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Estimating the Economic Impact of Chinese BRI Investment in Africa

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African perspectives
Global insights

Executive summary

China's investment in African infrastructure as part of its Belt and Road Initiative has proven to be both transformative and controversial. While investment projects are helping Africa to close its infrastructure gap, they have also raised fears of runaway debt levels. Overall, more research is needed on the development impact of Chinese investment activities on the continent, including the financial implications thereof. This report aims to address this knowledge gap. Drawing on diverse datasets, it examines Chinese infrastructure projects in three countries: Ethiopia, Kenya and Nigeria. A key result of the study is that while many of these projects are still under way, they are likely to have a positive impact in the future. In particular, they will boost trade and development in the commodities and services sectors. Nevertheless, the benefits of the Belt and Road Initiative will not be evenly distributed in Africa. Top commodity producers and exporters will continue to benefit more than some other African countries. Countries should take cognisance of and mitigate the downside risks associated with Chinese interventions in Africa, including growing their debt loads and minimising the negative effects on the environment.

Abbreviations & acronyms

| | |
|-----------|---|
| AfCFTA | African Continental Free Trade Area |
| AfDB | African Development Bank |
| AIDI | Africa Infrastructure Development Index |
| AMCP | African Monetary Cooperation Programme |
| BRI | Belt and Road Initiative |
| CCECC | China Civil and Engineering Construction Company |
| CRBC | China Road and Bridge Corporation |
| CREC | China Railway Engineering Corporation |
| EXIM Bank | Export-Import Bank of China |
| FDI | Foreign Direct Investment |
| FOCAC | Forum for China-Africa Cooperation |
| GDP | Gross Domestic Product |
| GNP | Gross National Product |
| GWDC | Great Wall Drilling Company |
| GWIC | Great Wall Industry Corporation |
| IMF | International Monetary Fund |
| LDCs | Least-Developed Countries |
| MOFCOM | Ministry of Commerce |
| MW | Megawatt |
| ODI | Overseas Development Initiative |
| SAIS-CARI | School of Advanced International Studies–China Africa Research Initiative |
| SDGs | Sustainable Development Goals |
| SGR | Standard Gauge Railway |
| SOEs | State-Owned Enterprises |
| SSA | Sub-Saharan Africa |
| SSC | South-South Cooperation |
| US | United States |
| WEF | World Economic Forum |

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Cover image

Part of the Olkaria geothermal power generation complex seen from a vantage point on the floor of the Kenyan Rift Valley, near the shores of Lake Naivasha August 28, 2015. Olkaria is one of the largest single geothermal investment projects in the world (Tony Karumba/AFP via Getty Images)

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Introduction

In 2013, the Chinese government launched one of the most ambitious infrastructure projects that had ever been seen globally – the Belt and Road Initiative (BRI). With estimates putting the investment programme at \$8 trillion over a 20-year period, the BRI finances projects mainly in the energy, telecommunications and transport sectors across Africa, Asia and Europe.¹ The aim is for these infrastructure projects to increase regional connectivity and economic integration. So far, China has listed 43 of Africa's 55 countries as partners under the BRI. The financing modalities for the BRI come in various forms, ranging from 'packaged loans', blended finance and interest-free loans to projects funded at full commercial rates.

For China, the BRI represents the intermingling of Chinese historical progress with the country's rising prominence in modern development architecture. The BRI seeks to resuscitate the old Silk Road that connected Asia, parts of Africa and Europe in the past and serves as an important channel for trade and the global exchange of ideas and innovations. The BRI is in effect the new Silk Road linking the three continents for the purpose of deepening economic cooperation and trade. The initiative could at the same time be aptly described as an extension of China's 'going-out' policy and a broad export-orientated development strategy that has contributed to more than three decades of high and sustained economic growth.

For Africa, the BRI feeds into a more nascent approach to balancing development cooperation between the West and China. While the role of North-South cooperation remains crucial, Africa is increasingly gravitating towards South-South cooperation, as exemplified in the new modality for regional integration – the African Continental Free Trade Area (AfCFTA) agreement – and additional trade and social cooperation with China.

Africa stands to benefit significantly from the targeted sectors in the BRI. For example, in the transportation sector, only 28.3% of the existing road networks on the continent are paved; meanwhile, Africa's infrastructure financing need is between \$130 billion and \$170 billion per year. In the energy sector, more than 70% of the population lack electricity or energy for cooking. These problems are a reflection of the development finance challenges facing Africa. The BRI represents a massive opportunity to address these challenges. It is estimated that about 66% of Chinese investment in Africa goes to the transportation and energy sectors. Another key developmental issue for Africa is weak intraregional trade. As estimated by Gandhi, intraregional trade accounts for 17% of Africa's exports compared

¹ John Hurley, Scott Morris, and Gailyn Portelance, 'Examining the debt implications of the Belt and Road Initiative from a policy perspective' (Policy Paper 21, Center for Global Development, Washington, DC, 2018), <https://www.cgdev.org/sites/default/files/examining-debt-implications-belt-and-road-initiative-policy-perspective.pdf>.

to 59% in Asia and 69% in Europe.² Again, the BRI can help in this instance by providing finance for large-scale and, in some cases, cross-country infrastructure investment projects.

However, there are potential drawbacks associated with the BRI, as the expected benefits will be uneven across countries and even negative in some instances. Concerns have been raised about the impact of BRI projects on debt sustainability in Africa. Hurley, Morris and Portelance (2018) observed that of 23 developing countries that are part of the BRI, between 10 and 15 countries face the risk of debt distress due to BRI-related financing.³ Moreover, the opaque nature of Chinese loans is a potentially hidden debt risk, which makes it difficult to accurately gauge and forecast countries' fiscal sustainability. Another concern is the environmental impact of BRI projects. For example, the extensive scope of BRI projects tends to pose risks of forced displacement of people as well as biodiversity and ecosystem losses.

This is particularly important as the initiative is of a long-term nature (until at least 2049) and of considerable significance, making an impact assessment timely. Against this background, this study seeks to estimate the developmental benefits to African countries of increased public infrastructure investment provided under the BRI.

Estimating the impact of the BRI on Africa is challenging, for two reasons. First, the infrastructure investments are recent and it is premature to determine their impact. Second, there are no official, quality administrative data on Chinese infrastructure investment in Africa. This constitutes a major challenge and limitation of any impact assessment of the China–Africa relationship. This study addresses this challenge by using the Johns Hopkins University School of Advanced International Studies China–Africa Research Initiative (SAIS–CARI) database.⁴ The SAIS–CARI database uses several innovative techniques (including obtaining information from official websites, central banks, ministries of finance and Chinese contractors) to aggregate data on Chinese loans and investment into Africa. In addition, given that most BRI projects are new or not yet complete, we focus on overall Chinese infrastructure investment as this will predict the likely impact of the BRI – since the agents involved and rationale are similar. Nevertheless, we complement this aggregate analysis with cases of BRI projects in three countries: Kenya, Ethiopia and Nigeria.

The rest of the report comprises five chapters. Chapter 2 provides a background analysis of the dimensions and drivers of Chinese investment in Africa. Chapter 3 presents a detailed analysis of the impact of Chinese infrastructure investment and loans to African countries. Here we focus on four key areas: infrastructure quality, direct economic growth, debt sustainability and trade. In Chapter 4, we present the cases of the impact of the BRI in the three selected countries. Overall, the analysis points to the potential benefits outweighing the costs. In Chapter 5, we discuss crucial areas aimed at strengthening infrastructure investment and the overall China–Africa relationship. Chapter 6 concludes and offers policy recommendations.

2 Dhruv Gandhi, 'Figures of the week: Increasing intra-regional trade in Africa,' Brookings Institution, February 22, 2019, <https://www.brookings.edu/blog/africa-in-focus/2019/02/22/figures-of-the-week-increasing-intra-regional-trade-in-africa/>.

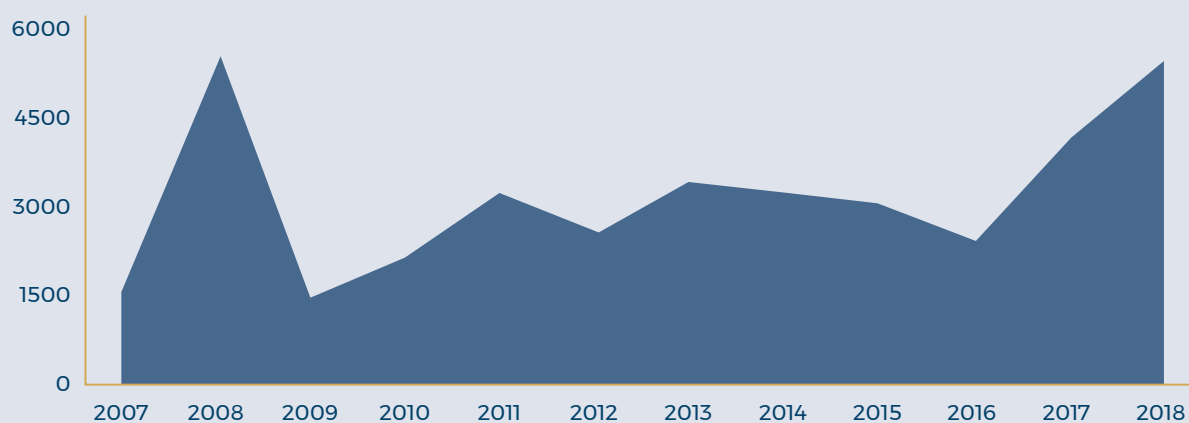
3 Hurley, Morris, and Portelance, 'Examining the debt implications.'

4 Johns Hopkins University, China–Africa Research Initiative, 'Chinese loans to Africa database,' <https://chinaafricaloandata.org/>.

Dimensions and drivers of Chinese investment in Africa

While Chinese investment globally increased at the beginning of the new millennium in the wake of China's going-out policy, the emergence of the BRI in 2013 further channelled investment to Europe, Asia and Africa with the principal aim of developing infrastructure projects that connect China with these regions. In addition to infrastructure projects in the transportation sector, the BRI covers the energy, mining, IT and communication sectors. Whereas the geopolitical aspect of the BRI has been the main focus in the literature,⁵ as China advances a more dominant foreign policy and seeks to gain greater political leverage, its geo-economic dimension presents an opportunity for China and partner countries to deepen their economic integration and promote greater interconnectivity. For Africa specifically, the Forum for China-Africa Cooperation (FOCAC) has become a key platform for channelling China-Africa bilateral investment to the continent. Figure 1 depicts the increase in investment flows to Africa, with foreign direct investment (FDI) more than doubling between 2016 and 2018 from \$2.4 billion to \$5.4 billion.

Figure 1 Chinese investment flows to Africa, 2007–2018 (\$ million)



Source: Author's calculations from SAIS-CARI dataset, 2020*

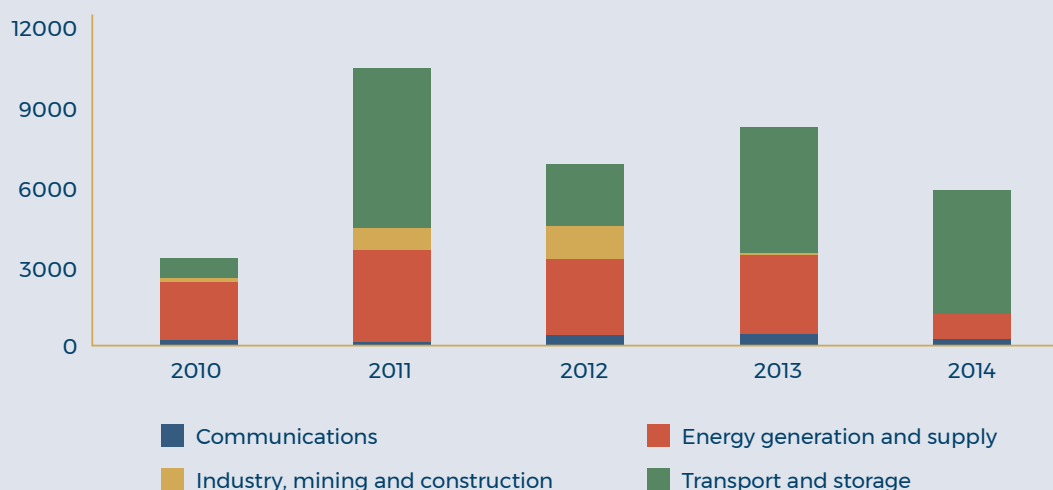
* Johns Hopkins University, China-Africa Research Initiative, 'Data: Chinese Investment in Africa,' <http://www.sais-cari.org/chinese-investment-in-africa>

5 Christopher Len, 'China's 21st century maritime Silk Road Initiative: Energy security and SLOC access,' *Maritime Affairs: Journal of the National Maritime Foundation of India* 11, no. 1 (2015), 1-18; also see Yong Wang, 'Offensive for defensive: The Belt and Road initiatives and China's new grand strategy,' *Pacific Review* 29, no. 3 (2016), 455-463.

The size, structure and growth of Africa's population create significant market opportunities, both now and in the future, thus strengthening China's economic engagement with Africa.⁶ Despite Africa being the second most populous continent, the population growth rate of Sub-Saharan Africa (SSA) at 2.7% is the highest globally and its population is expected to double in size by 2050, given current growth trends.⁷ In view of Africa's youthfulness (two-fifths of the African population are in the 0-14 age range and about one-fifth are in the 15-24 age range),⁸ the growth in the working age population is helping to boost current and emerging trade prospects for Chinese manufactured goods. Furthermore, as China seeks to access energy resources for its industrialisation drive and reduce the scale of overcapacity, particularly in the steel, construction and heavy-machinery industries, Africa – with its vast resources and wide infrastructure gap – has become an attractive investment destination for China.

In 2013 and 2014, the transportation and storage sector alone accounted for 59% and 80% of total investment, respectively (see Figure 2). As China is a major trading partner of Africa's, reducing the cost of transporting goods to the region is a key element in China's quest to further boost trade with the continent. Meanwhile, between 2010 and 2014, transportation and storage; energy generation and supply; industry, mining and construction; and communications accounted for 54%, 36%, 6% and 4% of total investment, respectively.

Figure 2 Sectoral composition of Chinese investment flows to Africa, 2010–2014 (\$ million)



Source: Richard Bluhm et al., 'Connective Financing: Chinese Infrastructure Projects and the Diffusion of Economic Activity in Developing Countries.' *SSRN Electronic Journal*, <https://doi.org/10.2139/ssrn.3262101>

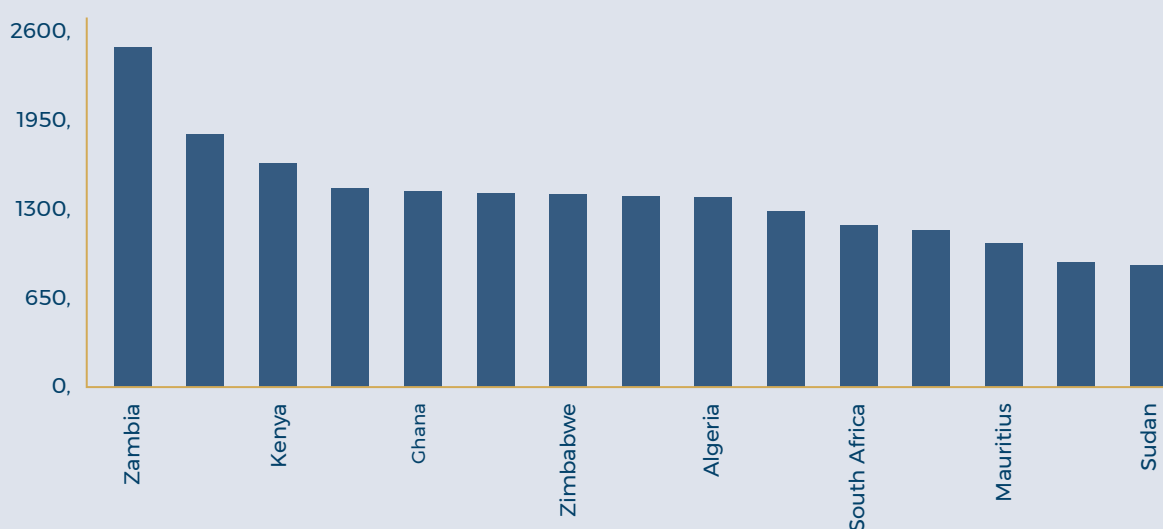
6 Michael Tiboris, 'Addressing China's Rising Influence in Africa,' Chicago Council on Global Affairs, May 2019, https://www.thechicago-council.org/sites/default/files/2020-11/report_addressing-chinas-rising-influence-africa_20190521%20%281%29.pdf.

7 Ruth Gursch-Adam and Livia Benkova, 'The Impact of Demographic Developments in Africa on Europe,' *European View* 15 (2016), 291-304, <https://doi.org/10.1007/s12290-016-0425-3>.

8 UN Economic Commission for Africa, *The Demographic Profile of African Countries* (Addis Ababa: UNECA, 2016), <https://repository.uneca.org/handle/10855/23177>.

Despite the fact that China’s investment is broad-based, covering at least 43 of Africa’s 55 countries,⁹ the preferred investment destinations seem to be selected on the basis of economic and political factors. Figure 3 shows that nearly all of the top 15 recipients possess vast mineral resources, including Zambia (copper), Democratic Republic of Congo (diamonds), Kenya, Nigeria, Ghana, Angola, Algeria, Mozambique, Egypt and Sudan (oil and gas), and South Africa and Tanzania (gold). Similarly, nine of China’s top 10 exporting countries in Africa are among the top 15 recipients of investment flows to the continent.¹⁰ As such, the resource and trade opportunities that these countries offer align with China’s economic interests and provide the rationale for greater connectivity between China and Africa.

Figure 3 Top 15 recipients of Chinese investment flows to Africa, 2011–2018 (\$ million)



Author’s calculations from SAIS-CARI dataset, 2020

Furthermore, the BRI has created new security challenges for Chinese companies operating outside of China.¹¹ Therefore, countries with stable governments, which can provide security for China’s economic interests, such as Ethiopia,¹² are largely preferred because of the need to rely on host governments to provide some guarantee of security.

9 Government of China, 2021. Belt and Road Portal. Retrieved from: https://eng.yidaiyilu.gov.cn/info/iList.jsp?cat_id=10076&cur_page=1.
 10 Trading Economics, ‘China Exports by Country,’ <https://tradingeconomics.com/china/exports-by-country>.
 11 Zi Yang, ‘Securing China’s Belt and Road Initiative’ (Special Report 436, US Institute of Peace, Washington, DC, 2018), https://www.usip.org/sites/default/files/2018-11/sr_436_securing_chinas_belt_and_road_initiative_web.pdf.
 12 World Bank, *Chinese FDI in Ethiopia: A World Bank Survey* (Washington, DC: World Bank, 2012), <https://openknowledge.worldbank.org/bitstream/handle/10986/26772/NonAsciiFileName0.pdf?sequence=1&isAllowed=y>.

CHAPTER 3

Sector-wide assessment of Chinese BRI investment in Africa

This chapter analyses the effects of Chinese infrastructure investment and loans on key economic variables in Africa. The main areas of focus include infrastructure quality, direct economic growth, debt sustainability and trade. While we are unable to link this effect to BRI, we draw inferences on the possible implications for sectors and countries covered under the BRI.

Infrastructure quality

African countries face a huge deficit in terms of the stock and quality of infrastructure and this has contributed significantly to economic underdevelopment on the continent. SSA is the region with the lowest road density (measured as kilometres of road per surface area of a country) and road quality, based on the World Economic Forum (WEF) Global Competitiveness Index on infrastructure quality. The region also lacks large-scale infrastructure, which is necessary for regional integration and expansion of intraregional trade.¹³ The African Development Bank (AfDB) estimated that meeting the continent's infrastructure needs will cost between \$130 and \$170 billion per year.¹⁴

| Region | Existing network (km) | Paved roads (km) | Average Paved roads (% of total) | Average Paved roads in good condition (%) | Road network density per population (km/1000 persons) | Road network density per population (km/1000km ²) |
|------------------------------|-----------------------|------------------|----------------------------------|---|---|---|
| Central Africa | 344,083 | 79,139 | 23.0 | 58.7 | 2 | 37.00 |
| Eastern Africa | 850,710 | 250,959 | 29.5 | 49.0 | 1 | 128.00 |
| Southern Africa | 998,334 | 353,410 | 35.4 | 47.8 | 6 | 100.00 |
| Western Africa | 638,982 | 116,934 | 18.3 | 43.2 | 2 | 84.00 |
| Sub-Saharan Africa (total) | 2,832,109 | 800,442 | 28.3 | 48.6 | 11 | - |
| Comoros | 14 | 164 | - | - | - | 48.66 |
| Angola | 15 | 173 | - | - | - | 43.86 |
| Democratic Republic of Congo | 16 | 184 | - | - | - | 36.85 |

Source: Urbanization and Industrialization for Africa's Transformation, UNECA, 2017 & Exim Bank Calculations

13 Klaus Schwab, 'The Global Competitiveness Report 2019,' World Economic Forum, http://www3.weforum.org/docs/WEF_TheGlobalCompetitivenessReport2019.pdf.

14 African Development Bank, 'Annual Development Effectiveness Review 2019,' https://www.afdb.org/fileadmin/uploads/afdb/Documents/Development_Effectiveness_Review_2019/ADER_2019_EN.pdf.

The public sector, using budgetary allocations, remains the main source of infrastructure financing in Africa. However, government investments are insufficient, with the annual financial shortfall standing at between \$68 and \$108 billion. Multilateral support, although still significant, has been on the decline in recent years, as donor attention has shifted towards social priorities and humanitarian aid. In addition, the private sector financing model of infrastructure development is yet to pick up, particularly in the face of elevated investment risk and poor development of domestic financial markets in many African countries. The high interest rate accompanying non-concessionary loans available to African countries has raised concerns about fiscal sustainability and the ability of governments to repay their loans.

China-led infrastructure development in Africa is therefore a crucial vehicle for closing the financing gap and boosting intraregional development. According to data from Johns Hopkins University, African governments received some \$148 billion in Chinese loans between 2000 and 2018, much of it for large-scale infrastructure projects.¹⁵ The quantum of the loans has gradually increased and over the past five years has amounted to about \$2 billion per year. Chinese infrastructure investment comes in various modalities, including concessionary and non-concessionary loans, grants and FDI.

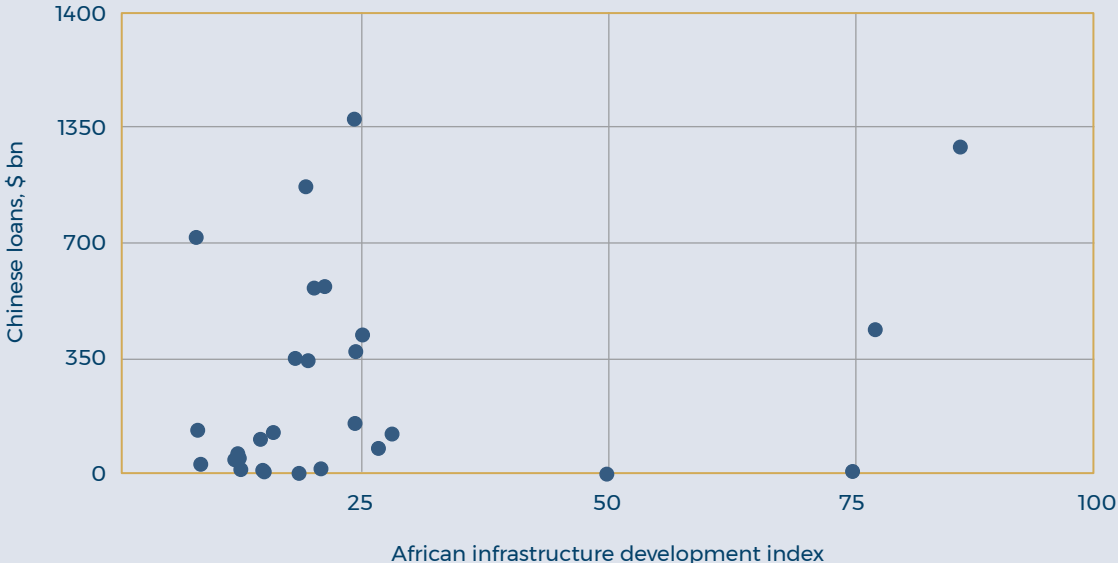
Chinese infrastructure investment can also be viewed through pre-BRI and BRI lenses. Prior to the BRI, Chinese investment largely took place through bilateral arrangements and was mostly targeted at in-country infrastructure. The BRI promised to scale up both in-country and cross-country infrastructural development. As the BRI extends beyond Africa, the expansion of infrastructure networks that link Africa to other continents will also be possible in the future.

Figure 4 shows the correlation between infrastructure stock and Chinese loans to Africa in the period 2015–2017. The infrastructure stock was measured in terms of the Africa Infrastructure Development Index (AIDI)¹⁶, which reflects progress in infrastructure development based on countries with comparable metrics. On average, the larger the infrastructure stock, the greater was the value of the Chinese loans. This trend was to be expected as the loans were provided for new projects, which resulted in infrastructure stock invariably rising. However, in Figure 5, when we correlated Chinese loans over the same period with infrastructure quality (as measured by the WEF), a negative relationship was observed. The trend line indicates that countries with large loans between 2015 and 2017 had relatively lower infrastructural quality.

15 China-Africa Research Initiative, 'Chinese loans to Africa,' n/d, <http://www.sais-cari.org/research-chinese-loans-to-africa>.

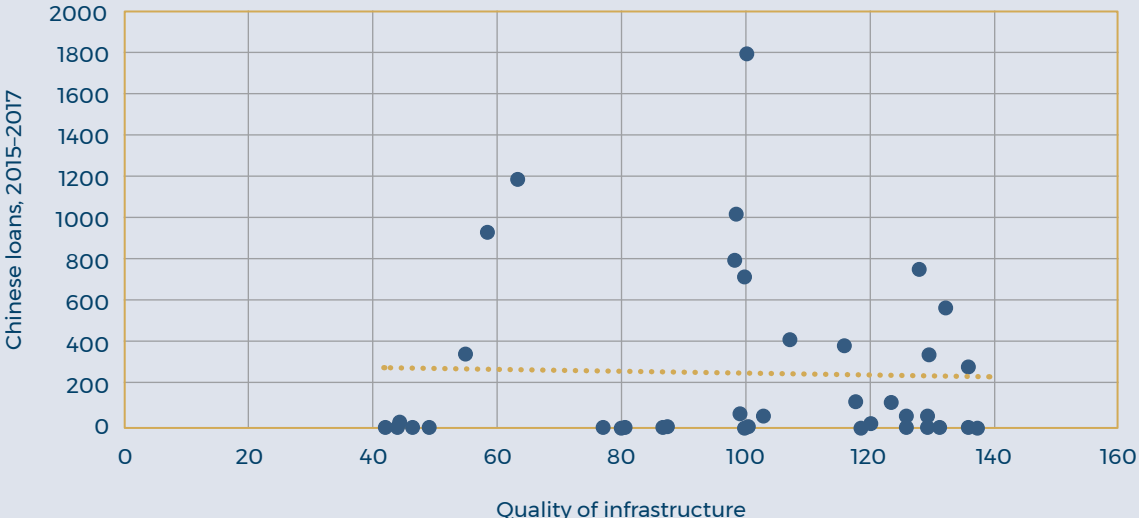
16 See Africa Infrastructure Knowledge Program, <http://infrastructureafrica.opendataforafrica.org/pbuerhd/africa-infrastructure-development-index-aidi-2020#:~:text=The%20AIDI%20serves%20a%20number,the%20Bank%20and%20between%20the>.

Figure 4 Correlation between African infrastructure stock and Chinese loans, 2015–2017



Source: Author’s computations from SAIS-CARI dataset and the African Development Bank, ‘Africa Infrastructure Development Index 2020’, <http://infrastructureafrica.opendataforafrica.org/pbuerhd/africa-infrastructure-development-index-aidi-2020>

Figure 5 Correlation between African infrastructure quality and Chinese loans, 2015–2017



Source: Author’s computations from SAIS-CARI dataset and the World Economic Forum, ‘Global Competitiveness Index,’ <https://www.weforum.org/>

The usual caveat that correlation does not imply causation pertained to the above analysis, especially in relation to infrastructure quality. Quality of infrastructure reflects the extensiveness and condition of ports, electricity, and road and rail infrastructure – all of which depend on several factors, including domestic capital investment and maintenance of existing infrastructure stock. These are multifaceted factors that respond mostly to the decision matrix of the local actors. This means that local decision-makers could play a more significant role in the allocation and distributional effects of infrastructure investment. Relating this to BRI projects, the impact on infrastructure quality will depend on African countries' decisions regarding the types of project to finance and their strategic geographical locations.

The literature on infrastructure and economic development emphasises quality rather than stock of infrastructure.¹⁷ For example, Asher and Novosad examined the impact of India's \$40 billion national rural road construction programme on local development.¹⁸ The authors found no significant effect on agricultural outcomes, income and assets, which formed the basis of the programme's objectives. Kondogo and Kalu, in turn, found in their empirical studies on 45 SSA countries that it is the quality of infrastructure that leads to economic growth and export diversification.¹⁹ The emerging consensus in this literature is that infrastructure has an impact on economic performance in as much as it creates new markets or connects existing ones.

Relating this to Chinese infrastructure investment, it is difficult to quantify the impact, especially in the short run. However, there are two factors that could still prompt possible long-term effects and have implications for infrastructure quality in Africa. The first factor is the local 'ownership' of projects in terms of the respective decision-making roles of state and non-state actors. The China-Africa relationship is built on the South-South cooperation principle of domestic ownership and mutual benefit, which promotes more state-led control in project setting, although the inclusion of non-state actors is minimal. The second factor is the extent to which projects are preceded by a comprehensive cost-benefit analysis combined with periodic monitoring and evaluation, both during and after implementation. While these factors might partially feature in Chinese infrastructure investment in Africa, they are not made public for the purpose of multi-stakeholder engagement. This suggests that BRI investment in Africa could produce significant economic gains and expand the scope for development.

17 For example, see Gilles Duranton, Geetika Nagpal, and Matthew Turner, 'Transportation Infrastructure in the US' (Working Paper 27254, National Bureau of Economic Research, Washington, DC, 2020), <https://www.nber.org/papers/w27254>.

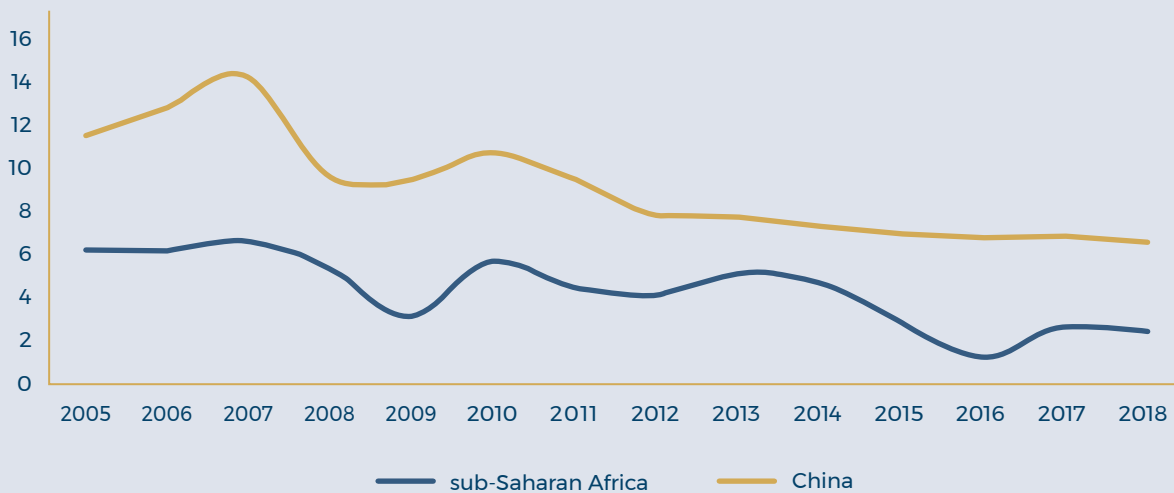
18 Sam Asher and Paul Novosad, 'Rural roads and local economic development,' *American Economic Review* 110, no. 3 (2020), 797-823, <https://www.aeaweb.org/articles?id=10.1257/aer.20180268>.

19 Odongo Kodongo and Kalu Ojah, 'Does infrastructure really explain economic growth in Sub-Saharan Africa?' (Working Paper 653, Economic Research Southern Africa, Pretoria, 2016), https://www.econrsa.org/system/files/publications/working_papers/working_paper_653.pdf.

Direct Economic Growth

The debate about the impact of the China–Africa relationship on economic growth in Africa has intensified in recent years as it is supplanting conventional North–South cooperation. Economic growth patterns in Africa and China have followed a similar trajectory (see Figure 6). For example, Africa and China have experienced more than two decades of economic growth. Figure 7 indicates that African growth during this period has largely followed commodity price trends (crude oil, agricultural raw materials, and metals and minerals). China’s growing demand for natural resources and raw materials contributed to the commodity boom by expanding export opportunities for many African countries.

Figure 6 Economic growth rates (%) in Africa and China, 2005–2018



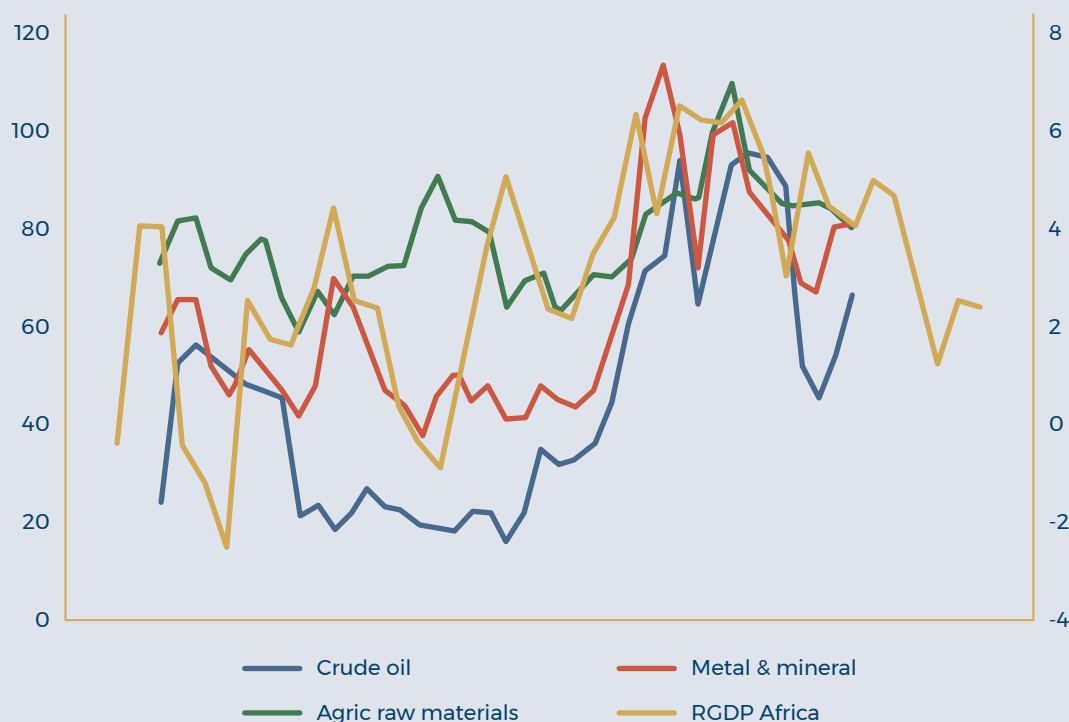
Source: World Bank, 'World Development Indicators Dataset,' <https://databank.worldbank.org/source/world-development-indicators>

However, there are other possible drivers of the recent growth trend, such as debt forgiveness initiatives (which create fiscal space for governments to invest in development projects and even take on more external debt) and global attention being given to the Millennium Development Goals and the need for development assistance to drive poverty reduction and institutional reform.

Clearly, the growth debate illustrates the challenges associated with measuring and accounting for growth. Drivers of growth are multifaceted and complement one another, making it difficult to determine the contribution of a specific variable.

The extensive literature on the China–Africa relationship highlights a number of factors that could enhance or otherwise impede Africa’s economic development. We review these factors below in relation to Chinese infrastructure investment in Africa.

Figure 7 Real GDP growth rates (%) in Africa and commodity prices (\$) (1978–2018)



Source: World Development Indicators and World Bank Commodity Price Data

Positive factors

1 Aid for trade and development

According to the World Bank's Doing Business report (various editions), access to electricity is the second-biggest obstacle for small and medium-sized enterprises in SSA, after access to finance. It is estimated that 66% of Chinese investment in Africa goes to the transportation and energy sectors, which directly addresses some of the barriers to growth.

Weisbrod and Whalley²⁰ estimated (using the neoclassical growth accounting framework) the contribution of Chinese investment to gross domestic product (GDP) growth in SSA and found that it added about one half of a percentage point prior to the 2008 global financial crisis. As China-Africa relations have expanded significantly since the crisis, the economic impact of Chinese loans is expected to have increased. A more recent study by Doku, Akuma and Owusu-Afriyie (2017) found that a 1% increase in

20 Aaron Weisbrod and John Whalley, 'The contribution of Chinese FDI to Africa's pre-crisis growth surge' (Working Paper 17544, National Bureau of Economic Research, Cambridge, MA, 2011), <https://core.ac.uk/download/pdf/6653966.pdf>.

China's FDI stock in Africa boosted Africa's GDP growth rate by a significant 0.607%.²¹ This could be an important channel through which Chinese BRI investment addresses structural bottlenecks to growth in Africa.

2 Technology transfer and exchange of development solutions

Technology is important for long-term economic growth. Li noted that technology transfer occurs in different ways in the China-Africa cooperation model, such as technical assistance, knowledge transfer and knowledge sharing.²² Wu reviewed the various action plans set out in the FOCAC and found that knowledge transfer was mentioned over 40 times.²³ Many of China's infrastructure investment projects are implemented using Chinese technology and a combination of local and Chinese manpower. This acts as a form of knowledge transfer for locals who are involved in such projects. However, it is still inadequate, given the high levels of unemployment in many African countries.

In recent BRI projects, African countries have been tapping into China's vocational education model in order to develop local technical capacity. For example, Chinese investment in the Nigerian railway system has included the establishment of railway technology training centres to bring locals into the process. A similar approach has been observed in the building of Kenya's standard gauge railway, with locals being integrated into operations and maintenance processes. A more profound trend has been the gradual migration of Chinese manufacturing jobs to Africa owing to rising labour costs in China. South Africa, Ethiopia and Rwanda are leveraging opportunities in the car assembly, footwear and textiles sectors, thereby acting as production hubs for Chinese firms diversifying into Africa. The BRI can fast-track this process by integrating local technical know-how into production systems.

3 Opening of trade channels

The African commodity boom has no doubt been a significant driver of economic growth in recent years and the emergence of China as a major trading partner has contributed to this. China's strong economic performance has stimulated the country's demand for natural resources, to which many African economies have enthusiastically responded. In addition, China has facilitated greater involvement of many African countries in the World Trade Organization and more trade opportunities through its Accessions Programme for Least-Developed Countries (LDCs), which entails capacity-building and special funding. In the context of the BRI, it will be crucial to deepen China-Africa trade ties via the financing of projects.

21 Isaac Doku, John Akuma, and John Owusu-Afriyie, 'Effect of Chinese foreign direct investment on economic growth in Africa,' *Journal of Chinese Economic and Foreign Trade Studies* 10, no. 2 (2017), 162-171, <https://econpapers.repec.org/article/emeceftpp/jcefts-06-2017-0014.htm>.

22 Anshan Li, 'Technology transfer in China-Africa relation: Myth or reality,' *Transnational Corporations Review* 8, Issue 3 (2016), 183-195, <https://www.tandfonline.com/doi/abs/10.1080/19186444.2016.1233718>.

23 Yu-Shan Wu, 'How technical knowledge flows between China and Africa: It's complicated,' *AfricaPortal*, September 2, 2019, <https://www.africaportal.org/features/how-technical-knowledge-flows-between-china-and-africa-its-complicated/>.

4 Welfare effect

With more infrastructure development, labour mobility and capital accumulation in Africa will improve. This will lower input costs and commodity prices, thereby further enhancing welfare gains.

Negative factors

1 Manufacturing sector

It has been widely argued that China's infrastructure investments are targeted at facilitating trade within Africa. Currently, trade is skewed against Africa, which is running a trade deficit with China. In 2018, this amounted to about \$25 billion. This is good for consumers who benefit from cheaper goods, but it could be deleterious to local industries which are unable to compete with a big player like China. Jeanneney and Ping, for example, reported that imports of manufactured goods from China have a negative effect on African countries' local industries and also cause their currencies to appreciate.²⁴ Edwards and Jenkins had a similar result in their study of the impact of Chinese imports on the manufacturing sector in South Africa.²⁵ Specifically, they found that an increase in import penetration resulted in South African manufacturing output declining by 5% and employment declining by 8%.

The skewed China-Africa trading relationship has also been used to explain the atypical development process in Africa. In the development literature, economic progress is evidenced in a gradual transition from an agriculture-led phase to a manufacturing-led phase and then to the final phase when the services sector becomes dominant. Many African countries have shortened this typical transition by moving straight from an agricultural economy to a services-led economy. The emerging services sector is informal in nature, with the influx of cheap imports being a major contributing factor.

2 Environmental effect

Large-scale infrastructure projects usually evoke environmental concerns, and the BRI is no exception. Past experiences of Chinese infrastructure investment in Africa reinforce these concerns. As reported by Shinn, the China National Machinery and Equipment Import and Export Corporation and the Sinosteel Corporation, multi-billion-dollar investments in mining and infrastructure in Gabon were abandoned due to the locals' growing agitation about the threat of deforestation and other environmental challenges.²⁶ In addition, the World Wildlife Fund estimated that the BRI corridors cross

24 Sylviane Guillaumont Jeanneney and Hua Ping, 'China's African financial engagement, real exchange rates and trade between China and Africa,' *Journal of African Economies* 24, Issue 1 (2015), 1-25, <https://doi.org/10.1093/jae/eju020>.

25 Lawrence Edwards and Rhys Jenkins, 'The impact of Chinese import penetration on the South African manufacturing sector,' *Journal of Development Studies* 51, Issue 4 (2013), 447-463, <https://www.tandfonline.com/doi/full/10.1080/00220388.2014.983912>.

26 David Shinn, 'The environmental impact of China's investment in Africa,' *Cornell International Law Journal* 49 (2016), 25-65, <https://www.lawschool.cornell.edu/research/ILJ/upload/Shinn-final.pdf>.

1,739 important bird areas or key biodiversity areas, as well as 46 biodiversity hotspots.²⁷ Africa is already vulnerable to extreme climatic conditions. If the environmental impact is not fully accounted for, it may appear that the economic impact of infrastructure investment is lower than it actually is.

Overall, Chinese infrastructure investment in Africa has had a mixture of positive and negative effects. While it is difficult to accurately quantify which effect dominates, the positive effects seem to be immediately dominant, in the light of the observed growth trends. However, the analysis points to many different dimensions in the China-Africa relationship and targeted BRI projects can be used to promote more sustainable development.

Trade

Over the past two decades, China has been carving out its role as one of Africa's leading trading partners, surpassing the United States (US) in 2009 to become Africa's largest bilateral trading partner. Total merchandise trade between Africa and China grew from \$9 billion in 2000 to \$166 billion in 2012 (nearly a 2000% increase).²⁸ Conventionally, trade between Africa and China has been influenced by five causal factors.²⁹ These are: China's rapidly industrialising economy; the abundance of natural resources on the African continent; China's comparative advantage in labour-intensive and capital-intensive production; the importance placed on infrastructure development, both in China and Africa; and the economies of scale linked to China's shipping and manufacturing sectors. For China, Africa offers the dual benefit of being a source of raw materials, which are needed to fuel China's manufacturing-driven economy, and a large and crucial emerging market in which China can sell its products. For Africa, trade with China is accompanied by key infrastructure investment projects across the continent, while China is also a relatively cheap source of capital equipment and consumer goods.

China currently has bilateral trade agreements with 40 countries in Africa and factor endowments have the strongest influence on China-Africa trade patterns.³⁰ Eisenman compared the balance of payments of two autocratic African nations: Libya and Egypt. According to his findings, both countries have experienced economic growth as a result of China's comparative advantage in capital equipment and consumer goods. However, as Libya is an oil-endowed country and Egypt is not, China has benefited more in its relationship with Egypt, with the latter experiencing a trade deficit.³¹ Eisenman's findings have been corroborated by other studies: Kolstad and Wiig found that African countries

27 World Wildlife Fund, 'WWF and greening the Belt and Road Initiative,' November 2, 2017, <https://www.wwf.org/hk/en/?19680/Feature-Story-WWF-and-Greening-the-Belt-and-Road-Initiative>.

28 UN, UN Comtrade Database, n/d, <https://comtrade.un.org/>.

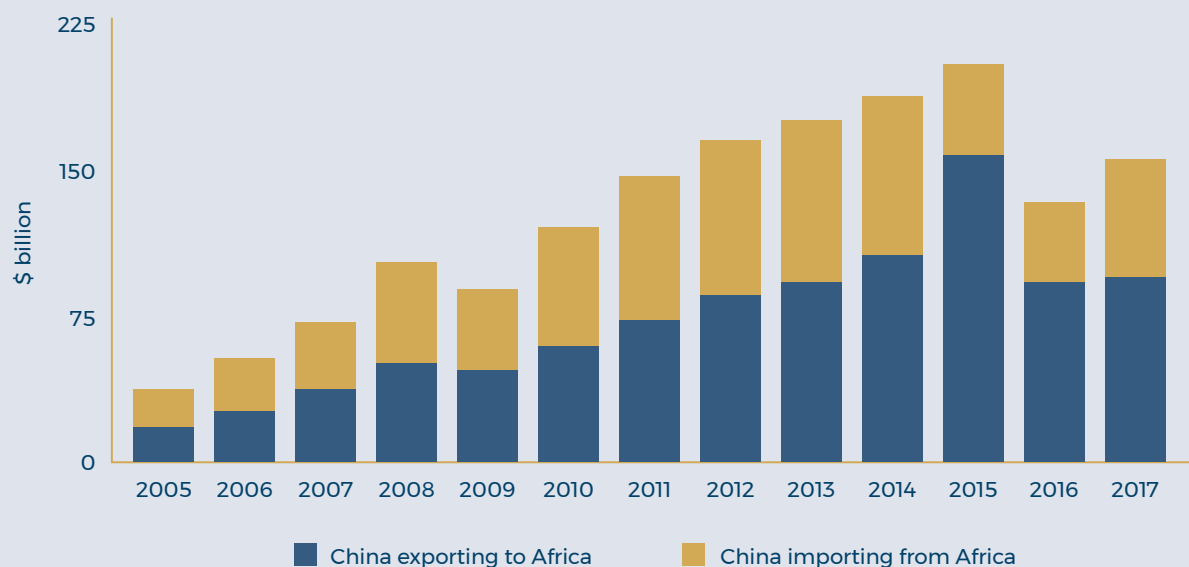
29 Joshua Eisenman, 'China-Africa trade patterns: Causes and consequences,' *Journal of Contemporary China* 21, no. 77 (2012), 793-810, http://sites.utexas.edu/chinaecon/files/2015/06/Eisenman-China_Africa.pdf.

30 Eisenman, 'China-Africa trade patterns.'

31 Eisenman, 'China-Africa trade patterns.'

with rich natural endowments are usually targeted recipients of Chinese FDI,³² while Biggeri and Sanfilippo suggested that China's economic relationship with Africa is driven by the interactions and impact of trade and investment.³³

Figure 8 China–Africa trade patterns, 2005–2017



Source: John Hopkins SAIS China Africa Research Initiative Database; World Development Indicators; African Development Bank AIDI

Between 2000 and 2011, exports and imports between China and Africa were roughly at the same level, with African exports to China slightly exceeding its imports for a couple years. In 2012, African exports to China (representing 7.8% of GDP) exceeded imports (representing 4.8% of GDP), resulting in an African trade surplus of about \$39 billion.³⁴

An analysis of merchandise goods trade between China and Africa, against the backdrop of the above-mentioned five factors, sheds light on the dynamics and determinants of China–Africa trade. In 2018, China's top trading partners in terms of exports from Africa were Angola, South Africa and the Republic of Congo, with over 99% of exports from Africa comprising raw materials, minerals and metals. Regarding imports from China, the largest buyers were South Africa, Nigeria and Egypt, with almost 99% of imports comprising capital

32 Ivar Kolstad and Arne Wiig, 'Better the devil you know? Chinese foreign direct investment in Africa,' *Journal of African Business* 12, Issue 1 (2011), 31–50, <https://www.tandfonline.com/doi/abs/10.1080/1536710X.2011.555259>.

33 Mario Biggeri and Marco Sanfilippo, 'Understanding China's move into Africa: An empirical analysis,' *Journal of Chinese Economic and Business Studies* 7, Issue 1 (2009), 31–54, <https://www.tandfonline.com/doi/abs/10.1080/14765280802604714>.

34 Matthias Busse, Ceren Erdogan, and Henning Mühlen, 'China's impact on Africa: The role of trade, FDI and aid' (IEE Working Paper 206, Institute of Economic Research and Development Policy, Ruhr University Bochum, 2014), <https://ideas.repec.org/p/zbw/ieewps/206.html>.

equipment and manufactured goods. Africa typically exports low value-added commodities (raw materials) and imports high value-added products (manufactured goods).

| Year | China's exports to Africa (\$ billion) | China's imports from Africa (\$ billion) | China's trade with Africa (exports + imports) (\$ billion) |
|-------------|---|---|---|
| 2005 | 18.60 | 18.99 | 37.59 |
| 2006 | 26.58 | 26.79 | 53.37 |
| 2007 | 37.37 | 33.91 | 71.28 |
| 2008 | 51.09 | 51.04 | 102.13 |
| 2009 | 47.64 | 40.31 | 87.95 |
| 2010 | 59.81 | 60.27 | 120.08 |
| 2011 | 72.92 | 73.63 | 146.55 |
| 2012 | 85.13 | 78.91 | 164.04 |
| 2013 | 92.57 | 81.11 | 173.68 |
| 2014 | 105.83 | 79.86 | 185.69 |
| 2015 | 155.70 | 47.53 | 203.23 |
| 2016 | 91.98 | 41.27 | 133.25 |
| 2017 | 94.50 | 60.21 | 154.71 |

Source: John Hopkins SAIS China Africa Research Initiative Database; World Development Indicators; African Development Bank AIDI

The literature on the implications of trade between China and Africa is polarised. Earlier studies found that imports from China had a positive effect on economic growth in Africa.³⁵ Trade between Africa and China was encouraged because the diversification of trade patterns had the potential to positively affect Africa's growth rate.³⁶ In a 2008 study by Meyersson et al., it was found that (compared with the rest of the world) exporting natural resources to China had largely positive effects on economic growth and investment in Africa.³⁷ This positive outlook was buoyed by China's improving economic growth performance, which has led to China's rising prominence and influence in global markets.³⁸ Given China's global status, its demand for raw materials from Africa could offset high prices in global markets, leading to more favourable terms of trade for the continent.

35 Mina Balamoune-Lutz, 'Growth by destination (where you export matters): Trade with China and growth in African countries,' *African Development Review* 23 Issue 2 (2011), 202–218, <https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1467-8268.2011.00281.x>.

36 Norman Loayza and Viktoria V. Hnatkowska, 'Volatility and Growth (Policy Research Working Paper 3184, World Bank, Washington, DC, 2004), <https://ideas.repec.org/p/wbk/wbrwps/3184.html>.

37 Erik Meyersson, Gerard Padró, Miquel Lse, and Nancy Qian, 'The rise of China and the natural resource curse in Africa,' London School of Economics and Political Science (2008), https://www.researchgate.net/publication/228775991_The_Rise_of_China_and_the_Natural_Resource_Curse_in_Africa.

38 Ali Zafar, 'The growing relationship between China and sub-Saharan Africa: Macroeconomic, trade, investment, and aid links,' *The World Bank Research Observer* 22, Issue 1 (2007), 103–130, <https://doi.org/10.1093/wbro/lkm001>.

However, more recent findings have suggested that Chinese exports to Africa, particularly of the non-resource variety, have had a negative impact on economic growth on the continent,³⁹ to the extent that China-Africa relations could be construed as a new form of colonialism.⁴⁰

This more recent stance, which challenges the value of the BRI, stems from the perceived risks associated with the implementation of BRI projects. For example, recent findings highlight the fact that Chinese exports to Africa mainly comprise capital equipment and manufactured consumer products, which have the potential to stifle economic diversification and non-resource economic growth in Africa. China's comparative trade advantage in manufactured products threatens Africa's own manufactured products, such as furniture, footwear and textiles. As a result, Africa finds it difficult to compete both globally and regionally, which displaces African manufactures.⁴¹

Over and above the crowding-out of African manufactured products, increased exports of natural resources from Africa could lead to a case of Dutch Disease. This is where the rapid development of one sector leads to a decline of another and where there is a chronic overvaluation of a country's currency due to the exploitation of cheap natural resources, which impacts the exchange rate. Such a situation could inadvertently create opportunities for corruption.⁴²

Despite these risks, the incentives for cooperation are also huge, with each trading partner leveraging what it has in order to get what it lacks. China needs natural resources to support its manufacturing drive, while Africa needs loans and investment to satisfy its immediate infrastructure development needs. African countries are able to trade their natural resources for large investments in key infrastructure projects that could, in theory, help them to navigate a path away from the 'resource curse'. For example, China advanced a \$5 billion loan to Angola, which is to be repaid in oil. Through the loan, Angola is able to benefit from improved roads, schools, hospitals and other facilities, while mortgaging future oil production to China. Current Chinese investments in Africa include: railways in Angola, high-voltage transmission lines in southern Africa, roads and bridges in the Democratic Republic of Congo, mass transit systems in Nigeria, power stations in Zambia, mining developments in Mauritania and Gabon, and national communications networks in Ethiopia.⁴³

Because loans come in the form of infrastructure development, they provide direct socioeconomic benefits, thus helping African countries to pursue other forms of development beyond that associated with natural resources. In addition, given China's

39 Busse et al., 'China's impact on Africa.'

40 Eisenman, 'China-Africa trade patterns.'

41 Oliver Morrissey and Evious Zgou, *The impact of China and India on sub-Saharan Africa: Opportunities, challenges and policies* (London: Commonwealth Secretariat, 2011).

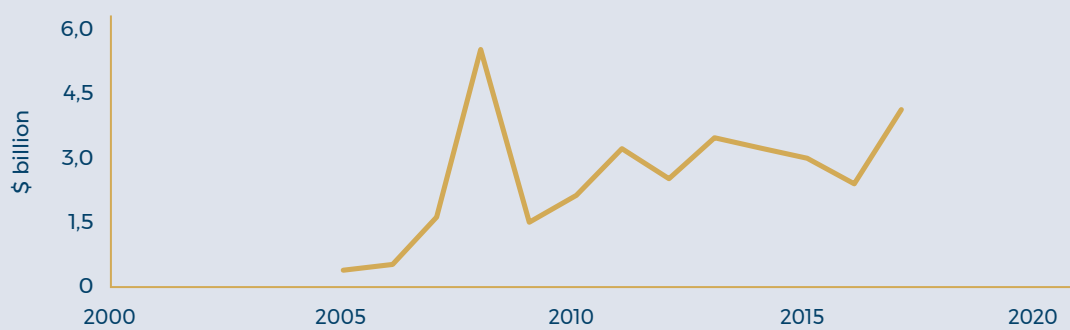
42 Matthias Busse and Steffen Gröning, 'The resource curse revisited: Governance and natural resources' (Working Paper 106, Hamburg Institute of International Economics, 2013), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1634963.

43 Richard Schiere and Alex Rugamba, 'Chinese infrastructure investments and African integration' (Working Paper 127, African Development Bank, Abidjan, 2011), <https://ideas.repec.org/p/adb/adbwps/293.html>.

current economic power and future prospects, African countries that partner with China today will be associated with a global economic shaper in the future.

An analysis of data provided by Johns Hopkins University revealed the relationship between China-Africa investments and the AIDI. The AIDI is produced by the AfDB and serves as a reference point for monitoring infrastructure development across the African continent. Figure 9 plots China-to-Africa FDI from 2005 to 2017 and shows that following a spike in 2008 and subsequent fall in 2009 (most likely caused by the great recession occurring at that time), Chinese FDI in Africa rose steadily. The visible dip in 2016 corresponds with the decline in trade that year, previously depicted in Figure 8.

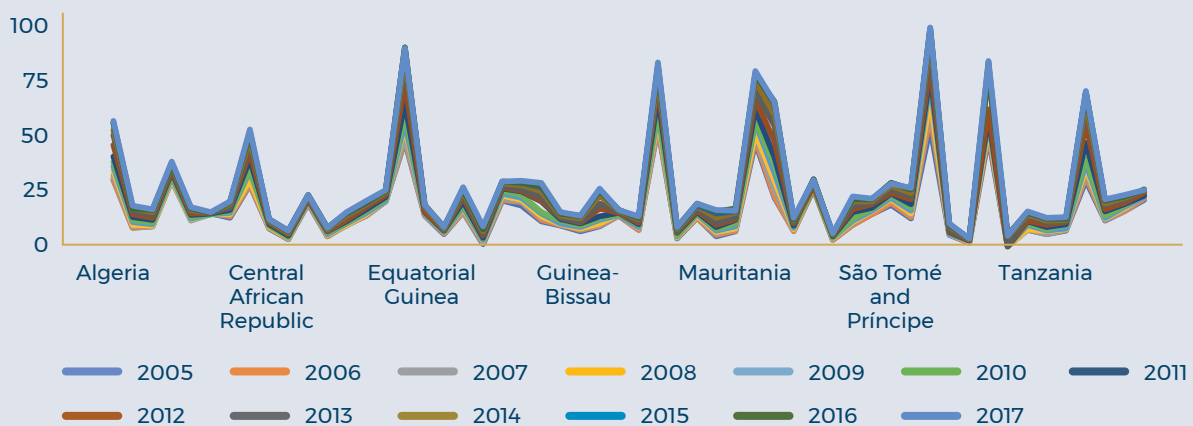
Figure 9 China-to-Africa FDI, 2005-2017



Source: John Hopkins SAIS China Africa Research Initiative Database; World Development Indicators; African Development Bank AIDI

Figure 10 depicts the AIDI over a number of years, where a higher index indicates a higher and better level of infrastructure. AIDI scores have improved for every country over the period in question.

Figure 10 Africa Infrastructure Development Index, 2005-2017



Source: African Development Bank, 'Africa Infrastructure Knowledge Program'

Debt sustainability

Over the past two decades, China has pledged billions of dollars to countries in Africa in the form of grants, loans and development finance. In 2012, China became Africa's largest creditor, surpassing previous Western lenders. In the five-year period from 2012 to 2017, Chinese lending to Africa grew to over \$10 billion per year, up from less than \$1 billion in 2001. According to the Jubilee Debt Campaign, as of 2018, China accounted for 20% of African countries' debt stock, with 17% of all governmental external interest payments being made to China.⁴⁴ Country-level data from the Overseas Development Initiative (ODI)⁴⁵ reveal that China accounts for 20–25%, and 10% of external debt servicing in Kenya, and Nigeria, respectively.

Description of China–Africa loans, sources, types and identified projects

China has financed infrastructure projects in at least 35 African countries, with the projects spread across different sectors, such as dams, power, ports, railways, roads, and water and sanitation. The sources of these loans are diverse, including China's Ministry of Commerce (MOFCOM), two Chinese policy banks (the Export–Import (EXIM) Bank of China and the China Development Bank), Chinese private and commercial banks, state-owned enterprises (SOEs), private businesses providing suppliers' credit or investment loan financing, and, recently, the Central Bank of China. The forms that the loans take are just as diverse as their sources.

China provides four main types of finance:

- **Zero-interest loans:** The Chinese authorities are of the view that over 90% of these loans will be written off over time.
- **Grant aid:** This is usually aid provided 'in kind'.
- **Concessional loans from the EXIM Bank of China:** These are loans that are given with an interest subsidy by MOFCOM. The subsidy is the difference between China's central bank base rate and the preferential loan rate. While Chinese concessional loans are not as benevolent as concessional loans from international organisations such as the World Bank and International Monetary Fund (IMF), the latter are usually far more restrictive, making Chinese loans more attractive.
- **Commercial loans and investments:** These are usually targeted at natural resources and facilitated via joint ventures or licences for resource extraction and production.

China mostly engages in lending on a barter basis, where funds are not directly lent to a recipient country. Instead, China makes provision for infrastructure development in a

44 Jubilee Debt Campaign, 'Africa's growing debt crisis: Who is the debt owed to?' October 2018, https://jubileedebt.org.uk/wp-content/uploads/2018/10/Who-is-Africa-debt-owed-to_10.18.pdf.

45 ODI, *Four lessons from Zambia's emerging debt default*. (2020). Retrieved May 21, 2021, <https://odi.org/en/insights/four-lessons-from-zambias-emerging-debt-default/>.

recipient country and, in exchange, the borrowing country gives Chinese lenders the right to mine natural resources in their country. Chinese infrastructure development largely centres on resource extraction, telecommunications and transport. As business often takes place using a barter mechanism, financial transparency is difficult to establish. For example, under the 'Angola Model', funds are not directly channelled to the recipient country; rather, the Chinese government mandates a Chinese construction company (which is usually given credit by the EXIM Bank of China) to undertake the construction work upon the approval of the recipient country. Then, in exchange for the infrastructure provision, the borrowing government extends the right to a Chinese company operating in the field of natural resources (mostly oil or minerals) to mine natural resources by acquiring an equity stake in a national oil company or by acquiring a licence for production.

As at 2017, some of the largest infrastructure projects that had been commissioned were:

- Ethiopia borrowed \$1.3 billion for the construction of the Addis Ababa-Djibouti railway, using a master loan facility; the terms are 15 years with a 6-year grace period and an interest rate of LIBOR (London Interbank Offered Rate) + 3%;
- Kenya borrowed \$2 billion for the construction of railway lines; the terms are 15 years with a 5-year grace period and an interest rate of LIBOR + 3.6%;
- Cameroon borrowed \$500 million for the Memve'ele hydropower project; the terms are 16 years with a 6-year grace period and an interest rate of Euribor (Euro Interbank Offered Rate) + 3.1%;
- Nigeria borrowed \$500 million for the construction of the Abuja-Masaka light rail; the terms are 20 years with a 7-year grace period and a fixed interest rate of 2.5%.

Critique of Chinese lending in Africa

One of the most contentious issues surrounding Chinese lending to Africa is debt sustainability. The literature on the impact of Chinese investment in African infrastructure is polarised. While some studies have found that the Chinese mode of lending to Africa can lead countries down an unrealistic path towards fiscal unsustainability, others have posited that China-led BRI investments serve as valuable development aid that supports the continent's development efforts.

Positive effects

Helmut Reisen argues that the labelling of China as a 'free rider' is misplaced. His study revealed that China has positively impacted debt tolerance through the stimulation of exports, infrastructure investment and gross national product (GNP).⁴⁶ In terms of the

⁴⁶ Helmut Reisen, 'Is China actually helping improve debt sustainability in Africa?' Presentation at Emerging Powers in Global Governance conference, Paris, July 6-7, 2007, https://www.researchgate.net/publication/242304882_Is_China_Actually_Helping_Improve_Debt_Sustainability.

state-owned structure of Chinese policy banks, capital is invested in a manner that is arguably more suited to the long-term development needs of developing economies and does not chase a short-term return on investment.

Bandiera and Tsiropoulos assessed debt sustainability and fiscal risks under the BRI.⁴⁷ Their study found that debt financing of BRI investments is expected to be paid out fully only in the medium term (2019–2023), even though the full growth impact of BRI-related projects would not be entirely realised. In addition, the impact of the BRI on public debt would improve over the longer term, assuming a sustained negative interest rate growth differential and the failure of BRI-related fiscal risks to materialise.

Schiere, Ndikumana and Walkenhorst explained that in the China–Africa relationship, both parties stand to gain.⁴⁸ While China’s infrastructure investment in Africa helps to mitigate supply bottlenecks and improve competitiveness in the region, China benefits from Africa’s abundant resources which are necessary to expand the Chinese economy. According to Schiere, China–Africa loans are a win-win scenario. However, African leaders need to strengthen and harmonise their domestic and regional policies and governance so as to improve the continent’s bargaining position vis-à-vis China.⁴⁹ This is necessary if the China–Africa relationship is to contribute to sustainable growth and development on the continent. Ayodele and Sotola are of the opinion that the African continent has much to gain from Chinese investment.⁵⁰ This is because the Chinese government does not force political conditions on African governments before signing contracts, either for exploration or for other economic activities. In addition, Chinese firms are willing to invest where Western companies are unwilling to do so.

On the basis of available information, Dollar postulated that African experiences of the BRI are heterogeneous.⁵¹ While some African debtors have sustainability issues, others have channelled loans from China into sustainable macroeconomic development programmes. Although China has focused on the construction of new facilities, sustainability issues have tended to be overlooked, such as maintenance and capacity-building, which are also critical for generating future returns on investment projects.

47 Luca Bandiera and Vasileios Tsiropoulos, 'A framework to assess debt sustainability and fiscal risks under the Belt and Road Initiative' (Policy Research Working Paper 8891, World Bank, Washington, DC, 2019), <https://openknowledge.worldbank.org/bitstream/handle/10986/31904/WPS8891.pdf?sequence=4&isAllowed=y>.

48 Richard Schiere, Léonce Ndikumana, and Peter Walkenhorst, *China and Africa: An emerging partnership for development?* (Abidjan: African Development Bank, 2011).

49 Richard Schiere, 'China and Africa: An emerging partnership for development? – An overview of issues' (Working Paper 125, African Development Bank, Abidjan, 2011), <https://www.afdb.org/fileadmin/uploads/afdb/Documents/Publications/WPS%20No%20125%20China%20and%20Africa%20%20An%20Emerging%20Partnership%20.pdf>.

50 Thompson Ayodele and Olusegun Sotola, 'China in Africa: An evaluation of Chinese investment' (IPPA Working Paper Series, Initiative for Public Policy Analysis, Lagos, 2014), https://ippanigeria.org/articles/China%20-Africa%20relation_Workingpaper_final.pdf.

51 David Dollar, 'Understanding China's Belt and Road infrastructure investments in Africa,' Brookings Institution, September 2019, https://www.brookings.edu/wp-content/uploads/2019/09/FP_20190930_china_bri_dollar.pdf.

Negative effects

According to Hurley, Morris and Portelance, of the 68 countries identified as Chinese borrowers, eight of these faces a particularly high risk of debt distress.⁵² According to Horn, Reinhart and Trebesch, 50% of China's lending to developing countries is not reported to the IMF or World Bank. These hidden arrangements affect policy surveillance, risk pricing and debt sustainability analyses in Africa.⁵³

Furthermore, China is being accused of 'debt trap diplomacy' – in other words, imposing high interest rates on countries that are unable to pay, thereby increasing the lender's bargaining power over the borrowing country. China has also been accused of soliciting corrupt infrastructure deals in exchange for political influence and using 'bribe-fuelled debt-trap diplomacy' to undermine good governance.

What does the data say?

Despite the increase in Chinese lending to Africa, China is not the biggest holder of external debt in most African countries. An analysis of CARI data revealed that China holds the majority of external debt in only two countries that are at risk of or already experiencing debt distress – Zambia and the Republic of Congo. Chinese lending to both countries stands at around \$14 billion, representing just over 10% of its total lending on the continent.⁵⁴

Fiscal sustainability of African economies – Data analysis

There are currently 47 countries identified as Chinese debtors (borrowers) in Africa, each of which is unique in terms of policies, governance and economic circumstances. To determine the impact of Chinese lending on Africa's fiscal sustainability, we looked at the 10 major debtors and measured their fiscal and debt sustainability positions against two indicators: debt-to-GDP and debt service-to-exports. The debt service-to-export ratio indicates the extent to which a country's export revenue is used to service its debt. Table 3 presents the 10 largest debtors as at 2017.

The African Monetary Cooperation Programme (AMCP) and IMF set the debt-to-GDP ratio for developing economies at 60% and 55%, respectively. When a country's debt-to-GDP ratio exceeds this threshold, the country is said to be on the cusp of fiscal risk. The IMF and World Bank set the debt service-to-exports ratio for developing economies at 15% and 25%, respectively. Therefore, maintaining a low debt service-to-exports ratio is what is required for a healthier and more stable economy. If countries surpass these thresholds, it means that they are highly vulnerable to economic changes and their governments have diminished capacity to provide support to the economy in the event of a recession.

52 Hurley, Morris, and Portelance, 'Examining the debt implications.'

53 Sebastian Horn, Carmen M. Reinhart, and Christoph Trebesch, 'China's overseas lending' (Working Paper 26050, National Bureau of Economic Research, Washington DC, 2019), <https://www.nber.org/papers/w26050>.

54 Arve Ofstad, Elling Tjønneland (2019). *Zambia's looming debt crisis – is China to blame?* CMI – Chr. Michelsen Institute. Retrieved May 21, 2021, from <https://www.cmi.no/publications/6866-zambias-looming-debt-crisis-is-china-to-blame>.

| Country | China's loans from (2005-2017, \$ billion) | Total debt (2017, \$ billion) | Total debt (% of GDP, 2017) | Total debt servicing (% of exports, 2017) | African Infrastructure Development Index (2017) |
|---------------|--|-------------------------------|-----------------------------|---|---|
| Angola | 42,548 | 46,661 | 69.3 | 25.6 | 17.5 |
| Ethiopia | 13,796 | 22,431 | 57.7 | 20.8 | 8.6 |
| Kenya | 8,887 | 35,022 | 55.2 | 14.6 | 25.0 |
| Zambia | 8,627 | 17,905 | 63.1 | 9.3 | 22.1 |
| Cameroon | 5,557 | 10,070 | 37.7 | 2.0 | 19.3 |
| Nigeria | 4,912 | 88,195 | 25.3 | 6.8 | 21.6 |
| Sudan | 4,820 | 53,920 | 159.6 | 4.0 | 15.0 |
| Rep. of Congo | 4,804 | 7,492 | 111.7 | 3.2 | 15.0 |
| Côte d'Ivoire | 4,804 | 16,848 | 36.9 | 17.0 | 20.0 |
| South Africa | 3,616 | 178,286 | 53.0 | 13.4 | 80.0 |

Source: John Hopkins SAIS China Africa Research Initiative Database; World Development Indicators; African Development Bank AIDI

There are growing concerns about an impending debt crisis in Africa in the face of the continent's rising debt levels. As at 2017, 19 African countries had exceeded the 60% debt-to-GDP threshold set by the AMCP for developing economies, while 24 countries had surpassed the 55% debt-to-GDP threshold suggested by the IMF. In Table 3, Sudan and the Republic of Congo had the highest debt-to-GDP ratios, exceeding the thresholds identified by both the AMCP and the IMF. However, the nature of debt differs in these two countries. While the proportion of Chinese loans to total debt is low in Sudan, the opposite is true in the Republic of Congo.

| Debt-carrying capacity | Present value of total public debt (% of GDP) | Present value of debt servicing (% of exports) |
|------------------------|---|--|
| Weak | 35 | 10 |
| Medium | 55 | 15 |
| Strong | 70 | 25 |

Source: Author's Computation from World Bank World Development Indicators data, <https://databank.worldbank.org/source/world-development-indicators>

It is difficult to make clear assertions about the impact of Chinese loans on African fiscal sustainability, for two key reasons. First, there is a paucity of data, especially at the country level, on the total value of loans received by individual countries from all the different sources. Second, the available data reveal that the impact and experiences of individual countries regarding debt stock, interest rates and repayments are heterogeneous across the continent.

However, what matters for debt sustainability in Africa is not just China's lending activities, but also how the lending stimulates African exports (natural resources), supports

infrastructure development and positively affects GNP. China has been found to have a positive impact on debt tolerance in Africa as Chinese loans are used to drive industrial development and socioeconomic growth. The data suggest that the major African borrowers from China are on average achieving good infrastructure index ratings. Although only South Africa has a high ranking on the index, other countries are progressively moving up in the rankings, which could imply that the loans received are being effectively allocated and utilised.

Whereas Chinese lending succeeds in driving exports, infrastructure development and income growth, the lower standards associated with China's loans are known to undermine democratic institutions and induce a higher incidence of corruption in African borrowing countries, particularly those that are resource-rich. While it is not clear that China's presence encourages corruption, the lack of transparency surrounding the nature and quantum of commercial lending to Africa makes it difficult to track the build-up of Chinese debt in Africa.

Chinese aid, including that channelled through the BRI, comes with both benefits and risks, depending on the contours of the loan-investment agreement. If countries are also to negotiate proper concessional lending rates, steer clear of resource-backed financing and take advantage of infrastructure development, they could overcome their debt challenges and avoid debt traps. By adopting general best practices, African countries could position themselves to benefit from Chinese aid. From its side, China could work on becoming more transparent, particularly in sharing common loan criteria and making these publicly available.

CHAPTER 4

An assessment of the development impact of Chinese investment in Africa

Building on the quantitative assessment in Chapter 3, this chapter provides a qualitative assessment of three selected countries – Kenya, Ethiopia and Nigeria – in order to evaluate the development impact of specific infrastructure projects. The countries were selected on the basis that a large number of projects had been implemented in each country under the BRI and therefore data availability did not pose a challenge. The specific projects were selected on the basis of available data from the BRI website and China research by AidData.

| | | |
|-------------------|------------|--------------|
| Algeria | Gambia | Rwanda |
| Angola | Ghana | Senegal |
| Benin | Guinea | Seychelles |
| Burundi | Kenya | Sierra Leone |
| Cameroon | Lesotho | Somalia |
| Cape Verde | Liberia | South Africa |
| Chad | Libya | South Sudan |
| Comoros | Madagascar | Sudan |
| Congo, Rep. | Mali | Tanzania |
| Côte d'Ivoire | Mauritania | Togo |
| Djibouti | Morocco | Uganda |
| Egypt | Mozambique | Zambia |
| Equatorial Guinea | Namibia | Zimbabwe |
| Ethiopia | Niger | |
| Gabon | Nigeria | |

Source: Government of China, 2021. Belt and Road Portal. Retrieved from: https://eng.yidaiyilu.gov.cn/info/iList.jsp?cat_id=10076&cur_page=1

Kenya

Mombasa-Nairobi railway

In 2014, the government of Kenya began the construction of the 472km standard gauge railway (SGR) connecting Mombasa – the largest port in East Africa – to Nairobi, with the aim of improving passenger and freight transportation as well as facilitating Kenya's transition to a middle-income industrialised country in line with Kenya's Vision 2030. However, the Mombasa-Nairobi railway is part of a much larger railway project that will eventually link Kenya to other countries in East Africa, including Tanzania, Rwanda, Burundi and Uganda. By 2017, the Mombasa-Nairobi section of the railway had been completed,

thus increasing passenger numbers from 960 to 2,400 passengers and annual cargo capacity from 4.8 million tons to 22 million tons.⁵⁵

While the total cost of the project is estimated to be \$3.8 billion, making it the costliest infrastructure project undertaken in Kenya since independence,⁵⁶ the Chinese government (through the EXIM Bank of China) contributed about 90% of the total funding, with the remaining 10% provided by the Kenyan government. According to China research by AidData, the funding was provided in 2014 both in the form of loans (\$1.63 billion) and preferential credits (\$1.6 billion). It is noteworthy that the China Road and Bridge Corporation (CRBC) was the primary contractor in the project and required the importation of Chinese supplies and materials. Nevertheless, the successful completion of the SGR is regarded as an early result of the BRI.⁵⁷

Generally speaking, rail transportation is a safe and reliable means of transporting large numbers of people and goods over long distances and at high speed. Rail transportation also contributes to economic development by reducing transaction costs, expanding demand, achieving economies of scale and scope, and fostering trade and investment. The completion of the Mombasa-Nairobi railway shortened passenger travel time from ten to four hours and freight travel time to eight hours, and reduced freight costs from \$0.20 per ton/km to \$0.08 per ton/km.⁵⁸ The reduction in travel costs and time will lead to lower costs for businesses involved in the transportation of goods and will increase the welfare gains for both workers and non-workers alike.

Apart from the reduction in passenger and freight costs and time, the SGR has boosted economic growth and created job and business opportunities. In this regard, the SGR is estimated to have increased Kenya's GDP by 1.5%, while its construction has created over 30,000 direct and indirect jobs, and has given momentum to the local sourcing of raw materials and intermediate goods required to build the railway.⁵⁹ Furthermore, the SGR is likely to improve the value of assets along the rail route and boost economic activity around the SGR stations as well as in the eight counties through which the SGR runs – Mombasa, Kilifi, Kwale, Taita-Taveta, Makueni, Kajiado, Machakos and Nairobi.

However, the high cost of the project has increased Kenya's national debt considerably, raising concerns about the project's costs versus its benefits. In addition, as the loan is dollar-denominated, excludes debt rescheduling and falls under the other official flows

55 Oluochi Jane Nthenya, 'The Contribution of the Standard Gauge Railway towards promoting Harmony in the East African Member States' (PhD diss., United States International University, Lagos, Nigeria, 2018).

56 Miriam Nkirete, 'Kenya's Standard Railway Gauge Project to cost Sh1.02 trillion,' *Construction Kenya*, May 23, 2017, <https://www.constructionkenya.com/2971/mombasa-malaba-sgr-project/>.

57 Nthenya, 'The Contribution of the Standard Gauge Railway.'

58 Anthony B. Masinde, 'Challenges of Implementing Turnaround Strategies at Kenya Railways Corporation,' (PhD diss., University of Nairobi, Kenya, 2016). See also Oluochi Jane Nthenya, 'The Contribution of the Standard Gauge Railway.'

59 Ventures Africa, 'Standard Gauge Railway to raise Kenya's GDP by 1.5 percent,' January 30, 2015, <http://venturesafrica.com/standard-gauge-railway-to-raise-kenyas-gdp-by-1-5-percent/>. See also Oluochi Jane Nthenya, 'The Contribution of the Standard Gauge Railway.'

category with a low grant provision,⁶⁰ debt repayments could pose a challenge in the face of foreign exchange risks. Nevertheless, the future economic activity that will flow from the project could offset the principal loan amount and interest payments. Moreover, given that the project is futuristic in nature, with the aim of linking Kenya to other countries in the East African region, the envisaged positive externalities associated with increased trade and stronger economic growth in these countries could also potentially offset the debt incurred.

Olkaria IV geothermal power station

In 2012, the Kenyan government commenced the construction of the 140-megawatt (MW) Olkaria IV geothermal power station, one of five power stations located in the Olkaria Ward in Nakuru County, aimed at improving geothermal electricity generation in the country. This was against the backdrop of the government's twin goals of achieving universal electricity access by 2020 and transitioning to renewable energy by securing in excess of 50% of its power supply from geothermal sources by 2025. With the completion of the power station in 2015, Kenya became the largest geothermal power producer in Africa and the eighth-largest globally.⁶¹

With the total cost of the project standing at \$714 million, the Chinese government, through the EXIM Bank of China, provided 13% of this amount. Specifically, China research by AidData showed that China provided \$94.7 million in concessional loans and the implementing agency for the project was the Chinese state-owned Greatwall Drilling Company (GWDC).

Although geothermal energy generation involves high cost and risk during the exploration stage, it is more affordable and cleaner than other forms of energy, given its relatively low carbon dioxide emissions in the production of electricity. Consequently, the power station has supported the transition to renewable energy and reduced the cost of electricity from \$0.15 per kWh to \$0.085 per kWh.⁶² The transition to renewable energy averts the air and water pollution associated with fossil fuel-powered plants, which negatively impact public health, and also makes electricity more affordable, particularly for low-income households. Furthermore, geothermal energy escapes the volatility in energy prices that is characteristic of fossil fuel-powered plants. Even when compared with other renewable sources, such as solar and wind, the constant availability of geothermal energy results in more stable energy prices.

The geothermal energy industry is also more labour-intensive than the fossil fuel industry which is typically capital-intensive. In Kenya, the geothermal energy industry has employed over 10,000 people both directly and indirectly, in skilled jobs (scientists, geologists

60 Bluhm et al., 'Connective Financing.'

61 Richard Metcalf and Paul Zakkour, 'Geothermal projects in East Africa – full steam ahead?' Norton Rose Fullbright, July 2016, <https://www.nortonrosefulbright.com/en/knowledge/publications/ed7d5a3e/geothermal-projects-in-east-africa--full-steam-ahead>.

62 Government of Kenya, 'Climate Investment Funds,' *Scaling-Up Renewable Energy Program (SREP) Investment Plan for Kenya*, September 8, 2011, https://www.climateinvestmentfunds.org/sites/cif_enc/files/Kenya%20IP_0.pdf.

and environmentalists) as well as semi-skilled and unskilled jobs.⁶³ Moreover, the local community where the power station is located has benefited from its establishment. Aside from the new job opportunities, particularly for unskilled and semi-skilled labour, that were created during the construction of the power station in the Olkaria Ward, the area has generally benefited from the infrastructure development. For instance, a 10km road is being planned to enhance the accessibility to the Olkaria IV power station.⁶⁴ Projects such as these help the development of the communities in the vicinity of the geothermal areas.

Ethiopia

Addis Ababa light railway

In 2011, the Ethiopian government commenced the construction of a light railway with the aim of reducing traffic congestion in the capital city of Addis Ababa. By 2015, the project had been completed, with the capacity to transport 60,000 passengers per hour through two lines connecting the city on the north-south and east-west axes.⁶⁵ While the cost of the project was \$475 million, the Chinese government, through the EXIM Bank of China, covered 85% of this amount through a concessional loan.⁶⁶ The China Railway Engineering Corporation (CREC) was the primary contractor responsible for the project.

A light railway is considered six times safer than road transport owing to the absence of collision risk.⁶⁷ In addition, a light railway is an energy-efficient transport system and is associated with a reduction in carbon dioxide emissions stemming from less reliance on cars as a mode of commuting within a city. In the case of the Addis Ababa light railway, studies have found that the network will reduce carbon dioxide emissions.⁶⁸ As such, the light railway system contributes significantly towards the achievement of the Sustainable Development Goals (SDGs). Specifically, the reduction in fatalities and carbon dioxide emissions as well as the use of a clean transport system support the achievement of SDG 3 (good health and wellbeing), SDG 11 (sustainable cities and communities) and SDG 13 (climate action), respectively. Furthermore, as the light railway is an intercity transport system, the value of residential and commercial assets around the line, particularly near train stations, will rise and the area is likely to attract investment for shopping malls and improve economic activity close to the line.

63 Peketsa Mwaro Mangi, 'Geothermal Exploration in Kenya – Status Report and Updates,' Presented at SDG Short Course II on Exploration and Development of Geothermal Resources, organised by UNU-GTP, GDC and KenGen, at Lake Bogoria and Lake Naivasha, Kenya, November 9–29, 2017, <https://orkustofnun.is/gogn/unu-gtp-sc/UNU-GTP-SC-25-0701.pdf>.

64 Elizabeth Mwangi-Gachau, 'Social Aspects of Geothermal Development – A Case of Olkaria Geothermal Project in Kenya,' Presented at Short Course VI on Exploration for Geothermal Resources, organised by UNU-GTP, GDC and KenGen, at Lake Bogoria and Lake Naivasha, Kenya, October 27–November 18, 2011, <https://orkustofnun.is/gogn/unu-gtp-sc/UNU-GTP-SC-13-0806.pdf>

65 Centre for Public Impact, 'Light Rail Transportation Systems Are Built in Ethiopia,' *Global Delivery Initiative*, June 2017, http://www.globaldeliveryinitiative.org/sites/default/files/case-studies/dn_ethiopiaIrts_v2a.pdf.

66 Istvan Tarrosy and Zoltán Vörös, 'China and Ethiopia, Part 1: The Light Railway System,' *The Diplomat*, February 13, 2018, <https://thediplomat.com/2018/02/china-and-ethiopia-part-1-the-light-railway-system/>.

67 International Association of Public Transport, 'Light Rail: A tool to serve customers and cities,' 2016, https://www.uitp.org/sites/default/files/LRT_Knowledge%20Brief_LQ.pdf.

68 C40 Cities, 'Addis Ababa: Light Rail Transit Project,' n/d, <http://www.c40.org/awards/2016-awards/profiles/107>.

Considering that the project was financed by a \$403 million loan from the EXIM Bank of China, the issue of debt sustainability due to foreign exchange risks or negative shocks to government revenue still prevails. However, in the case of the Addis Ababa light railway, the loan was concessional and therefore has longer maturity and grace periods, and could be rescheduled.

Adama II wind farm

In 2012, the Ethiopian government began the construction of the Adama II wind farm, about 95km from Addis Ababa. With a total capacity of about 153MW, it is Africa's second-largest wind farm. By 2015, the farm became operational, thus increasing the country's wind generation capacity to 324MW, which is in line with Ethiopia's five-year Growth and Transformation Plan aimed at generating about 890MW of energy from wind.⁶⁹

The Chinese government covered 85% of the project's total cost of \$345 million, with the Ethiopian government financing the remaining 15%. Specifically, in 2012, the EXIM Bank of China provided \$293.3 million in the form of a loan to the Ethiopian government. The implementing agencies were Hydrochina Corporation and the CGC Overseas Construction Company Limited, both state-owned Chinese companies.⁷⁰

In addition to being a clean energy source and given Ethiopia's dry-wet season climate, wind energy is an important and reliable energy source, particularly during the dry season. The Adama wind farm generates about 10% of Ethiopia's electricity, although during the dry season it accounts for over 15%.⁷¹ Furthermore, the cost of electricity generated from wind power is lower than that from diesel-powered generators. Studies have found that wind-generated electricity costs about \$0.06 per kWh compared with \$0.129 per kWh for electricity generated by diesel-powered generators.⁷²

The Adama wind farm has created job opportunities and facilitated knowledge transfer. The construction phase alone employed over 1,000 Ethiopians, while Hydrochina subcontracted other aspects, such as shipping and insurance, to local companies. Now that the construction has been completed, the wind farm continues to employ several experienced engineers. Moreover, as a part of its contract, Hydrochina trained 30 engineers from the national power company, Ethiopian Electric Power, with 22 securing jobs at the wind farm.⁷³ In addition, local universities (rather than foreign firms) were selected as consultants in the project, which further facilitated knowledge and technology transfer.

69 Getachew Tafesse, 'Environmental and Socioeconomic Effects of Wind Energy Production; the Case of Adama II Wind Farm' (PhD diss. Addis Ababa University, 2019), <http://etd.aau.edu.et/handle/123456789/20324>.

70 Bluhm et al., 'Connective Financing.'

71 Yanning Chen, 'A Comparative Analysis: The Sustainable Development Impact of Two Wind Farms in Ethiopia' (SAIS China-Africa Research Initiative Working Paper 7, Baltimore, MA, 2016), <https://static1.squarespace.com/static/5652847de4b033f56d2bdc29/t/583dca51d1758e46ff33fdbb/1480444498737/CARI%2BWP%2B07+Ethiopia.pdf>.

72 Chen, 'A Comparative Analysis.'

73 Chen, 'A Comparative Analysis.'

Specifically, 17 professors from Adama University and Mekelle University worked as consulting engineers in the project.

Nigeria

Abuja-Kaduna standard gauge railway

In 2011, the construction of the 186km Abuja-Kaduna railway commenced, to facilitate both passenger and freight transport. The railway line was the first segment of the Lagos-Kano standard gauge project. By 2014, the line had been completed, with each passenger train carrying up to 5,000 commuters and each cargo train carrying 800 tons of goods per day from 6:40am – 8:20pm.⁷⁴ With the total cost of the project standing at \$874 million, the EXIM Bank of China provided \$500 million in loans and the Nigerian government financed the rest. In addition, the implementing agency was the China Civil and Engineering Construction Company (CCECC).⁷⁵

While the general benefits of rail transport have been highlighted in the case of Kenya, there are developmental impacts specific to the Abuja-Kaduna railway. Relative to the alternative mode of transport, which is the Abuja-Kaduna highway, the railway reduced travel time to 1 hour for passengers and 1.5 hours for cargo.⁷⁶ The reduction in transit time enabled freight carriers to save money and also facilitated easier travel for workers who commuted between the two cities. Apart from the direct user benefits, the railway has produced several socioeconomic spillovers. First, direct and indirect employment was created during the construction and operation of the railway. The project employed about 4,000 people during the construction phase and about 5,000 people during its operation.⁷⁷ Furthermore, although neither city is remote, the railway has improved accessibility, which could potentially expand the market for tourism and/or labour, and foster competition.

NIGCOM satellite

In 2004, the Nigerian government contracted China to build and launch the NIGCOM communications satellite with the aim of improving communication and internet services across the country, particularly in remote areas. The satellite would also cover other parts of Africa, the Middle East and southern Europe, and carry out intelligence and security surveillance.

The total cost of the satellite was \$257 million, with the EXIM Bank of China providing \$200 million in the form of preferential credits to finance the project. The satellite was launched

74 Railway Technology, 'Abuja-Kaduna Rail Line,' n/d, <https://www.railway-technology.com/projects/abuja-kaduna-rail-line/>.

75 Railway Technology, 'Abuja-Kaduna Rail Line.'

76 Railway Technology, 'Abuja-Kaduna Rail Line.'

77 Railway Technology, 'Abuja-Kaduna Rail Line.'

in 2007.⁷⁸ In addition, the Great Wall Industry Corporation (GWIC), a Chinese state-owned aerospace company, monitored the satellite from a station in China. It is noteworthy that this was the first time that a Chinese firm had provided in-orbit delivery outside China.⁷⁹

| TABLE 6 SUMMARY OF CASE STUDIES ON BRI PROJECTS IN KENYA, ETHIOPIA AND NIGERIA | | | | |
|--|-------------------------------------|--|--|---|
| Country | Project | Chinese intervention | Implementing agency | Developmental impact |
| Kenya | Mombasa–Nairobi railway | 90% of project's cost: \$1.63 billion in loans and \$1.6 billion in preferential credits | CRBC | <ul style="list-style-type: none"> • Reduction in passenger and freight transit time • Job creation |
| | Olkaria IV geothermal power station | 13% of project's cost: \$94.7 million in loans | Chinese state-owned GWDC | <ul style="list-style-type: none"> • Improvements in access to electricity • Reduction in electricity costs • Job creation • Development of the host community |
| Ethiopia | Addis Ababa light railway | 85% of project's cost: \$403.75 million in loans | CREC | <ul style="list-style-type: none"> • Reduction in fatalities • Reduction in carbon dioxide emissions • Improvements in the value of residential and commercial assets around the rail line • Attracting investments into the host community |
| | Adama II wind farm | 85% of project's cost: \$293.3 million in loans | Hydrochina Corporation and CGC Overseas Construction Company Limited | <ul style="list-style-type: none"> • Reduction in electricity costs • Job creation • Knowledge and technology transfer |
| Nigeria | Abuja–Kaduna standard gauge railway | 57% of project's cost: \$500 million in loans | CCECC | <ul style="list-style-type: none"> • Reduction in travel time • Job creation • Improved accessibility to the community |
| | NIGCOM satellite | 78% of project's cost: \$200 million in loans | Chinese state-owned GWIC | <ul style="list-style-type: none"> • Improvements in communication and internet services • Knowledge transfer |

78 Julie Michelle Klinger, 'China, Africa, and the Rest: Recent Trends in Space Science, Technology, and Satellite Development' (Working Paper 38, SAIS China-Africa Research Initiative, Washington DC, 2020), <https://static1.squarespace.com/static/5652847de4b033f56d2bdc29/t/5ecdb4ab6dad0e25fa0feb06/1590539437793/WP+38++Klinger++China+Africa+Space+Satellites.pdf>.

79 Klinger, 'China, Africa, and the Rest.'

Besides providing broadband, broadcasting and other services for households and firms in rural and urban communities, the project facilitated knowledge transfer. As part of the contract, Nigerian scientists and engineers were trained in satellite design and construction in China. These scientists and engineers then managed the satellite from a control station in Nigeria. The satellite had an expected life span of 15 years. However, in mid-2008, technical errors in its solar arrays caused the satellite to fail and de-orbit.⁸⁰

80 Klinger, 'China, Africa, and the Rest.'

Tying it all together

The BRI represents another phase in the expanding China–Africa relationship. Economic and trade opportunities have always underpinned this relationship and in the case of BRI projects, this is still the case. There is no clear-cut demarcation of China’s investments into Africa before and during the BRI; rather, the BRI has scaled up the China–Africa relationship.

As in the past, the focus of the BRI is on the transportation, energy, mining, IT and communication sectors. This underscores the fact that the relationship is a symbiotic one aimed at satisfying China’s need for resources and economic expansion and gradually integrating African countries into the global supply chain and also expanding export opportunities for resource-rich economies on the continent.

Determining the specific impact of the BRI is difficult as the latter involves large-scale projects (most of which have not yet been completed) with long-term economic potential. However, past Chinese infrastructure projects offer a glimpse of the likely trajectory of the BRI’s economic impact. The analysis in this study showed that trade facilitation and the commodity boom that could result from it will stimulate economic growth in Africa, especially in the resource-based and services sectors.

BRI projects also address many aspects of Africa’s infrastructure deficit. The region’s low capital formation, for example, is well known and the implications of this for economic development have been highlighted in the development literature. However, the capacity of the public and domestic private sectors is constrained by limited fiscal space and underdeveloped domestic financial markets. Moreover, Western donors have shifted their sights towards social and humanitarian initiatives. Hence, the emergence of a new player like China has enabled African countries to meet some of their infrastructure needs.

There are still areas of concern, though. It is in the area of debt sustainability that the China–Africa relationship has attracted a great deal of criticism. However, an analysis of the debt status and risk of debt distress among countries borrowing from China revealed that only two countries (Zambia and the Republic of Congo) were actually at risk of debt distress. Interestingly, the Republic of Congo is one of the 43 BRI recipient countries in Africa. Again, it is hard to single out Chinese lending as the major driver of Africa’s debt crisis. Nevertheless, the history of debt crises in Africa points to the need to exercise caution when considering large projects with substantial cost implications that might deliver little value in terms of creating new markets or connecting existing ones. Specifically, BRI projects need to be evaluated in the light of their inclusive growth potential and the capacity of countries to repay loans. More importantly, transparency is needed if African countries are to engage in efficient debt management. The hidden or unquantifiable debt phenomenon that characterises Chinese loans to Africa is a major obstacle to transparency.

Concerns about debt sustainability have become even more pronounced in light of the recent health and financial shocks that the global economy has experienced as a result of COVID-19. The crisis is still ongoing and its impact on the China-Africa relationship cannot be accurately determined through available data. However, the expected downturn in economic performance and trade implies that many African countries' capacity for debt repayment will be adversely affected. The key point here is that even if the BRI poses no immediate debt risk, the fallout from COVID-19 could change the dynamics. Furthermore, the pandemic illustrates the vulnerability of many developing countries to external shocks and needs to be taken into consideration when making debt- and investment-related decisions. As far as the BRI is concerned, African countries have a major role to play in conducting extensive cost-benefit analyses of projects and their short- and long-term capacity for repayment.

Reviews of ongoing BRI projects in Nigeria, Kenya and Ethiopia support the aforementioned point that Chinese infrastructure investment is helping to dismantle critical barriers to economic development in Africa. Infrastructure projects have the potential to accelerate the achievement of sustainable development goals pertaining to poverty reduction, job creation and economic diversification. Another crucial component of Africa's relationship with China is knowledge transfer, which is vital for African countries to develop their own local industries.

Overall, the quantitative and qualitative analyses of past and present Chinese infrastructure investment projects indicate that the impact has been enormously positive. Yet there are many areas needing improvement, especially the environmental impact and the creation of linkages with the domestic manufacturing sector.

Conclusion and policy recommendations

This study assessed the impact of Chinese investment, particularly investment under the BRI, on priority development areas in Africa, including infrastructure quality, economic growth, trade and debt. It also used three country case studies – Kenya, Ethiopia and Nigeria – to illustrate the specific effects of BRI projects on development.

Chinese investment is typically associated with an increase in infrastructure stock, growth in economic output, and debt. However, the impact of investment on trade is mixed. While Chinese investment has been used as a tool to promote trade between China and Africa, with countries with large markets and significant natural resources being the main recipients of Chinese investment, the effect of increased trade on growth has been found to be negative. The literature shows that the export of Chinese manufactured goods has led to the crowding out of locally produced goods, while the focus on the resource sector has been associated with a decline in non-resource sectors in some African countries.

The country case studies reveal that the projects had positive development outcomes (of both a direct and indirect nature) as the host communities benefited from the increased investment and accessibility. Moreover, many of the projects were environmentally friendly and developed in line with countries' national plans, reflecting the mutual-benefit rhetoric underpinning Chinese investment. However, the significant cost of the projects and China financing a large share of them has given rise to debt concerns in many African countries. In the case of Nigeria, the failure of the NIGCOM satellite, which was built by a Chinese firm that had previously not provided in-orbit delivery outside of China, has triggered concerns that Africa is being used as a testing ground to promote learning and capacity-building among Chinese workers and companies. Further research needs to be conducted on how China's lending decisions affect debt sustainability on the continent.

Notwithstanding these concerns, the evidence seems to support the 'win-win' narrative of Africa developing its infrastructure with the assistance of Chinese finance and implementing agencies. However, we conclude with the following overarching recommendations for African countries:

- **Stipulate high standards for construction work and improve the management of projects** in order to achieve better infrastructure quality. In particular, all stages of a project should be monitored to ensure that the project addresses the country's particular investment needs.
- **Reconfigure the composition of China-Africa trade to become more symmetrical**, with Africa importing fewer consumer and capital goods and exporting fewer primary commodities in order to reduce competition from Chinese imports.

- **Negotiate favourable loan terms with concessional lending rates and desist from resource- and infrastructure-backed financing.** This will prevent the accumulation of unsustainable levels of debt and the loss of national assets in the event of debt default.



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