) in the recent past.

Henceforth, the infrastructure package will finally position China as a leading player in Argentina, not just as a trade partner but also as key stakeholder, for its increasing investor role. As Argentina's ambassador to China Diego Guelar noted, "China is our principal energy partner and now, without a doubt, our [number one] financial partner."[49]

NOTES

This paper is an expanded version of a report presented at the conference "China, United States, and Latin America: New Actors and Changing Relations" and the 6th Chinese Youth Forum on Latin American Studies, which took place at Renmin University, Beijing, October 20–21, 2016.

1. It took China more than twenty years to become a net foreign investor, from the early 1990s to 2014.

2. Presidents Mauricio Macri and Xi Jingping met twice in 2016: first in April in New York, on the occasion of the Global Nuclear Security Summit at the UN headquarters, and in September in Hangzhou, Zhejian Province during the 2016 G20 Summit.

3. As for the global commerce, China's top exports are computers ($208B), broadcasting equipment ($157B), telephones ($107B), integrated circuits ($61.5B), and office machine parts ($46.9B), using the 1992 revision of the HS (Harmonized System) classification. Its top imports are crude petroleum ($205B), integrated circuits ($135B), iron ore ($73.4B), gold ($63.9B), and cars ($55.2B). In the case of Argentina, its global top exports are soybean meal ($11.9B), delivery trucks ($3.88B), soybeans ($3.84B), corn ($3.7B), and soybean oil ($3.62B), using the 1992 revision of the HS classification. Its top imports are petroleum gas ($5.55B), refined petroleum ($3.92B), cars ($3.5B), vehicle parts ($3.21B) and telephones ($2.03B) (see https://atlas.media.mit.edu/en/profile/country/arg/).

4. Brazil is Argentina's main partner, with 20 percent of exports going to the neighbor country ($14 billion), and 22 percent of imports ($14.3 billion). All data is from https://atlas.media.mit.edu/en/profile/country/arg/

5. Other natural resource-related exports include tobacco, leather, poultry, wool, wine, groundnut oil, barley, whey, mollusks, and to a lesser extent, minerals (Source INDEC, data for 2012).

6. See http://www.bcra.gob.ar/PublicacionesEstadisticas/Inversiones_directas.asp.

7. Capital roundtrip introduces huge statistical problems. As an example, consider the Chen and Pérez Ludueña (2013) report, which unmasks inflows not covered by official statistics, associated with investment in the Argentinean oil and gas sector. Yue (2013) considers investment figures to be lower, placing Argentina fifth among Latin American countries.

8. China Global Investment Tracker, FDI Markets, and Thomson Reuters.

9. For example, the Industrial and Commercial Bank of China's entry into Argentina's financial market after paying $600 million for the acquisition of a controlling stake in Standard Bank Argentina, whose 103 branches represent a broad market penetration.

10. China National Offshore Oil Company (CNOOC) paid $3.3B in 2010 for the purchase of 50 percent of the capital from the local oil firm Bridas. The same year, SINOPEC paid $2.4B for the assets of Occidental Petroleum in Argentina.

11. Three factors could be the alternative for access: acquiring existing assets, engaging in contracts tied to government finance, and participating in competitive tenders. The second and third routes are not officially considered FDI, as the piece of infrastructure built is not kept as an asset by the foreign company, but is treated as an export of goods and services. However, these are often important ways for Chinese and other international companies to bring capital and technical knowledge into host economies.

12. According to Jorge Castro, head of Argentina's Strategic Planning Institute (*China Daily* 2016).

13. This second deal permitted the BCRA to obtain additional funds for a maximum of $11 billion, acting "as support to implement its financial, exchange and monetary policies" (Bloomberg, 2014).

14. In particular, China differentiates agreements in three broad groups: (simple) partners, strategic partners, and comprehensive strategic partners.

15. As observed by Strüver (2016), although they are similar, strategic (signed in 2004) and comprehensive strategic partnership (signed in 2014) agreements are different. In particular, the latter recognize "a broader agenda and [a] more formalized mechanism of cooperation."

16. During an official visit to Beijing in May 2016, Argentinean foreign minister Susana Malcorra reaffirmed the "State-level commitment between Argentina and China with respect to their long-term comprehensive strategic partnership" (Ministry of Foreign Affairs and Worship: https://www.mrecic.gov.ar/en/ministry-foreign-affairs-and-worship).

17. During the presidential race, Mauricio Macri said that he would review and possibly veto the multimillion-dollar contracts signed in 2015 by the outgoing Peronist administration with China.

18. Argentinean transport minister Guillermo Dietrich headed an official visit to China in September 2016, observing investments in the local railway system (BNAmericas 2016). Rogelio Frigerio, minister of the Interior, Public Works, and Housing, also made a trip to China to invite Chinese public works firms and financial entities to participate in housing, hydraulic works, and dam construction (Infobae 2017).

19. In 2015, Chinese enterprises signed 3,987 EPC (engineering, procurement, and construction) projects in countries along the OBOR. The total value of these contracts

reached $92.6 billion and accounted for 44.1 percent of China's newly signed overseas EPC projects worldwide in the corresponding period (EY 2016).

20. In order to fill the gap, the government should be investing $27 billion per year.

21. According to Rogelio Frigerio, the government expects to increase the infrastructure budget to six percent of the GDP (BNAmericas 2016).

22. Those of national jurisdiction are included at the current national budget, making Chinese firm lead projects the main recipients of Argentinean public works (*Cronista* 2017).

23. A study conducted by the former Division of Energy of Argentina (or SE, its Spanish acronym) and EBISA Company assessed thirty hydroelectric projects, taking into consideration economic, technical, and environmental aspects. From a technical perspective, CC dam ranked eleventh and LB twenty-first, whereas from an economic viewpoint both are certainly far from being a national priority (23rd and 25th, respectively).

24. The winning consortium's offer resulted in 25 percent below the official budget, and 23 percent lower than the second lowest bidder.

25. Banks advanced some funds during 2015. The first loan disbursement on January 2015 ($287 million) was used for initial roadwork, bridges, and worker facilities in the camp but also for payments in advance for the fabrication of generation equipment in China. The second payment came in July 2015 ($150 million).

26. The CC hydroelectric station will produce 1,140 MW, while the LB dam will produce 600 MW.

27. In particular, the quality of the 500 kV grid running from Choele Choel at Rio Negro province to Rio Gallegos in Santa Cruz province. According to the Argentine Energy Institute, the interconnected system would be unable to transport all the energy produced in Santa Cruz.

28. The FARN is one of the leading voices against the dams. Others include a large collective of environmental ONGs still opposed to the project, such as Fundación Vida Silvestre, Greenpeace, Banco de Bosques, Aves Argentinas, Fundación Flora y Fauna Argentina, and Fundación Naturaleza para el Futuro.

29. This newspaper launched two critical editorials against the project (*La Nación* 2016a and 2016b).

30. "A logical and natural step to consider taking, given the relevance of the project" (D. Redondo, secretary of strategic energy planning at the Ministry of Energy and Mining).

31. In order to restate works, and after the Supreme Court decision, the government should call for a public audience (*Clarín* 2017).

32. The funding for the CC-LB project was agreed on in 2014 when Chinese president Xi Jinping visited Argentina and signed a number of agreements, including a $2.09 billion agreement to renovate the Belgrano Cargas freight rail system and a $11 billion currency swap to bolster the Central Bank reserves (*Buenos Aires Herald* 2015).

33. Trains at the metropolitan area were privatized (seven different concessions),

interurban trains transferred to the provinces, and freight trains remained under national jurisdiction while they were transferred to private hands. However, the Belgrano Cargas remained a state-owned enterprise.

34. The former single network was divided into six different corridors, including the Bahía Blanca-Rosario corridor, 5,300 km (FEPSA); the Urquiza line, 2,700 km (Ferrocarril Mesopotámico); the Mitre line, 4,800 km (NCA); the San Martín line, plus a portion of the Sarmiento line, 4,700 km (Buenos Aires al Pacífico; BAP); the remainder of the Roca line (without the Bahía Blanca-Rosario package), 5,700 km (Ferrosur Roca); and the Belgrano line, 6,400 km.

35. China's Sanhe Hopefull Grain & Oil and Grupo Macri from Argentina were the main shareholders.

36. Since 2016 Belgrano Cargas became commercially named as TRENES ARGENTINOS CARGAS (TNC) although legally it remains under the BCyLSA.

37. BCyLSA 9,282-kilometer railway—Belgrano 4,897 kilometers; San Martín 2,899 kilometers; and Urquiza 1,486 kilometers—traverses through 17 provinces: Salta, Jujuy, Chaco, Santiago del Estero, Formosa, Entre Ríos, Corrientes, Misiones, San Juan, San Luis, Córdoba, La Rioja, Tucumán, Santa Fe, Catamarca, Mendoza, Buenos Aires, and the autonomous city of Buenos Aires—the country's capital. It reaches five international borders: Brazil (Paso de los Libres / Uruguayana), Uruguay (Concordia/Salto), Paraguay (Posadas/Encarnación), Bolivia (Pocitos/Yacuiba), and Chile (Socompa/Antofagasta).

38. During 2016, railways freight grew by 20 percent—1,012,609 tons (Argentine Chamber of Railways Freight Entreprises/Camara Empresaria de Ferrocarriles de Carga).

39. In the case of Argentina, there exists a US $6 per ton cost differential in favor of trains over trucks. This differential harms local producers, who are forced to pay excessive transport and logistics costs in comparison to other producers with access to cargo.

40. The Argentinean Ministry of Interior and Transport and China Machinery Engineering Corporation signed and ratified this commercial contract, Decree 1090/14.

41. Ratified under Decree 1071/14, this financial agreement was signed by the Argentinean Ministry of Economy and Public Finance, the China Development Bank Corporation, and the Industrial and Commercial Bank of China Limited.

42. CMEC was built on its predecessor China National Machinery & Equipment Import & Export Corporation through an overall reorganization. On December 21, 2012, CMEC was listed on the Hong Kong Stock Exchange. Founded in 1978, CMEC is the first large engineering and trade company in China, and a member of the China National Machinery Industry Corporation. It is a conglomerate taking engineering contracting as its core business and integrating trade, R&D, and international service. CMEC is forming part of the China National Machinery Industry Corporation (Sinomach) group of companies, included among the Fortune 500 list.

43. ICBC, actually between the top ten global financial institutions, bought 80 percent of shares of Standard Bank Argentina in 2012.

44. After forty years, new locomotives would be rolling in the Argentinean railway system. The first two broad-gauge locomotives were delivered in mid-December and arrived to Buenos Aires in February. The first shipment with 230 new wagons had arrived by December (130 for the San Martín line and 100 been directed to the Belgrano line). Locomotives will be used on the San Martín route from Buenos Aires via Rosario to Córdoba and Mendoza.

45. CRRC rushed to exhibit its interest to open railways maintenance workshop facilities in Argentina—to build locomotives, wagons, and trains.

46. According to private sources from the agrobusiness sector, China has blocked oilseed exports coming from Argentina in retaliation for the government's decision to open the dam's project to renegotiation (LPO 2016).

47. As an example, consider SCJN statement "the magnitude of the project requires a profound reflection, scientifically proven, socially participatory and value-balanced."

48. Due to a political and environmental compromise during the presidential campaign, the new administration put the whole project under review, forcing the postponement of the Santa Cruz dams' preliminary phase. Argentinean president Macri allegedly promised conservationist Douglas Tompkins's widow Cristine McDivitt in a meeting at the Government House that he would do everything in his power to make sure the dams do not become a reality. At the same time, the president of China Development Bank visited the job site of the CC/LB dams, accompanied by Party standing committee member and vice president of CGGC (China Gezhouba Group Corporation) Ren Jianguo, Chairman of CGGC's No. 1 Engineering Company Chen Gang, and President of CGGC International Lyu Zexiang. Soon, those at the national government realized that contracts should be honored. They also became aware of the "cross-default" clause introduced by the original contract, linking the dam project to the Belgrano Carga railway project (*Ambito Financiero* 2016).

49. Quoted from the Argentinean state news service TELAM (http://www.hydroworld.com/articles/2016/08/china-loans-argentina-us-25-billion-for-energy-projects-including-hydroelectric.html).

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5

CHINESE INFRASTRUCTURE PROJECTS IN ADVANCED INDUSTRIES

The Atucha III Nuclear Power Reactor in Argentina

Ravi Madhavan, Thomas G. Rawski, and Qingfeng Tian

INTRODUCTION

The nature of the economic relationship between China and Latin America and the Caribbean is changing rapidly as their respective economic and technological interests evolve. In particular, Chinese export incentives have changed in response to the national drive for industrial upgrading, prioritizing infrastructure export projects in advanced industries. Although Chinese infrastructure exports still include many conventional construction projects, such as roads and stadiums, we are now beginning to see more examples of higher value added projects such as high-speed rail and nuclear power plants (NPP). In this chapter, we focus on one example of this shift, the involvement of the China National Nuclear Corporation (CNNC) in Argentina's planned Atucha III NPP project.

In our assessment, this project presents four interesting features that make it worth studying in depth. First, NPP construction involves a level of technological and managerial complexity, and a resulting economic and strategic significance, that put it in a class of its own. A typical NPP project costs several billion dollars, takes a minimum of six to seven years to complete, and involves many actors representing industry, government, and regulators. Because NPPs involve many different underlying specialties, such as reactor design, construction, control systems, fuel fabrication, and a plethora of engineering services, as well as finance and management, their construction calls for an ecosystem of specialized actors and, on the part of the prime contractor, deep systems integration skills (including complex project management) (IAEA 2006; Metzler

and Steinfeld 2013). Further, NPP exports are tools for geopolitical influence to a greater degree than the construction of roads and stadiums (Stratfor Assessment 2015). Given the long timelines and extensive high-level government interactions necessary for construction and operation, NPP exporters gain the opportunity for long-term relationship building with the host nations.

Second, overseas construction of NPPs is a relatively new activity for Chinese enterprises. Although a nuclear state since the 1950s and a civil nuclear entrant in the 1970s, China's determined effort to achieve scale and leadership in NPPs began only in 2010. After initial forays into the nearshore Pakistani market, it was in 2014 that NPP exports became an established goal for the Chinese nuclear industry (Madhavan, Rawski, and Tian 2017).

Third, unlike Pakistan, Argentina is not a newcomer to NPPs, with three reactors operating since 1974, 1983, and 2014, respectively, as well as a local nuclear supply chain and a high degree of local design expertise. This is a critical factor that will elevate the need for CNNC to learn how to integrate the local skill base into its project, a radical departure from the current Chinese model of vertically integrated project exports.

Fourth, China's role in the Atucha III project is primarily as a financier and supplier of equipment and services, with technology coming from Candu Energy (Canada) and with Nucleoeléctrica Argentina SA (NASA) as the designer, architect-engineer, builder, and operator. Such a model calls for significant new learning on CNNC's part as it requires a different approach that focuses on financing and interacting with multiple actors from other nations and assimilating their technologies. At the same time, from Argentina's perspective, Atucha III promises an opportunity to build the entire set of capabilities needed for large-scale NPP construction, filling in the complementary skills and experience that have been lacking in a country that already has some basic nuclear engineering capability. These four features make the Atucha III project an example of an emerging new model for Chinese infrastructure exports in Latin America and the Caribbean, as well as more broadly.

PROJECT DESCRIPTION AND STATUS

The Atucha III project comprises a planned Pressurized Heavy Water (PHWR) reactor at Atucha, incorporating the Candu design. NASA will be the designer, architect-engineer, builder and operator, thus making the Argentinean entity both customer and prime contractor (World Nuclear Association 2016). CNNC, which operates two similar units at Qinshan (China), will provide the bulk of the equipment and technical services; it was also initially announced that China would provide long-term financing for eighteen years at no more

than 6.5 percent interest. Total investment was estimated at almost $6 billion (Global Construction Review 2015). CNNC's Qinshan Phase III units (678 MWe net) will be the reference design. Candu Energy will be a subcontractor to CNNC. The framework agreement was signed in July 2014 by the Argentine and Chinese presidents, and a commercial framework contract was signed in September between NASA and CNNC. The technical and commercial contracts were signed in November 2015. Local content was estimated to be about 70 percent.

At the same time as the July 2014 framework agreement, the two presidents signed another agreement covering Chinese-Argentinean cooperation in further reactor building. In February 2015, the Argentinean federal planning minister, president of China's National Energy Administration, and vice president of CNNC signed a cooperation agreement to jointly build a Pressurized Light Water Reactor (PLWR) based on Chinese reactor technology. Although initially based on CNNC's ACP1000 design, it was subsequently changed to the patriotically titled Hualong One (China Dragon One) design, an amalgam of rival designs from CNNC and another Chinese vendor, China General Nuclear (CGN) (Madhavan, Rawski, and Tian 2017). China will supply the enriched fuel. Despite the use of the Chinese reactor design, NASA will act as the architect-engineer for the project. The agreement states the intention to achieve the maximum local content in terms of materials and services, through the transfer of technology to Argentine companies, including the manufacturing of components and fuel fabrication. Between 50 percent and 70 percent of components and 100 percent of the civil works for the reactors will be local. Foreign inputs will be limited to locally unavailable components and engineering services. The agreement also guarantees that China will supply enriched uranium and fuel assemblies throughout the life of the plant. The reactor is estimated to cost $7 billion. Further, the stated intent is that Argentina will eventually become a Latin American value-added partner, supplying neighboring countries with nuclear reactors incorporating Chinese technology, equipment and services—effectively a distribution partner for CNNC. In November 2015, CNNC and NASA signed the framework agreement for the project and a commercial contract and financing agreement were anticipated by the end of 2016 (World Nuclear Association 2016).

CURRENT STATUS

The presidential agreements referenced above were signed during Cristina Kirchner's presidency, which ended in December 2015, giving way to President

Mauricio Macri's administration. The change in administration led to some delay and uncertainty. Initially scheduled for December 2016, the next set of high-level agreements was postponed (Nuclear Engineering International 2016). Although there were sporadic reports of continuing contact regarding financing and contracting, there was little further news of visible high-level endorsement; indeed, in early 2017 there were reports of some layoffs at the Atucha III site (Viglianco 2017).

However, President Macri's May 2017 visit to Beijing resulted in agreements for China "to supply Argentina with two nuclear power reactors—one a Candu pressurized heavy water reactor . . . the other a Hualong One pressurized water reactor" (World Nuclear News 2017). Argentine approval of two Chinese-financed hydroelectric projects (Reuters 2017) removed a possible obstacle arising from reported Chinese threats to "pull out of the plans for the nuclear plants" in the absence of progress toward approval of the hydroelectric projects (Gutman 2017).

HISTORY AND EVOLUTION OF ARGENTINE NPP CAPABILITY

Similar to China, Argentina has a long history of nuclear development, beginning with the acquisition of its first research reactor from the United States under the Atoms for Peace program in 1958 (CIA 1982). Within a decade or so, Argentina had designed and built four additional research reactors. Argentina established its National Atomic Energy Commission (Comisión Nacional de Energía Atómica; CNEA) in 1950, but nuclear power efforts were launched only in 1964. By the time a Siemens design was selected for its first NPP in 1965, Argentina's capability had developed sufficiently to fully participate in its construction, with some of the electromechanical equipment, materials, civil engineering, and labor being locally sourced. By the time Atucha I was completed, CNEA had approximately 600 nuclear scientists and 1,000 professional technicians (CIA 1982). Although the tumultuous Perón period led to some loss of this scientific capability through the out-migration of skilled scientists, Argentina has subsequently sustained this capability.

As of 2017, Argentina's operational NPP fleet consists of three reactors (see table 5.1). About one-tenth of Argentina's electricity is generated from nuclear sources, but government plans call for boosting this to 15–18 percent. A firm policy preference for natural uranium fuel (to save on uranium enrichment costs) predisposed Argentina to heavy water reactors, leading to the construction of German and Canadian PHWRs (Siemens and Candu designs, respectively). Argentina operates five uranium mines and a single uranium purifi-

TABLE 5.1. ARGENTINA'S NPP FLEET

Unit Name	Type	Status	Location	Capacity (MW)	First Grid Connection
Atucha I	PHWR	Operational	Lima	335	1974
Embalse	PHWR	Operational	Cordoba	600	1983
Atucha II	PHWR	Operational	Lima	692	2014
CAREM25	PLWR	Under Construction	Lima	25	
Atucha III	PHWR	Planned	Lima	745	2025?
Unnamed	PLWR	Possible	Undisclosed	1,150	

Notes: PHWR—Pressurized Heavy Water Reactor, using unenriched uranium as fuel and heavy water as coolant and moderator, e.g., the CANDU design.
PLWR—Pressurized Light Water Reactor, using enriched uranium as fuel and ordinary water as coolant and moderator, e.g., the Westinghouse AP1000 or Hualong One designs.

cation plant (Baez 2015). A locally designed reactor prototype, CAREM-25, is under construction, demonstrating a definite shift toward Light Water designs.

Evidence of Argentine capability in the nuclear sector includes the following:

- Canada's Candu Energy established a technology transfer agreement as early as 1967, which has led to significant local capability.
- For the Siemens reactor Atucha II, which was connected to the grid in 2014, local content is reported to be 90 percent.
- A local supply chain for PHWRs exists (World News Association 2016).

It is interesting to note that a key indicator of Argentina's nuclear capability is its extensive research reactor expertise. As figure 5.1 shows, Argentina has built six research reactors for domestic use, and exported five to Peru, Algeria, Egypt, and Australia. This is significant when considering China's proposed partnership—in Atucha III, they have a partner who clearly has basic technological capability, significant supply chain capability, civil engineering expertise, and a well-trained nuclear labor force. An interesting research question that emerges from this capability perspective is: what is the "mobility barrier" that separates research reactor capability from NPP capability at scale? Arguably, the missing pieces are large-scale design (NPP reactors being larger

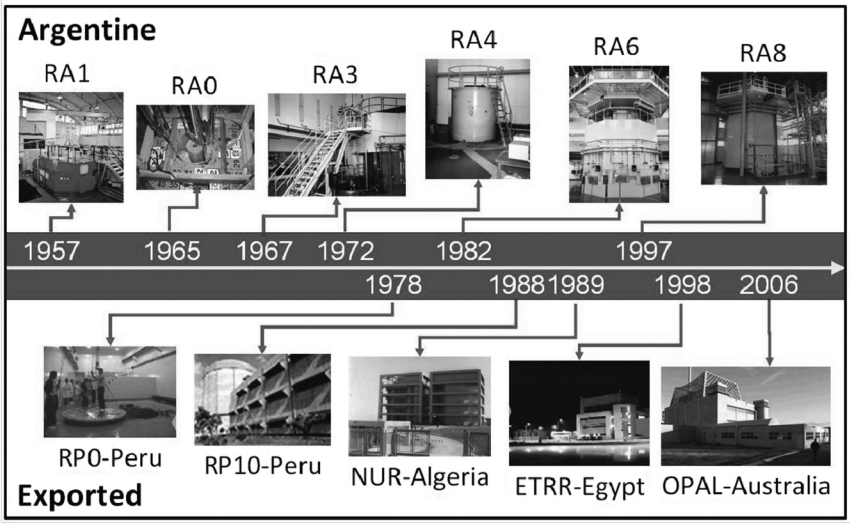

FIGURE 5.1. RESEARCH AND RADIO ISOTOPE PRODUCTION REACTORS BUILT IN ARGENTINA. SOURCE: CNEA (NATIONAL ATOMIC ENERGY COMMISSION), STRATEGIC PLAN, 2010-2019.

and more complex than research reactors), management (systems integration, engineering management, and safety culture in design and manufacturing), and capital. Thus, a key question for Argentina might be how those missing pieces can be assembled into a complete set of NPP construction capabilities. In this context, Atucha III will provide NASA with its first experience as the design authority and architect engineer for an entire commercial-scale NPP project (Baez 2015).

CHINESE NPP EXPORT INITIATIVE

China is in the midst of an ambitious expansion of its own nuclear fleet (Madhavan, Rawski, and Tian 2017). Of the sixty nuclear power reactors under construction worldwide in 2017, China accounts for twenty, by far the largest share (IAEA 2017). Twenty-six years after the Qinshan (Zhejiang) nuclear facility entered production in 1991, the People's Republic not only operates a fleet of thirty-seven nuclear plants and hosts fully one-third of global nuclear construction projects, but it also boasts an extensive supply chain for nuclear

technology and equipment, stands on the brink of commercializing its own Hualong One reactor design, and is forcefully reshaping the global market for nuclear project management.

CHINA'S NUCLEAR GOING OUT

China sees nuclear power as "a nexus of clean energy, economic incentives, and international prestige" (Tiezzi 2014). In 2014, the National Energy Administration director Wu Xinxiong outlined the Chinese goal of becoming a world leader in nuclear power (Chen 2014). This ambition has propelled a strong push to enter the world civil nuclear market. China's nuclear advance builds on an already strong international presence in conventional power systems and equipment. China's emergence as the world's largest producer and consumer of electric power and of power-related equipment, coupled with Beijing's "Go Outward" and "One Belt One Road" campaigns promoting overseas direct investment on the part of (especially state-controlled) Chinese companies, has prompted rapid expansion into global markets related to conventional electricity. Formally announced in 2013, One Belt One Road was initially a plan for infrastructure exports along two regional routes—the ancient Silk Road from China through central Asia and the Middle East to Europe, and the other a maritime belt linking China to Southeast Asia and East Africa. Since then, the scope of the Belt and Road initiative has grown to include projects as far afield as New Zealand, Great Britain, and even the Arctic, with sixty-five countries listed as part of the initiative (Hancock 2017). Along with the subsequent launch of the Asian Infrastructure Investment Bank, the Belt and Road initiative is clearly intended to boost Chinese participation in global infrastructure investment. Argentina has joined both initiatives (CCTV 2017).

Accordingly, Chinese engineering firms have become a major force in global energy markets. Annual exports of steam generating boilers, for example, exceeded $1.5 billion between 2009 and 2013, years in which no other country's exports reached that figure; indeed, only South Korea's annual exports reached $1 billion, and then only in 2011 and 2012 (Ueno, Yanagi, and Nakano 2014). Sinohydro has become "the world's dominant dam builder," apparently controlling "50 percent of the global market for hydropower contracts" (Brosshard 2014). The State Grid Corporation of China has major investments in Australia, Brazil, the Philippines, and Portugal.

Following a lengthy period in which China's involvement in overseas nuclear operations was limited to Pakistan, China's nuclear export ambitions

received a major boost from a flurry of activity in 2014. Multiple successes involving two of China's three big nuclear operators represent a major breakthrough for China's efforts to penetrate global nuclear markets. Chinese participation in the UK's Hinkley project is particularly important as an endorsement of Chinese nuclear capability. Contracts and ongoing negotiations in Argentina, Romania, and Turkey constitute further evidence of global penetration. Ongoing discussions and cooperation agreements elsewhere, particularly South Africa, may lead to further international project agreements in the near future.

As these new prospects unfold, two developments on the home front promise to further expand China's international nuclear opportunities. The announcement of official certification for the Hualong One design jointly developed by CNNC and its rival CGN creates a standardized technology platform that can now be offered to potential customers both within and beyond China's borders. At the same time, a unique joint venture may accelerate the rate at which components of China's domestic nuclear supply chain enter overseas markets. SNPTC-Westinghouse Nuclear Power Technical Services (Beijing) Company (SWSC), a joint venture between Westinghouse Electric and China's State Nuclear Power Technology Corporation, seeks to help Chinese nuclear suppliers obtain certification as international nuclear vendors serving international projects using Westinghouse's AP1000 technology and its Chinese derivatives.

China's recent economic slowdown, which has created massive excess capacity throughout China's energy sector, provides Chinese nuclear suppliers with powerful incentives to push into global markets. The presence of SWSC—a company explicitly designed to assist such efforts—coupled with the potential costs of failing to match efforts by close rivals to penetrate overseas markets—seems likely to push domestic nuclear suppliers to satisfy international requirements for quality and safety certification—the best possible outcome for assuring a supply of high-quality equipment to both domestic and overseas nuclear projects.

We see Chinese entry as a disruptive force in the global civil nuclear market. Taking advantage of lower costs and potential scale economies, China's entry might appear to be a low-end disruption from the viewpoints of the industry's incumbents. Since construction costs typically account for about 60 percent of building a reactor, China's experience and scale in construction (as against technology, equipment and services) will no doubt be an advantage. However, given the inherent complexity and global footprint of the nuclear supply chain, as well as rising wages and high internal transport costs, there may be limits to how much China can undercut incumbents. China's most

potent business weapon might well be its ability to provide vendor financing to customer nations that might otherwise be unable to afford a nuclear power plant. Another factor will be political flexibility; that is, a greater willingness to deal with nations that might have a difficult time getting US, French, or Japanese authorities to allow their firms to acquire sensitive dual-use technologies. In combination, deep pockets and regulatory flexibility may well work to make China's reactors appealing to prior non-consumers such as emerging nations in Asia, Africa, and South America.

For technologically complex and potentially dangerous products like large-scale passenger aircraft and nuclear power plants, we anticipate exceptionally narrow windows located at the upper extremity of the quality space (Sutton 1998). Historically, the global market for nuclear power has behaved in this exact fashion. After absorbing and then developing their own adaptations of technology originally imported from the US, it has been French, Japanese, and Korean firms that have emerged as full-fledged global competitors, but only after lengthy periods of maturation during which their firms' skill and experience gradually came to match that of Westinghouse and other original innovators.

China's recent success in capturing overseas contracts, its accumulation of experience in erecting and operating the AP1000 reactors that currently occupy the leading edge Generation III nuclear technology, and its growing capacity in nuclear design and equipment manufacture point to a surprising outcome: the emergence of a two-tiered market for nuclear power plants, with American, French and South Korean firms occupying the upper and Chinese (and possibly Russian) rivals populating the lower tier of a global price-quality ladder.

Although this differentiated (i.e., two-tiered) market remains in its infancy, the characteristics of the second, lower tier are already visible. They include (1) "good enough" levels of quality, longevity, and durability; (2) low costs; and (3) project financing. As an illustration, South Korea's success in winning the United Arab Emirates contract for four reactors in 2009 was based on having a "good and safe enough" technology, assurance on construction costs, long-term commitment to operate the plants and attractive commercial terms (Bakr and Mee-young 2009). Chinese success in winning nuclear business (e.g., the UK Hinkley project) and in obtaining certification (AP1000 start-up data accepted by the US Nuclear Regulatory Commission; SWSC clients qualifying for international project participation) from national authorities in advanced countries with stringent safety requirements is crucial to China's overseas nuclear ambitions. For it is these accomplishments that will persuade decision makers in countries like South Africa that China's nuclear companies can be trusted to build (and in some cases operate) nuclear installations with adequate levels of reliability.

The daunting cost of nuclear facilities creates problems even for buyers in advanced countries. This gives a big advantage to vendors whose tenders incorporate offers of financial backing from their home governments. China's "Go Outward" and "Belt and Road" policies include generous financial support for large-scale overseas infrastructure projects (Uneo, Yanagi, and Nakano 2014 discuss Chinese financing for exports of conventional power equipment), and also provide full payment for training and preliminary cooperative efforts that increase the prospects for future reactor sales. Financing can be crucial to buyer decisions: Japanese nuclear firms have warned Japan's government that their industry's viability is critically dependent upon Tokyo's willingness to finance overseas nuclear projects (interview with Japanese executive, May 2014).

Nuclear facilities embody multiple layers of safety systems—for example, protection against a direct hit from a large-scale passenger aircraft—that are hugely expensive. If Chinese alternatives are perceived as safe and reliable, potential buyers, especially in low- and middle-income countries, will enthusiastically welcome the cost advantages available from Chinese equipment-makers and construction specialists. Potential cost savings are substantial: equipment typically occupies 50 percent of nuclear project budgets (Huge Market 2013). A Chinese nuclear specialist indicated that, with the exception of materials-intensive devices, Chinese firms can typically undercut the costs of international vendors of nuclear-related equipment by approximately one-third (interview, May 2014; interviews with Western nuclear executives indicate that Chinese firms' limited capacity to "get it right the first time" may undercut this cost advantage.).

A NEW MODEL FOR CHINESE INFRASTRUCTURE EXPORT

Here we propose that Atucha III represents an emerging new model of infrastructure export for China, one that will call for significant new learning on the part of Chinese nuclear enterprises. Simultaneously, it poses an intriguing example of an infrastructure project where China appears willing to embrace an industrial upgrading pathway for its counterpart, inasmuch as Argentina stands to gain valuable skills that will round out its own nuclear capability.

NUCLEAR POWER AS A SPECIAL CLASS OF INFRASTRUCTURE EXPORT

China is already well established as an exporter of infrastructure to developing nations worldwide. One account estimates global infrastructure investment re-

quirements at $3.7 trillion annually, driven by growing populations and urbanization in the developing world, and by aging infrastructure in the developed world (World Economic Forum 2014). Yet only about $2.7 trillion goes into infrastructure investment, leaving a significant investment deficit. A lion's share of the unmet investment need is in the energy sector. In this opportunity-rich space, NPP exports remain a compelling target, estimated at $500–$740 billion over the next decade (US Department of Commerce 2016). In addition, two special features accentuate the strategic significance of NPP exports.

Geostrategic Influence

As our introduction suggests, NPP exports are different from the construction of roads and stadiums in that they are a more potent tool for geopolitical influence (Stratfor Assessment 2015). Given the long timelines and extensive high-level government interactions necessary for construction and operation, NPP exporters gain the opportunity for long-term relationship building with the host nations. Especially with the emergence of the Build-Own-Operate model, in which the exporter not only constructs the plant but operates it on a long-term contract basis, effectively recouping its investment via selling electricity, such projects potentially offer an "influence base" akin to embassies or military bases (Global Risk Insights 2015). From this perspective, it is by no means a stretch to see the emerging rivalry between Russia and China in NPP exports as having geostrategic overtones. With the retrenchment of Western and Japanese nuclear firms weakened by their current financial difficulties, Russia's Rosatom and the Chinese nuclear companies are expected to gain more momentum in the marketplace.

Systems Integration

The NPP business is a complex, multitechnology endeavor that is capital-intensive and long-cycle. As figure 5.2 illustrates, the nuclear power development cycle faces challenges in three areas: policy development, infrastructure, and project implementation. Successful design, fabrication, and operation of nuclear power plants requires substantial expertise in systems integration, an amalgam of skills that evolve over time and with the accumulation of experience. Systems integration involves bringing together high-technology components, subsystems, software, skills, knowledge, engineers, managers, and technicians to produce complex products and services in competition with

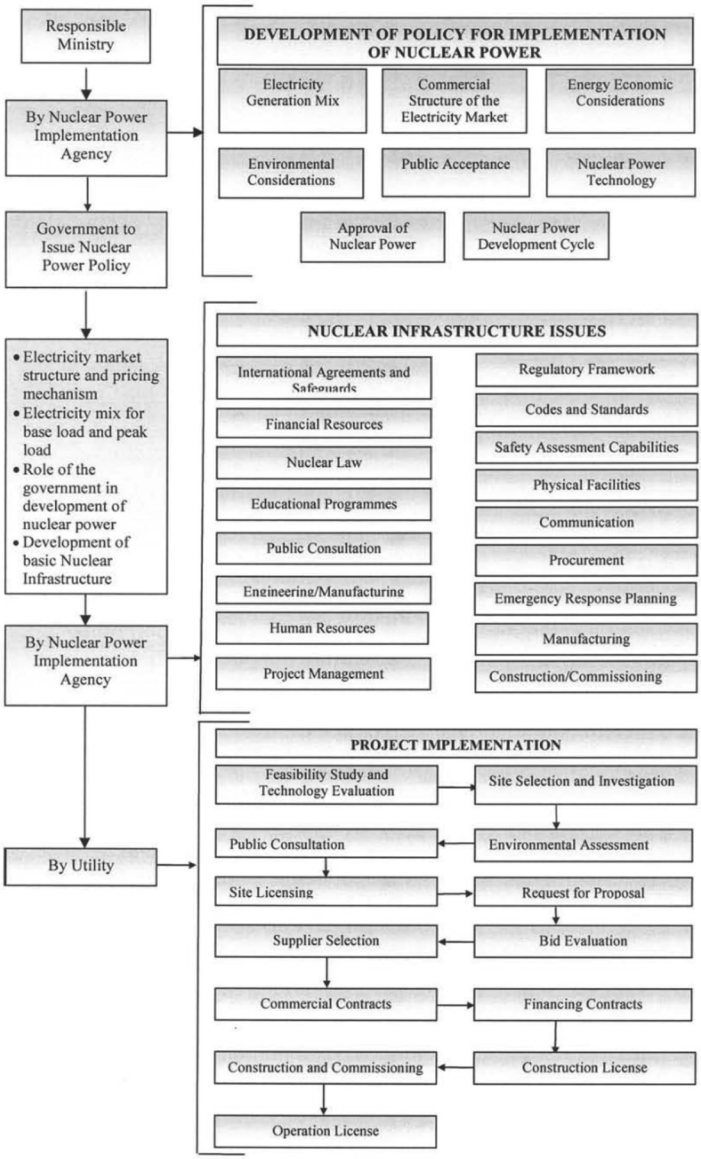

FIGURE 5.2. NUCLEAR POWER DEVELOPMENT CYCLE. SOURCE: IAEA (2006).

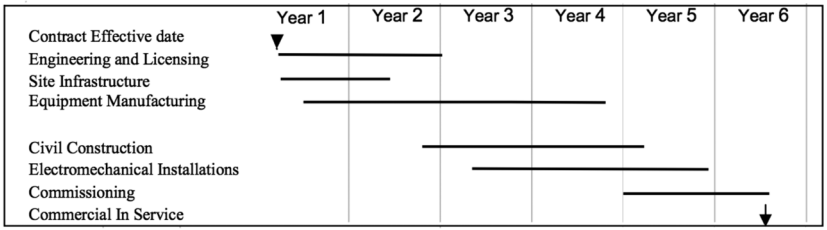

FIGURE 5.3. STAGES OF NPP PROJECT ACTIVITIES AFTER CONTRACT EFFECTIVE DATE. SOURCE: IAEA (2006).

other suppliers (Hobday, Davies, and Prencipe 2005). The more complex, high technology, and costly the product, the more significant systems integration becomes to the firm's success. NPP projects are also long-cycle projects, typically taking six to seven years from the awarding of contracts to grid connection (see figure 5.3). "First of a Kind" projects that involve new reactor designs, such as the very first AP1000 reactor in Sanmen, China, often take longer.

Systems integration capabilities tend to cluster in advanced economies, particularly in networks of private companies (e.g., Toyota, Siemens, Westinghouse, Boeing, General Electric) and public agencies (e.g., NASA) that specialize in extremely complex design and production processes. China and other "follower nations" typically have limited capacity in this area. Latecomer suppliers of complex capital goods face multiple barriers: poorly developed national systems of innovation, separation from international networks of suppliers and users, underdeveloped local supply chains, lack of experience in coordinating networks of suppliers, and lack of trust among industry actors (Kiamehr, Hobday, and Kermanshah 2014).

Plan-era legacies represent a further potential obstacle. Gholz links Soviet decline to failures of systems integration: "design bureaus were poorly integrated with manufacturing plants, so they rarely considered the challenges of actually building their high-end products, and the rigidity of the plan often prevented simple substitution of components or materials . . . with equivalents (or even better inputs) from another domestic supplier" (2007, 634). China's planned economy displayed similar shortcomings; Chinese experts continue to criticize the tendency of manufacturers to put quantity, speed, and cost considerations ahead of quality control—an unfortunate legacy of the socialist past. Political rivalry and bureaucratic infighting among the (state-owned) firms and official agencies responsible for nuclear operations, as well as reports of capability gaps in IT, instrumentation, and controls indicate that Chinese nuclear efforts may encounter similar difficulties.

With its growing mastery of complex products and rapid expansion of both domestic and transnational supply chains, however, China's recent development may have ameliorated these disadvantages. Since domestic demand is a key driver of capability creation (Kiamehr, Hobday, and Kermanshah 2014), China's prospects for developing expertise in systems integration seem unusually bright.

CHINA'S CURRENT INFRASTRUCTURE EXPORT MODEL

Many analyses focus on features of China's current management model, as evidenced in its infrastructure export projects. Using China's construction projects in Africa as an instructive case study (Dollar 2016), we may draw out two key features of the Chinese infrastructure export model: internalization and interaction modularity, both of which limit multinational learning for the Chinese companies and positive spillovers to the host country.

Internalization

Chinese infrastructure export projects tend to maximize the value-added share of Chinese participants (Dollar 2016). Concessional loans stipulate that projects must be executed by Chinese contractors, who are themselves selected via a non-competitive political allocation process. The lion's share of goods and services must come from China. This overriding objective applies even to labor used in overseas projects, with the construction companies bringing thousands of their own laborers to the host nation. This internalization policy is consistent with the long-standing Chinese insistence on import substitution. For example, China used visa restrictions adroitly to accelerate the training of Chinese workers by foreign investors. We see the other side of the coin in the Chinese infrastructure export model: while China hosted one foreigner for each $1.9 million of foreign investment, one Chinese worker migrated to Africa for every $32,000 of Chinese investment (Dollar 2016). As a result, Chinese construction companies have been seen as crowding out local rivals.

Interaction Modularity

An important consequence of internalization is that the projects tend to limit the task interactions between the Chinese project participants and their local

hosts. Since most suppliers and partners are themselves Chinese, such projects provide limited opportunities for learning how to manage teams of multinational partners. Further, Chinese investment rarely engages with the host nation's governance environment. Chinese operators tend to passively accept (and sometimes ignore) local rules and regulations (Dollar 2016). From a corporate learning perspective, this prevents Chinese managers from engaging with the local population and institutions.

NEW SKILL SETS REPRESENTED IN ATUCHA III

Against this background, we anticipate that the Atucha III project will call for a radically different set of skills from Chinese enterprises, and thus potentially trigger an intriguing new evolution in Chinese management. Three key elements of this new skill set are externalization, soft managerial skills, and managing the duality of capability diffusion. Atucha III also promises to be a significant leap for the Argentine nuclear enterprise, potentially triggering an evolution in three areas: scaling up nuclear capability, technology learning, and the maturing of lead systems integrator capability.

China

Atucha III potentially signals the need for the Chinese infrastructure export model to embrace externalization. China's role in the Atucha III project is primarily as a financier and supplier of equipment and services, with technology coming from Candu Energy and with NASA as the designer, architect-engineer, builder, and operator. Thus, CNNC will be working with a skilled host partner as well as a technology partner with advanced nuclear experience. The follow-on Hualong One project will also likely involve significant local input, for example in civil construction. Eventually, Argentina could act as a value-added partner for Chinese nuclear design, supplying other Latin American nations with nuclear technology and services built around the Chinese design. In such a scenario, the Chinese NPP company model is seen as drawing closer to that of the system integrator and technology licensor model more commonly associated with Western companies (e.g., Westinghouse) (Metzler and Steinfeld 2013).

Over the last decade, Chinese nuclear enterprises have built up significant experience with import substitution, including upgrading Chinese suppliers' capabilities to work with foreign technologies and systems. Notwithstand-

ing this supplier integration experience, Atucha represents a sharp departure from the internalization model described earlier, and will call for a huge amount of managerial learning on the part of Chinese enterprises. Atucha III will also highlight the need for Chinese enterprises to rapidly learn an entire suite of soft managerial skills, including the effective management of multinational partnerships and engaging constructively with local stakeholders. Managing networks of partners from different nations poses many challenges stemming from cultural and institutional differences, and calls for skilled governance design, multilingual information systems and careful day-to-day management (see, e.g., Kale and Sigh 2009).

On the stakeholder front, lead systems integrators in other countries need to actively shape the conversation. In the NPP sector, for instance, the purpose of public consultation is not merely to "sell" the project, but to develop adequate responses to legitimate public concerns and thereby contribute to better technology (IAEA 2006). This mind-set goes hand in hand with the development and deployment of soft power.

Finally, Atucha III highlights the need for China to manage the duality of capability diffusion. China is in the process of assimilating and adapting foreign NPP technology (Madhavan, Rawski, and Tian 2017). Specifically in Atucha III, CNNC will be learning about the Candu technology from its Canadian partner. At the same time, CNNC will be assisting the local partner, NASA, to learn significant new capabilities from China. With the follow-on Hualong One project, which envisages that Argentina will become a technology partner for Latin America, this challenge will become even greater. Chinese firms will have to learn the delicate art of sharing technology with foreign partners, accepting the risk that partners will master it eventually and perhaps pose significant competitive risks in the future.

China is very familiar with this dynamic, but so far only from the other side of the table. Western industry leaders, such as Westinghouse, have accepted this reality for decades; for example, South Korea, today a key rival in NPP exports, used early Westinghouse partnerships to systematically build significant NPP capability (see table 5.2). Many companies in advanced industries, such as Boeing in aircraft, have concluded that the only realistic response is to spread technology influence and capture immediate value through such partnerships, while staying nimbly ahead by constantly innovating. (Recall the SWSC partnership set up by Westinghouse in China, explicitly designed to accelerate local skill development.) This mind-set is different from a prevention-focused internalization approach, and will call for a deep transformation in Chinese managerial culture.

TABLE 5.2. MILESTONES IN SOUTH KOREA'S NPP CAPABILITY ABSORPTION

1987	Localization of CANDU Fuel
1988	Localization of PWR Fuel
1995	Indigenous design and construction of HANARO Research Reactor
1996	Development of the Korean Standard Nuclear Power Plant (KSNP)
2001	Development of innovative therapeutic radiopharmaceutical, 'Milican Inj'
2002	Completion of Basic Design of SMART
2003	Development of Advanced Zirconium Alloy Fuel Cladding
2005	Construction of ATLAS
2006	Completion of KALIMER-600 conceptual design
2009	Bid Winner for the Construction of a Research Reactor in Jordan
2010	Construction of Cold Neutron Research Facility
2011	Development of High Power Proton Linear Accelerator
2014	KAERI won a bid to upgrade a Dutch experimental reactor
2015	SMART Partnership between Korea and Saudi Arabia

Source: Korea Atomic Research Institute (n.d.).

Argentina

On the host nation's side, too, Atucha III promises a significant leap. Here, we see learning potential in three key areas: scaling up nuclear capability, technology learning, and the maturing of lead systems integrator capability. First, NASA will learn valuable lessons about the scaling up of its nuclear capability. Recall that Argentina already has significant technology experience, including the design, construction, and export of research reactors as well as the design and domestic construction of a small NPP reactor. However, there is a big jump from there to constructing a large NPP with its multibillion dollar price tag, complex technology, rigorous performance, and safety standards, and a network of multinational partners. The Atucha III project will allow, indeed force, NASA to rapidly learn how to do all of this (Baez 2015). Second, Argentine nuclear companies will also be able to accelerate their technology learning. Even as existing PHWRs are updated (Rudistein 2017), the Atucha site will see the completion of the small (indigenous) PLWRs and the initiation of the new Candu model. As Argentina moves from its exclusive reliance on heavy water reactors, it will also need to build up capabilities in uranium enrichment and fuel reprocessing. Finally, Atucha III provides NASA with a valuable opportunity to practice the demanding lead systems integrator role (Baez 2015). This skill set is arguably the missing piece in Argentina's tool set—complementing

the existing skills in reactor design, equipment supply, and construction with the lead integrator role will be valuable, but also require significant learning in areas such as complex project management and risk management.

CONCLUSIONS AND KEY TAKEAWAYS

Atucha III represents a radical departure from the default Chinese model of vertically integrated infrastructure projects with minimal local content. Whereas "industrial offsets" that call for integrating substantial local content are not unusual in advanced industries like NPPs and aircraft, the managerial model of embracing and incorporating local content is new to Chinese exporters. Successful implementation of this project, with its emphasis on integrating major contributions by both partners, may strengthen China's capacity to compete for overseas infrastructure business in a growing array of industries and venues. At the same time, it represents a compelling opportunity for Argentina to take its nuclear capability to the next level. As the project unfolds, these incentives should set up an intriguing "learning race" between the two partners.

NOTE

The authors acknowledge financial support from the University of Pittsburgh's University Center for International Studies. Enrique Dussel Peters and other participants provided valuable comments at the October 2016 Conference on Chinese Infrastructure Projects in Latin America and the Caribbean. The authors also thank Tom Nguyen (Global Crossing Solutions) for valuable insights and suggestions from the nuclear industry perspective.

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6

CHINESE INFRASTRUCTURE PROJECTS IN BRAZIL

Two Case Studies

Celio Hiratuka

INTRODUCTION

Economic relations between Brazil and China have expanded at a rapid pace since the beginning of the twenty-first century. At first, the deepening of relations was focused on the trade dimension, but over time has advanced and matured to involve other areas, such as financing and foreign direct investment. In this context, infrastructure projects have shown growth, and come to play an increasingly important role, highlighted by the two governments as a fundamental aspect for strengthening economic bilateral relations.

ECONOMIC RELATIONS BETWEEN BRAZIL AND CHINA

The advancement of economic relations between Brazil and China began with trade flows. China accounted for about 2 percent in both Brazilian exports and imports in 2000. Since then, the growth of bilateral trade relations was exponential and China has become an even more important partner after the 2007/2008 international financial crisis. In 2009 China became the main destination for Brazilian exports, reaching 13.2 percent of the total. In imports, China has become the largest trading partner in 2012, when it arose to represent 15.3 percent of the total imported by Brazil. In 2015, Brazil's exports to China reached US $35.6 billion and accounted for 18.6 percent of the total,

while imports reached US $30.7 billion and represented 17.9 percent of Brazilian purchases from abroad.

Despite the extraordinary growth of bilateral trade, it is important to highlight that the observed trade pattern has raised concerns on the part of several analysts. Barbosa (2014), Jenkins et al. (2015), and Hiratuka and Sarti (2016) called attention to the high degree of concentration of Brazilian exports to China in primary commodities, at the same time that imports from China include a diversified set of manufactured products, from labor-intensive to technology-intensive products. Jenkins et al. (2015) and Hiratuka and Sarti (2016) also point out how the rapid penetration of Chinese exports in the Brazilian market of manufactured products has raised concerns regarding the survival of national industrial producers. These are threatened with displacement in both the domestic market and important third markets for Brazilian exports such as Mercosur (Hiratuka 2016). Those concerned include not only academics but also business associations such as Fiesp, which have pleaded for actions by the Brazilian government against Chinese competition, often perceived as unfair for anti-dumping and other measures.

Other dimensions, such as finance and foreign direct investment (FDI), have gained more relevance since 2009. With regard to financial flows, Ray and Gallagher (2015) show significant volumes of financing provided by Chinese state-owned banks for projects in Latin America, especially by the China Development Bank and China Ex-Im Bank. The 2014 level, US $22.1 billion, is the highest record except for the post-crisis year of 2010. Of this total, US $8.6 billion was directed to Brazil.

Regarding FDI, Aciolly et al. (2011) and Santos and Milan (2014) emphasize that the observed increase in Chinese investments in Brazil should be analyzed by taking into account the explicit strategy of the Chinese government to stimulate the internationalization of its companies, especially the state-owned enterprises, from the beginning of 2000. Among the reasons for increasing their investments abroad the following stand out: 1) the quest to guarantee sources of raw materials; 2) the search for new markets as a way to advance the competitiveness of manufactured products; 3) the need to acquire technological knowledge abroad; and 4) the pursuit to increase political influence abroad, especially in the Asian region. More recently, with the slowdown in Chinese growth, the search for foreign markets, through exports or investments, has intensified.

Data on FDI in Brazil shows a significant increase in investments from China. The Brazilian Central Bank's information points to more significant FDI inflows since 2009, but still with sharp fluctuations. However, as shown

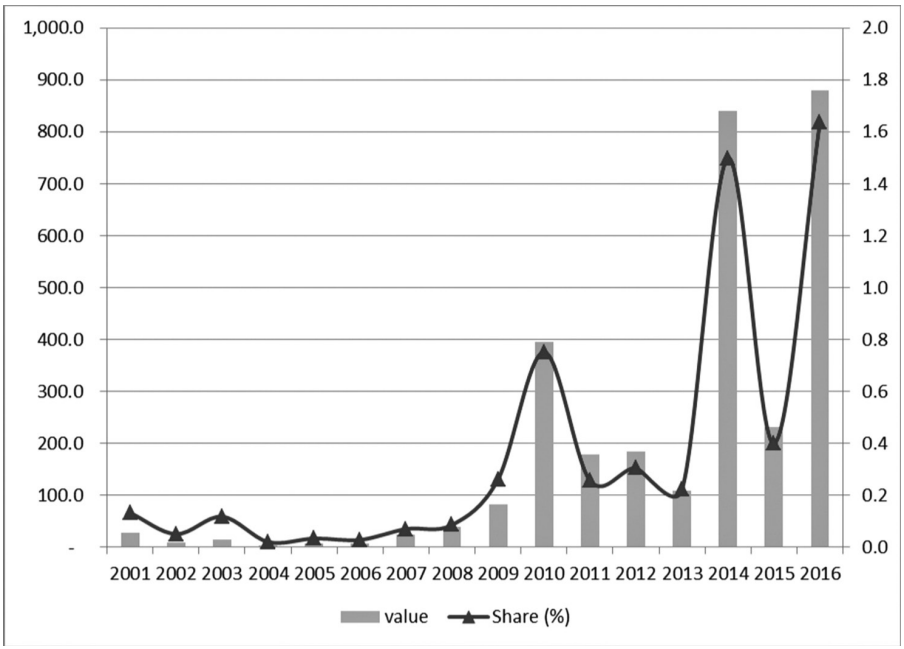

FIGURE 6.1. CHINESE FDI IN BRAZIL (US$ MILLION AND SHARE OF TOTAL).
SOURCE: BRAZILIAN CENTRAL BANK.

in figure 6.1, the Chinese investment in Brazil surpassed 1 percent of the total in 2014 and 2016 (the year that recorded the highest value of the series, with almost US $900 million), despite the growth in percentage points.

Information on the stock of FDI obtained from the Brazilian Central Bank data shows that the investments made by China in the Brazilian economy in 2014 reached US $12 billion and represented 2.3 percent of Brazilian FDI stock. Of that amount, 75 percent was concentrated in the mining sector. The financial and insurance sector appears as secondary in importance (11.1 percent), followed by manufacturing (5 percent), electricity and gas (4 percent), and retail and wholesale trade (3.8 percent). In terms of share of total stock received by Brazil, the highlights are the mining sector (16.4 percent) and electricity and gas (2.1 percent).

Data on announced greenfield investments and mergers and acquisitions show larger figures than those recorded by FDI flows.[1] Despite the high figures, there is the same upward trend since 2009, with the highest values recorded in 2010 and 2011 (figure 6.2).

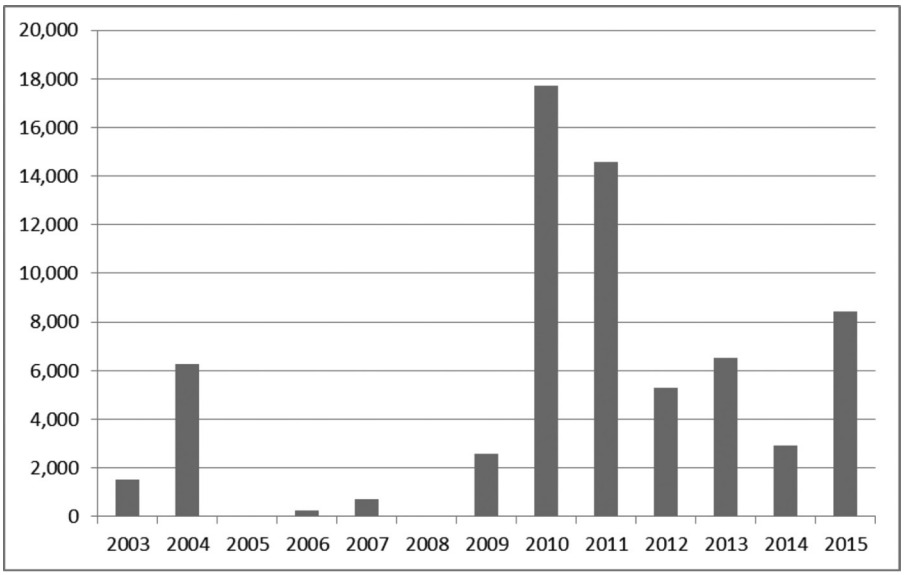

FIGURE 6.2. CHINESE INVESTMENTS ANNOUNCED IN BRAZIL (VALUE OF TRANSACTIONS IN US$ MILLION). SOURCE: MONITOR DE LA OFDI CHINA EN ALC/RED ALC-CHINA AND CHINA GLOBAL INVESTMENT TRACKER.

The analysis carried out by the Brazil-China Business Council (Conselho Empresarial Brasil China, CEBC) (2016) also points out some important changes over the most recent years in the profile of Chinese investments made in Brazil. To a large extent these changes reflect the slowdown in the Chinese domestic market and the quest to offset idle capacity in various sectors, as well as the One Belt One Road strategy. Compared to the previously observed high concentration in the natural resources sector, the information analyzed by CEBC for the period 2014/2015 shows greater de-concentration, with investment projects increasingly being directed to sectors such as industry, finance and services, and infrastructure.

One of the important features of recent Chinese investments in Brazil is its diversification and increased participation of the infrastructure sector, especially in the energy area. If at first, investments in mining and quarrying were more important (and still appear as the most relevant in 2014; see table 6.1), the volume and the interest of the Chinese in the infrastructure area has increased.

TABLE 6.1. CHINESE FDI STOCKS IN BRAZIL IN 2014

	Value	Share in Total	Share in Brazilian Total
ISIC session	US$ million	%	%
Agriculture, forestry, and fishing	5	0.0	0.1
Mining and quarrying	9,237	75.6	16.4
Manufacturing	607	5.0	0.3
Electricity, gas	485	4.0	2.1
Construction	2	0.0	0.0
Wholesale and retail trade	470	3.8	1.3
Transportation and storage	1	0.0	0.0
Accommodation and food service	0	0.0	0.0
Information and communication	35	0.3	0.1
Financial and insurance activities	1,352	11.1	1.4
Other	24	0.2	0.1
Total	12,219	100.0	2.3

Source: Brazilian Central Bank.

INFRASTRUCTURE IN BRAZIL AND THE ROLE OF CHINESE PROJECTS

As noted earlier, relations between Brazil and China have changed considerably in recent years, involving increasingly new dimensions. Among these dimensions, investments in infrastructure received the most attention. However, it is important to highlight that this emphasis is associated with an expectation created by a particular moment and that it should be relativized for a deeper analysis. The evaluation of possible advances, successes, or failures should not be influenced by the expectations created, but rather, as far as possible, by the actual results.

The rising expectations regarding Chinese infrastructure investments in Brazil are primarily associated with a deliberate effort by the Chinese gov-

ernment to establish a diplomatic and economic rapprochement with Latin American countries. The launch of the "White Paper on China's Policy for Latin America and the Caribbean" in 2008 (Chinese Central Government 2008) highlighted the general principle of a cooperative relationship, based on the idea of peaceful coexistence and mutual gains between regions with similar degrees of development. This general principle became more concrete in 2014 and 2015. As already pointed out, Chinese investments abroad gained momentum not only to guarantee the supply of raw materials, but also to compensate for the deceleration of the domestic market.

In 2014, Chinese President Xi Jinping visited Argentina, Brazil, Cuba, and Venezuela. Just in Brazil, fifty-six cooperation agreements were signed, mostly in infrastructure. In early 2015, China hosted the first China-CELAC Forum, in which the 2015–2019 China-LAC cooperation plan was approved, and China pledged to increase trade with Latin America to US $500 billion and to invest upwards of US $250 billion until 2025.

Of the thirteen thematic areas of work contained in the plan, two are related to infrastructure. Area IV (Infrastructure) highlights the objective of promoting cooperation in transport, ports, roads and storage facilities, business logistics, information and communication technologies, broadband, radio and television, agriculture, energy and electricity, housing and development. Area V (Energy and Natural Resources) highlights the possibilities of cooperation in research and technological development in the sustainable use of natural resources, and investment in energy, including electric generation, high and ultra-high voltage electrical transmission, planning and development of water resources, biomass and solar, geothermal and wind energy (CEPAL 2015).

The year 2015 also witnessed the visit by Chinese Prime Minister Li Keqiang to Brazil, during which several cooperation agreements and a memorandum for the creation of a bilateral investment fund for infrastructure that could reach $50 billion were announced.[2] The Twin Oceanic Railroad, analyzed in more detail below, was one of the main projects discussed.

On the Brazilian side, the interest is related to the fact that investments in infrastructure present a chronic problem for the Brazilian economy. Since the debt crisis of the 1980s, through the period of privatization and market reforms of the 1990s, Brazil has faced difficulties in sustaining investments in infrastructure. In fact, due to high capital volumes and long maturation periods, infrastructure projects require the mobilization of resources by the public and private sectors and the capacity to detail projects, carry out feasibility studies and environmental impacts, and combine sources of funding that could not be adequately addressed in the context of the fiscal and financial crisis of the last twenty years of the past century.

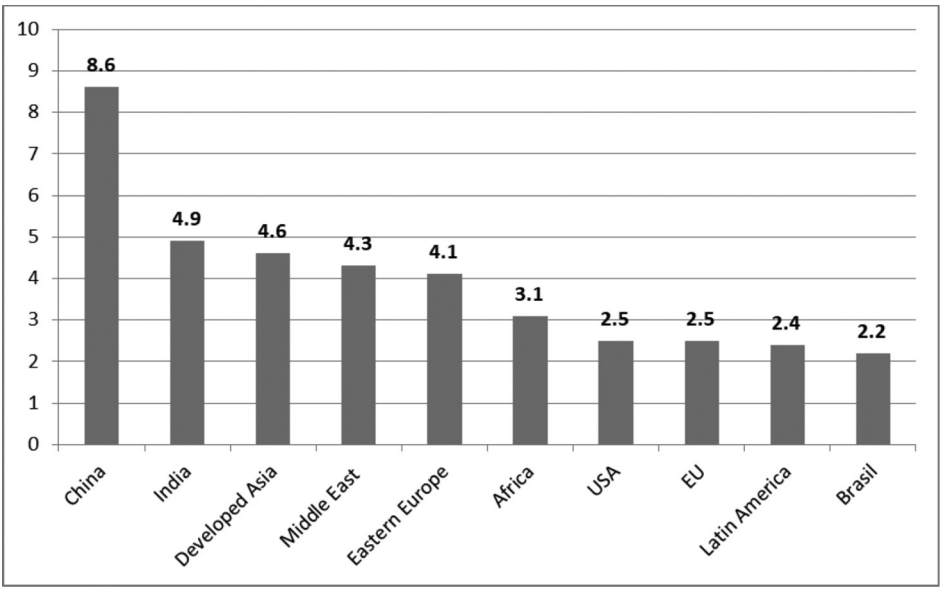

FIGURE 6.3. INFRASTRUCTURE PROJECTS AS A PERCENTAGE OF GDP, AVERAGE 1992–2013. SOURCE: MACKYNSEY GLOBAL INSTITUTE (2016).

Even during the 2000s, the brief cycle of recovery of public and private investments and the search for the revitalization of the capacity to articulate infrastructure projects advanced slowly.

As shown in figure 6.3, from 1992 to 2013, the percentage of Brazilian infrastructure projects was well below other developing countries such as China and India, developed countries that already have an advanced infrastructure such as the United States, and even below the average of Latin America.

Frischtak and Noronha (2016) estimate investments in infrastructure for 2014 similar to those reported by the Mackynsey Global Institute (2016) in figure 6.3. But table 6.2 also shows a significant drop in investments in 2015. The total volume was 21 percent lower than in 2014, reaching 1.7 percent of GDP. In sectoral terms, the energy sector was the only one in which there was expansion, given the positive effects of the fourth cycle of tariffs review promoted by National Agency of Electric Energy (ANEEL), which made the conditions more attractive to investors (Junqueira 2017).

The data in table 6.2 also points to a specific element that can be added to the structural problem of the deficiency of infrastructure in Brazil. With the depletion of the growth cycle favored by the commodities boom and by the

TABLE 6.2. INVESTMENTS IN INFRASTRUCTURE IN BRAZIL IN 2014 AND 2015 (IN R$ BILLION AND PERCENTAGE OF GDP)

Sector	2014	% of GDP	2015	% of GDP	Change 15/14
Transport	53.1	0.9	36.1	0.6	–32.0
Airports	4.7	0.1	4.3	0.1	–8.0
Ports	3.8	0.1	2.4	0.0	–37.0
Roads	26.1	0.5	19.5	0.3	–25.0
Railroad	9	0.2	5.1	0.1	–43.0
Urban transportation	8.9	0.2	4.6	0.1	–48.0
Water transportation	0.7	0.0	0.2	—	–69.0
Energy	37.5	0.7	40.3	0.7	8.0
Water, sewage, and sanitation	11	0.2	7.8	0.1	–29.0
Telecommunication	29.3	0.5	18.7	0.3	–36.0
Total	130.9	2.3	102.9	1.7	–21.0

Source: Frischtack and Noronha (2016).

expansion of domestic demand associated with the expansion of labor market and credit, President Dilma Roussef's economic policy managers sought to find new vectors to recover growth. In this context, the effort to create positive expectations about a resumption of investment was considered strategic. The possibility of having more Chinese investments was an important lever in this strategy and the Brazilian government placed a large emphasis on bilateral relations and on the Chinese investment announcements. To illustrate this issue, we can highlight the launch of the second phase of the Integrated Logistics Program in June 2015, with a set of projects that could be implemented based on concessions to the private sector. At that time, potential investment of R $198.4 billion was announced in the transportation infrastructure sector, and the Brazilian section of the Bi-Oceanic Railway was the most ambitious project.

In this context, the possibilities of receiving more Chinese investments in infrastructure projects are met with high expectations by the government and the Brazilian business sector, especially with the recent signs that investments in infrastructure could be a key element in strengthening relations between the two countries.

Considering the value of announced Chinese infrastructure projects, it is estimated to have been US $16.6 billion between 2010 and 2015, with great

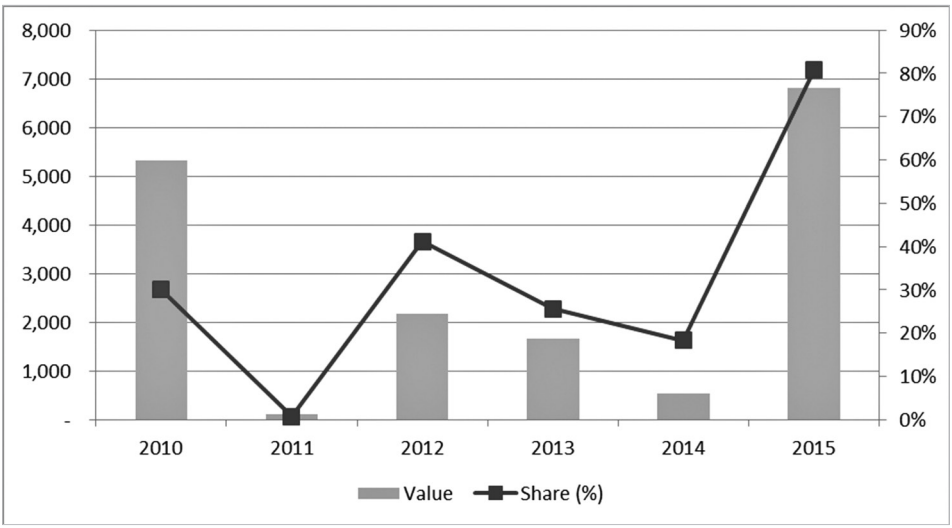

FIGURE 6.4. CHINESE INFRASTRUCTURE PROJECTS IN BRAZIL (VALUE OF TRANSACTIONS IN US$ MILLION AND SHARE PERCENTAGE IN THE TOTAL). SOURCE: MONITOR DE LA OFDI CHINA EN ALC/RED ALC-CHINA AND CHINA GLOBAL INVESTMENT TRACKER.

fluctuations over the years. The highest value was observed in 2015 (almost US $7 billion), when the share in the total announced investments reached almost 80 percent. It is worth noting that of the total amount, most went to the energy sector (except oil), due to the large investments made by State Grid and China Three Gorges.

The following sections analyze two specific infrastructure projects. The first one is the Belo Monte Transmission Lines. The second one, the Twin Ocean Railroad Project, remains in the planning stage, and there is much uncertainty about its feasibility.

BELO MONTE ENERGY TRANSMISSION LINES TO THE SOUTHEAST

One of the areas where Chinese firms have shown greater interest is the Brazilian electric sector. Since 2010, State Grid and China Three Gorges (CTG) have made significant investments, consolidating their position as leading companies in the Brazilian electric sector.

CTG is a state-owned Chinese group formed for the construction and operation of the world's largest hydroelectric power plant—Three Gorges—in

China. After a rapid expansion, the group became the largest producer of hydroelectric power in the world and has a presence in forty countries, with an installed capacity of about 100 GW in 2014. In that same year, it had US $10.1 billion in operating income and profits that reached US $3.3 billion. It also operates in the wind and solar energy sectors.

CTG began operating in Brazil in 2013, with a focus on power generation. Through several acquisitions, the company achieved a prominent position. Just in 2015, the company acquired the power generating firm Triunfo (US $490 million) and won the bidding auction of hydroelectric utilities Jupiá and Ilha Solteira (US $3.7 billion), reaching a total generating capacity of 6 GW. In 2016, the company announced an agreement to buy Duke Energy (US $1.2 billion), increasing its generation capacity to 8.2 GW and consolidating its position as one of the largest operators in Brazil in the sector.

State Grid is another Chinese state-owned group, founded in 2002 and responsible for operating a large part of China's electric transmission. Its expansion in China leveraged its international growth and positioned it as the world's largest infrastructure company and the second largest company in the Fortune 2016 ranking. It has reached US $329.8 billion in revenues, US $10.2 billion in profits, and counted 927,000 employees around the world.

The group also stands out for its advances in distribution technologies, having several patents in the sector, both in the area of smart grids and in the ultra-high voltage (UHV) transmission, furthermore developing technology in the area of renewable energies (Barbosa 2014).

State Grid began operating in Brazil in 2010, when it acquired seven transmission energy companies from the Spanish ACS and one company from Plena Transmissora. Since then, the company expanded its operations in Brazil and has thirteen transmission lines, with 7,600 kilometers and another 9,800 kilometers under construction. In 2016 the company acquired CPFL Energia, which was the largest integrated private company in the energy sector, with net revenue only second to the Brazilian state-owned Eletrobras and Cemig, largely owned by the state of Minas Gerais. The amount paid for the 53 percent interest in CPFL was about US $4 billion. The group's consolidated revenue in Brazil was R $1 billion in 2015, accounting for 20 percent of all group revenues outside China.

The first project highlighted in this chapter is the construction of the transmissions lines from the Belo Monte dam on the Xingu River in the state of Para, to the Brazilian Southeast. The 11.2 GW Belo Monte project, which has been beset by delays and controversies over its impacts on the ecology of the Xingu River and indigenous communities, began the operation in April 2016. Once fully operational, Belo Monte will become the world's third largest dam in the world. The construction of the power line is key for linking the energy generated in Belo Monte to the country's largest market.

State Grid won the bid for the construction of the first transmission line in February 2014, forming a consortium called Belo Monte Transmissão de Energia (BMTE). State Grid retained control with 51 percent, whereas two minority partners are controlled by Eletrobras: Eletronorte (24.5 percent) and Furnas (24.4 percent). The BMTE proposed an annual remuneration 38 percent lower than the ceiling set by the Brazilian government and well below the offers of the two other bidders (the Spanish group Abengoa offered a discount of 11.4 percent and the consortium formed by Taesa and Alupar offered a discount of 4.93 percent) (Becard and Macedo 2016).

The transmission line will have 2,100 kilometers and will cross four states: Pará, Tocantins, Goiás, and Minas Gerais. It begins at the Xingu Substation, located approximately 17 kilometers from the Belo Monte Hydropower Dam, in the municipality of Anapu in Para Sate, and extends to the Estreito Substation, located in the municipality of Ibiraci, in Minas Gerais, close to the border with São Paulo State.

The estimated construction cost is R $5.1 billion (US $1.6 billion) and the projected start of operations is early 2018. An important part of the costs should be related to transformers and converters. Construction of the line will require a further 25,000 kilometers of cables and 64,000 tons of steel. The structure will be built with the UHV technology, in direct current with 800 kV, and with substations only at the beginning and end of the line, which will reduce the transmission losses of energy.

The amount of labor initially estimated for the implementation of the project is 8,000 direct and indirect workers throughout the project. It is expected that 40 percent of the workers during the construction phase will be contracted in the cities close to the civil works. The remaining 60 percent will be composed of specialized teams in the construction industry, recruited from other regions (BMTE 2014).

One of the main concerns regarding the project was related to environmental licensing. According to the impact study for the first transmission line, 1,725 hectares of native vegetation in Brazil's two largest biomes will be lost. The line runs close to ten separate conservation areas, three of which are federally protected. Nevertheless, in early 2016, the first transmission line obtained the environmental license from the Brazilian Institute of Environment and Renewable Natural Resources (IBAMA).

Regarding the work flow, the converting stations have completed the earthworks, and civil works are already underway. The assembly of structures is in progress, according to the Agência Nacional de Energia Elétrica (ANEEL) and the agency responsible for evaluating the safety and continuity of Brazil's electricity supply. As of April 2017, the degree of fulfillment of the contract was 67 percent for physical development and 87 percent for general development (see table 6.3).

TABLE 6.3. FULFILLMENT OF THE CONTRACT FOR THE FIRST TRANSMISSION LINE (XINGU-ESTREITO), AS OF OCTOBER 4, 2017

1.0	Basic project	98
2.0	Signing of contracts	
2.1	Studies, projects, construction	100
2.3	CCI installation sharing agreement	100
2.4	Transmission Service Agreement	100
3.0	Declaration of public utility	
3.1	Solicitation	100
3.2	Obtaining	100
4.0	Environmental licensing	
4.1	Term of reference TR	100
4.2	EIA/RIMA or RAS	100
4.3	Previous license LP	100
4.4	Installation license LI	100
4.5	ASV plant suppression authorization	100
4.6	Operating license	0
5.0	Executive project	90
6.0	Acquisition of equipment and materials	
6.1	Purchase order	100
6.2	Structures	99
6.3	Cables and conductors	83
6.4	Main equipment (TR and CR)	96
6.5	Other equipment (Dj, Secc, TC, TP, PR)	97
6.6	Protection, control, and automation panel	74
7.0	Civil works	
7.1	Construction site	100
7.2	Foundations	95
8.0	Assembly	
8.1	Structures	66
8.2	Cables and conductors	49
8.3	Main equipment	50
8.4	Other equipment	30
8.5	Protection, control, and automation panel	0
9.0	Commissioning	0
	Physical development	65
	General development	87

Source: ANEEL (2017).

However, problems were reported in some parts of the work. According to Costa (2017), the Chinese contractor SEPCO1, responsible for sections 1 and 2 of the project, had reached 20 percent and 57 percent of the planned work in early 2017, respectively. In the other 6 sections the percentage of completion was between 60 and 78. According to Costa (2017), the Chinese contractor faced difficulties in operating a complex project in the state of Para, a region subject to a rainfall pattern that often affects the work process. In addition, communication difficulties have been reported between Chinese leaders and Brazilian technical teams. Nevertheless, BMTE ensures that there will be no delay in completing the work, as it should relocate other companies to accelerate the work that was under the responsibility of SEPCO1.

In February 2017 the Brazilian National Bank for Economic and Social Development (BNDES) approved a financing contract in the amount of R $2.56 billion for the completion of the construction of the first line. This amount, according to the BNDES, would be equivalent to 46 percent of the total investment. In addition, it is expected to issue infrastructure debentures in the amount of R $520 million. The project already had a bridge loan of R $718 million, contracted in 2015. According to the available evidence, traditional suppliers of equipment and services operating in Brazil, such as Siemens, ABB, Brametal, and Tabocas, were involved as suppliers of the project. Furthermore, BNDES financing rules generally favor the purchase of national equipment.

During the auction for the second transmission line, in June 2015, State Grid won the bid again, this time with no local partners. The estimated investment reached US $2.2 billion. The firm offered R $988 million in the auction, a discount of 19 percent compared to the annual maximum compensation allowed. This second transmission line has an extension of 2,550 kilometers, extending from the Xingu River to Rio de Janeiro. The outlook for the beginning of transmissions is at the end of 2019 and the number of jobs generated is estimated to be 15,000. At the time of writing, work on the second transmission line had not begun.

THE TWIN OCEAN RAILROAD

The next project in our analysis is the Twin Ocean Railroad between Brazil and Peru. The proposed rail link, known also as the Interoceanic Railway, would connect a Brazilian Atlantic port with a Peruvian port on the Pacific. The aim is to have a faster, more efficient rail-based export corridor to transport products like soybean, iron ore, and copper from Brazil and Peru, while fostering imports from China.

It is important to emphasize that the search for improving transport infrastructure and the connectivity between the Atlantic and the Pacific has been discussed for some time, whether within the scope of the Initiative for the Integration of Regional Infrastructure in South America (IIRSA),[3] or on the individual or joint initiative of South American countries. The construction of the railroad would thus be an alternative solution to provide a solution to the improvement of the regional infrastructure and the relationship between South America and Asia.

Almeida et al. (2013) point out that an access to the Pacific is important because it would cut the costs for Brazilian exporters. First, because the travel time from the Peruvian ports to China is significantly shorter than that from Brazilian ports. Second, because such a trip would avoid the cost of the fares to cross the Panama Canal.

The current option is ground transport, such as the Bioceanic Highway, completed in 2011. The highway connects Porto Velho (Rondônia State in Brazil) to Inãpari in Peru and allows the connection with the ports of Ilo and Matarani in the Pacific. However, the road has limitations on the number of heavy trucks allowed because of the narrow bends in the Andean section of the highway. In addition, ground transportation of soybean is only economically viable for Rondônia, but not for the other producing states that are more distant from Peru.

The railway project was announced during Chinese President Xi Jinping's trip to Latin America in July 2014. Xi and the presidents of Brazil and Peru signed a memorandum of understanding in November of the same year. The feasibility studies on the project started in May 2015, when Chinese Prime Minister Li Keqiang visited Brazil.

In June 2015, part of the railroad route in the Brazilian section was included in the second round of Logistics Investment Program (Programa de Investimento em Logística), launched by the Brazilian government as a fundamental component in the strategy to resume economic growth. At that time, the estimated investments in the railway were R $40 billion (US $12.6 billion), which accounted for almost 20 percent of all investment in the Logistics Investment Program.

In the original project, the 5,300-kilometer railway was estimated to be completed in six years. About 3,500 kilometers would run through Brazil, crossing the states of Rio de Janeiro, Minas Gerais, Goias, Mato Grosso, Rondônia, and Acre. On the Brazilian side, the railway project is divided into five segments, including some sections that were already under study by the Brazilian government. The section with more advanced feasibility studies is the one that runs for 901 kilometers from Campinorte (Goias State) to Lucas do Rio Verde (Mato Grosso State). The second part continues for another 740

kilometers to Vilhena (Rondonia State). These first two sections constitute the project of what is called by Valec (Brazilian state-owned company responsible for railway projects) the Central-West Integration Railway. The third section runs 770 kilometers from Vilhena to Porto Velho (also in the state of Rondônia). There is an open bid to carry out economic technical feasibility studies. There are two more sections that are only projects with no expected feasibility studies yet: the track that would link Rondônia to Acre, and the section that would extend from Goias to the Rio de Janeiro Coast.

From the beginning, the project has raised concerns among environmental and civil society groups, since the proposed route would run through the Amazon rain forest lands occupied by indigenous and protected groups. For environmentalists, the main areas of concern are the Isconahua Reserve in Peru, and Vale do Rio Juruá in Brazil, which is home to one of the most important areas of flora and fauna on the planet. Moreover, the logistical challenges of the project are considerable because, beyond the forest, the line will pass through swamps and mountains, raising the risk of higher construction costs.

However, recent developments have shown that there is still a long way before the project becomes reality. Throughout 2016 the press reported that preliminary feasibility studies carried out by the China Railway Eryuan Engineering Group Co. (CREEC) pointed to the economic viability of the project. The projection is that the railroad would carry 23 million tons, forecast to increase to 53 million tons in twenty-five years. Regarding the route, the best alternative for interconnection with Peru would be to reach the Pacific in Bayovar, with less need to cross high altitude stretches (Amora 2016; Jaeger 2015).

In September 2016, under the command of the Temer government, a new package of procurement projects in infrastructure was announced within the Investment Partnerships Program. Among these projects, there was no mention of the Twin Ocean Railroad. Even the stretch between Lucas do Rio Verde and Campinorte, which has more advanced feasibility studies, was not included.

Finally, in a public hearing at the Brazilian Federal Senate in April 2017, CREEC engineers once again defended the viability of the project. However, they stressed that there was still no guarantee of effective involvement by the Peruvian government. There was also a suggestion that the work on the Brazilian side could be done in three stages, starting with those of greater financial viability: first completing the East-West Integration Railway (FIOL), which would connect the Midwest and the Atlantic Ocean. Then taking the railroad from Campinorte to Porto Velho and finally, reaching Acre. FIOL is

TABLE 6.4. TWIN OCEAN RAILROAD, ALTERNATIVE ROUTES

	Northern Route	Central Route
Length (km)	4,400	3,750
Project length (km)	4,544	2,200
Investment (US$ million)	10,000	7,500
Cost indicator (US$ million/km)	4.4	3.41
Execution time	10	5
Coast to coast transport cost	211	150
Comercial Speed	70	70
Travel Time	2.6	2.2

Source: Serra (2016), original data from Ministerio Boliviano de Obras Públicas, Servicios y Vivienda.

being built by Valec and connects the port of Ilhéus (Bahia State) to Barreiras (also in Bahia), and is expected to extend to the North-South Railway in Figueirópolis (Tocantins State). From there it would connect with the planned route of the Twin Ocean Railroad through an already built stretch between Figueirópolis and Campinorte. The CREEC engineers suggested that after the Brazilian part is finished and shows financial returns, Peru could then accept the continuation of the work (Agência Senado 2017).

It is important to highlight that more recently, an alternative to the "northern route" is gaining more attention: the "central route," that would run not only through Peru and Brazil, but also through Bolivia, with a more direct East-West trajectory (Serra 2016).

Since 2015, the Bolivian government has been working to present preliminary studies to Chinese, Peruvian, and Brazilian officials. According to the Bolivian government, the central route is shorter (around 3,750 km) than the northern route and would require significantly less construction expenses.

The estimates of the Bolivian government show that the central route has better travel time, execution time, and cost indicators than the alternative route. Another fact that could favor this alternative is that it has more possibilities of linking the north of Argentina, which is also a great producer of grains and other agricultural products.

The Ilo port in the south of Peru, would be the most likely candidate for the Pacific terminus, although other Peruvian ports, such as Matarani, Lomas, and Mollendo, have been considered.

In June 2015, UNASUR's Council of Infrastructure and Planning (COSIPLAN) held a meeting, where representatives of the governments of Brazil, Peru, and Bolivia agreed to continue working on the details of the feasibility studies.

In March 2017, a technical meeting was held in Bolivia between the governments of Brazil, Peru, and Bolivia, which led to the formation of working groups for finance, regulatory frameworks, and technical specifications to continue evaluating the project. As a result of the Bolivian government's efforts to maintain the central route as an option to be considered, representatives of other countries that could have interest in the project—Paraguay, Germany, France, and Switzerland—also participated in the meeting (Ministério de Obras Públicas 2017).

Since the announcement of the project in 2014, there have been few concrete advances toward an effective start. The project is still largely in its planning phase, with many uncertainties about the costs of construction, route, funding, environmental impacts, and companies that will construct, operate, and provide equipment.

It is quite likely that the technical, environmental, financing, and coordination difficulties between the different countries will result in the breaking up of the project into smaller ones. Even so, the evidence points out that in the new governments of Brazil and Peru, the priority given to the project today is lower than it was in the past. Only Bolivia has given signs that the project is central to its development strategy. As for China, it continues to pursue the opportunities, but it could also be interested in a less risky involvement.

FINAL REMARKS

An exaggerated expectation about infrastructure projects was created in Brazil due to Chinese companies' aggressive strategy of internationalization, combined with the deepening of China-Brazil diplomatic ties. In addition, with the exhaustion of the economic cycle that began in Brazil in 2003/2004, the Brazilian government tried to create positive expectations among the business sector, seeking to maintain the expansion of investments. The inclusion of the Twin Ocean Railroad in the concessions package announced in 2015 is an example of this effort.

Obviously, when compared to the results found throughout the chapter, one could conclude that these expectations were exaggerated. Chinese infrastructure projects have played a modest role and were not able to close the infrastructure gap in Brazil.

However, when confronted with a more realistic outlook, the data and the case studies analyzed provide a more balanced assessment. From the point of view of the contribution made by Chinese infrastructure projects to Brazil's strategy of development, it can be said that there is an important potential, since the Chinese companies see Brazil as a great market for the expansion of their businesses. To turn that potential into reality, however, more actions need to be taken on the Brazilian side than on the Chinese side.

It is important to point out that the Chinese presence in Brazil has been increasing significantly, with a greater diversification to its activities beyond those directly linked to the commodities sector. Among these activities, the infrastructure sector, especially the electric power sector, should be highlighted, since Chinese companies have consolidated themselves as major players in the Brazilian market.

In the case of the Belo Monte transmission lines, the entry of State Grid contributed to the success of the auctions and to carry forward a fundamental project for the supply and distribution of electric energy in Brazil. Despite some difficulties in obtaining environmental licensing and reporting some delays in stretches of Line 1, the monitoring system of ANEEL, as well as the company itself, continues to point to the possibility of maintaining the start-up schedule at the beginning of 2018. Line 2 also had its environmental licensing delayed for about six months, but there is still no reason to think that the December 2019 deadline for the work to be completed cannot be met.

It is also worth noting that the project has not been configured as a complete turnkey project where only Chinese agents such as banks, machinery and equipment suppliers, and service providers, are taking part. Although led by the State Grid, there are national partners in the transmission Line 1. BNDES is financing a significant part of the investments. Suppliers already operating in Brazil for a long time are responsible for a large part of the supply, although it was not possible to verify the volume of imported content of the equipment. In this case it would be interesting to observe the possibilities of the entry of new investments in the supply chain for the electric sector.

It is worth emphasizing here the importance of the existence of Brazilian state institutions with qualified technical staff—for example, to carry out the analysis of environmental aspects, such as IBAMA, and the inspection of the evolution of concessions, as is the case of ANEEL. Moreover, the existence of a development bank with the tradition and experience of BNDES has been important in complementing State Grid's own funds. BNDES was also very important to foster greater participation on the part of national suppliers and to increase the linkage effects of the project.

With regard to the Twin Ocean Railroad, in addition to the technical complexity of the railway project itself, the economic, financial, environmental, and the coordination of different countries' interests make it difficult to believe that such a major undertaking is feasible as a single project. If some progress could be expected, it may happen in some stretches where the obstacles and technical and economic challenges are smaller. Moreover, unlike the electric power sector, where Chinese companies have been present since 2010, learning about the market, partners, suppliers, regulatory policy, and where they can be expected to continue playing a role, investment in the rail sector is still in a development phase with regard to future opportunities.

The data analyzed in this chapter highlights how conducting large projects can often be problematic. This is especially true in the case of Brazil, where there is a lack of a long-term planning strategy for the infrastructure expansion that could better articulate the interest of Chinese companies with the general interests of Brazilian companies, workers, and society.

As discussed throughout this chapter, the expansion of infrastructure projects is one of the most important factors in boosting Brazilian development, especially considering the low volume of investments in this area in recent years. However, it is important to have a strategy that maximizes the benefits of these projects, which means maintaining and perfecting mechanisms to monitor and generate positive national effects in terms of quality of services, employment generation, labor conditions, linkages with domestic productive chains, and technological spillovers.

This strategy would require an effort to strengthen these mechanisms and the capacity for coordination between the public sector and the private sector, and among the various institutions responsible for regulatory, environmental, financial, industrial, and technological policy.

Unfortunately, the new government seems to be heading in exactly the opposite direction. After Roussef's impeachment, the economic policy promoted by the Temer administration to resume economic growth would include the reduction of the role of the state, the expansion of trade liberalization, and the removal of requirements on the activities of transnational companies. At the same time, some political and economic groups are pressing the government to change the law to remove restrictions to the private sector, for instance, concerning labor reform and the changes in the rules of environmental licensing. These proposed changes could have significant impact on Brazil's future plans to expand its infrastructure.

NOTES

1. It is worth noting the difference between the Brazilian Central Bank data and that data recorded by announced investments and mergers and acquisitions. The Central Bank figures are related only to the amount of capital inflows from China. The values of the investment and mergers and acquisitions that is released by the press sometimes refer to the total value of the transaction, even if part of the funds has not yet been spent or if part of the funds will be financed from Brazilian sources. It explains why the data of the second source is greater than the first.

2. The bilateral fund was implemented only at the end of 2016, with resources of US $20 billion, with China's contribution of US $15 billion, and Brazil's contribution of US $5 billion.

3. The IIRSA is a joint program of the governments of twelve South American countries. It aims to promote South American integration through physical integration. In 2009 the IIRSA was incorporated as a technical forum of the South America Council of Infrastructure Planning (COSIPLAN) in the Union of South American Nations (UNASUR).

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7

THE CHINESE-BACKED NICARAGUA CANAL

Domestic Rationale, Multiple Risks, and Geopolitical Implications

Shoujun Cui

In the last decade, China's engagement with Latin America and the Caribbean (LAC) has been expanding in an enormous way. Infrastructure, trade, and investment are the key pillars boosting the fast-developing Sino-LAC bilateral relations. As indicated by the five-year action plan (2015–2019) released in Beijing during the first China–Community of Latin American and Caribbean States (CELAC) Forum in January 2015 and Chinese leaders' commitments during their trips to Latin American countries, more infrastructure projects are likely on the way. As the commodity boom goes bust, Latin American countries' economic growth is cooling down. In this context, Chinese involvement in much-needed infrastructure projects such as transportation, telecommunication, energy, and sanitation will be critical for closing the infrastructure gap and stimulating medium-to-long term economic growth.

According to a study released by the International Monetary Fund (IMF), infrastructure projects would have a strong "multiplier effect" on driving economic growth and bolstering overall competitiveness, in which every one dollar of infrastructure spending would boost 1.6 dollars in economic growth (Shen et al. 2015). With homegrown comparative advantages in capital, technology, equipment, and engineering, China's new commitments in infrastructure construction have spurred a lot of expectations from Latin American countries. In the meantime, some critics argue that infrastructure building is an economic diplomacy tool wielded by the Chinese government for projecting political and geostrategic clout, as mega-infrastructure projects could have "spillover" implications on reshaping the regional geopoliti-

cal landscape. Others are concerned about the socio-environmental impacts of Chinese-built infrastructure projects in recipient countries, partially due to the fact that Chinese firms have an image of non-adherence to, and little knowledge about, local institutions, regulations, norms, and values. In this context, a Chinese-backed grand canal in Nicaragua linking the two largest oceans—the Atlantic and the Pacific—has aroused concerns, critics, and skepticism.

CHINA AND NICARAGUA RELATIONS IN CONTEXT

From the outset of the new millennium, China's increasing presence in Latin America has been ubiquitous, especially in South American countries endowed with abundant natural resources such as Brazil, Peru, Chile, Venezuela, and Argentina. Unlike the rapidly growing trade and investment ties between China and South America, the expansion of Central American countries' economic relations with China has been slower. The low degree of complementarity between the "soft" commodities—such as cane sugar, coffee, and other agricultural products—exported by Central American countries and the Chinese demand for "hard" commodities—such as oil and minerals—has created a weaker tie. Therefore, the so-called China effect produces fewer benefits for Central American countries (CLACDS 2014). As such, these countries remain tightly linked to the US economy due to the geographical proximity and mutual complementarity.

Nicaragua has so far maintained its diplomatic recognition of Taiwan. Looking back, it can be noted that Nicaragua had retained diplomatic ties with China for a short period from 1985 to 1990, but afterwards switched its ties to Taiwan for the sake of seeking better economic assistance (Ministry of Foreign Affairs of People's Republic of China 2017). When the People's Republic of China was established in 1949, the ruling Somoza government opted to support the Taiwanese government instead of the newly founded China, primarily due to the ideological divergences with the latter. With support from many Asian and African developing countries, in 1974 China successfully dislodged Taiwan and resumed its seat in the UN Security Council as a permanent member, which propelled Taiwan into a fight for international recognition. In a move to strengthen ties with existing diplomatic allies, Taiwan invited President-elect A. Somoza Debayle of Nicaragua to pay a state visit to Taipei in 1974. During the visit, Taiwan's authorities signed a fruitful Memorandum of Understanding (MOU) with Somoza, promising to provide

a generous and much-needed package of economic assistance to Nicaragua to develop its fertilizer, manmade fiber, and oil refining industries. Nicaragua, in return, vowed to continue recognizing Taiwan as a sovereign state (Taiwan Today 1974). However, that honeymoon came to an end after the Sandinista Revolution and the rise of the Sandinista National Liberation Front (FSLN) to power. Based on the mutual ideological affinity, in 1985 the FSLN decided to switch its diplomatic ties to Beijing, and Nicaragua became the first Central American state to recognize Beijing (*New York Times* 1985). However, at that time, Beijing was just kicking off its economic reform and opening-up policy. The initially fledgling economic muscle limited its outreach to the Central America subregion, which was not regarded as vital to China's solidarity cause, considering the size and influence of these small states. As a consequence, during his visit to Beijing in 1986, Nicaraguan President Daniel Ortega was disappointed and angered by Beijing's unwillingness to offer economic and military aid to his country beyond moral and ideological support (Southerl 1986). By 1990, when the National Opposition Union headed by Violeta Chamorro beat the FSLN in national elections, Nicaragua restored diplomatic ties with Taiwan. Since then, Taiwan has supported the bilateral relationship by granting generous foreign aid.

With the fast development of Chinese economic might in the twenty-first century, Central America is increasingly emerging as a stronghold for China's global quest for economic internationalization. Nicaragua, together with four other nations that currently recognize Taipei (Belize, El Salvador, Guatemala, and Honduras), is located in the subregion, so China is motivated to squeeze Taipei's international legitimacy and isolate the regime through rising economic engagement. As the second largest economy in the world, China's striking economic growth has overshadowed Taiwan's economic clout in the subregion. Nicaragua seems to have adopted a pragmatic dual approach, with the aim of trying to court the Chinese without breaking its ties with Taiwan. It is worth noting that Nicaragua opened a trade and investment office in Beijing, administered by the Nicaraguan Business Council for Economic and Trade Development with China (CEFECH), in order to promote business opportunities and foster the development of economic relations between the two countries (PRO Nicaragua 2011). A look at Chinese and Nicaraguan bilateral trade shows a steady increase in the last decade. In 2006, the bilateral trade volume totaled $200 million, while in 2016 it climbed up to $642 million, with Chinese exports reaching $624 million of textile, computer, motorcycle, and bicycle parts to Nicaragua and imports of $18 million of agricultural products, sugar, leather, and wood from Nicaragua. China is now the second-largest import origin for Nicaragua, only after the United States (CLACDS 2014;

Ministry of Foreign Affairs of the People's Republic of China 2017). In comparison, Taiwan and Nicaragua signed a Free Trade Agreement in 2006, and in 2016 bilateral trade stood at $105.5 million, whereas Taiwan's export and import volume reached $23 million and $82.5 million, respectively (Bureau of Foreign Trade of the Republic of China 2017). Therefore, China has already surpassed Taiwan as a major trade partner.

Although most of China's investment is confined to countries that have diplomatic ties with China, Central American countries are among the recipients of Chinese investment and loans, particularly in the fields of energy and infrastructure. Costa Rica spearheaded the switching of diplomatic relationships from Taiwan to China in May 2007, which catalyzed a multitude of Chinese investment. Chinese footprints are also visible in Guatemala and Honduras. China Machine New Energy Corporation has undertaken the construction of electricity generation facilities in Guatemala and Honduras, while the Sinohydro Corporation has been building a new hydroelectric dam on Honduras's Patuca River, expected to be completed in 2018 (Shortell and Welch 2014). Elsewhere in Central America, China has invested in solar energy, oil, and telecommunications. The most significant infrastructure project proposed by Chinese investors is the new trans-oceanic Nicaragua Canal, which is estimated to cost over $50 billion, potentially involving a decade of construction work (Ellis 2014). Although not significant in absolute volume, with an inflow of $96 million in 2015, China is now ranked as the fourth-largest source of foreign direct investment in Nicaragua after the United States, Mexico, and Panama (Chinese Embassy in Costa Rica 2017). If the Nicaragua Canal can be materialized, there is no doubt that a sharp surge of Chinese investment can be expected. The details of the mega-project will be discussed later in the chapter.

However, the growing but still feeble economic links between China and Central America are in stark contrast with the subregion's role in the diplomatic tussle between China and Taiwan. As of June 2018, nine out of a total of eighteen countries which still maintain diplomatic ties with Taiwan are in Central America and the Caribbean (see Bland and Fredrick 2017). By relying on these diplomatic allies, Taiwan's leadership can make a stopover in the United States on the way to and from Taiwan, which provides a rare opportunity for the Taiwanese government to meet with US officials and lawmakers without imposing serious tension on China-US relations. In recent decades, Taiwan has endeavored to keep these diplomatic allies by promising financial aid and technical assistance. Nevertheless, Central American countries are increasingly more enticed by a globalized China, whose engagement with Latin America is unfolding in an overwhelming way.

From a geo-economics dimension, this bloc of isthmus countries is situated in a very strategic geographical location, with easy access to two great oceans—the Pacific and the Atlantic—and the value of directly shipping commodities from one coast to the other. Additionally, there is a growing possibility of establishing Special Economic Zones (SEZs) to manufacture goods for the Chinese market. Furthermore, as the largest net oil importer in the world and with an overseas oil dependence rate reaching over 60 percent (*China Daily* 2015), China's overseas oil demand has been increasing due to the shortage of domestic reserves and rapid industrialization and urbanization. From an energy security perspective, Latin American oil is well suited to China's oil import diversification strategy as an alternative supply source to decrease China's overdependence on the turbulent Middle East, where China imports half of its overseas oil (Zha and Meidan 2015). Over the last decade, China provided massive financial loans to oil rich South American countries—primarily Venezuela and Brazil. However, the high shipping cost restrains transport efficiency from the Atlantic coast to the Pacific coast. In this context, the connectivity between the two oceans through the isthmus has geostrategic significance in facilitating oil flows toward China and the Asian market. What's more, Chinese firms can better process heavy crude oil in refineries constructed in El Salvador, Nicaragua, or Costa Rica to climb up the value-added chain by selling oil products to Central America and the Caribbean. In this sense, Central America is appealing to China as both an economic and a transit hub (Urcuyo 2014).

With the expansion of China's audacious One Belt and One Road Initiative that seeks to create new growth drives for Chinese economy by promoting regional and extra-regional connectivity, Central America is well suited to be integrated into China's global infrastructure development agenda (Zhang 2016). In a meeting with Argentine President Mauricio Macri during the first One Belt and One Road Initiative Summit, held in Beijing in mid-May 2017, Chinese President Xi Jinping stressed that Latin America is the natural extension of the twenty-first-century maritime Silk Road (Hou 2017). This is the first time that China's top leadership officially clarified the inclusion of Latin America in China's audacious Belt and Road Initiative. Previously, only Asian, African, and European countries were formally integrated into the blueprint (Zhang 2016). With China's Initiative landing in the region, it can be argued that it is well poised to further bolster its global leadership ambitions in Latin America and the Caribbean through trade, investment, and infrastructure. This development happens while US President Donald Trump promotes his "America First" agenda, promises to build a wall on the Mexican border, and questions free-trade agreements.

It can be argued that Central America's importance to China does not reside in the economic arena, since it is not a large market, with a total population of only 42 million. China's real interest lies in the geography of Central America; in other words, the ease of access to two great oceans and the option of directly shipping its products to the east coast of the United States. Additionally, there is a growing possibility of establishing SEZs to manufacture goods for the Chinese market. In this sense, Central America is appealing as both an economic and transit platform. This interest replaces China's former objective in the region: to diplomatically displace Taiwan. The geostrategic issue is very important, especially considering the possibility of moving petroleum from the Atlantic Ocean to the Pacific Ocean, and of processing heavy crude oil in refineries constructed by China in El Salvador, Nicaragua, or Costa Rica.

THE NICARAGUA CANAL AND THE RATIONALE OF CHINESE INVOLVEMENT

The dream of building a man-made canal in Nicaragua connecting the Caribbean Sea—and thus the Atlantic Ocean—and the Pacific Ocean goes back to the Spanish conquistadores of the sixteenth century, when the colonial administration of New Spain conducted preliminary surveys. In 1825, the Federal Republic of Central America hired surveyors to study a route via Lake Nicaragua, 32.7 meters (107 feet) above sea level, but it failed to materialize for various reasons. Decades later, the United States gained rights to build a canal through Nicaragua in 1901, but it opted to build in Panama instead. Despite the opening of the Panama Canal in 1914, interest in building a Nicaragua Canal has continued, as Nicaragua was hoping to boost its economic growth and relieve the country from poverty by taking advantage of its unique position on the isthmus. Since the twentieth century, several governments and a range of personalities had repeatedly reconsidered placing the country at the center of maritime operations by means of a canal, but all such efforts failed. The long-term dream of constructing a canal has been embedded in the hearts of Nicaraguan general public and has turned out to be a self-perceived national symbol. The tenacious pursuit of having a canal justifies the recent endeavor of the Ortega administration to reboot the project.

With the acceleration of global trade, talks of building a second canal across Central American land to mitigate the limitations of the Panama Canal became more attractive. Nowadays, ships of the "Panamax" size (294.3 meters long, 32.3 meters wide, carrying 4,600 standard 20-foot containers),

designed to fit through the existing locks of the Panama Canal, are dwarfed by new generations of larger ocean vessels (Gross 2014). As such, interest in constructing a new canal was reignited at the beginning of the twenty-first century. In 2000, the Nicaraguan government granted a concession to Canal Interoceánico de Nicaragua SA (CINN), a company formed and led by New York attorney Don Mario Bosco, to build a railway "dry canal" connecting Nicaragua's coasts. However, CINN was unable to obtain financing to kick off construction (Kanali 2014). In 2006, the President of Nicaragua, Enrique Bolaños, announced his intention to proceed with such a project, but failed in securing financial and legislative backing (Tobar and Kraul 2006). In September 2012, Nicaraguan President Daniel Ortega signed a MOU with the newly formed Hong Kong Nicaragua Canal Development Group (HKND), a private Chinese enterprise, and committed HKND to finance and build the Nicaraguan Canal and Development Project. It can be argued that the award of the concession of the Nicaragua Canal to HKND seems less a response to a change in foreign policy in favor of China at the expense of Taiwan than a pragmatic step of fulfilling its long-cherished national dream of connecting the two oceans.

The Nicaragua Canal is designed to be 278 kilometers long and 30 meters deep, three times the length of the Panama Canal, running across Lake Nicaragua, the largest freshwater lake in Central America (see table 7.1). The HKND was granted the concession to build the canal and the rights to projects surrounding it for fifty years, including airports, ports, resorts, and free-trade zones, with the option to extend the concession for another fifty years utilizing a Build, Operate and Transfer (BOT) model. Nicaragua will reportedly receive a 1 percent stake in the project after year one, plus a 10 percent increase in ownership each decade. Because it is relatively unlikely that traditional investors would provide such a large quantity of capital to a company with no proven track record in large hydrological projects, it is probable that in the end, the project will rely significantly on Chinese banks for financing, and by association, on Chinese companies to do the actual construction work (Ellis 2014). However, it is worth noting that since Nicaragua maintains diplomatic ties with Taiwan and HKND is not a Chinese public firm, it is less likely for Chinese developmental banks (such as China Development Bank or China EximBank) to provide financial support to HKND, as these are usually more willing to grant financial support to Chinese state-owned enterprises (SOEs) that undertake projects in countries with diplomatic relations with China.

Additionally, Nicaragua will receive $100 million in ten annual payments (Nicaragua Solidarity Campaign 2015). The canal's biggest competitive advantage is that it is designed to handle ships with 25,000 TEU capacity, like the

TABLE 7.1. COMPARISON OF INTERNATIONAL CANAL CHARACTERISTICS

Parameters	Nicaragua	Suez	Panama (expanded)
Canal Depth (meters)	26.9–30.2	24	16.1
Canal Length, coast to coast (kilometers)	259	193	80
Canal Bottom Width (meters)	230–280	121	218–366
Ship Carrying Capacity (DWT)	400,000	240,000	170,000
Ship Container Cargo Capacity (TEU)	25,000	19,000	13,000
Ship Fully Loaded Draft (meters)	23	20	15
Lock Length (meters)	520	NA	427
Lock Width (meters)	75	NA	55

Note: DWT—dry weight tons; TEU—twenty-foot equivalent units.
Source: Environmental Resources Management (2015), 2.

Triple E ships from Maersk. While experts question whether there is enough traffic to support the project, the trend in the marine industry is to increase the size of cargo ships to gain economies of scale. That trend shows no signs of abating (Venkatesh and Srinivas 2016). Shipping firms say the route would provide faster travel time than the Panama Canal, which currently handles around 5 percent of global shipping traffic (Renwick 2015). Proponents argue it will yield much needed jobs and eradicate poverty in the second poorest country after Haiti in the Western Hemisphere. Opponents doubt the viability of the project and charge that even if it is successful, the environmental and social costs of constructing such a massive scale project would be catastrophic. The proposed Nicaragua Canal would not only be one of the largest infrastructure projects ever undertaken in Latin American history, but also one of the largest man-made commercial waterways in the world.

To add to the skepticism, the HKND Group, owned by Mr. Wang Jing, an unknown and enigmatic Chinese entrepreneur, is in the spotlight for several reasons. In 2010, Wang acquired 34 percent of Xinwei, a telecommunications equipment company. Ironically, the HKND has no experience in building or operating any big infrastructure project before, not to mention it is stepping into one of the world's most ambitious engineering projects. In addition, the project construction cost is estimated at $50 billion—roughly five times Nicaragua's GDP. Such a huge amount of financing also justifies the concerns that Wang Jing may not have the resources to finish it. Although HKND is a private company registered as a consortium in the Cayman Islands, there

is speculation that the Chinese government is underwriting the project and Wang is just its agent. Otherwise, Wang's record does not inspire the requisite confidence for participating in one of the world's most ambitious infrastructure projects.

As the proverb goes, there is no smoke without fire. Doubts have grown with the visible involvement of a handful of SOEs in the Nicaragua Canal project. With the government as their largest shareholders, Chinese SOEs enjoy massive state support, which not only fosters their growth but may also mean they take governmental directives. Evidence shows that the following Chinese SOEs are engaged in different stages of the project: China Railway Construction corporation (technical viability studies); Xuzhou Construction Machinery Group (heavy construction machinery); China Railway Siyan Survey and Design Group (design contractor and responsible for the highway subproject); Civil Aviation Engineering Consultancy Company of China (design of airport subproject); CCCC Second Harbour Consultants (port design); and Changjian Institute of Survey, Planning, Design and Research (design of canal project) (Grau Vila 2016; Ren Guishu 2014). Executives of those SOEs are apparently refraining from revealing the details of how they would participate in the Nicaragua Canal project. The involvement of those SOEs seems merely symbolic and depends on the prospect of how fast the investment capital will be made available. The reason for the SOEs' involvement is based on the pragmatic expectation that it would generate additional corporate profits and expand their business presence in Central America, consistent with the "going out" strategy advocated by the Chinese government. Speculation raised by the media and some scholars that the Chinese government is behind the scenes, or will eventually join the project at some point, is based on the fact that China is increasing its engagement with Latin America, and it is in China's interest to build a new canal to facilitate economic ties with the region. China is now the region's second largest source of imports and third largest export destination. According to the data of the United Nation's Economic Commission for Latin America and the Caribbean (ECLAC), between 2000 and 2014, China's contribution to the region's imports grew from just over two percent to 16 percent, while its export share rose from one percent to nine percent (attaining 10 percent in 2013). In 2014, China and the European Union accounted for virtually the same share of the region's merchandise trade with the world as a whole (12.4 percent and 12.5 percent, respectively) (ECLAC 2015). The following year, Beijing signed a slew of agreements with Latin American countries promising to double bilateral trade to $500 billion and increase the total stock of investment from less than $100 billion to $250 billion within 10 years (China-CELAC Forum 2015). In November 2016, the

Chinese government released its second white paper on Latin America at a time when Chinese President Xi Jinping was concluding his third trip in Latin America. This document laid out a comprehensive road map for the future comprehensive cooperation with Latin America, explicitly singling out trade, investment, and finance as three driving engines, with a special emphasis on infrastructure project construction. In this context, infrastructure projects such as the Nicaragua Canal can be viewed as enablers for China to promote trade and investment with Latin America.

Compared with South America, Central America is closer to the United States geographically and has been its geopolitical backyard for nearly 200 years. Some analysts assumed that Beijing has an incentive to avoid the appearance of overt involvement in the Nicaragua Canal project, as it may provoke a vigilant overreaction from Washington. By backing the HKND Group, Chinese authorities can get things done without antagonizing the United States. Reacting to the speech of the US ambassador to Nicaragua on the construction of the Canal, Chinese foreign ministry spokeswoman Hua Chunying denounced the charge of Chinese involvement in the project in December 2014, claiming that the participation in the construction of the canal is an independent commercial initiative of a Chinese company and there is no association with the Chinese government (*China Daily* 2014).

It is undeniable that the HKND's exposure is partially due to the fact that it is a Chinese firm. If the Nicaragua Canal builder were a Western consortium instead of a Chinese one, it would probably not have aroused so much controversy. As China is increasing its diplomatic engagement with Latin America, observers might link the intent of building such a mega-project with China's grand strategy of engaging with the region. International relations realists argue that states remain the most important actors in international affairs and that multinational companies (MNCs) are in a relatively inferior and subordinate position to the states of origin (Gilpin 2001). First, home countries are the most important beneficiaries and drivers of transnational operations. Generally speaking, MNCs' foreign assets are usually protected by the home government and receive their support when they encounter difficulties in the process of investing in the host country. Second, states of origin are able to impose restrictions on the development and expansion of MNCs. Theoretically, the home government can exercise complete control over the activities of its enterprises. As Susan Strange points out, in times of war or in states of emergency, "MNCs of American nationality will first obey Washington's orders" (Huang 2008). Third, MNCs are rooted in the economic and political system of the country of origin. Therefore, the speculation about the Chinese government's involvement is not unwarranted.

However, from a pragmatic perspective, it can be noted that the Chinese government's response to the Nicaraguan transoceanic canal is in striking contrast with the other transoceanic project being carried out under the patronage of the Chinese government: a railway crossing Peru and Brazil to connect the Pacific Ocean with the Atlantic. When President Xi Jinping met with then Peruvian president Ollanta Humala in Brasilia on July 16, 2014, they made a collective statement together with the Brazilian president, promising to form a working team to promote comprehensive collaboration on the design, construction, and operation of the project. In the following year, Chinese Prime Minister Li Keqiang visited Brazil where he signed the legal document to inaugurate the feasibility study (Pang 2015).

If the Chinese government is behind the Nicaragua Canal then the puzzle is why China is pushing the railway project with great commitment while trying to avoid expressing an opinion about the other one, when both routes aim to traverse the two oceans and diminish the lucrative monopoly of the Panama Canal. Apparently, the land-based twin-oceanic railway project only involved two Latin American countries and will not pose a serious challenge to the Panama Canal and regional maritime order, while the proposed Nicaragua Canal will reshape regional maritime landscape in the Western Hemisphere.

What is clear now is that the HKND Group's ongoing efforts in building the Nicaragua Canal are happening in the context of China's increasing engagement in Latin America, and the canal is consistent with China's commercial interests in global trade and strategic interests in expanding its maritime foothold in the Western Hemisphere. In a pragmatic sense, the HKND Group alone does not have the capacity to complete the megaproject. At the end of the day, if this project will be continued and finally finished, then it can be seen whether the Chinese government was behind it. Chinese authorities may not extend direct support to the project in an overt and official way, but may facilitate it in subtle and implicit ways, as a new Nicaragua Canal will coincidentally increase Chinese presence in Central America. The tacit acquiescence of the Chinese government in permitting the Canal construction means that there could be a close cooperation between the HKND Group and Chinese SOEs and Chinese commercial banks, on the condition that the HKND Group really is an honest and responsible investor committed to building the project.

FINANCIAL, SOCIAL, ENVIRONMENTAL, AND POLITICAL RISKS

As of the end of 2017, there is no evidence of actual construction. The Nicaraguan local media *El Nuevo Diario* had reported that construction work

was set to begin in the first quarter of 2017 (Fresh Fruit Portal 2017), but this has not happened. Most recently, according to a report released by Chinese official media Xinhua News Agency on July 2017, HKND Vice President Peng Guowei announced that they are finalizing design plans for building Brito Port on Nicaragua's Southern Pacific coast. This new design will substitute an earlier one, providing a better response to the risk of natural disasters like earthquakes and tsunamis, and will also provide a significantly greater port capacity, according to the same source. However, Peng Guowei still did not mention when the construction will finally break ground (Xinhua News Agency 2017). As the Nicaragua Canal is solely financed by the HKND Group in a BOT model, the company that obtained the concession from a government for an infrastructure project normally signs on other firms to deliver the project, such as supply and construction contractors, and makes an agreement with banks and investors. The advantage of the BOT is to reduce the burden for the taxpayers and shift the risks to private investors. The disadvantages include the reduction of influence on the project design and implementation. Consequently, there is a growing awareness of potential negative side effects of BOT in the infrastructure sector like environmental hazards and opportunistic behavior of the investors (Koppenjan 2008). In addition, considering China does not have diplomatic ties with Nicaragua and the current tension between Mainland China and Taiwan, there is a political risk for the disruption of the project as well.

Financing is the first and foremost challenge for the HKND Group. HKND's Chairman Wang Jing, who may be prepared to spend as much as $300 million of his own cash, said that he will use a combination of cross-shareholding, bank lending, and debt issuance to raise the estimated $50 billion needed to finance the project (Zhang 2014). In April 2014, Xuzhou Construction Machinery Group, one of China's biggest construction equipment manufacturers, announced it had reached a framework agreement to take a 1.5 percent to 3 percent stake in Wang's company. Other firms that may participate in an international consortium include state conglomerate China Railway Construction Corporation, China's biggest overseas engineering contractor. On various occasions, Wang argued that HKND will cooperate with the above-mentioned SOEs in a flexible way such as securities margin trading, financial leasing, and private placement. However, in 2015, Wang lost a lion's share of his fortune in the Chinese stock market crash. In December 2016, NetEase, a leading Chinese online media outlet, released a controversial investigation report on Xinwei, accusing it of cheating the public and shareholders by hiding massive debt and secretly cashing out money from the stock market (Zhao and Chen 2016). Consequently, Xinwei's stock was halted by the

Shanghai Stock Exchange authority for trading, and to date the firm is under investigation. Wang's shrinking fortune and his implication in the scandal undermines his ability to raise capital.

Next are the social and environmental risks. The controversial results of the company's environmental and social impact assessments add additional woes to the HKND Group. Environmental Resources Management (ERM), the Britain-based environmental consultancy that conducted the Environmental and Social Impact Study (ESIA), recommended further investigation into the seismic risk along the canal route and whether there is enough water to fill the canal. An executive summary of the fourteen-volume study was released to the public in May 2015. The Nicaraguan government announced that all the recommended studies must be undertaken, which will delay construction. According to polls, in areas of proximity to the canal route, the population seems almost equally divided between those in favor and those opposed, but the general population still favors the canal (Wade et al. 2015). Even though the ESIA has been approved by the Nicaraguan government in November 2015, environmentalists still worry that the negative socio-environmental impacts will be duly mitigated.

It is estimated that about 30,000 to 100,000 people will be displaced due to construction of the canal (Kraul 2015). HKND has a compensation budget of $300 million to $400 million, or up to $13,300 for each displaced person (Cloutier 2017). Research conducted by a group of scientists expressed concerns about the ESIA's report, claiming that it contains insufficient data and analysis of the project's impact on freshwater, terrestrial, coastal, and marine habitats, as well as on biological and human communities (Huete Perez and Ortega Hegg 2016). A special concern has been raised over the risk of immediate and irreversible impacts from the canal's construction and operation on Lake Nicaragua, since it is the largest freshwater source in Central America, currently supplying water to over 80,000 Nicaraguans (Jorge et al. 2016). The protesters have already forced the government and the company to be more responsive and sensitive to people's concerns, and they will probably try to be more careful and professional in the future when dealing with environmental and social issues. The confrontation between activists and police demonstrates the tension over the lack of transparency and growing mistrust around the project. While the canal is likely to be economically advantageous for Nicaragua, its environmental and social impact could be grievous if mitigated improperly.

Last but not least is the political risk. The issue of territory and sovereignty has always been sensitive in many Latin American countries, which will likely cause discontent and resentment from the public. According to the agreement

with the Nicaraguan government, the Chinese firm will have a concession over the canal, and numerous facilities in its surrounding area, for 50 to 100 years. This means, more or less, an enclave set in the middle of Nicaraguan territory. Taking history as a mirror, in the case of the Panama Canal, the tension between the US and the Panamanian government and its citizens constantly plagued the daily management. To relieve the anger from Panamanian side, the US was forced to sign a new agreement in which the canal co-management mechanism between the two countries was established and the authority was fully transferred to Panama by 1999. What makes things more unpredictable is the tension between mainland China and Taiwan's governments. The China-Taiwan cross-strait relations have chilled since Tsai Ingwen of the independence-leaning Democratic Progressive Party took office in May 2016. As China still does not have diplomatic ties with Nicaragua, the evolving bilateral relations will have a direct impact on the canal project.

THE BROADER GEOPOLITICAL IMPLICATIONS

This closer engagement with Latin American countries coincides with the election of President Trump in the United States, who has vowed to renegotiate regional trade deals, build a wall on the Mexico border, and deport undocumented immigrants. As the Trump administration is chilling US-Latin American ties, the massive infrastructure project undertaken by the world's fastest rising power will be music to the ears of Latin American countries. Mega infrastructure projects can have a multiplier effect in boosting economic growth. The proposed Nicaragua Canal, if completed properly, will not only better integrate Nicaragua into the world economy and stimulate economic growth, but also will undoubtedly strengthen China's relations with Central America, which may reshape the geopolitical landscape of China-US relations in a much broader sense.

In terms of the economic viability of the Nicaragua Canal, there are both optimistic and pessimistic views. The Nicaraguan government believes that the canal would be a wonderful boon for the country and its people. The Nicaragua Canal will be a competitive alternative route to the Panama Canal on the estimation that 5 to 10 percent of current global shipping is unable to sail through the latter, which will dramatically improve Nicaragua's strategic importance in the global maritime industry. In addition, the Nicaragua Canal would save the largest ships between 5,000 and 7,000 miles on each journey from Asia to ports on the east coast of the US as well as the Caribbean and Latin America, because they would not have to travel around Cape Horn (Nic-

aragua Solidarity Campaign 2015). Considering the increasing trade volume between Asia and Latin America, the Nicaragua Canal would produce tangible commercial dividends for the country.

Job creation is another spillover effect of building a new canal. Nicaragua is a country of six million people and has a per capita income of $2,024 in 2015, with 30 percent of the population living in poverty (World Bank 2017). According to HKND's plans, the canal project would provide Nicaragua with a sizeable amount of job opportunities. Up to 50 percent of the 50,000-man crew needed to build the canal over several years would be Nicaraguan, but almost all of the skilled jobs would go to Chinese and other foreigners (HKND Group 2014). The canal would require over 200,000 workers to operate, which represents 10 percent of the Nicaraguan workforce and will substantially produce a poverty eradication effect. In line with the ESIA undertaken by the British firm ERM in 2015, the project offers potential benefits to the environment and people of Nicaragua, but only if its business case is robust, the financing secure, and the project constructed according to international standards (ERM 2015). Nevertheless, the proper implementation of the mitigation measures requires the joint collaboration of the Nicaragua's Canal Commission, the HKND Group, and civil society organizations. It is too early to judge whether the HKND Group is a responsible company or not. What can be argued is that, in general, Chinese firms have experienced a steep learning curve over the last few decades on how to operate properly in a foreign environment, and there is a clear sign of improved corporate standards and guidelines on how to operate abroad.

However, there are also some skeptical views on the viability of the canal. Some scholars claim, based on the Nicaragua Canal's water depth conditions and engineering design, that while theoretically it will be able to service the largest vessels in the world, in practice it depends on other external factors, such as technological feasibility, port infrastructure, and other economic factors (Chen, Xin, and Deng 2016) In addition, the Nicaragua Canal may not be able to create significant new demand for large vessels, as there is no transportation demand for large container ships in the shipping market where the canal is located. Currently, large container ships with between 10,000 and 18,000 TEUs primarily use routes linking Asia with Europe rather than the trans-Pacific route (Chen et al. 2016).

From the perspective of China, China's current maritime shipping routes have tremendous vulnerabilities as it mainly relies on the route traversing the Suez Canal, Indian Ocean, and Strait of Malacca. The recent tensions in the South China Sea might also prompt the idea of building an alternative to the Panama Canal, which can facilitate trade with countries on the east coast of

the Americas as well as with countries in north and west Africa. Chinese trade with South America has become greatly diversified and will likely continue to grow. Taking oil trade as an example, China is committed to deepening its oil links with Latin America, and the canal will improve China's access to Latin American oil in the long run. Venezuela was China's largest South American crude oil supplier at 4 percent in 2014, according to a May 2015 EIA report on China, followed by Colombia and Brazil at 3 and 2 percent respectively (EIA 2015a, 2015b). As half of China's imported oil is from the Middle East, oil supply from Latin America will reduce China's overreliance on the chaotic region and diversify China's oil supply security. The expansion of the Panama Canal still has its limitations in transit capacity, while the Nicaragua Canal will have a comparative advantage because it will have the capacity to accommodate a new, larger generation of cargo ships and oil tanks, which will further reduce the maritime shipping cost of oil imports. In addition, beyond commercial competition, the Nicaragua Canal might also drive down the transit rate of the Suez Canal and Panama Canal to their operating cost, which will not only benefit China but also give a boost to the maritime shipping industry.

Undoubtedly, if the Nicaragua Canal is built, its short distance from the US would have significant geostrategic implications both as a rival to Panama and as a base for Beijing to extend its influence in the Americas (Watts 2015). Latin America is sometimes considered—especially by the US—to be in its sphere of influence. A Chinese-built canal in the middle of the Americas would symbolize accelerating shifts in geopolitics. Some experts argue that the canal's construction should be seen as a geostrategic probe by China. The depth of the canal, a reported twenty-eight meters, should also raise eyebrows, as it would be deep enough for Chinese submarines to quickly and covertly cross between the Pacific and Atlantic Oceans (Runde 2015). Although for the foreseeable future China does not have any intention of projecting its military presence in the Western Hemisphere, the canal will give China maritime leverage in the region.

CONCLUSION

The construction of the Nicaragua Canal has already faced postponement amid a shortage of funding and negative socio-environmental concerns. There has not been much additional construction since the ceremonial breaking of ground in 2014. However, both the Nicaragua government and the HKND Group, the two main stakeholders of the canal project, still have the enthusiasm and motivation to continue the project. Since the Nicaragua

Canal is perceived as a national pride project and the Ortega administration holds considerable sway over the people and political system of Nicaragua, finance will be the key determinant that decides the future fate of the canal. From the available facts released by various sources, the HKND group does not seem able to raise adequate funds for the project. In the meantime, as China is expanding its footprint in Central America, a new Nicaragua Canal serves the interests of both Chinese authorities and Chinese companies who are increasingly going global. If the project is fully funded, the Chinese government may play a tacit facilitating role behind the scenes, most likely in an indirect approach, to encourage the involvement of Chinese SOEs. What the future will hold for the audacious Nicaragua Canal is still unknown, but there is good reason for various stakeholders to fulfill the long-held Nicaraguan dream.

NOTE

This study is supported by the Fundamental Research Funds for the Central Universities of China and the Research Fund of Renmin University of China (N0.14 XNJ005).

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8

CHINESE INFRASTRUCTURE PROJECTS IN LATIN AMERICA AND THE CARIBBEAN

The Experience of the Inter-American Development Bank

Sven-Uwe Mueller and Fan Li

INTRODUCTION

The Inter-American Development Bank (IDB) recognizes the important role infrastructure projects have in modern societies. Infrastructure investment allows countries to provide basic services such as reliable roads, water, sanitation, and energy. In turn, these basic services help promote health and education. Furthermore, investment in infrastructure helps promote growth by reducing production costs, increasing productivity, facilitating the accumulation of human capital through the hiring and training of experts, creating markets, improving market access, helping diversify the productive structure, and creating employment (Serebrisky et al. 2015).

Even though the positive effects of infrastructure on an economy are well recognized, there remains a considerable gap in infrastructure investment. Since the late 1980s, total infrastructure investment in Latin America and the Caribbean (LAC) has dropped. Several studies show that there is a need for LAC countries to invest about 5 percent of GDP in infrastructure to close the gap (Bhattacharya, Romani, and Stern 2012; Calderón and Servén 2003; Fay and Yepes 2003; Kohli and Basil 2010; Perrotti and Sánchez 2011; Serebrisky et al. 2015). Currently, LAC countries are underinvesting, having spent an average of 2.4 percent of their GDP between 1992 and 2013 (Serebrisky et al. 2015). This estimated gap of between 2 percent and 2.5 percent of GDP in infrastructure investment in the region has made the IDB further increase its focus on infrastructure. The evolution of this gap is demonstrated in figure 8.1. Consequently, the IDB gave loans worth $5 billion annually for invest-

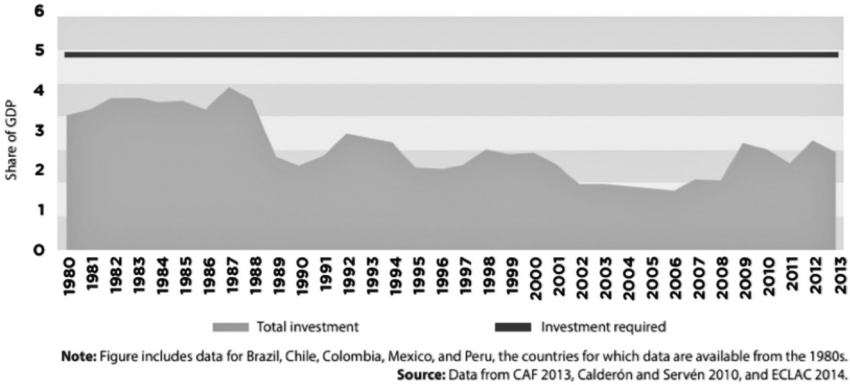

FIGURE 8.1. ANNUAL INVESTMENT IN INFRASTRUCTURE IN LATIN AMERICA AND THE CARIBBEAN, 1980–2013. SOURCE: SEREBRISKY ET AL. (2015).

ments in infrastructure from 2009 to 2014. This represents about 50 percent of the bank's portfolio during those years.

By 2015, 39 percent of the total $10.3 billion loans given by the bank were allocated to public sector operations in infrastructure and the environment, as seen in figure 8.2 (note that that figure does not include operations in the Urban Development and Housing sector, which increases the total share of spending in infrastructure that year to about 45 percent).

However, the bank acknowledges a growing need for improvement in the quality of investments in infrastructure in LAC as well. The IDB's infrastructure strategy shows ways to further increase the level of environmental, social, and fiscal sustainability in infrastructure projects financed by the IDB. Such projects will promote more sustainable and inclusive growth (Serebrisky 2014).

IDB'S EFFORTS IN CLOSING THE INFRASTRUCTURE INVESTMENT GAP

To tackle the challenge of ensuring high quality and sustainable projects while closing the investment gap, the bank has undertaken several steps. One such step was to open a technical cooperation fund in 2006 specifically geared for infrastructure preparation called InfraFund. This fund's goal is to create a pipeline of well-prepared infrastructure projects, improve the regulatory framework, and improve the quality of private and public infrastructure projects. The fund finances preparatory work for infrastructure projects.

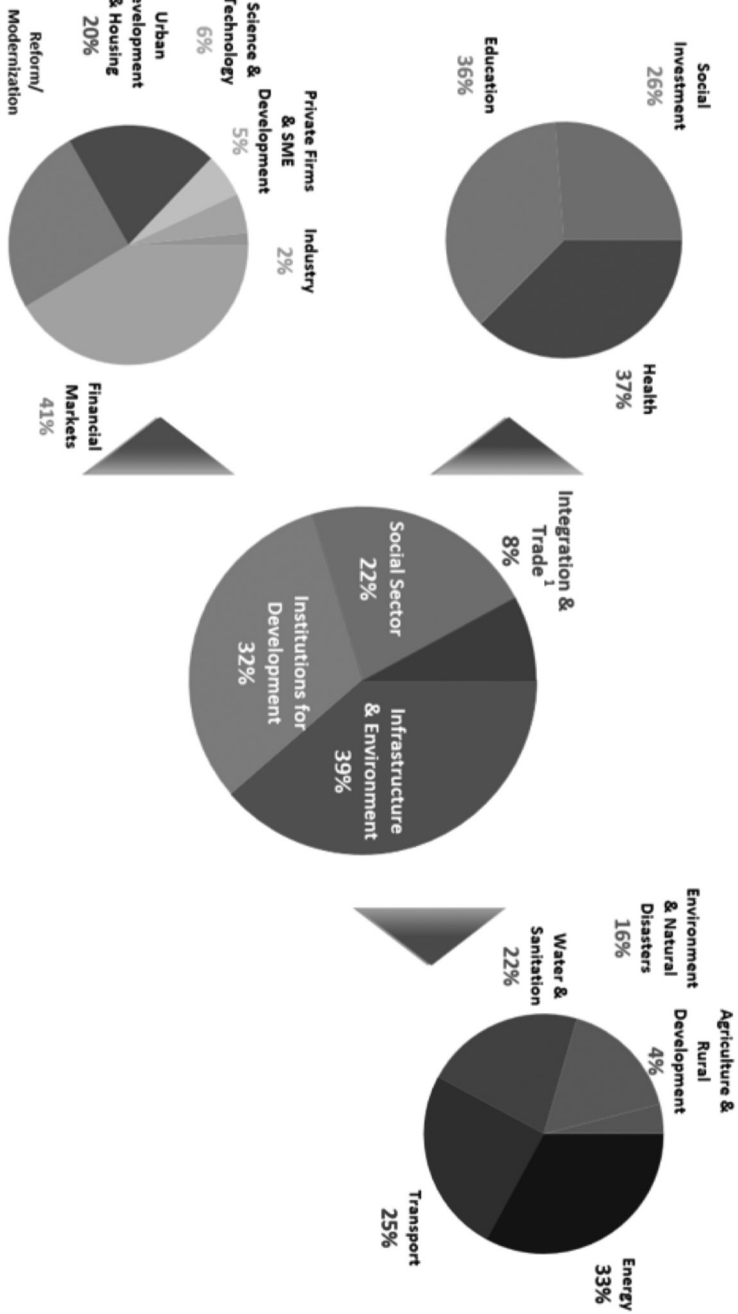

FIGURE 8.2. IDB LOAN APPROVALS BY SECTOR, IDB CORPORATE PRESENTATION, 2015

Another step taken by the bank to improve the infrastructure projects and close the gap was the establishment of the Sustainable Energy and Climate Change Initiative (SECCI) Fund to help finance alternative energy, sustainable agriculture, climate-friendly transportation, and climate-resilient resource management. This fund was created in 2007 with funding from the IDB and international donors. The SECCI Fund finances activities to promote renewable energy, to increase access to international carbon finance and to mainstream mitigation of and adaptation to climate change across sectors in LAC.

These trust funds are valuable instruments for delivering more sustainable infrastructure. Trust funds enable donors to direct aid to specific countries using the Multilateral Development Banks (MDBs) while making sure that such aid funds are used efficiently.

In addition to creating trust funds, the establishment of the China Co-Financing Fund was another step the bank took that helped close the infrastructure investment gap in LAC. It was approved by the IDB and the People's Bank of China in 2013. It supports public and private sector projects that promote sustainable and inclusive economic growth. Originally established with $2 billion by China in 2013, this fund has been instrumental in financing projects, including infrastructure. The Fund contributed $1.5 billion in loans to various firms allowing them to close the gap in financing in numerous infrastructure projects in LAC. This focus on the private sector has made possible a considerable number of projects; increasing trade flows by improving seaport infrastructures in Mexico or promoting the use of renewable energy by building wind power plants in Uruguay are just two examples. Through the Fund, Chinese financing has played an important role in IDB's infrastructure financing in LAC countries.

HOW THE IDB FINANCES PROJECTS

Infrastructure projects tend to be capital intensive and complex due to their massive nature. The IDB Group finances projects in both the public and the private sector. The IDB Invest (formerly known as the Inter-American Investment Corporation [IIC]), is the legal entity of the IDB Group, which works exclusively with the private sector. Although both the public-sector business of IDB and IDB Invest work on infrastructure projects, they follow different procedures on how to select and implement these types of projects. These procedural differences are important to understand the type of projects that each side undertakes and lead to different types of investors participating in the projects.

All public and private loans, grants, guarantees, and investments by the IDB Invest, the private sector branch of the IDB, or the IDB itself, follow a strict series of review processes before the capital is released to the borrowers. These processes are critical for prudent financial and risk management, which helps to preserve the triple-A rating of the IDB, a rating it has had since 1962.

A loan given to a country's public entity must fulfill several requirements. The project of the entity must be aligned with three documents: the IDB's Institutional Strategy; the IDB Country Strategy, which states the priorities for the recipient country; and with the Sector Frameworks for the specific infrastructure sector.

The IDB's Institutional Strategy serves as a roadmap to focus its efforts on the most important issues of the region in terms of economic and sustainable development (IDB 2015). Approved by the Board of Governors every ten years but updated periodically, this document helps determine the bank's actions in the region.

The Country Strategy is developed every four years with the recipient country's administration, mostly with the treasury or with its cabinet. This strategy document ensures that the country's needs are reflected within the IDB's future operations. It reflects the priorities of the recipient government as well as the priorities of the bank's Institutional Strategy.

Furthermore, Sector Framework documents are created with the help of experts in their respective fields. Sectors include areas such as Urban Development and Housing, Transportation, Energy, Climate Change, Social Protection, and Gender and Diversity. These framework documents guide the bank in its selection and execution of projects in the different sectors and bring in most recent sector knowledge and the perspective of the bank's field experts.

SOVEREIGN GUARANTEED OPERATIONS IN THE PUBLIC SECTOR

Loans given to countries' governments or state-owned entities are considered Sovereign-Guaranteed Operations. The loans given to these projects are guaranteed by the loan recipient country's treasury. This means the loan obligations will be satisfied by the country's treasury if the primary creditor defaults.

The IDB's Institutional Strategy and the Country Strategy guide the selection of projects, especially in the public sector. In a constant dialogue between the bank's country office and the recipient government agencies, infrastructure projects are brought forward and evaluated. Projects that have the backing of the government and are able to comply with financial and/or environmental requirements of the bank are then selected and handed over

Proposal	**Borrowers submit detailed proposal to IDB** **The proposal includes:** **– development impact** **– evaluation of the project's expected environmental risks and impact, as well as the impact on gender and indigenous groups** **– proposed mitigation measures for expected risks/negative impact**
Assessment	**The IDB evaluates the proposal, taking into consideration:** **– capacity of the borrower to carry out its financial obligations under the loan agreement** **– technical, economic, and developmental merits**
Authorization	**Goes to Board of Executive Directors for approval**
Implementation	**IDB staff reviews progress and monitors compliance with IDB policies to achieve the operation's objectives and ensures that funds lent are utilized as intended**
Evaluation	**An independent unit of the IDB—Office of Evaluation and Oversight—evaluates lending operations to determine the extent to which they have met their objectives** **Evaluations are reported directly to the Board of Executive Directors**

FIGURE 8.3. TYPICAL LIFE CYCLE OF AN IDB OPERATION

to a dedicated project team which prepares the project technically, structures it financially and helps it to comply with IDB's Environment and Safeguards Policies (IDB 2006) and the other relevant frameworks. The project team devises solutions for the financial, technical, social, and environmental issues of the project and describes them in the loan proposal and its annexes. An important annex is the Environmental and Social Management Plan (ESMP) which describes the measures to be taken to achieve compliance with the social and environmental safeguards of the bank.

This proposal is then presented to the Board of Executive Directors for decision. After a positive decision, it can be prepared for disbursement and then, when the requirements for disbursement are met, the loan is disbursed. During and after disbursement the IDB reviews the recipient's compliance and monitors that the funds are allocated as contractually agreed. This is done by an independent unit of the IDB, which was not involved in the loan preparation to ensure maximum objectivity in oversight. Such a typical lending process is described in figure 8.3.

NON-SOVEREIGN GUARANTEED OPERATIONS IN THE PRIVATE SECTOR

Loans issued to recipients in the private sector are Non-Sovereign Guaranteed Operations. A typical lending process in the private sector looks similar but

has some differences. It is not only driven by policy decisions and government priorities but by market forces and business opportunities. Investment officers identify business opportunities as a result of, for example, bidding processes in infrastructure and energy sectors, and determine if they align with the IIC's general strategy and meet the risk and additionality criteria. This strategy must also be aligned with the IDB's Institutional Strategy, the Country Strategy, and the Sector Frameworks. Investment officers deal directly with the private firms to identify and develop projects. If the project meets the "eligibility criteria," the investment officer can sign a mandate letter and launch the due diligence of the project. This includes a thorough analysis of the project from a legal, market, technical, insurance, environmental, and social standpoint. In this process, the investment officer is supported by the IDB's headquarters and local counsel and by specific advisors depending on the nature of the project. In this context, the project's potential social, environmental, financial, and development benefits and risks are assessed and risk mitigation strategies are developed. The ESMP is one of these risk mitigation instruments. Once the team has concluded the due diligence, the project is presented to the IDB Invest's Credit Committee. Once approved, the infrastructure investment loans must be approved by the IDB Invest's Board of Directors. Infrastructure investment loans require their approval.

Once the project receives the board's approval, the documentation process starts. In other words, this is the drafting of the financing documents that reflect the commercial and legal understanding. For the loans to be disbursed, the project must satisfy a series of "conditions precedent," which include due diligence reports in final form acceptable to the lenders and client compliance with the applicable regulations and safeguards. During the implementation of the project, the IDB Invest monitors to ensure compliance and conducts ongoing supervision as the project progresses. This regulatory process ensures that the project will comply with international social and environmental standards which mitigates the projects' environmental and social risks, as well as integrity, legal, and to a certain extent, operational risks.

IDB'S ADVANTAGES

ADVANTAGES THROUGH PROVIDING TECHNICAL CO-OPERATIONS

An important tool for helping with infrastructure preparation and planning in the client countries of the bank are technical co-operations (TCs). The bank can use its own funds or the special funds of donor countries dedicated to

specific purposes to finance such TCs, which perform research and dissemination studies, and provide client support or operation preparation. These could be for a specific project or for more general topics like the overarching purposes of project planning or for improving the framework conditions for infrastructure preparation and finance. These TCs are prepared in close cooperation with the government of the recipient country and can be very useful interventions as they bring international state of the art knowledge and practices into the country. They can be instrumental in helping the governments to better assess their specific challenges, reframe their own governmental interventions, and explore new solutions by looking at proven methodologies and best practices.

An illustrative case is the TC used by the bank to improve the expansion of a port in Manzanillo, Mexico. In this case, InfraFund disbursed funds to hire technical expertise to promote several concrete sustainability issues related to the project: climate change adaptation, carbon footprint reduction, and gender equality in the port sector. The findings of this TC recommended Manzanillo's port authority and the local government to build adaptive capacity that would allow them to gather information on climate change and better understand how to respond to it. Furthermore, it recommended the port authority undertake specific actions to increase the resilience to climate change such as upgrading its drainage system to be able to handle increased flows, insulating certain electrical equipment to resist flooding or improving its sediment traps. This TC on Manzanillo's project also helped the Mexican authorities better assess the challenges of climate change. The section on the China co-financing fund will further elaborate on this project as it also demonstrates a successful cooperation between the IDB and China.

ADVANTAGES IN PROVISION OF LOANS

Loans given by the IDB, or other large public MDBs, have certain advantages over other sources of financing that are essential for infrastructure projects to succeed. Two advantages are key in MDB loans: the technical expertise the MDB provides and its long maturity.

In general, MDBs can bring in a strong technical expertise of the bank's sectoral experts. This can maximize the impact of the resources they spend. For example, one study done by the World Bank estimates that the impact of such expertise leads to multipliers of around two to five dollars per dollar invested by an MDB in private sector operations (Inter-Agency Task Force on Financing for Development 2016, 2).

For example, MDB's policy advice can help countries attract, catalyze, and handle additional capital from improved domestic resource use. The additional capital brought in by this effect may lead to net gains in welfare.

These net gains in welfare are the result of the oversight of the loans by MDBs. This oversight includes policy advice, technical assistance, and capacity building that strengthen local financial institutions and capital markets and create a climate conducive for financing. MDBs usually finance only a share of the total cost of the project, but because of the positive effects of their oversight, the financing conditions improve and thus the project becomes more attractive to investors. When MDBs invest in high-risk or novel environments there is a demonstration effect that leads to new investors and additional projects (Inter-Agency Task Force on Financing for Development 2016). Attracting additional investors can be of special help to large-scale operations in infrastructure.

Moreover, the long maturity periods of the loans that MDBs offer is a crucial precondition for infrastructure projects. Loan maturities from the IDB may range up to twenty-five years. When surveyed on loan preference, country ministerial officers in LAC stated that loan maturity was "at the top of their priorities when deciding on borrowing sources" (Humphrey and Michaelowa 2012). The long maturity allows recipient firms and countries to pay back smaller amounts per year, which consequently reduces the financial stress on the operation. This reduction of financial stress is especially useful to operations where the recipient may have liquidity constraints. Small developing countries that often suffer this constraint can especially benefit from the long maturity of the loans.

CHINA AND LAC

The economic ties between China and LAC have intensified significantly in the past fifteen years. Total trade flows reached $292 billion in 2013 (Estevadeordal, Mesquita Moreira, and Kahn 2014), driven by LAC imports from China and LAC's commodity exports to China.

Chinese investment in LAC is high and has grown significantly in the past decade. Figure 8.4 shows the magnitude of such foreign direct investment (FDI) growth and figure 8.5 shows Chinese finance to LAC by year. However, Chinese direct investment has not boosted the manufacturing sectors in LAC significantly (Estevadeordal et al. 2014). Most of Chinese financial inflows have come as loans for oil.

Besides FDI, loans from Chinese developmental banks play a consider-

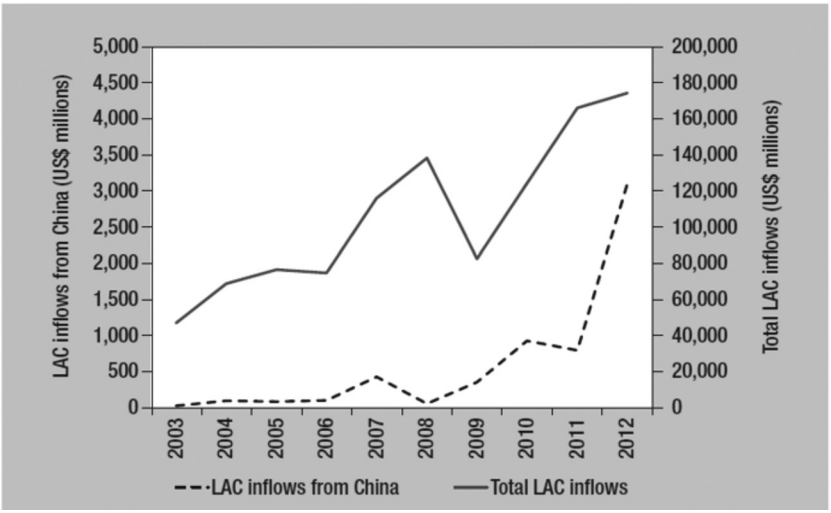

FIGURE 8.4. LAC FOREIGN DIRECT INVESTMENTS INFLOWS FROM CHINA AND THE WORLD. SOURCE: MOFCOM (MINISTRY OF COMMERCE OF PEOPLE'S REPUBLIC OF CHINA) AND UNCTAD

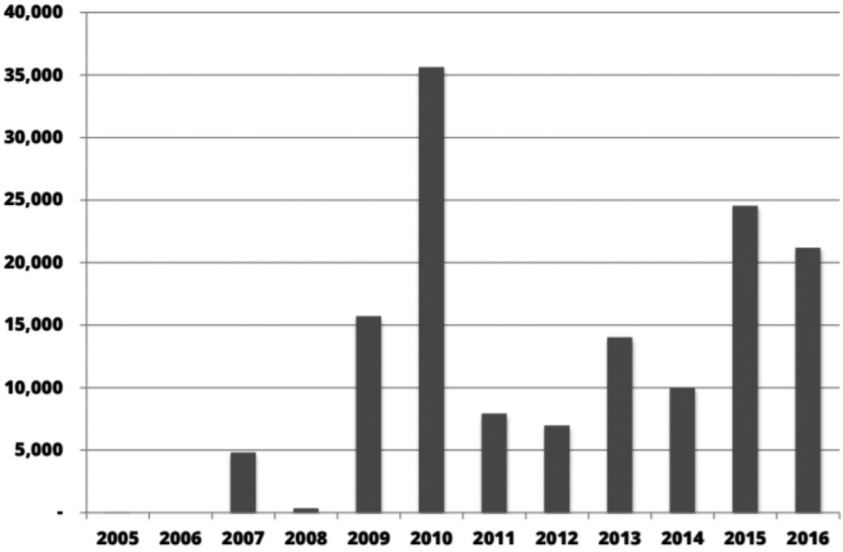

FIGURE 8.5. CHINESE FINANCE TO LAC, 2005–2016 (US$ MILLION). SOURCE: MYERS AND GALLAGHER (2017).

able role, especially in infrastructure finance. In 2016, Chinese developmental banks' finance to governments and state-run companies in LAC reached $21 billion (Myers and Gallagher 2017). The year before that, this amount was even higher, reaching almost $25 billion. Only 2010 witnessed a higher investment level than 2015, where Chinese policy banks gave loans worth $35 billion in LAC. From 2005 to 2016 the China Development Bank and the China Export-Import Bank have financed $141 billion in total. Furthermore, China allocated $35 billion in region-wide funds for infrastructure and other projects in 2015.

Loans given by China have differed within LAC, benefiting some countries more than others. In 2016, Brazil, Ecuador, and Venezuela accounted for 92 percent of the loan portfolio to the region (Myers, Gallagher, and Yuan 2016). China has focused especially on infrastructure and raw materials and the development of the oil sector. Brazil and Venezuela have received especially large loans due to Chinese interest in these industries. Beginning in 2017, China has invited LAC countries to join its One Belt One Road Initiative with billions of dollars in infrastructure investment. China will certainly become a much more important source of capital for LAC, diversifying into sectors such as manufacturing, e-commerce, and technology.

CHINA AS A SHAREHOLDER OF THE IDB

As of January 2009 China joined the IDB as a nonregional donor member and became the forty-eighth member country of the bank. Donor member countries are not the majority shareholders and hold 49.98 percent of the voting power in the bank unlike in other international multilateral banks. Zhou Xiaochuan, governor of the Central Bank of China, currently serves at the IDB's Board of Governors while Yi Gang, the Central Bank's deputy governor, serves as an alternate governor at the Board.

China contributed $350 million to the IDB Group when it joined the bank in 2009 that were allocated to different sectors in the bank in the following way:

- $125 million went to the Fund for Special Operations that provides soft loans to Bolivia, Guyana, Haiti, Honduras, and Nicaragua
- $75 million to different IDB grant funds that help improve the institutional capacity of states
- $75 million to the IDB Invest, the private sector branch of the bank, to establish an equity fund focused on providing investment to small and medium-sized enterprises
- $75 million to the Multilateral Investment Fund, an IDB entity in charge

of microenterprises, designed to increase economic opportunities for the poor in LAC

THE CHINA CO-FINANCING FUND FOR LATIN AMERICA AND THE CARIBBEAN

Since it was first approved in 2013, the China Co-Financing Fund for Latin America and the Caribbean has become a valuable financial instrument for the IDB Group and has complemented the latter's resources when funding projects.

The China Co-Financing Fund was the first co-financing fund established by China and an MDB. Two billion dollars were allocated for it. Of this amount, $500 million is reserved for public sector loans and the remaining $1.5 billion for private sector loans. By the end of 2016, the China Co-Financing Fund had committed and approved over half of its resources for different projects.

The Fund and the China-IDB partnerships have further promoted South–South cooperation by improving knowledge and funding in areas key to LAC. Consequently, the large amount of capital contributed by the Fund has been a major advantage of this partnership. What follows are some examples that have been financed by the China Co-Financing Fund.

COSTA RICA: CONNECTING COMMUNITIES

In 2013, a $450 million loan was given to Costa Rica to improve its road and port infrastructure. Of this amount, $50 million came from the China Co-Financing Fund. This project's goal is to reduce vehicle operating costs, improve road and port safety, and shorten travel times for passengers and goods. Achieving this goal will facilitate the flow of trade between Costa Rica and other countries and further integrate the country economically.

This project came as a response to Costa Rica's road deficiencies. As of 2011, only 36 percent of its national highways were in good shape. Costa Rica's investment in infrastructure reached 0.93 percent of its GDP that year, while world averages tend to range from 2 percent to 4 percent. This infrastructure investment gap diminished Costa Rica's potential GDP growth, even though the country's GDP had grown dramatically in the previous decades. This project sought to reduce this gap.

This project involves repairing or paving up to 110 kilometers of the national road network, widening 51 kilometers of roads from two to four lanes, and building or repairing nineteen bridges and nearly 400 meters of breakwa-

ter in ports. These measures are estimated to reduce vehicle operations by 7 percent and travel time by 28 percent. Furthermore, the better road connectivity will allow nearby firms to lower their transportation costs and facilitate access to social services.

MANZANILLO: IMPROVING TRADE CAPACITY

Mentioned earlier as an example of a successful TC operation, Manzanillo's port project also exemplifies the use of the China Co-Financing Fund as an instrument to help give loans to large infrastructure projects in LAC.

In 2015, the IDB closed a $117.5 million loan to International Container Terminal Services Inc. to modernize and expand the port of Manzanillo in Mexico. In this private sector loan package, $25 million of it was from the China Co-Financing Fund. Other investors include the International Finance Corporation, Standard Chartered Bank, and KfW Ipex Bank.

This project originated from Mexico's need for a deepwater port capacity to be able to receive larger ships and offer higher quality services. International trading across the Pacific is growing quickly. As Manzanillo Port handles more than 60 percent of Mexico's Pacific container traffic volume, the project intends to speed up shipments across the Pacific and Mexico and increase trade flows, lower costs for shippers, shipping lines, and consumers.

China Harbour Engineering Company (CHEC) was contracted for the construction of phase one of the port by International Container Terminal Services (ICTSI). CHEC, a subsidiary of China Communications Construction Company Ltd., specializes in the construction of basic infrastructure, including naval engineering works. CHEC brought expertise in building the wharf, the yard, other related terminal infrastructure, and general naval infrastructure. In this case, both CHEC and the China Co-Financing Fund helped the project succeed.

CHINESE CONTRACTING

Chinese firms also participate in tenders linked to IDB public sector loans under IDB's procurement policies.

TRINIDAD AND TOBAGO'S WASTEWATER REHABILITATION PROGRAM

In 2013, the IDB approved a $246.5 million loan to help improve Trinidad and Tobago's water treatment plans.

According to the Water and Sewerage Authority of the country, 30 percent of the country's population has a wastewater collection system available to them. The rest of the population has on site sanitation solutions such as septic tanks and latrines. Several wastewater treatment plants have been abandoned by the private sector and thus have aged and do not collect and treat wastewater adequately. IDB's loan is intended to help the country's government to rehabilitate and expand such wastewater treatment plants. During this process of rehabilitation, in November 2014, the company Sinohydro was awarded a $97.6 million contract after a public procurement process to work on water and sewage infrastructures in the country. Sinohydro has built a wastewater treatment plant in the neighborhood of Malabar in the city of Arima and has worked efficiently and complied with deadlines. This experience shows that hiring a Chinese company can bring expertise to a country and provide construction services for critical infrastructure in a timely and reliable manner.

CONCLUSION

The underinvestment in infrastructure continues to inhibit LAC's development. The IDB has taken several steps to close this investment gap. As the bank's loans can provide only limited remedies for this general problem, more finance of other sources is needed and has to be mobilized.

As long as the gap in infrastructure investment in LAC remains, so will the region's need for investors and for infrastructure expertise. China's vast expertise and experience in infrastructure building all over the world is evident. Moreover, China has the financial capacity and experience in infrastructure investment required to ameliorate such needs. Thus, the IDB sees its partnership with China as a crucial and strategic line of cooperation which, as shown by the examples discussed above, is beneficial for both sides.

The IDB Group's experiences working with China to close this investment gap in LAC have been positive. The China Co-Financing Fund has invested in many infrastructure projects alongside with the IDB and will continue to do so in the future. Chinese infrastructure firms have won contracts in IDB financed infrastructure projects and have implemented them in a timely and successful way. It is the bank's opinion that a strong collaboration with China in the field of investing in sustainable infrastructure can be mutually benefi-

cial for both sides and could lead to sustainable economic growth for Chinese firms and for LAC as a region.

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9

A STRATEGIC ANALYSIS OF CHINESE INFRASTRUCTURE PROJECTS IN LATIN AMERICA AND THE CARIBBEAN

Haibin Niu

Since the beginning of the twenty-first century, we have witnessed growing economic ties between China and Latin America. The relationship has evolved from trade centered around raw material exchanged for manufacturing goods to a more substantial and broader pattern that includes investment and financial cooperation. With the end of the commodity super cycle, both sides are adapting to a slowing world economy. During this process, China's role in Latin America's sustainable development has been debated, and infrastructure has been identified as one of the key areas for both sides to develop cooperation. This chapter examines the potential of cooperation on infrastructure between China and Latin America and its impact on Latin America's capacity to achieve sustainable development from a strategic perspective.

REDEFINING CHINA'S ROLE IN LATIN AMERICA'S DEVELOPMENT

China's increasing economic presence and impact on Latin America's development in the twenty-first century has been widely discussed by scholars, international organizations, and policymakers (Augusto 2015; Gallagher and Porzecanski 2010; OECD 2015; Dussel Peters and Armony 2015). The joint report completed by the Organization for Economic Co-operation and Development (OECD), the Economic Commission for Latin America (CEPAL), and the Development Bank of Latin America (CAF) recognizes that China is

a key player in the advance of Latin America's development even though its involvement brings both opportunities and challenges (OECD 2015). To some extent, China played a positive role by helping the region deal with the shock of the 2008 financial crisis. However, this role is being redefined in the slowing world economy, especially as China enters a new era characterized by slowing economic growth as well as a transition to a more consumption-based economy, while Latin America has been recovering from a region-wide recession since 2015.

There are three concerns regarding China's possible negative influence in Latin America. The first concern is China's increased strategic influence in Latin America due to the former's economic ties with the region. The argument focuses on China's impact on the region's governance and economic quality, highlighting China's preference of emphasizing diplomacy in order to create opportunities for its enterprises, avoid market competition, and to downplay environmental and labor requirements (Esteban 2015). The second concern is the North–South relationship dynamic of China's economic ties with Latin America and the deindustrialization effects on Latin America: China's demand for raw materials and investment in energy, agriculture, and mines has increased the dependency of Latin American economies on primary goods (Gallagher and Porzecanski 2010; Guajardo 2016). The third concern is China's possible assertive geopolitical influence in the region's liberal order based on its growing trade ties (Ellis 2005; Hakim 2006; Piccone 2016). By this argument, competition between Washington and Beijing for influence in the LAC region occurs mainly on the battlefield through clashing visions of the international liberal order and competing models of economic and political governance.

In response to these concerns, the Chinese government released its second policy paper on Latin America and the Caribbean in 2016 (the first one was published in 2008). The paper argues that China's goal is to achieve basic development and not target or exclude any third party. Differing from the 2008 policy paper, the new one emphasizes the importance of strengthening exchanges of experience in governance and development. In doing so, China will establish an International Development Knowledge Center.

On the economic front, the new policy paper emphasizes the adoption of two previous policy initiatives: the "1+3+6" framework and the "3×3" model. The "1+3+6" framework utilizes trade, investment, and financial cooperation as driving forces, and identifies energy and resources, infrastructure construction, agriculture, manufacturing, scientific and technological innovation, and information technology as cooperation priorities. The "3×3" model for capacity cooperation discusses developing the three major passages of lo-

gistics, energy, and information, thus enabling healthy interactions among the three players of business, society, and government, and expanding the three financial channels of funds, credit loans, and insurance. The adoption of these two initiatives demonstrates that China has a balanced and comprehensive perspective on economic cooperation and prefers a business-led and market-oriented economic cooperation.

It is notable that infrastructure has been identified by Chinese policy makers as a major field for economic cooperation. In 2014, Chinese president Xi Jinping proposed a $35 billion fund to finance infrastructure and development projects in Latin America and the Caribbean after he met leaders of the Community of Latin American and Caribbean States (CELAC) during his visit to Brazil. The proposal demonstrates China's effort to diversify its investment in Latin America. The vast majority of China's investment in Latin America between 2005 and 2013 was spent on raw materials.

There are several reasons for prioritizing infrastructure in China's external agenda. First, the Chinese proverb "If you want to get rich, build a road" captures the notion that China does value the importance of infrastructure construction in its domestic economic growth strategy. Second, building infrastructure has achieved an international consensus in the sustainable development agenda set by international institutions such as G20, BRICS New Development Bank (NDB), the IMF, and so on. Along these lines, China treats cooperation on infrastructure as a contribution to the region's sustainable development. Third, with China's accumulated advantages of experience, capital, and industrial capacity in the domestic infrastructure sector, the Chinese government has the intention of letting this sector go global by initiating strategies like the One Belt One Road Initiative (OBOR). OBOR tries to connect China to the rest of the world mainly by supporting major infrastructure projects across the world. Fourth, Latin America has a huge infrastructure deficit to be filled. The deficit produces substantial damage to economies of the region. For example, transport costs within countries such as Brazil have been identified as root causes of labor market friction by affecting inter-industry labor mobility and the integration of domestic labor markets (Torre 2015). Most of the policymakers in Latin American countries are increasingly aware of the value of infrastructure in promoting sustainable development, and they have expressed interest in receiving contributions from China to develop infrastructure. With the deepening economic ties and knowledge of the region, there are increasing economic motivations for China to invest in the infrastructure of Latin America.

China's definition of infrastructure is broad and comprehensive. The cooperation on infrastructure addresses technical consultation, construction

and engineering, equipment manufacturing, and operation management. The fields of infrastructure cooperation cover transportation, trade logistics, storage facilities, information and communication technology, energy and power, water conservancy, housing, and urban construction. The cooperation will happen not only within individual countries but also at the continental level with massive infrastructure projects. One innovation is to adopt the Public-Private Partnership (PPP) model even though the PPP model is at an early stage in China's domestic infrastructure development.

As to the financial support provided by China, there are several special funds in the China-CELAC Forum. The China-Latin America Cooperation Fund and the China-Latin American Production Capacity Cooperation Investment Fund, among others, provide concessional or special loans for China's involvement in infrastructure construction in Latin America. Presidents of Chile and Argentina were invited to a high-level dialogue on One Belt One Road, which shows that the geography of the OBOR Initiative will be open to every corner of the globe and that Latin America will receive financial resources from the Silk Road Fund of the initiative. The NDB and the Asian Infrastructure Investment Bank (AIIB) might also provide financial support to Latin America's infrastructure projects.

It is puzzling why both China and Latin America are active in infrastructure cooperation in the context of downward raw material prices since the infrastructure is supposed to facilitate commodity exports. For an intermediary period, China will reduce its import of raw materials from Latin America as it deals with the industrial overcapacity issue. One possible explanation is that Latin American countries want to integrate themselves better into Asia's value chains and enhance regional economic integration in Latin America by cooperating with China on infrastructure sectors.

Even though great potential exists for China and Latin America to develop cooperation in the infrastructure sector, previous experiences of this kind of cooperation are not encouraging. Infrastructure investment is becoming controversial because of concerns about its environmental effects, capital formation, and possible loss of strategic resources. China's efforts to invest in the high-speed railway sector of Mexico, Venezuela, and Brazil met many unexpected difficulties. Proposed mega infrastructure projects such as the Nicaragua Canal and the Bi-Oceanic Railway are facing many uncertainties. China's investment in infrastructure sectors such as energy, transportation, and digital infrastructure offers a better picture. To understand this mixed picture and the future of China's performance in Latin America's infrastructure sectors, we need a cross-country and cross-sector analysis of China's infrastructure investment in Latin America and the Caribbean.

BUMPY MEGA-NARRATIVE AND RAILWAY DIPLOMACY

With its world-class high-speed railway network, Chinese firms are eager to explore overseas business opportunities. Lack of infrastructure, especially of railway, has been a problem in most Latin American countries. Under the development-oriented popular leadership, infrastructure was treated as an important way to achieve economic growth. Due to the region's difficult environment for running high-speed trains, most of the Chinese achievements in this sector have been modest. The booming economic ties between China and Latin America in the first decade of the twenty-first century also encouraged people to think big and imagine mega-infrastructure such as the Bi-Oceanic Railway, the Nicaragua Canal, and so on.

The first high-speed railway contract in Latin America was signed by China Railway Group Limited and Venezuelan National Railway Department in July 2009. The contract represented the first and most expensive overseas railway design and construction project signed by Chinese firms in Latin America until then. The contract volume reached $7.5 billion. It aimed at building a two-way, 471.5-kilometer, electrified railway line with a speed of 220 km/h by 2012. The planned railway aimed to connect Tinaco and Anaco with four states involved. However, the project failed to be completed because of the financial troubles of the Venezuelan government, which intended to use this railway to promote economic activities in the underdeveloped inland states that were to be connected. The government did not keep its financial commitment to the project when it met increasing fiscal difficulties. In many ways, the government's attitude of abandoning the project reflected the poor economic rationality of the project itself.

Many Chinese scholars think that the failure of the railway project was due to political reasons rather than economic logic (e.g., Zhang 2016). According to China's domestic experience of running high-speed rail, most of the profitable lines are those that connect populous metropolitan areas. The successful lines also rely heavily on a stable supply of electricity. These conditions did not exist in Venezuela. There were also increasing difficulties for the country to get access to finance, electricity, and basic goods supplies when the price of oil dropped in 2009. The worsening economic performance made it difficult for the country to build and run a high-speed railway. Furthermore, there was no report available on whether the project went through a public bidding process, which reduced its commercial credibility and feasibility.

China Railway Group Limited made it clear that the contract to build the railway was a commercial move, meaning the project was not based on political motives. Although China Railway Group Limited wanted to continue the work on this project by overcoming poor conditions such as requirements

from environmental groups and labor unions, inflation, lack of basic goods, and poor public security, the company finally stopped working on the project because of the Venezuelan government's fiscal problems. The railway case in Venezuela taught Chinese companies that the better way to achieve successful overseas investment is to go through a traditional commercial process and follow financial common sense (Zhang 2016).

Some observers even go further to question the general cooperation pattern between China and Venezuela (Xie and Zheng 2017). The pattern was famous for its feature of "oil exchange loans." According to the official Chinese understanding, the bilateral financial cooperation between China and Venezuela is a commercial one between financial institutions and enterprises from both sides. Considering the nationalization of Venezuela's strategic economic sectors, sufficient evaluation of the country's economic performance and fiscal capacity became important for any commercial cooperation. The failure of the railway project is directly related to the Venezuelan government's inability to pay. Furthermore, Venezuela's worsening economic and political situation made the country's repayment of Chinese loans uncertain. Chinese enterprises doing business in Venezuela faced similar risks as other foreign firms because of hyperinflation and a tight rein on foreign exchanges.

Another failed railway project in Latin America is the Mexico City-Querétaro high-speed railway. The line would have been 210 kilometers long, with a speed of 300 km/h. The commercial feasibility of this line was much better than Venezuela's, considering the size of the population along the line and the government's fiscal capacity, as well as the stable supply of electricity in Mexico. In this case, there was a public bid in 2014 and China Railway Construction Corporation Limited (CRCC), together with its local partners, won the bid. However, the Mexican government indefinitely suspended the bid because of the falling price of crude oil. The real reason behind the Mexican administration's changed attitude was the questioning of the transparency of the bidding process by opposition parties in Congress and public opinion.

This failure was a setback to Chinese efforts to deepen the economic cooperation with Mexico under the leadership of Enrique Peña Nieto, who was invited to attend the Boao Forum and pay a state visit to China in 2013. The high-speed railway project was expected to show the maturity of the bilateral strategic relationship. Because of their competition for the US exports market, economic ties between China and Mexico are much weaker than bilateral political ones. A substantial economic relationship with Mexico would also help China's economic presence in the region become more balanced and full-fledged, since China's economic ties had expanded with Venezuela, Argentina, Chile, and Brazil in the previous decade.

There was no consensus on the lessons learned from the failed Mexican high-speed railway project. One argument was that the responsibility for the failure was on the Mexican side because of its unpredictability, while most of the blame was placed on Chinese enterprise. Some observers criticized the low price competition strategy since the declared price was even cheaper than that for a similar project in China (Lin 2014). Others praised the Chinese firm's local partnership strategy but thought the company should have paid attention to opposition parties in the Mexican Congress as well as civil society (Haibin 2014). The quiet suspension of the high-speed railway showed that the project failed to get strong support from both the public and opposition parties. Given the strong prejudice that the high-speed train was only profitable to China, the likelihood of future railway projects might improve only if more feasibility reports and impact evaluations are carried out.

The other widely discussed mega-case is the Bi-Oceanic Railway project that is designed to connect the Atlantic coast of Brazil with the Pacific coast of Peru. It is noteworthy that the Bi-Oceanic Railway plan has been a dream since the Brazilian government introduced this idea to the United States in 2008 for possible cooperation. China's rise only offers another chance to realize this vision. Representatives from China, Peru, and Brazil agreed to start the feasibility study for the Bi-Oceanic Railway project when Chinese Premier Li Keqiang visited Brazil in 2015. The economic benefits of the railway to the region are clear: The railway can enhance the interconnectivity of the region. Latin America has long been known for its lack of intraregional value chains and trade. To some extent, poor regional infrastructure is a central reason for weak regional integration. The railway will also help reduce the domestic transportation cost by connecting areas of agricultural production to the seaports. Furthermore, it will facilitate the trade between Asia and Latin America and make Latin America more competitive than Australia by reducing transportation costs.

Several factors must be addressed to make it a reality. The first is that the railway's route has to be decided. Peru is considering inviting Bolivia to be involved in the project. The second factor is the question of addressing the environment, indigenous people, and biodiversity concerns since the railway will cross some parts of the Amazon area. One *New York Times* article commented that across the region, one large Chinese rail venture after another has come crashing against the hard realities of Latin American politics, resistance from environmental groups, and a growing wariness toward China (Romerooct 2015). The third factor is the financial problem, considering the fiscal difficulties of Latin American partners in the project. If China contributes most of the loans to the project, the model of concession or arrangements

of payment must be adapted to attract Chinese investors. The fourth factor is that the business community of Germany is interested in joining the game as a potential competitor (VOA 2017). Germany prefers the Bolivian route with a preliminary cost of $10 billion, while China's estimate cost of adopting the route without Bolivia was $60 billion. The potential international competition on the Bi-Oceanic Railway project showed that the commercial benefits of the project—with its function to serve the trade ties across the Pacific Ocean—were well recognized.

Moreover, the calculation of national interests also played a significant role. The original route without Bolivia is in the interest of Brazil as it would benefit more inland states. From the economic, environmental, and regional integration perspective, the route that would include Bolivia is more feasible and attractive because it would be shorter, would avoid the biodiverse Brazilian regions, would save costs with established railway within Bolivia, and would use Bolivia's existing transportation connection with Argentina's agricultural region. Against this regional context, it might take more time for LAC countries to reach a consensus. Considering the time and money that is often involved in building this kind of strategic, continental infrastructure, local officials are encouraging Chinese investors to focus on important but smaller infrastructure projects in urban areas. It is highly possible that the mega-infrastructure might lose priority under the new political leadership of Brazil and Peru.

The other important perspective on the Bi-Oceanic Railway project is the geopolitical strategic thinking. Some scholars thought of the project as a test of China's mettle as a global power, a tool for China to get greater access to the region's resources, and a leverage for China in the region's internal affairs (Romerooct 2015). Some commentators thought China's interests in the mega-infrastructure of Latin America is to avoid the potential strategic risks by relying too much on the Panama Canal, which is assumed to be under strong US influence. Scholars argued that China's interests in mega-infrastructure reflected Beijing's efforts to secure raw materials, improve its food security, and find new markets for Chinese engineering and rail firms at a time when the nation's economic growth is slowing (Yi 2014). This thinking does not fit very well with the region's lack of effective and sufficient infrastructure to serve a broader development agenda, especially as countries around the world are reaching a consensus to build more infrastructure. In the mega-infrastructure cooperation, it is better to focus on absolute gains rather than relative gains, or even worse, zero-sum thinking.

Another mega-case is the Nicaraguan Canal. It is a planned shipping route through Nicaragua to connect the Caribbean Sea with the Pacific Ocean.

Different from cases with strong involvement by Chinese state-owned firms, the private Hong Kong Nicaragua Canal Development Investment Company (HKND Group) led by Chinese billionaire Wang Jing is to finance and manage the project. The Chinese government denied its involvement in this mega-project even though there are many suspicions that the project has official Chinese backing, since it serves China's interest as a trading power in getting access to critical shipping lines. Despite the strong support for the canal project by the Nicaraguan government, there are many obstacles to be overcome. Similar to other mega-infrastructures, the canal project has a huge pressure from environmental activists about the possible damage to the Nicaragua Lake. It also faces the challenge of getting financial resources since the HKND Group needs to look for investors besides its financial capacity. There is also peer competition from the Panama Canal and Suez Canals, among others. Besides the lack of diplomatic relationship between China and Nicaragua, the absence of Chinese firms with construction capacity also decrease the feasibility of the project.

The above failure shows that the regional context has the most important impact on whether Chinese investment on mega-infrastructure becomes a success. Political corruption, weak fiscal capacity, strong labor, and environmental regulations, among other bureaucratic issues, had delayed or paralyzed many initiatives on mega-infrastructures in the region. The highly expected Rio de Janeiro–São Paulo High-Speed Railway's formal bidding had yet to start even though the railway was built to serve sporting events such as the FIFA World Cup and the Olympics.

STORIES WITH A BROADER AGENDA

Infrastructure is a concept used widely beyond economics. Infrastructure covers several economic and public utility sectors, such as transportation, communication, energy, water services, and sanitation. It is noteworthy that China's investment in Latin America's infrastructure goes beyond the railway projects. Cooperation has become more diversified beyond project contracting. After almost forty years of rapid economic growth, China has accumulated plenty of experiences, capacity, and technologies in the broader aspects of infrastructure. Considering its population, geography, and urbanization, Chinese firms are good at high-speed railway, highway, metro, telecommunication, ports, airports, oil and gas pipelines, long-distance, ultra-high voltage direct current power transmission, as well as power stations. These technologies and experiences are highly valuable for Latin America's integration projects, as well as domestic infrastructure development.

Chinese loans and products, such as metro trains, have reshaped the region's general infrastructure by building dams, roads, highways, bridges, hospitals, ports, hydropower stations, and power transition networks. These loans and products were targeted to countries that had difficulties in obtaining access to the international financial market—such as Ecuador, Brazil, Argentina, and Venezuela. Even in the difficult situation of Venezuela, China Railway Group Limited finished the reconstruction and extension of the Palua Port on time with a contract value of $112 million in 2015. China CAMC Engineering is in the process of building the Vigia combined cycle power plant, a large-scale integrated power station. The III unit started to generate electricity in 2015. The station is expected to help solve the severe shortage of electricity in the western part of Venezuela.

Though the Bi-Oceanic Railway faced resistance in Peru and Brazil, there are many other infrastructure projects in other parts of these countries with Chinese participation. Chinese firms have participated in hydropower stations, urban water supply and sewerage, transportation, bridge building, housing, and more. These projects include the HUANZA hydropower station, built with the China SFECO Group. Projects like HUANZA are mature developments with solid environmental impact assessment and social as well as economic contributions to sustainable development (UNFCCC 2012), which minimizes the participation risks for Chinese firms. The other advantage of these well-prepared and middle-size projects is that they are more flexible in building a PPP cooperation model.

In Brazil, there is a redirection of Chinese investments from natural resources to industry—especially the automotive sector and more advanced technology sectors such as electronics and communications, as well as energy, services, and finances. In 2016, Brazil received the most Chinese investments of any country behind only the United States and Switzerland. The ultra-high voltage electricity transmission project at the Belo Monte hydroelectric dam has been a flagship project for cooperation on infrastructure. China's State Grid Corporation has increased its influence in Brazil through equity mergers, acquisitions, and constructions. A consortium, led by China's Three Gorges Corporation is actively involved in Brazil's hydropower dam projects. The Three Gorges Corp. also actively invested in Brazil's wind power generation sector. Another positive development is that an increasing number of Chinese financial institutions are acquiring Brazilian banks, which can serve Brazilian infrastructure projects by combining Chinese capital with Brazilian managers.

An interesting phenomenon has been observed in the use of Chinese labor by Chinese construction companies as substitution for local labor on infrastructure projects (Trinkunas 2016). Argentina, Ecuador, Venezuela, Guyana, Suriname, Trinidad and Tobago, Jamaica, and Costa Rica have witnessed large migration flows of Chinese labor to work on infrastructure and construction projects. Although some criticize Chinese firms' preference of employing Chinese labor, this development can reduce training costs of local labor and help smoothly manage employees by avoiding cultural differences. The acceptance of Chinese labor by Latin American countries is partially explained by financial agreements. However, this situation might change significantly in the near future as Chinese labor costs are becoming higher than labor costs in Latin America. Chinese enterprises are also paying more attention to their social responsibilities.

OUTLOOK AND POLICY SUGGESTIONS FOR FUTURE COOPERATION

Considering the region's recession of 2015–2016 and heightened political uncertainty, it is safe to say that continental infrastructure projects such as high-speed rails are losing momentum. Neither fiscally constrained governments nor cautious private investors would be interested in this type of long-term, money-consuming, and uncertain project. What Chinese investors need to do is allow enough time to plan overseas infrastructure jobs. They need to better understand their targeted environments, social and long-term risks, and potential benefits when making their investment decisions.

Therefore, as an alternative option, it might be more workable to focus on smaller but predictable infrastructure projects in urban areas by balancing short-term profitability and long-term development strategy. In fact, most of the railway construction planning for the next five to ten years in Chile, Peru, and Brazil are focused on short-distance projects. Even though European firms dominate these markets, Chinese enterprises will be able to acquire some shares of the market based on their technology and cost control capacity. Infrastructure cooperation meets demand from both sides for different reasons. China has done a better job, with strong support from its state in the past three decades, while total domestic investment in infrastructure in Latin America has fallen since the late 1980s. With rising debt concerns among China's local governments, particularly in the railway sector, China is adapting its domestic infrastructure financing strategy to a PPP model by stimulating more investment from the private sector.

PPP should be adopted as the main model for developing overseas infrastructure cooperation for Chinese investors. The PPP model can reduce political and economic risks since it needs more negotiations, public debates, and a stable investment environment. For instance, the members of the Pacific Alliance might be more attractive to Chinese investors in the next decade since their business environment, as well as their capacity to achieve growth, is better than the rest of the region. The PPP model is a popular approach among the Pacific Alliance countries. Countries transitioning from populist rule to more market-oriented governments are undergoing painful reform processes. Thus, countries like Brazil are looking for more investment in the infrastructure sector by adopting the PPP model.

Chinese companies and authorities need to develop a strategy to strengthen the risk management and economic benefits of the sizable overseas infrastructure investment in Latin America. Different from overseas assistance, development finance is an increasingly influential idea in China, such as OBOR or AIIB. China prefers not to give loans; instead, it focuses on projects with commercial returns or a positive impact of economic efficiency. By focusing on infrastructure sectors such as power stations, roads, railway, urban development, and telecommunication, China expects economic benefits for its companies as well as local development of its partners. In order to minimize the risk, Chinese firms should lobby the authorities in Latin American countries to offer longer times for bidding preparation. Chinese investors also can consider offering scholarship opportunities for think tanks or universities in Latin America to encourage further studies on China-related issues.

Infrastructure should be understood broadly by including digital infrastructure alongside roads, ports, power stations, and other sectors. Alibaba's rise in China was fundamentally facilitated by China's advanced infrastructure in logistic, information technology, and energy, alongside low labor costs. With Alibaba's increasing interests to import fresh goods from Latin American countries to serve the growing middle class in China, Latin American countries need to invest more in infrastructure to take advantage of this development opportunity.

Enhancing international cooperation on mega-infrastructure might be an option to avoid geopolitical competition. China's closer economic ties with the region and its priorities to invest in infrastructure have motivated more global participation in infrastructure sectors in Latin America. Against this backdrop, a joint partnership between China and Germany on the Bi-Oceanic Railway might be more doable and effective. The involvement of multilateral development institutions such as the NDB, World Bank, or CAF in China-Latin American cooperation on infrastructure would be even better. It is better

to abandon the outdated zero-sum geopolitical thinking on the continental infrastructure projects. Chinese firms have been actively involved in the expansion and operation of the Panama Canal. More Chinese enterprises are interested in participation in the expansion of the Canal after the example of Hong Kong-based Hutchison Whampoa Ltd. It is in the interests of all the main trading powers to invest in the expansion or maintenance of important lanes such as the Panama Canal.

There is still the serious task for the region's policymakers to build a strong consensus on infrastructure's positive role in achieving sustainable development. Investment in infrastructure was treated widely as a contribution to growth by increasing productivity, reducing production costs, and facilitating the accumulation of human capital. However, Chinese infrastructure projects that take place in rural areas or within areas valued by indigenous groups raises concerns over the weakening of the rights and protections of these communities (Trinkunas 2016). In a region with divergent interest groups, it is difficult for Latin American countries themselves to build consensus on big infrastructure projects. International cooperation is necessary for Latin American countries to develop their infrastructure when they have internal financial and technical difficulties. China, on the other hand, needs to address the concerns of deindustrialization from the Latin American side. China's interests in investing in Latin America's infrastructure sector are welcomed by the region. Chinese enterprises involved in this cooperation also need to spend more time and money on improving their transparency and public relations.

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