



ASIAN INFRASTRUCTURE
INVESTMENT BANK

With sections written by:

The
Economist

INTELLIGENCE
UNIT

ASIAN INFRASTRUCTURE FINANCE 2020

Investing Better, Investing More





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Foreword

I am delighted to see the release of our second Asian Infrastructure Finance report. 2019 was a challenging year for the world and for Asia, with growth decelerating and impediments to investment mounting. Indeed, private sector infrastructure investment saw a decline in 2019.

The start of 2020 was also difficult, given the unexpected outbreak of COVID-19. The global economy has taken a hit, but I am confident of its recovery once the necessary public health measures are taken. The outbreak underscores the importance of infrastructure development. A country's readiness to cope with epidemics is correlated with its infrastructure. This is especially true in the context of megatrends such as urbanization and increased trade connectivity which will allow the fast transmission of pathogens. Without proper public health infrastructure to provide clean water and sanitation, healthcare, and healthcare-related information and communications technology (ICT), developing economies will remain vulnerable to such outbreaks. After the COVID-19 crisis, the focus will be to assist developing economies invest in adequate infrastructure for development, as well as to prevent and mitigate the impact of future epidemics.

Infrastructure does not guarantee development, but there can be no development without infrastructure. Bottlenecks in infrastructure still constitute major constraints for many developing countries, and they must be removed or eased considerably before these countries can hope to grow and meet their sustainable development goals. Infrastructure serves as the bedrock for sustained growth, which provides an economy with resilience to withstand external shocks and the ability to address climate change risks, protect the environment and biodiversity, and meet citizens' aspirations for a better life.

The theme of this second publication "Investing Better, Investing More" captures such logical thinking. I would emphasize that the report is not suggesting a more-is-better approach. Rather, it argues that we must first get the conditions right to allow better investment choices, which will then allow more public and private investments to flow. Among other things, investing better means ensuring good project design and implementation to improve the economic returns of projects, upholding high environmental, social and governance (ESG) standards throughout the entire life cycle of the projects financed, planning for the future and reducing the likelihood of stranded assets. Investing better also requires that policy makers get supportive macroeconomic and regulatory policies right and select good projects that integrate toward



development. These ideas are explored in various pieces of analytical work, with key findings presented in this publication.

I also make special mention of debt sustainability, which has been a cause for general concern and thus called forth much discussion. While we must keep high indebtedness under close watch, we should not simply scrap essential investment in infrastructure required for long-term growth. Debt burdens can be eased when investments generate revenues, directly or indirectly, and pave the path for long-term growth. There are success stories in the developing world of judicious borrowing and investment leading to robust and sustained growth for decades on end. It is important to note that while certain economies are grappling with tough challenges and debt vulnerabilities, the analysis presented in this report does not suggest a systemic debt risk. There is ample financial and policy space for the international community, private sector and governments to continue investing in a sound manner.

The Asian Infrastructure Investment Bank (AIIB) is now striding into its fifth year of operation in 2020. Our Bank was founded with an ambitious mission to improve economic and social development in Asia and beyond through investment in infrastructure and other productive sectors. As global conditions become more complex, the importance of working

together to achieve the envisioned outcomes becomes magnified. Circumstances may change, but the mission remains the same. Through the economic cycle and through difficult environments, AIIB will work with partners to stay the course—investing better, investing more.

A stylized, handwritten signature in black ink, consisting of several overlapping loops and a long horizontal stroke at the bottom.

Jin Liqun

President and Chair of the Board,
Asian Infrastructure Investment Bank

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Refer to [Appendix 3](#)

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Abbreviations

ADB	Asian Development Bank
AIIB	Asian Infrastructure Investment Bank
ASEAN	Association of Southeast Asian Nations
BLOC	basket of locally obtained commodities
CBA	cost-benefit analysis
CCGT	combined cycle gas turbine
CFP	corporate financial performance
DSF	Debt Sustainability Framework
EIU	Economist Intelligence Unit
EM	emerging market
ESG	environment, social and governance
EU	European Union
EUR	Euro
FX	foreign exchange
G20	Group of 20
GBP	British Pound Sterling
GDP	gross domestic product
GFCF	gross fixed capital formation
GSIA	Global Sustainable Investment Alliance
GW	gigawatt
ICT	information and communications technology
IDA	International Development Association
IEEFA	Institute for Energy Economics and Financial Analysis
IMF	International Monetary Fund
IPP	independent power producer
JICA	Japan International Cooperation Agency
JPY	Japanese Yen
km	kilometer
MDB	multilateral development bank
MW	megawatt
NTM	non-tariff measure
ODA	official development assistance
OECD	Organisation for Economic Co-operation and Development
PACTA	Paris Agreement Capital Transition Assessment
PPA	power purchase agreement
PPP	public-private partnership
RE	renewable energy
SDG	Sustainable Development Goals
SOE	state-owned enterprises
TPI	Transition Pathway Initiative
UK	United Kingdom
UN	United Nations
US	United States of America
USD	US Dollar



1

OVERVIEW: INVESTING BETTER, INVESTING MORE

1.1	The Paradox of Infrastructure	02
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1.1 The Paradox of Infrastructure

Uncertainty over trade policy and increasing protectionist measures in infrastructure development have contributed to a decline in private sector infrastructure investment in 2019. Even though monetary policies have become more accommodative, these are not translating into more private sector financing because investors are perceiving rising risks to investment. The Asian Infrastructure Finance 2019 report anticipated this trend based on the slowing global economy, heightened geopolitical tensions and rising borrowing costs. Since then, the situation has not improved with the International Monetary Fund (IMF) downgrading its projections for global economic growth multiple times.

Against this backdrop, stagnating investments also coincide with slower productivity growth. As the recent World Bank report shows, this slowing productivity growth is occurring in developing economies, even though they are expected to exhibit higher productivity growth as part of their catching up or convergence process.^[1]

The importance of infrastructure investments in this context is well recognized. However, entering into 2020, forces working against more investments are becoming more prominent. Many governments are facing increasing constraints, with public debts rising at the same time as infrastructure investments are falling. Prime Minister Narendra Modi summed this up when he said, at the Asian Infrastructure Investment Bank (AIIB) 2018 Annual Meeting, “As developing economies, we share similar challenges. One of them is to find resources for provision of infrastructure”.¹

This has naturally led policy makers to seek other sources of funding to meet their countries’ growing infrastructure demands. Knowing that public sector budgets cannot shoulder the burden alone, they are emphasizing the need for more private capital mobilization to close the infrastructure gap.^[2] The bad news is that private infrastructure investment in Asia has plateaued over the past few years, and saw a decline in 2019. This report shows that the decline was brought about by a combination of factors, such as slowing global growth and rising trade tensions (**Chapter 8**).

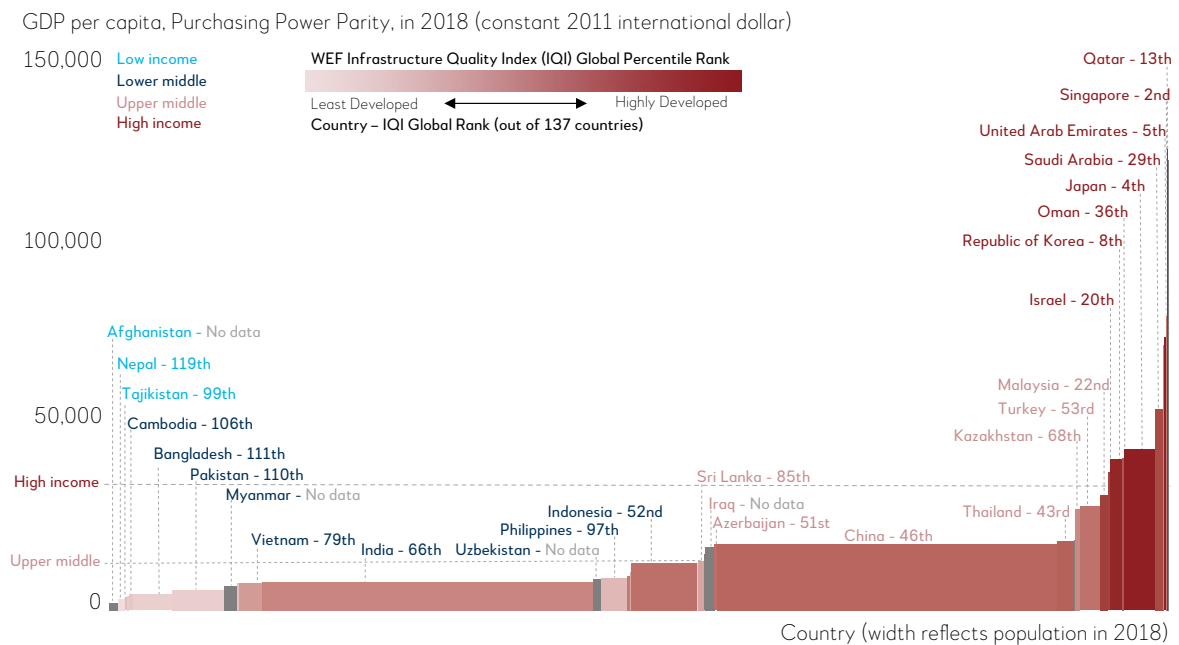
¹ Keynote Address, Meeting of the AIIB Board of Governors 2018.

Acknowledging these headwinds, this year’s Asian Infrastructure Finance report examines two key themes. First, it seeks to elucidate what is needed to “invest better” which would then create the conditions to catalyze more public and private infrastructure investments. Second, it reemphasizes the importance of infrastructure investments in raising economic growth and productivity for developing economies.

The lack of infrastructure investment is clearly part of the story—low incomes are highly correlated with poor infrastructure (Figure 1).

The effects of poor infrastructure are pernicious, impeding societies in many ways—reducing access to markets and opportunities, raising the cost of amenities and increasing risks and uncertainty for businesses and people. Yet, despite the presumed high economic returns from infrastructure in developing economies, it remains difficult to attract sufficient capital. This is the infrastructure paradox. There should be a natural matching of supply and demand; yet, as noted by many developers and financiers, projects that meet the bar for private investment remain in short supply.

Figure 1: Development and Infrastructure Quality in Asia



Data Source: World Economic Forum (WEF), World Bank, AIFB analysis.

- Note:
1. Analysis includes 43 countries—Afghanistan, Armenia, Azerbaijan, Bahrain, Bangladesh, Bhutan, Brunei Darussalam, Cambodia, China, Cyprus, Georgia, India, Indonesia, Iraq, Israel, Japan, Jordan, Kazakhstan, Republic of Korea, Kuwait, Kyrgyz Republic, Lao PDR, Lebanon, Malaysia, Maldives, Mongolia, Myanmar, Nepal, Oman, Pakistan, Philippines, Qatar, Saudi Arabia, Singapore, Sri Lanka, Tajikistan, Thailand, Timor-Leste, Turkey, Turkmenistan, United Arab Emirates, Uzbekistan, and Vietnam.
 2. World Economic Forum’s IQI measures the overall quality of infrastructure across countries. Higher scores indicate more developed infrastructure in land, water, air transport, electricity and water facilities.
 3. No data means a lack of data on infrastructure quality index global rank.

Of course, the so-called infrastructure paradox can be explained by the fact that high economic returns do not automatically translate into high financial returns from projects. This could be due to two factors: poorly designed projects with low returns, or projects with high economic but low financial returns. In principle, projects with high

social benefits but low financial returns should be financed publicly, and pay for themselves through higher revenues from the newly created economic activity. However, many such projects still end up as fiscal or debt burdens because of various failures. These projects do not sufficiently deal with distortions (e.g., inefficient subsidies or

trade policies), have poor project implementation and an inability to price infrastructure services properly. The latter situation is of a particular concern as governments are unable to collect sufficient revenues to grow out of infrastructure-related debts.

Even governments with relatively healthy fiscal positions are reluctant to borrow for investment into public goods—debt is incurred immediately but returns on investments are always uncertain. A level of skepticism toward large infrastructure projects or high spending is thus not unhealthy. Prudence is an ally to guard against poor investment choices, unsustainable infrastructure-related debts, and the erosion of hard-earned macroeconomic stability.

When it comes to working with the private sector, poor project quality or unsupportive policy frameworks limit the amount of resources available for investments. On one hand, the private sector is reluctant to invest because of insufficient financial returns, too much risks, or both. On the other hand, government actions are also limited by the lack of revenues, or fiscal or debt constraints. Multilateral development banks (MDBs) can provide finance and expertise to assist developing countries, but will too face balance sheet and capacity constraints, as well as limits in the amount of concessionary finance. MDBs are not replacements for country policies or institutions. Hence, MDBs are most effective as “multipliers” to accelerate the development process, when underlying country policies are sufficiently reformed to support investing better.

Fundamentally, investing better is about getting a larger return for every dollar invested. This is achieved by choosing projects with high economic returns, putting in the necessary measures for financial sustainability, and implementing them

properly. However, selecting projects with high returns is not a straightforward exercise given uncertainty over future demand, technological changes and macroeconomic conditions, etc. For example, many planners today will face uncertainty over the future alignment of supply chains stemming from trade frictions or even backlash against globalization as they plan for trade-related infrastructure. Similarly, can one take for granted that interest rates will remain benign over the long term to ensure the viability of projects? There are also deep uncertainties with regards to climate change impact, as this report will elaborate in [Chapter 5](#). Often in project design and selection, there is also a need to reconcile the interests of various competing groups, and the best outcomes are not always assured. Arguably, no policy maker planned for “white elephants” that unfortunately are far from extinction.

Recognizing that it will always be very difficult to consistently pick good infrastructure projects ex ante, the key is to put in a framework to guide public and private sector investment choices. Investing better does not suggest that there will be perfect investment foresight or that all projects will be successful. Rather, it is about putting in place a set of conditions that will allow the public and private sector to make better choices so that each country can, on balance, arrive at broadly good investment outcomes.



1.2 Investing Better

Although it is by no means an exhaustive list, the report has nonetheless identified two broad areas—at the project level and at the policy level—to be improved upon to realize better investments. At the project level, it is about:

- **Raising returns through good design and engineering. Planning, integration and deployment of suitable technologies are very much key ingredients to this.**
- **Enhancing coordination for investment in infrastructure in different sectors and subsectors.**

Cost-benefit analysis (CBA) has an important role in the investing better agenda. CBA has to be implemented more consistently and with high standards so it can fulfil its potential as a tool to help policy makers design, select and learn from projects.^[3] Beyond using CBA as a tool for project analysis and selection, it is possible to more proactively raise project returns. Infrastructure projects should be designed and engineered for the highest possible social and economic returns. Often, this would involve multisectoral integration to maximize the use and returns to infrastructure. The report will highlight some of these features in [Chapter 3](#).

Increasingly, good design also means taking advantage of digital technology. Thanks to digitalization and new building and engineering techniques, there is a vast potential for productivity improvement and efficiency in the construction industry, as pointed out in a World Economic Forum report, which is just one of many of such studies.^[4] Technology can bring about greater infrastructure sustainability at the lowest possible costs. It is not just new infrastructure but also rehabilitation and re-usage of existing infrastructure, focusing on durability, energy conservation, minimizing waste and materials.

- **Actively managing infrastructure costs. Bringing about greater value for money for existing projects, as well as encouraging more private sector investments with lower project costs.**

Investing better must also mean putting a greater focus on the costs of infrastructure. When it

comes to infrastructure development, emerging economies are plagued with cost overruns. India faced cost overruns in over 350 projects amounting to almost USD50 billion,^[5] whereas Pakistan was reported to experience cost overruns for more than 1,000 projects.^[6] In India, several infrastructure projects have been delayed beyond their scheduled date of completion with an average lapse of 45 months. The situation outside South Asia is similar, with more than 50 percent of construction projects in Malaysia prone to cost overruns, while infrastructure projects in Vietnam also suffer from the same problem.^[7]

Internationally comparable infrastructure construction cost data is hard to come by. This report highlights AIB's recent benchmarking exercise, which revealed significant variations in the cost of building roads and water infrastructure across cities in Asia, after accounting for the costs of locally obtained materials (in other words, construction purchasing power adjusted). This report also presents preliminary evidence that higher costs are associated with lower private sector investments ([Chapter 4](#)).

- **Planning for the future and avoiding projects that carry high risks of becoming prematurely obsolete (i.e., “stranded”)—physically or economically. This is particularly pertinent in the context of climate change.**

Investing better means thinking ahead, especially with regards to the impact of climate change, which presents deep and complex uncertainties. One can surmise two main risk types arising from climate change. First, extreme weather events such as heatwaves, droughts, floods, storms, and rising sea levels could put infrastructure at risk or even render them obsolete. Second, changes in regulations, technology and public opinion could also reduce the economic value of assets. In recent years, the fall in generation costs from renewables, coupled with citizens' demand to curb the use of coal, have rendered some coal power plants unsustainable economically.

Asset stranding is closely linked with the Paris Climate Agreement. One useful way to gauge the stranding risk of fossil fuel power plants is

to assess their relative efficiency, and whether they are consistent with climate change targets. If fossil fuel plants are needed as part of the energy transition, policy makers will have to make these as carbon-efficient as possible to minimize the risk of stranding (Chapter 5). Some ESG-conscious investors (including sovereign wealth funds) are reducing investments in climate-incompatible assets. The heads of many central banks around the world have sounded warnings on the risks that climate-incompatible assets pose to the financial sector, highlighting the seriousness of this concern.

Planning for the future goes beyond climate change. Developers also need to design infrastructure that takes into account technological advancements, certainly including those already afoot, such as artificial intelligence and the Internet of Things. Advances in digital technology can greatly change the use patterns of infrastructure. On the downside, cyber-related threats could have major security, financial, and legal implications. At the portfolio or national level, businesses or governments should measure the level of exposure to climate as well as technological risks, and factor these into their investment decisions. The international community, governments, and policy makers should also work together to help design infrastructure for tomorrow—resilient and fit for purpose to meet climate change and the economy of the future.

Yet, project-level measures would not be sufficient to ensure better investment. Projects need to be supported by the right policy frameworks. At the sectoral and macro policy level, it is about:

- **Building in stronger price signals through basic reforms (e.g., carbon pricing) and using suitable regulations to drive projects toward high standards.**
- **Ensuring adequate cost recovery for infrastructure services, thereby bolstering fiscal sustainability for the public sector and bankability for private investors.**

As mentioned, raising infrastructure spending would require the active participation of the private sector (“From Billions to Trillions”).^[8] What is equally important is that private sector finance be aligned to the greatest

extent possible to the public good, including toward climate change needs. There can be some cautious optimism in this regard. There is evidence that more investors have built in environment, social, and governance (ESG) considerations in their investment decisions. This report also notes that the green bond market is also becoming more developed (Chapter 6).

But more decisive policy actions are needed. Existing research does not indicate higher financial returns or funding advantage for green or ESG-certified bonds. Yet the green bond market is growing fast, driven by demand from investors who are keen to position themselves as good corporate citizens and manage their reputational risk. Over time, reputational effects might not be enough, and policy reforms are needed to sharpen incentives. Imagine if countries removed fossil fuel subsidies, put a price on carbon and taxed other harms to the environment—they could boost the returns to high-quality infrastructure and greatly align more private finance to that. Today, investors also face a plethora of ESG frameworks, with almost 80 such overlapping and similar standards in the market. Alignment and consolidation, with greater emphasis on transparency and accountability, can bring greater impetus toward high-quality investment. For economies used to underpricing infrastructure services, raising tariffs or removing subsidies will not be easy and will demand the full political attention of leaders. An increase in tariffs that is commensurate with real improvements in the quality of infrastructure can gain popular support.

- **Putting in place a sound macroeconomic framework, including management of debts, to minimize risks to projects stemming from macroeconomic instability. Large projects have to be planned and phased in carefully, especially for smaller economies, to avoid themselves creating macroeconomic risks.**

Finally, it is important to discuss debt sustainability in the context of infrastructure spending. In recent years, global debt levels have increased, including in emerging economies, leading to greater concerns.^[9] Related to this is the more specific concern that infrastructure spending and associated debts pose risks to

debt sustainability. Data from the recent past tell a somewhat more nuanced story. Between 2012 and 2017, many developing economies in Asia saw a higher level of public debt, but this is not the result of a sharp rise in infrastructure spending. In fact, many developing economies in Asia saw a decline in infrastructure investments between two five-year periods, 2008-2012 and 2013-2017 (Figure 2). More likely, the buildup of debt from other factors, including external shocks, could have led to the reduction of fiscal space available for investment into infrastructure.

Given the higher debt levels, it is now more important than ever to put in place sound macroeconomic and sectoral policies to support infrastructure investments. Governments need to emphasize that infrastructure projects pay for themselves by yielding positive economic values, enhancing economic activity, and bringing in additional fiscal revenues. There should also be more direct cost recovery from the provision of infrastructure services. Furthermore, large projects have to be planned and phased in carefully, especially for smaller economies, to avoid creating macroeconomic risks themselves.

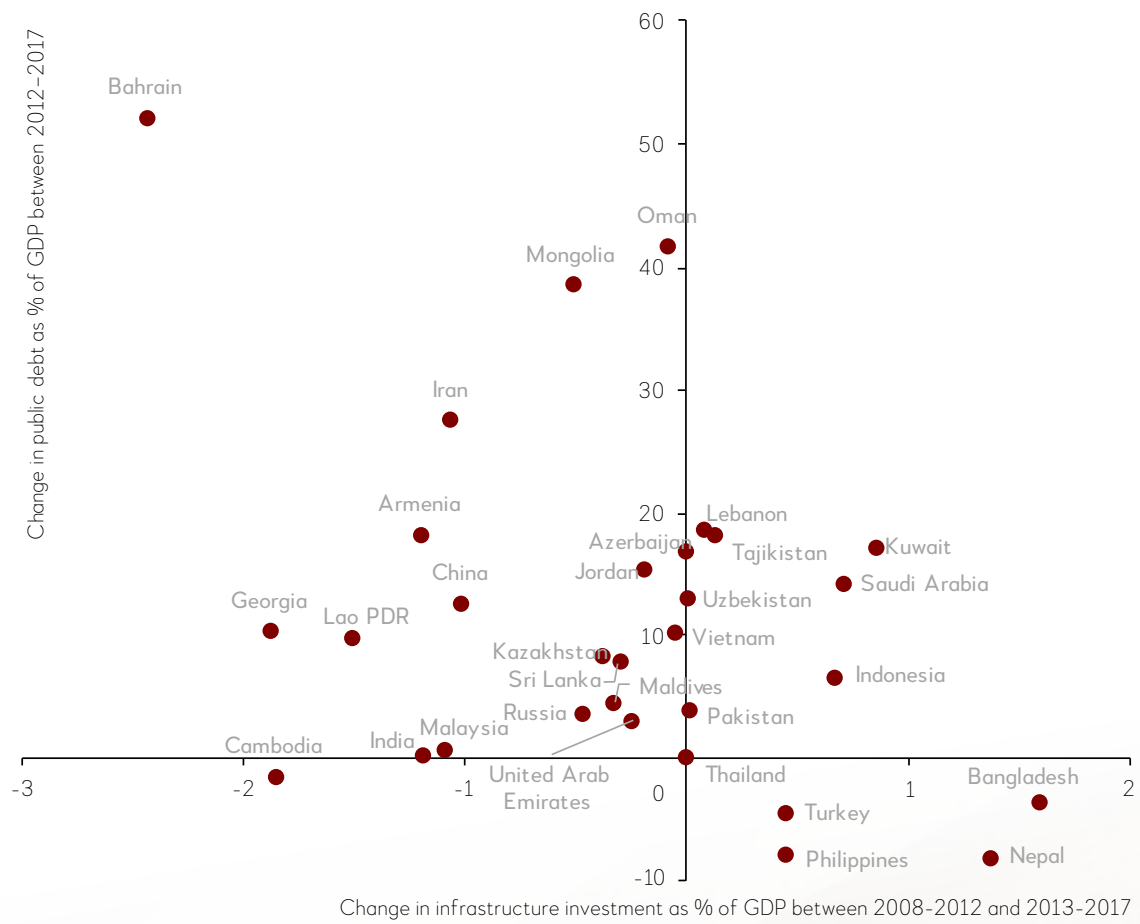
Many governments will still have to borrow to meet infrastructure priorities and support development, and this has to be encouraged where needed. The Chairperson of the G20 Eminent Persons Group on Global Financial Governance Mr. Tharman Shanmugaratnam remarked, “Today, it’s a sin to run a current

account deficit, and that’s crazy”, as he recounted Singapore’s experience of running sizable current account deficits which required external financing during its early development phase. Simply put, an allergy to debt is not the answer. Investing better must mean ever greater capacity for a country to grow out of any infrastructure-related borrowings. As AIB President Jin Liqun pointed out during the 2019 Meeting of AIB Board of Governors, “New investments must increase a country’s capacity to service debts, not just having debts to service.” In fact, many developing economies in Asia have healthy debt and fiscal positions that can support more infrastructure development. While debt vulnerabilities have increased in some smaller economies, this does not present a systemic risk to global or regional financial stability.

The IMF plays a critical role, working in concert with various development partners. Its Debt Sustainability Framework (DSF) is a key tool in assessing debt vulnerabilities. More importantly and beyond debt management, infrastructure investments (public or private) require supportive and sound macroeconomic policies. The IMF and development partners need to work closely and support developing economies in that respect. Finally, for small economies, the lumpy nature of infrastructure could result in large growth-enhancing macrocritical investment projects being excluded because of their size. In the context of investing better, there is a specific need for the international community to consider and support the needs of small economies.



Figure 2: Change in Infrastructure Investment and Public Debt



Data Source: IMF World Economic Outlook, October 2019 and IMF Investment and Capital Stock Database, 2019.



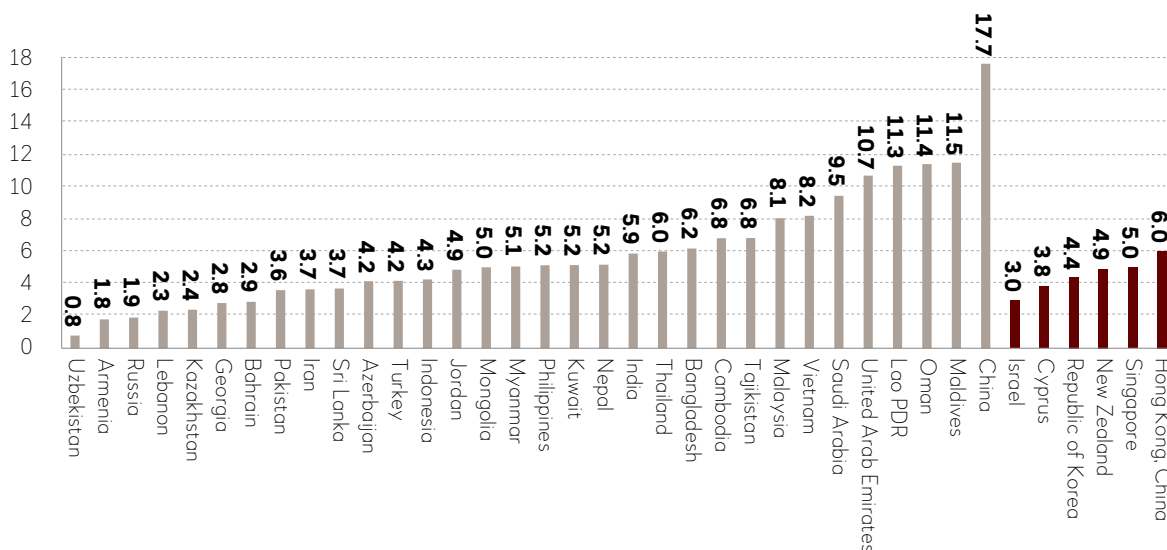
1.3 Raising Infrastructure Investment to Close the Development Gap

The key message of this report is that investing better goes together with investing more, it is not simply a “more-is-better” approach notwithstanding the big infrastructure gap. This is especially so in the challenging context of slowing global growth, trade tensions and uncertainties. The end goal of investing better is to crowd in more public and private resources for infrastructure development. This report will present cross-country findings that suggest that the returns to infrastructure are relatively higher in developing economies (Chapter 2). This reinforces the view that infrastructure is critical to economic development and is the key for developing countries to catch up to higher incomes.

On average, economies (including developed economies) invest around 5 percent of GDP on infrastructure.² In Asia, high-income economies

also invest around 3 percent to 6 percent of GDP on infrastructure, similar to the global average (Figure 3). On the other hand, developing economies tend to have growing populations, which suggests more infrastructure investment is needed during this demographic transition. Yet many developing economies in Asia are still investing relatively low shares of GDP on infrastructure, even below the rates of investment seen in high-income and more mature economies. Without a higher rate of investment, it would be harder for the long tail of developing economies to close the infrastructure gap or increase productivity. Arguing that more investment is needed for many of these low-income economies is not a contradiction to this report’s premise that more is not necessarily better, but a reiteration of the central premise that investing better is necessary to crowd in more investment resources.

Figure 3: Infrastructure Investment as Percentage of GDP, 2017



Data Source: IMF Investment and Capital Stock Database, 2019.

As elaborated in Chapter 2, this report presents evidence that the growth impact of infrastructure is indeed relatively higher in developing economies, pointing to the need for a higher rate of investment of around 6 percent to 10 percent of GDP. This higher rate of investment (above the global average of 5 percent) is also consistent with the idea that developing economies need to cope with demographic needs and deal with backlogs

and infrastructure gaps to achieve faster economic development. Scaling up investments will not be easy, and can only be achieved gradually even in the best circumstances. While recognizing that the specific circumstances of each country are different, investing better will help create the conditions for developing economies to increase infrastructure investment, both public and private.

² See Figure 4 in Chapter 2.

In summary, investing better and raising returns with improved project and sectoral or macro measures will already bring about better growth outcomes. Actions to raise returns will be highly country-specific, and would require stakeholders to work together to address the relevant key issues and constraints in each market. Multilateral institutions like AIIB are a key part of the equation, not just by catalyzing finance but also by ensuring high standards in procurement,

environment and social safeguards, as well as providing coordination and support. Importantly, investing better will help crowd in more resources for investment, which is key to the higher rate of investment into infrastructure (around 6 percent to 10 percent of GDP) bringing about faster economic growth and rekindling the promise of economic convergence. It will be difficult to see sustained development without this.

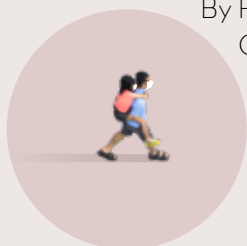


BOX A:

Impact of the Coronavirus (COVID-19) and Its Implications for Infrastructure Priorities

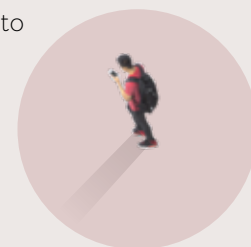
A. Economic Disruptions Will Be Sharp and Deep—In Retail, Transport and Manufacturing—Based on China’s Experiences

The coronavirus (COVID-19) outbreak came as an event shock in early 2020 and resulted in many disruptions to the global economy. China was initially the most affected. Based on past research, the reduction of transport services and school closures were found to reduce virus transmission but these would come at an economic cost.^[10] In January and February of 2020, China’s industrial production fell by 13.5 percent, compared to the same period in 2019. Investment in fixed assets dropped by 24.5 percent, with manufacturing and transportation the hardest hit. Overall retail consumption also decreased by 20.5 percent.^[11]



By February and March 2020, the COVID-19 outbreak also occurred in many countries outside China, further disrupting economic activities. As this latest outbreak comes at a time when the global economy is at its weakest since 2009 and Asia’s growth lowest since 1998, this adds to the considerable uncertainty and downside risks. Given the disruptions to supply chains, one can also expect infrastructure projects in 2020 to be delayed as a result, but this would not be the immediate concern.

As China’s experience shows, economic activity—especially in retail, transport and manufacturing—will take a significant hit for countries directly affected by the outbreak. The immediate priority would be on healthcare, as well as enacting forceful monetary and fiscal policies to stabilize economies and protect livelihoods.^[12] The Asian Infrastructure Investment Bank (AIIB) stands ready to provide financing to emergency healthcare infrastructure for China or other member countries with needs. For countries not directly affected by the outbreak, the loss of inbound tourism and trade, as well as supply chain and financial market disruptions will also exert a significant economic toll.



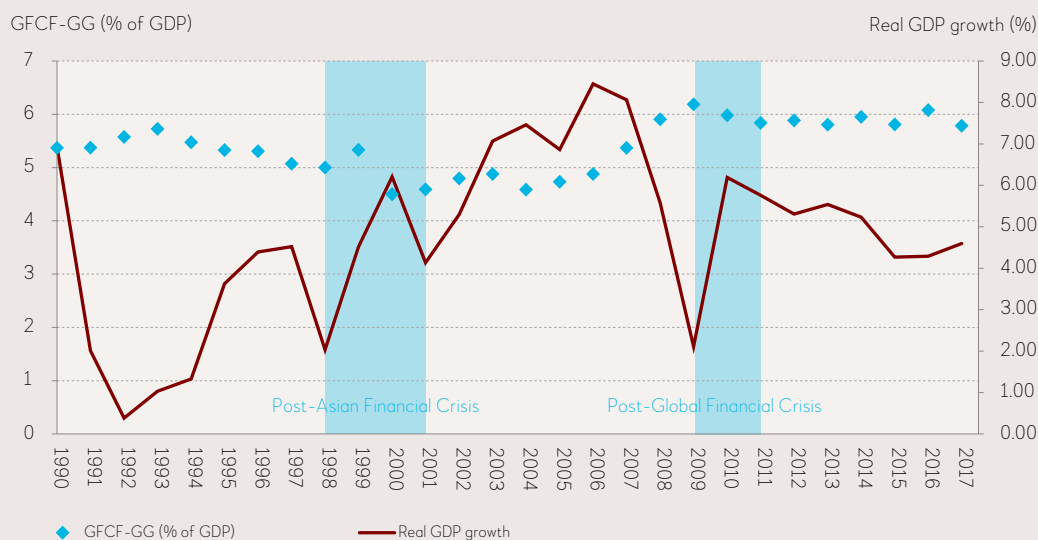
B. Fiscal Pressures Will Mount but There Is a Strong Need to Protect Key Infrastructure Development

Many developing economies, including in Asia, already face significant infrastructure gaps at current levels of spending. As economies are impacted, countries will come under increasing fiscal pressures, and private sector risk aversion will also remain elevated. As with past experience, economic growth declined and so did public investments in times of economic difficulties (Figure A.1). This was particularly clear during the aftermath of the Asian financial crisis, which directly affected the region.

Hence, key project developments, especially those mitigating climate change, should receive continued or even enhanced financing support in order to not put long-term economic or environmental sustainability at risk, even as policy makers deal with this present crisis. Also, critical

infrastructure has to be maintained for the health of economies and societies. MDBs play a special and often critical role in providing counter-cyclical financing—whether to public or private sectors—to assist developing economies.

Figure A.1: GDP Growth and Public Gross Fixed Capital Formation (GFCF-GG) as a Percentage of GDP



Note: Data coverage is for AIIB regional members, excluding high-income members.

Data Source: IMF Investment and Capital Stock Database, 2019

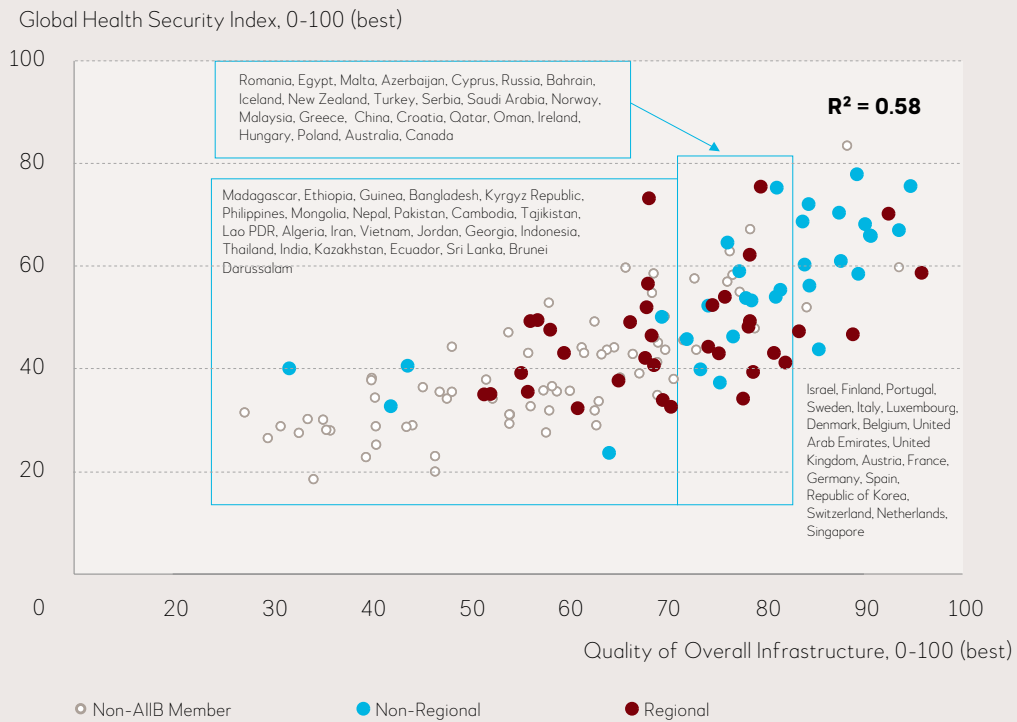
C. COVID-19 and Post-Crisis Implications in Public Health, Healthcare and ICT

The disruptions brought about by COVID-19 also highlight the importance of sustainable and resilient infrastructure. Firstly, developing economies will need to increase investments in healthcare and public health infrastructure. This is especially crucial in the context of megatrends such as urbanization and increased trade connectivity. Without proper public health infrastructure such as clean water and sanitation, developing economies will remain vulnerable to such outbreaks. A country's readiness to cope with epidemics is correlated with its quality of infrastructure (Figure A.2). Infrastructure development is a key part of health security and epidemic preparedness.

Based on preliminary reports, COVID-19 has also affected the elderly more. Given Asia's demographic trends, the number of Asia's senior citizens (65 years and above) is projected to nearly double from 412 million in 2020 to 802 million within a short span of 20 years. Much of the increase will be driven by China, India, Indonesia, Bangladesh and Vietnam (in terms of the absolute number of the elderly population). Many countries will witness a significant rise in the ratio of people aged 65 years to total population (Figure A.3). It is clear that healthcare infrastructure will need to be expanded, and the COVID-19 crisis further underscores this.

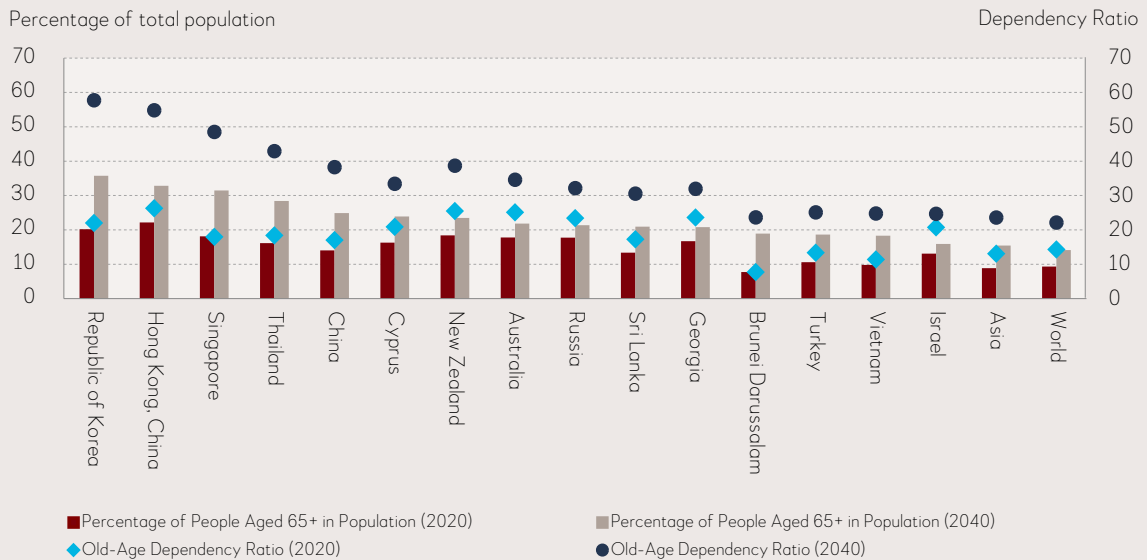


Figure A.2: Correlation Between Quality of Infrastructure and Health Security³



Data Source: Global Health Security Index Report (2019) and Global Competitiveness Report (2019).

Figure A.3: AIIB Regional Members With High Aging Population and Old Age Dependency Ratio



Note: Old Age Dependency Ratio = (Ratio of population aged 65+ per 100 population aged 15-64); Elderly Population is defined as the population age 65 and above. The data is the median interval of UN Population Projection.

Data Source: World Population Prospects 2019, UNDESA.

³ The Global Health Security Index is a cross-country assessment of global health security capabilities. The index illuminates preparedness and capability gaps to address outbreaks in the following health security areas: prevention, detection and reporting, rapid response, health system, compliance with international norms, and risk environment.

Secondly, public health infrastructure needs to be supported by robust information and communications technology (ICT). ICT improves efficiency in healthcare delivery and epidemic control. Mobile communications, broadband internet and computing have been used in epidemic response, and are particularly helpful in delivering information when transport services are curtailed. During the Ebola crisis for example, several civil society groups leveraged text messaging to warn communities, some in far-flung villages, about the Ebola virus and how to avoid it. Mobile computing tools were also able to deliver standardized learning for health workers in the field, with information continuously updated as new procedures are corroborated.⁴ Moreover, software technologies such as real-time monitoring systems were used for contact tracing.⁵ All these examples require investments in digital connectivity infrastructure (e.g., use of satellite technology to connect remote locations), as well as investments in utility infrastructure (e.g., access to power and electricity).

Thirdly, infrastructure supporting economic activities and supply chains will have to be more resilient. With the COVID-19 outbreak, businesses are naturally looking to strengthen the resilience of their supply chains against such outbreaks and natural disasters in general. This could mean diversifying their production, supplies and markets. This could also mean employing ICT technology to better monitor the various aspects of supply chains, making more use of automation, online commerce, etc., to ensure that production and trade can continue despite disruption. To support segments of the population affected by quarantine or stay-home arrangements, a robust supply chain is needed to keep them supplied with essentials. Work or study from home measures are widely practiced during this outbreak, and affected population will have to be supported by good national and cross-border ICT infrastructure.

D. Strong Demand for Infrastructure Development Post-Crisis

One can expect infrastructure financing to be highly subdued in the first half of 2020. Once the immediate task to contain COVID-19 is over, the focus will need to shift from crisis management to assisting developing economies invest in adequate infrastructure for development, as well as to prevent and mitigate the impact of future outbreaks. AIIB has approved financing for satellite ICT infrastructure to provide connectivity to remote areas in Indonesia, as well as financing for many water and sustainable cities projects across Asia. Furthermore AIIB-funded water, sanitation and drainage infrastructure projects in Pakistan, Bangladesh, India and Egypt are already on track to provide the communities there with access to clean water and sanitation. More investments will be required post-crisis.

As of late March 2020, China's experience showed that COVID-19 could be contained if the immediate measures were taken. Post-crisis, AIIB expects infrastructure development to rebound in line with underlying infrastructure demand, as well as the added priorities that arise from the outbreak. As a multilateral organization, AIIB will work with various stakeholders to prioritize infrastructure projects in areas of sustainable cities, resilient infrastructure, healthcare and ICT. Raising infrastructure spending and investing it well for development remains critical.

⁴ See World Economic Forum. 2015. 4 Ways Technology Can Help Fight Future Epidemics. 4 June. See <https://www.weforum.org/agenda/2015/06/4-ways-technology-can-help-fight-future-epidemics/>

⁵ One example is the Epi Info viral hemorrhagic fever (VHF) application. Developed by the Centers for Disease Control and Prevention, it is an open-sourced program that helps speed up contact tracing and data visualization for the outbreak. Available at <https://www.cdc.gov/media/releases/2014/p0429-new-software.html>

2

WHY DEVELOPING ECONOMIES SHOULD INVEST MORE IN INFRASTRUCTURE: A MACROECONOMIC AND GROWTH PERSPECTIVE



By conventional wisdom, developing economies face a large infrastructure gap and should invest more in infrastructure. Nevertheless, there has not been much macroeconomic research that provides evidence for this.⁶ The key focus of this chapter is to summarize

evidence of the relatively larger growth impact (elasticity) of infrastructure in developing economies. Because of the higher relative growth impact, developing economies should prioritize putting in a greater share of capital investment into infrastructure.

⁶ In fact, the infrastructure needs of developing economies are sometimes based on economic growth projections (which makes policy interpretation less intuitive).

2.1	East Asia's Experience	17
2.2	Growth Impact of Infrastructure	21
2.3	Policy Discussions and Limitation of Study	22



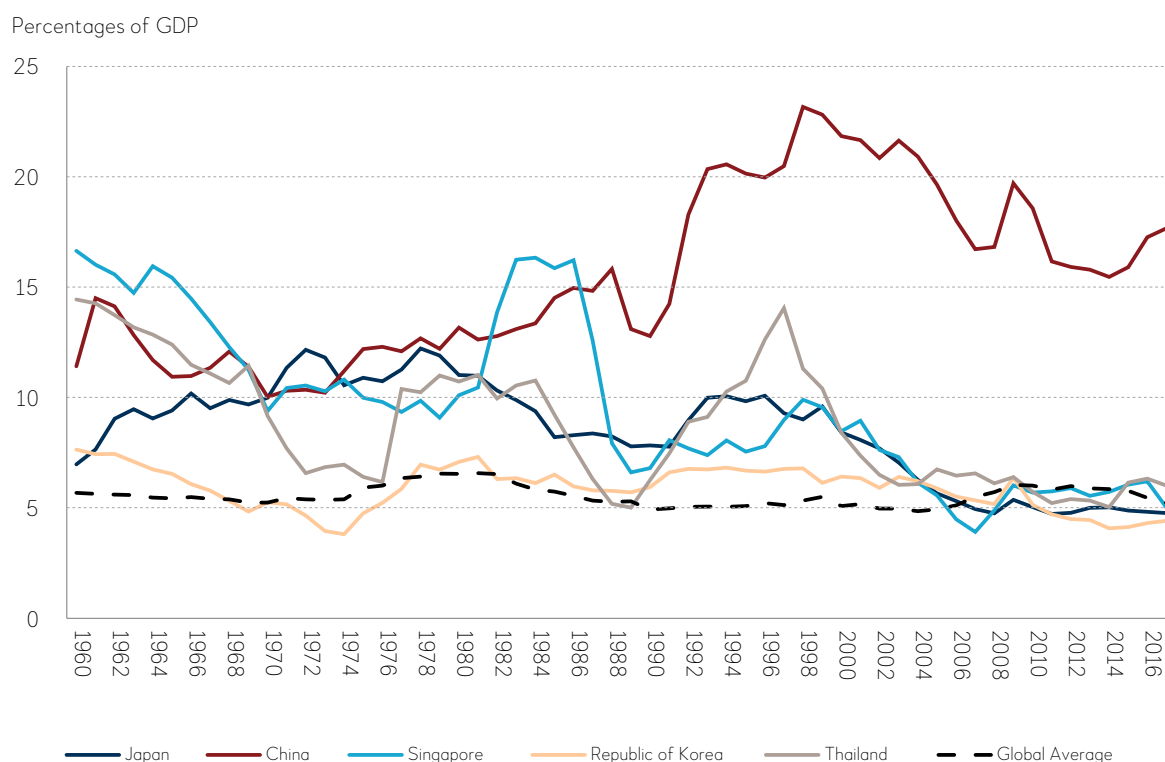
2.1 East Asia's Experience

Infrastructure development has attracted much renewed attention from policy makers in recent years.^[13] This is the result of the confluence of a few important agendas, such as the need for sustainable infrastructure to meet climate change challenges, China's impressive infrastructure development and its subsequent efforts to promote overseas infrastructure development, and the Sustainable Development Goals (SDGs) of which infrastructure development is a key part.

At the most macro level, it is well accepted that infrastructure raises the supply-side capacities of economies.^[14] Infrastructure investments also

provide a boost to short-run economic growth, and can be part of counter-cyclical policy measures.^[15] The recent history of several East Asian economies also attests to the importance of infrastructure. These economies sustained a high level of investments during key periods of their economic development, well above the global average, before returning to lower levels of investments as their economies matured (Figure 4).⁷

Figure 4: Infrastructure Spending as Percentage of GDP for Select Asian Economies (1960–2017)



Data Source: IMF Investment and Capital Stock Database, 2019.

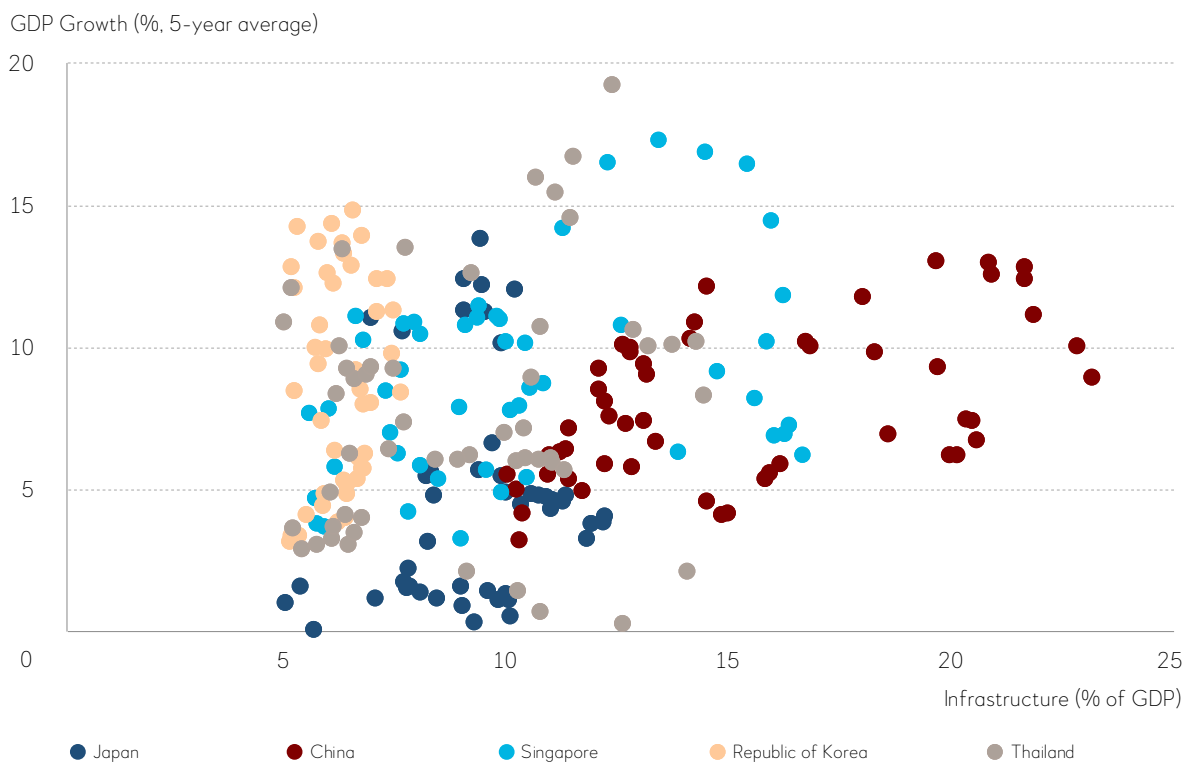
⁷ Infrastructure investment is proxied by gross fixed capital formation (GFCF) of general government, augmented by data on private sector investment.

Japan is the first large economy in Asia to invest significantly in infrastructure, with its infrastructure investment exceeding 10 percent of its gross domestic product (GDP) in the 1960s, 1970s and into the early 1980s. China, a large economy and a relatively new entrant to the upper-middle income club, remains exceptional in its level of infrastructure investment. It still invests more than 15 percent of its GDP in infrastructure.⁸ The scatter plot between GDP growth and infrastructure spending also shows a positive correlation (Figure 5).

China's success is not just in terms of sustaining a high level of infrastructure investment, but also in terms of the new benchmarks it sets. High-speed

rail operations in China began in 2007, when its per capita GDP was around USD2,700 (which was at that time less than one-tenth of the per capita GDP of the United States or European Union). Many studies have noted that China's transport infrastructure development has dramatically shrunk the economic distances within its borders and with its trade partners.^[16] China has also shifted the paradigm for infrastructure development. For instance, its experience now provides a viable template for how middle-income countries could undertake large-scale rail projects—it is no longer a prerequisite to be a citizen of a high-income country to zip through the countryside at 300 kilometers (km) per hour.

Figure 5: Scatter Plot of GDP Growth and Infrastructure Investment as Percent of GDP



Data Source: IMF Investment and Capital Stock Database, 2019.

⁸ Even if there is overestimation of China's expenditure on infrastructure, and with some discounting from the statistics, it would still constitute a very exceptional rate of investment in infrastructure.

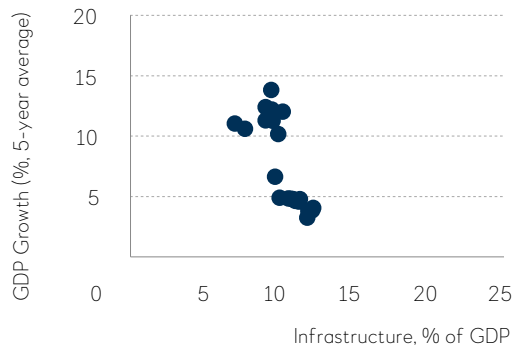
For Japan, Singapore, Republic of Korea and Thailand, it can be seen that the earlier high growth periods (left panels) were also accompanied by high shares of GDP devoted

to infrastructure (Figure 6). Infrastructure investment then slowed down and became smaller shares of GDP as economies reached maturity with lower growth rates (right panels).

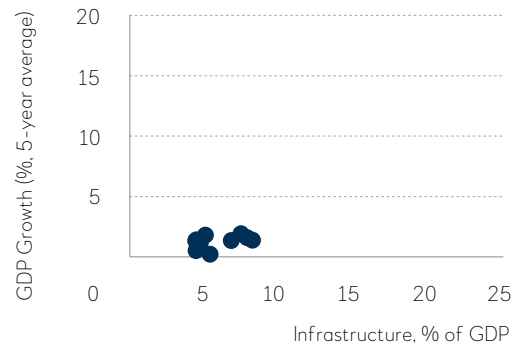
Figure 6: Comparing High Versus Low Growth Periods and Infrastructure Investment as Percentage of GDP for Select Asian Economies

JAPAN

1960-1980

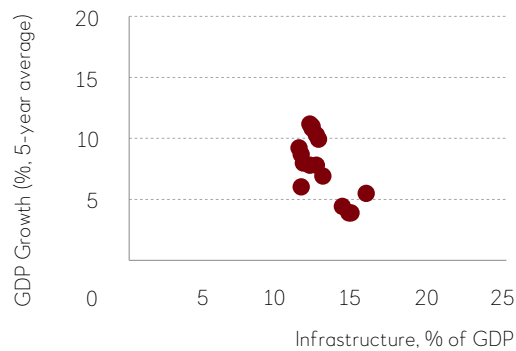


2000-2015

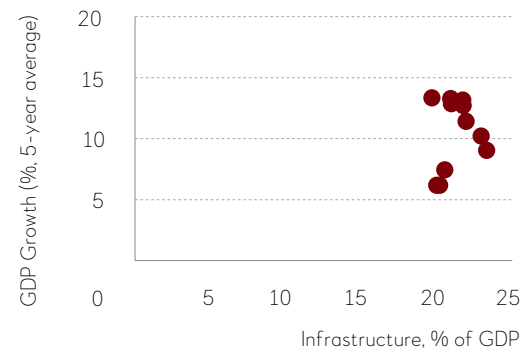


CHINA

1975-1990

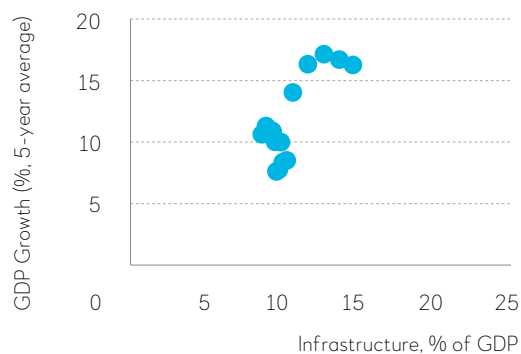


1995-2005

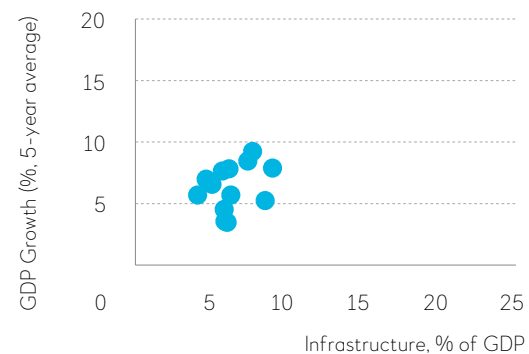


SINGAPORE

1960-1980

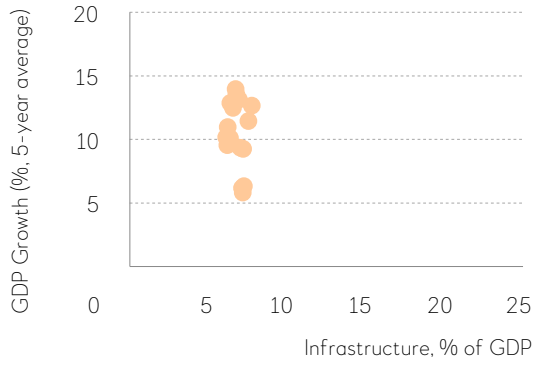


2000-2015

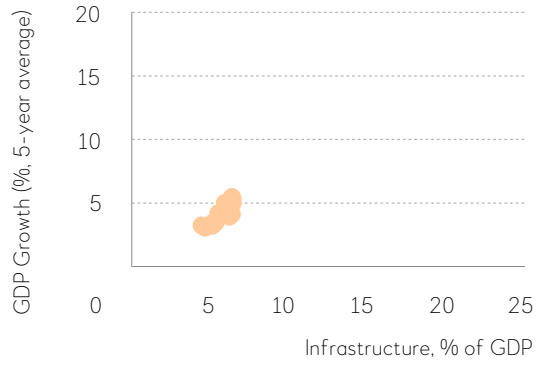


REPUBLIC OF KOREA

1980-1995

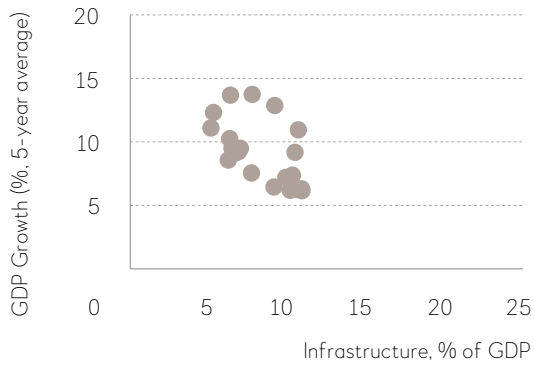


2000-2015

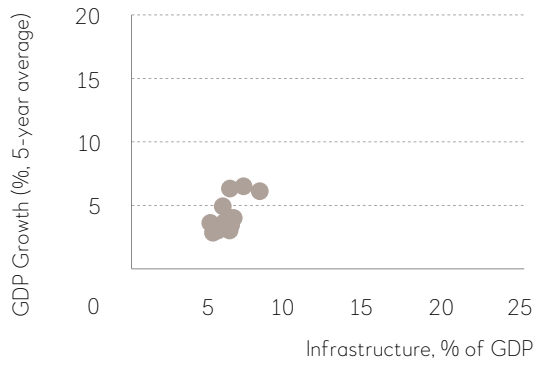


THAILAND

1980-1995



2000-2017



Data Source: IMF Investment and Capital Stock Database, 2019.

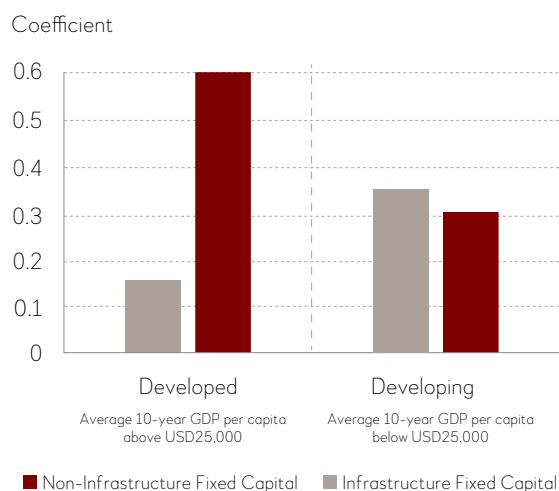


2.2 Growth Impact of Infrastructure

At a more granular level, researchers have found that transport infrastructure contributed to improving market access, trade, and welfare,^[17] often leading to agglomeration,^[18] and accompanied by changing comparative advantage and trade patterns.^[19] Infrastructure generates greater competition^[20] and also raises firms' productivity.^[21] Infrastructure investment is also found to generate further investments at the neighborhood level, thereby improving social outcomes.^[22] The effects of infrastructure are positive, often quite large, and can be found at different levels of economic activity.

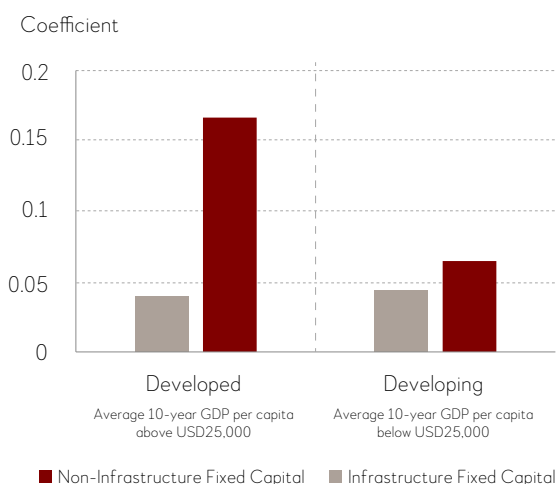
In this chapter, the empirical framework follows the earlier work by Esfahani and Ramirez.^{[23].9} Two separate datasets are used, one directly drawn from the Organisation for Economic Co-operation and Development (OECD) and the other using IMF data. The coefficients measure the impact on output per worker for investments in both infrastructure and non-infrastructure assets. The respective coefficients for infrastructure and non-infrastructure are presented in **Figure 7** and **Figure 8** for each of the datasets. The combined coefficients (for infrastructure and non-infrastructure) are typically larger for developed economies. However, the new insight presented in this research is that the infrastructure coefficient is relatively larger in developing economies. Across a range of regressions, infrastructure growth in developing economies has a higher relative impact on per capita GDP growth compared to non-infrastructure capital.

Figure 7: Infrastructure and Non-Infrastructure Coefficients Using OECD Dataset (Data in USD)



Data Source: AIIIB Staff calculations based on OECD Database.

Figure 8: Infrastructure and Non-Infrastructure Coefficients Using IMF Dataset (Data in International Dollars)



Data Source: AIIIB Staff calculations based on IMF Investment and Capital Stock Database 2019.

⁹ The empirical strategy emphasizes departures from steady states for regressors and also dependent variable. This gives more confidence on the direction of causality. Endogeneity is also dealt with using lagged variables (in the panel datasets). All regressions are carried out using country fixed effects, thus highlighting "within country" estimates, and reducing omitted variable bias. Economies with average 10-year per capita GDP exceeding USD25,000 are considered developed. The first dataset is from the OECD, which records infrastructure-related GFCF spending in each reporting economy. This dataset is relatively small, covering mostly developed economies and a select group of developing economies. The second dataset is constructed in this research, using general government GFCF (using data from from IMF) as the proxy for infrastructure spending, augmented with some PPP data. This is the approach discussed in Fay, Lee, Mastruzzi, Han and Cho's paper. (Fay, Lee, Mastruzzi, Han, & Cho, 2019). The second dataset is significantly larger than OECD's data coverage, and records spending in international dollars. The regression framework is discussed in further detail in **Appendix 1**. A more detailed technical working paper is available [online](#).

2.3 Policy Discussions and Limitation of Study

One could argue that the total gross fixed capital formation (GFCF) ratio in developing economies should be higher but it is certainly not the case based on the data.¹⁰ How much an economy should invest is a function of many other parameters, such as its intertemporal preferences, the real interest rate it faces, access to capital markets and, of course, varying institutional quality affecting the productivity of capital. Indeed, as mentioned before, there are studies highlighting the relatively lower productivity of capital in developing economies.

The claim here is that developing economies are not investing as much in infrastructure as growth elasticities suggest.¹¹ Developing economies have an infrastructure elasticity α to total capital elasticity ratio (i.e., $\frac{\alpha}{\alpha+\beta}$) of around 0.4, while the corresponding ratio for developed economies is 0.2, using the estimates of regressions conducted on the more comprehensive IMF dataset. Applying the ratio of 0.4 of 15.5 percent to 25.5 percent, developing economies should invest around 6 percent to 10 percent of GDP on infrastructure, whereas observed percentile 25 to percentile 75 values are lower at 2.3 percent to 7.0 percent. For developed economies, the corresponding share of investments on infrastructure based on relative elasticities is 3.9 percent to 4.6 percent of GDP, which is more similar to the 3.0 percent to 6.6 percent observed.¹²

In the end, the results point to a simple story—namely that the growth elasticity of infrastructure are relatively higher in developing economies, compared to other forms of capital investment. Infrastructure provides basic services to various economic and social activities. Infrastructure has to be in place, so that other forms of capital (human or physical) can become productive. It is in this context that for developing economies, it becomes more important to prioritize and raise the level of infrastructure investment. On the other hand, in developed economies, returns to infrastructure are relatively smaller compared to other forms of capital.

Furthermore, developing economies tend to have higher population growth. Potentially, this implies

a larger population of young people that has yet to enter the labor force (i.e., not yet productive), implying even heavier pressure on infrastructure services. This is another argument why developing countries need to invest more in infrastructure (as a share of GDP) compared to developed economies.

There are several important limitations to this study. Firstly, it does not account for the effects of various factors, such as institutional quality, human capital, etc., that would have an impact on growth as well as the efficiency of infrastructure. While such factors would likely affect infrastructure and non-infrastructure returns, perhaps they would not affect the key result too much in this report. Secondly, the regression results reflect the average effects of infrastructure. There is considerable heterogeneity across countries. While it points to a ballpark estimate that developing economies should invest around 6 percent to 10 percent of GDP in infrastructure, there will be considerable differences in actual need from country to country. In this regard, development agencies would typically provide country-specific diagnostics and assess the infrastructure needs of each economy separately.

The puzzle why developing economies do not invest as much in infrastructure despite the relatively high elasticity remains unanswered. Nonetheless, there are well-known hypotheses within the development community—such as the higher up-front capital, longer payback period, and the divergence between social and private returns—that set infrastructure apart from other forms of fixed asset investment and explain the relatively low levels of investment by the private sector. This is related to the previous point on the country-specific context. How to invest better will be discussed in the subsequent chapters of this report.

Based on the latest data, quite a few developing economies in Asia still invest relatively little, falling well short of the 6 percent to 10 percent mark. The key message of this report is that investing better goes together with investing more, not simply a “more-is-better” approach despite the big infrastructure gap. This is especially so in the challenging context of slowing global growth, trade tensions and uncertainties. The end goal of

¹⁰ Developed economies invest around 21 percent to 26 percent of GDP over the sample period. This is not too dissimilar for developing economies with 15.5 percent to 25.5 percent but with developing economies exhibiting greater heterogeneity across countries and volatility across time.

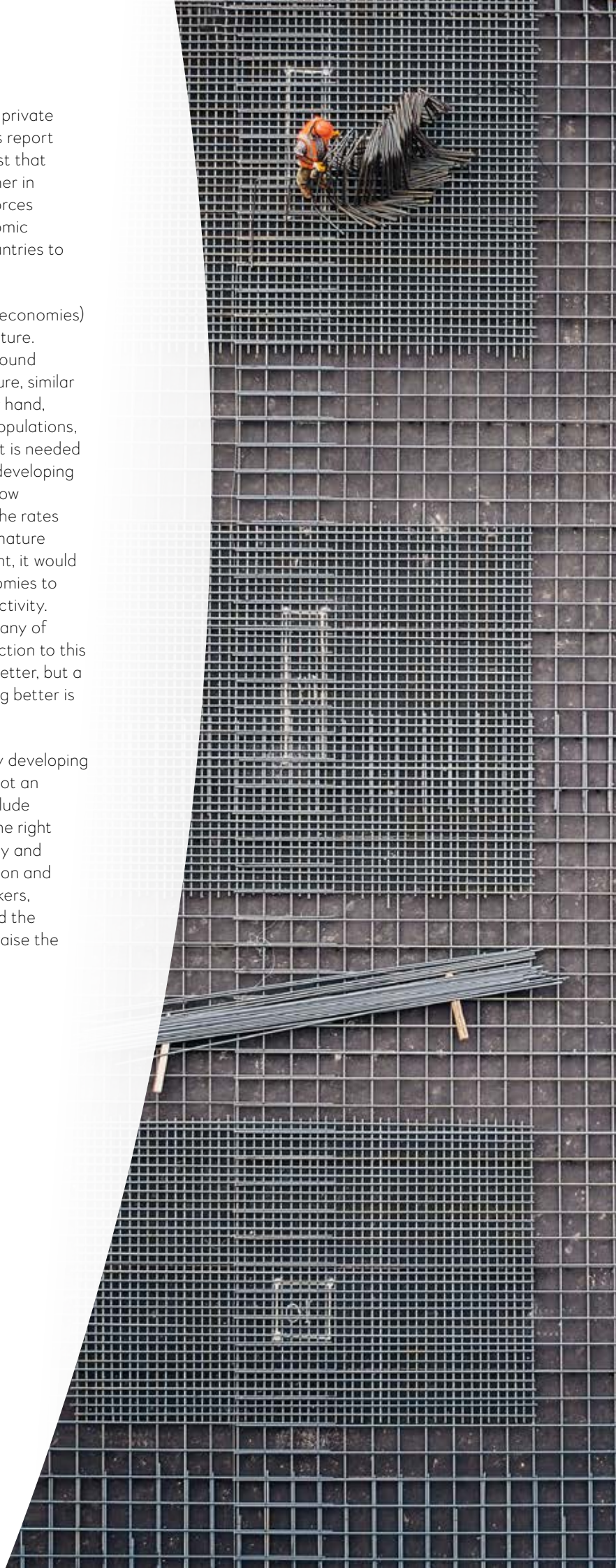
¹¹ The evidence here arises directly from the estimation of the growth Equation 3 in Appendix 1, which comes from the production function in Equation 1. This is a general framework, and the research does not rely on strong assumptions or very specific growth models to generate the results.

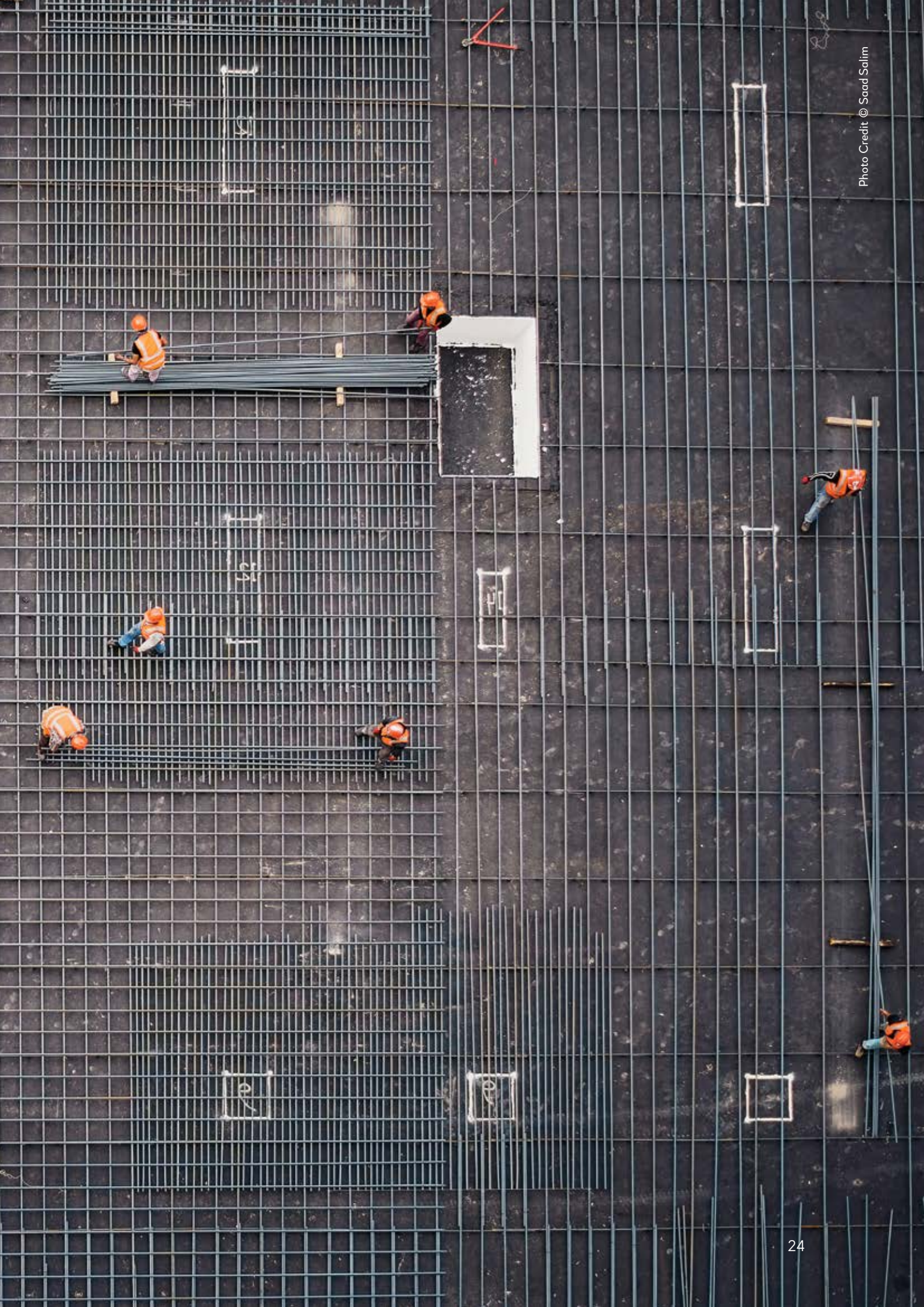
¹² The key insight here is that with these relative elasticities, developing economies should have a larger share of infrastructure to GDP, more so than what is observed in the data. On the other hand, the infrastructure to GDP ratios of developed economies are more aligned to the relative elasticities.

investing better is to crowd in more public and private resources for infrastructure development. This report will present cross-country findings that suggest that the returns to infrastructure are relatively higher in developing economies (Chapter 2). This reinforces the view that infrastructure is critical to economic development and is the key for developing countries to catch up to higher incomes.

On average, economies (including developed economies) invest around 5 percent of GDP on infrastructure. In Asia, high-income economies also invest around 3 percent to 6 percent of GDP on infrastructure, similar to the global average (Figure 3). On the other hand, developing economies tend to have growing populations, which suggests more infrastructure investment is needed during this demographic transition. Yet many developing economies in Asia are still investing relatively low shares of GDP on infrastructure, even below the rates of investment seen in high-income and more mature economies. Without a higher rate of investment, it would be harder for the long tail of developing economies to close the infrastructure gap or increase productivity. Arguing that more investment is needed for many of these low-income economies is not a contradiction to this report's premise that more is not necessarily better, but a reiteration of the central premise that investing better is necessary to crowd in more.

While infrastructure gaps remain large in many developing economies, raising infrastructure spending is not an overnight endeavor. Investing better would include getting cost-benefit analysis right, selecting the right projects, taking into account debt sustainability and macroeconomic policies, right down to execution and implementation. There is a need for policy makers, the private sector, international businesses and the development community to work together to raise the level of investment.





3

RAISING ECONOMIC AND SOCIAL RETURNS THROUGH DESIGN AND ENGINEERING^{The EIU}



Making better infrastructure investments and maximizing economic and social returns are essential, especially in the context of tight fiscal space and scarce private sector dollars, as they help to create the conditions for developing countries to invest more down the line. Increasingly, maximizing returns means that infrastructure has to be well-designed, well-engineered and connected to various ancillary activities in a network. Emphasis on value engineering and value for money design is also growing.

We are witnessing an important shift in attitudes toward infrastructure. A 2018 report for the UK's National Infrastructure Commission, *The Value of Design in*

Infrastructure Delivery, is an example of this new thinking. The report, commissioned to “put design at the heart of the country’s infrastructure planning,” articulates that good design is not just about aesthetics and architecture: it must also be user-friendly, environmentally sound and directly beneficial to both end-users and the wider community.^[24]

This chapter looks at two infrastructure projects that were designed and engineered to meet an array of needs for their end-users and local communities in a cost-effective, environmentally friendly manner. The first is the new high-speed rail terminus in West Kowloon, Hong Kong, China, and the second is the Pavagada Solar Park in Karnataka, India.

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3.1 Designing for Connectivity, Commercial and Civic Uses: West Kowloon Station in Hong Kong, China

Planning began in 2009 for West Kowloon Station, a new terminus connecting the city with mainland China via the latter's growing high-speed rail network. Costing an estimated USD11 billion, it officially opened in September 2018. The main structure is a soaring curvilinear roof that arcs upward, with curtain walls composed of 4,000 glass

panels. The station features 15 tracks for high-speed rail and commuter trains, shopping facilities and connections to the MTR, the city's metro system. The immigration and customs facilities are placed above the short-distance tracks to reduce transfer times and better accommodate passengers taking trips of varying lengths.



Perhaps the most notable design feature of the building is the three hectares of green space on its roof. Hong Kong, China is one of the densest cities in the world, with just 2.7 square meters of green space per person, far less than the 7.4 square meters per person in Singapore. And at a mere 0.6 square meters-worth of trees and grass per person, West Kowloon falls well below the national average. For this reason, the international architectural services firm AEDAS, sought to provide residents and visitors with “seamless access” to the rooftop park. This is why the roof flows upward from the ground plane, explains Andrew Bromberg, head of the design team. He noted that the city “has excellent engineering but it often falls short on quality of open space.”

Another key design consideration was how the station can be integrated into the surrounding area (“placemaking”). Because of their size and scale, transport infrastructure projects can often divide neighborhoods, further fracturing urban environments. The landscape design of West Kowloon Station minimizes that problem by connecting the terminus to the surrounding neighborhood through a series of “ribbons” composed of gardens and pathways that emanate outward from the station. These ribbons provide the sort of intangible benefits that have not been considered by governments until relatively recently, according to David Lung of AECOM, a multinational engineering firm which also worked on the project.

Additionally, the station links commuters to various commercial amenities, providing greater convenience for commuters and increasing the attractiveness of use.

Meanwhile, the direct and indirect economic returns of the project are also expected to be high. A forecast from the Legislative Council of Hong Kong, China estimated that the time saved by passengers using the service will be worth around USD11.2 billion over a 50-year period. Separately, the same forecast projects annual earnings before interest, taxes, depreciation and amortization to

reach HKD1.42 billion (USD181 million) by 2021 and increasing to HKD3.77 billion (USD481 million) by 2031.^[25]

The indirect benefits are harder to quantify but potentially significant. One of the broader objectives behind the station is greater integration in the Pearl River Delta region, also known as the “Greater Bay Area plan”.^[26] More narrowly, the project is expected to create jobs in a range of industries, such as retail and catering, and transform West Kowloon into a “world-class integrated arts and cultural district”.^[27]



3.2 Optimizing Through Scale and Automation: Pavagada Solar Park in Karnataka, India

In 2015, the Government of India announced plans to quadruple the renewables capacity of the country, setting a target of 175GW by 2022. Under the Paris Agreement, India committed to producing 40 percent of its electricity from clean sources and cutting emissions intensity to at least 33 percent below its 2005 levels by 2030. For India to achieve these targets, clean energy would have to replace, and not just augment, its coal generation output, since coal currently generates more than 50 percent of the country's electricity. More than half of the increase in clean energy will be driven by solar power, which is targeted to reach 100GW by 2022. India has been aggressively developing solar power parks to achieve these targets.

One such megapark located in Pavagada in the southern state of Karnataka provides several engineering and project design insights. The Pavagada Solar Park, an ambitious project aiming to generate over 2,000MW of renewable energy, covers more than 13,000 acres of land. Building infrastructure across such a large area is a formidable task in India. Inadequate compensation, poorly designed rehabilitation packages and strict land acquisition laws have made buying land both costly and time-consuming. The Pavagada Solar Park project has successfully overcome this challenge by creating a unique land-leasing agreement with attractive compensation for the landowners.

Most of the landowners are poor, marginal farmers living in nearby villages. Farming is a tough business in the semi-arid and drought-prone region. These conditions forced many to move to cities for better job opportunities. The solar park project offered a once-in-a-lifetime opportunity for those who remained. Poor villagers were able to improve their livelihoods while being able to stay in their native place and retain land ownership, both of which hold deep emotional significance for many. Nearly 3,000 farmers have agreed to the option to lease out their land to the park for 25 to 35 years, at an annual lease of INR21,000 (USD300) with a 5-percent increase every two years, an arrangement that will provide them with a higher and more stable income than crop production. This arrangement granted the solar park development access to more than 11,000 acres of land and can serve as a model for other infrastructure projects in other Indian states.

The unique design of the land leasing scheme allowed the solar park to be set up close to a major consumption point, the state capital city of Bengaluru, which is around 180 km away. This is unusual in India, where most solar parks are located at a significant distance from the final consumer. This proximity greatly reduces transmission line losses which rise disproportionately with the length of the line.

The solar park has several other notable features, one of which is the use of robotic solar panel cleaning. Typically, solar parks need large volumes of fresh water to work at maximum efficiency, with estimates varying between 7,000 to 20,000 liters of water per weekly wash for each MW. Studies have shown that one gram of dust per square meter of a solar panel can reduce its efficiency by up to 40 percent. Ecoppia, a robotic solar cleaning firm, has partnered with energy firm Fortum to deploy its autonomous, robotic and water-free photovoltaic solar panel cleaning solutions in the park. This leveraging of the capabilities of the Internet of Things and advanced machine learning helps to preserve precious water resources, a scarce commodity in this semi-arid region. The robots are even able to operate when the solar panels are tilted to maximize generation output.



The Pavagada Solar Park was one of the earliest instances of the “plug and play” model in the state of Karnataka, where the state takes responsibility for acquiring land and obtaining various government approvals. This allowed the contractor to start implementing the project immediately without having to worry about time and cost overruns, and knowing that the process of land acquisition and regulatory clearances has been greatly facilitated. Consequently, more than 90 percent of the park’s capacity (amounting to 1,850MW) had already been contracted out in the third quarter of 2019, with the remainder expected to follow by end-2019.

The sheer size of the solar park has allowed the state government to benefit from economies of scale by developing common infrastructure facilities (such as power evacuation and roads) to reduce costs. These reductions have been passed on to private investors and, as a result, solar park charges in Pavagada are significantly lower than similar parks in Gujarat and Andhra Pradesh. For example, the fixed upfront charges in solar parks in Gujarat are approximately INR8.5 million/MW, while in Karnataka it is only INR2.73 million/MW. High solar park charges deter developers from showing interest. Since the bulk of investments in solar parks tend to be upfront, the implementation agency cannot recover costs if the parks remain half-utilized.^[28] As such, lower costs raise the overall economic benefit of the project.

3.3 Integrating Infrastructure and Raising Benefits

Infrastructure is still considered a hard asset, but numerous other considerations are now involved. In the case of the West Kowloon Station, the project serves as an anchor for the larger neighborhood by connecting commercial spaces and improving economic opportunities while also providing green space in a section of Hong Kong, China that needed it. With the Pavagada Solar Park, innovative design elements were introduced to meet the aspirations of the local community and tailor the project to adapt to local conditions. These included a unique land-leasing system, the use of autonomous, robotic and water-free photovoltaic cleaning solutions which conserve scarce water supplies and the bolstering of ancillary infrastructure activities in a cost-efficient manner.

For architects, designers, urban planners and the broader array of firms and officials involved in infrastructure projects, finding a balance between a series of seemingly disparate goals—and on massive, multibillion-dollar projects—can present a daunting task. However, the examples here show it’s not impossible. “We’re doing a lot of integrated infrastructure projects with coastal resilience and revitalizing urban rivers in places like Kuala Lumpur,” says Stephen Engblom, Global Director of AECOM Cities. When projects like these are planned and designed well, he says, they can achieve that balance and deliver economic benefits.



4

MANAGING INFRASTRUCTURE COST^{The EIU}



It may seem obvious that managing infrastructure construction costs is important, but for developing economies in Asia, many of which already face large debts and tight budgets, cost is a crucial factor. Not only do high costs (often the

result of a wasteful use of resources) add to fiscal burdens, they also result in reduced returns on investment for both the public and private sectors. This makes the mobilization of private capital even more difficult.

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4.2	Why Is It Important to Keep Costs Down?	34
4.3	What Causes High Infrastructure Construction Costs?	35



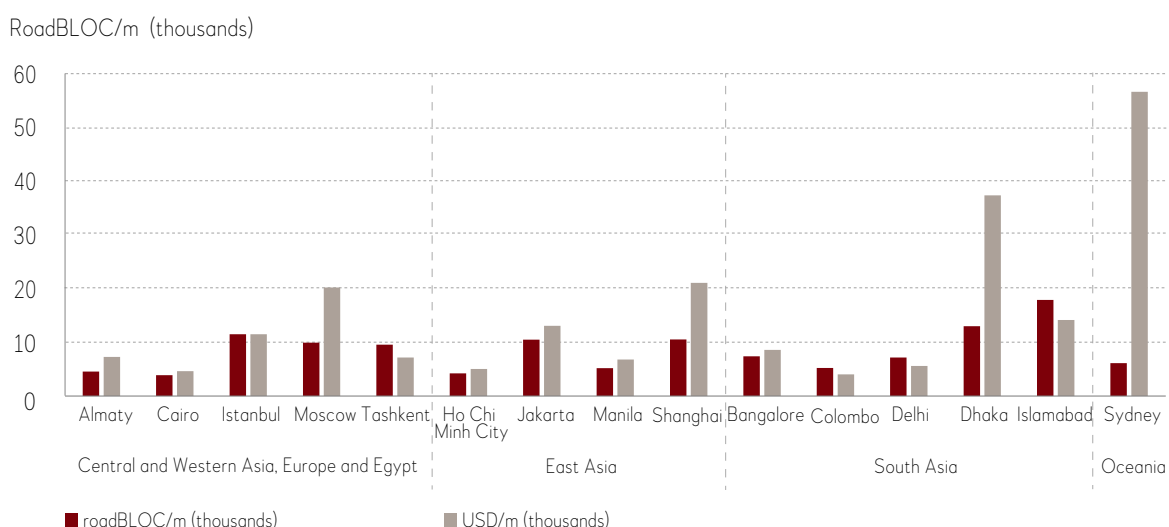
4.1 Benchmarking Road and Water Infrastructure Construction Costs

Before examining the policy issues around high infrastructure costs, it is worth noting that there is a need for better data. Internationally comparable infrastructure construction costs are hard to come by. This year's report expands on the infrastructure construction cost benchmarking exercise. Firstly, more cities are benchmarked for road construction cost. Secondly, water infrastructure is also benchmarked in this report. The results show large variations in the construction costs, even after adjusting for differences in local infrastructure input prices (Figure 9 and Figure 10).¹³ This suggests that the infrastructure construction process is more efficient in some countries than in others.

Sydney, Australia records the highest construction costs for road and water infrastructure in USD terms. However, when local commodity prices are taken into account, it emerges as one of the least costly

cities. In other words, construction cost is not high relative to the cost of inputs. On the other hand, the cost of constructing the same water-related infrastructure in Dhaka, Bangladesh is much higher than the lowest-cost location (Istanbul, Turkey). For road infrastructure, Islamabad, Pakistan is significantly more costly than the rest of the sample and is over four times as expensive as Cairo, Egypt (the lowest-cost location in the sample). This indicates that the variation in infrastructure costs is much greater than the variation in input costs and that, with better cost management, infrastructure construction costs could be reduced, even in locations facing high input costs. It is interesting to note that the highest-cost locations are those with the lowest national GDP per capita; this may suggest that factors that are most pronounced in lower-income countries tend to increase infrastructure costs.

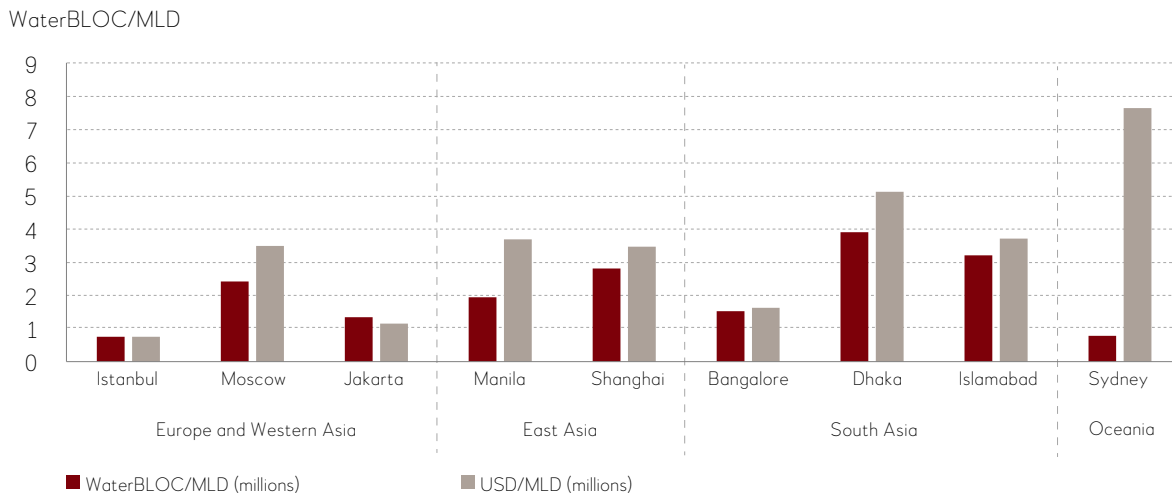
Figure 9: RoadBLOC Benchmarking of Road Construction Costs Across Cities¹⁴



¹³ Data on construction costs were obtained either through observed contract prices or via quantity surveyors in each city (typically engineering, engineering consultancy or construction firms), in local currency. This is then deflated by a weighted basket of input prices, also in local currency. This provides an additional measure of cost that is less sensitive to exchange rate fluctuations, and accounts for the effects of local prices. A high-cost location would imply higher construction costs, relative to the basket of inputs. Cost conversions to USD are also provided for comparison.

¹⁴ BLOC stands for basket of locally obtained commodities. RoadBLOC provides a measure of road construction costs that adjusts costs by the prices of locally obtained commodities (BLOC) used in road construction. Similarly, WaterBLOC provides a measure of water infrastructure costs that adjusts for locally obtained commodities used for water infrastructure construction. A more detailed technical working paper is available online: https://www.aiib.org/en/news-events/media-center/working-papers/pdf/Benchmarking-Infrastructure-Cost-A-Case-of-Road-and-Water_FINAL.pdf

Figure 10: WaterBLOC Benchmarking of Road Construction Costs Across Cities



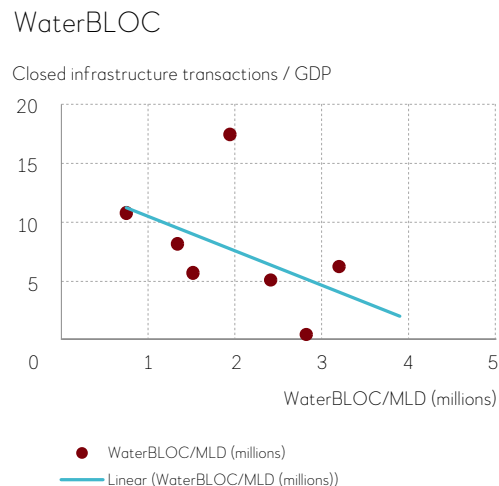
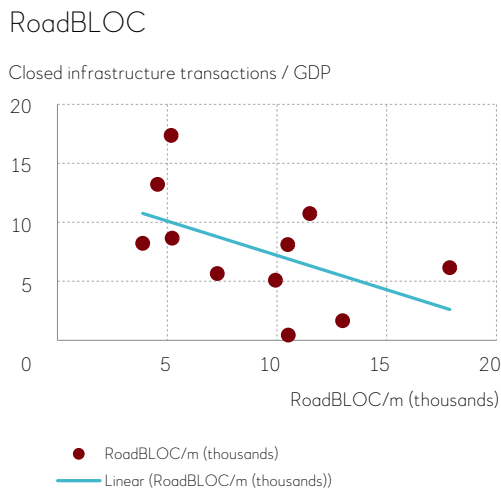
Note: MLD stands for Million Liters per Day

4.2 Why Is It Important to Keep Costs Down?

Intuitively, increases in the cost of construction risk erasing margins for private investors, making the project commercially non-viable and undermining the prospect of private financing without a public subsidy.^[29] In many cases, even a small erosion of margins may lead to funding being

withdrawn in the absence of a public subsidy.^[30] Yet public funds for infrastructure in Asia are already stretched and governments may be unable to afford such support. Figure 11 provides the cross-country correlations between costs and private-sector infrastructure investments.

Figure 11: Infrastructure Costs Are Negatively Correlated With Private Sector Investment¹⁵



As can be seen from the figure above, both the RoadBLOC and WaterBLOC indexes of construction costs are negatively correlated with the value of closed infrastructure

transactions in 2019 divided by GDP. This suggests that high infrastructure construction costs are associated with lower private investment in infrastructure.

¹⁵ Given that countries have different economic sizes, the X-axis in these figures reflect private sector investments divided by GDPs—in other words, normalized for cross-country comparison.

4.3 What Causes High Infrastructure Construction Costs?

One of the main causes of high infrastructure construction costs in Asia is cost overruns. As mentioned in the [Chapter 1](#), data from Pakistan, Malaysia and Vietnam all underline the extent of such overruns in Asian countries.^[31] Some of the main factors that lead to cost overruns in Asian infrastructure are changes to input costs or design specifications, or poor project design and delays.^[32] India has also historically faced high cost overruns. However, the country's experience over the last five years shows how countries can reduce their infrastructure construction costs through policy reforms ([Box B](#)).

Besides cost overruns, there are a number of important factors that affect infrastructure construction costs:

- **Regulatory framework.** In general, high costs of doing business correlate with high infrastructure construction costs.
- **Lack of competition.** A lack of local supplier competition can also push up construction costs, particularly in countries where market entry by foreign firms into the construction sector is restricted. This can allow contractors to charge high margins at the expense of the rest of the economy (and the public purse, in the case of publicly funded projects).
- **Governance issues, including corruption.** The construction sector is particularly prone to corruption, and construction of infrastructure is no different. This can add substantially to costs, particularly in developing countries. Infrastructure projects can be especially vulnerable because of their scale (making it easier to hide cost inflation in a vast budget) and uniqueness (making it difficult to compare whether costs are reasonable).^[33]

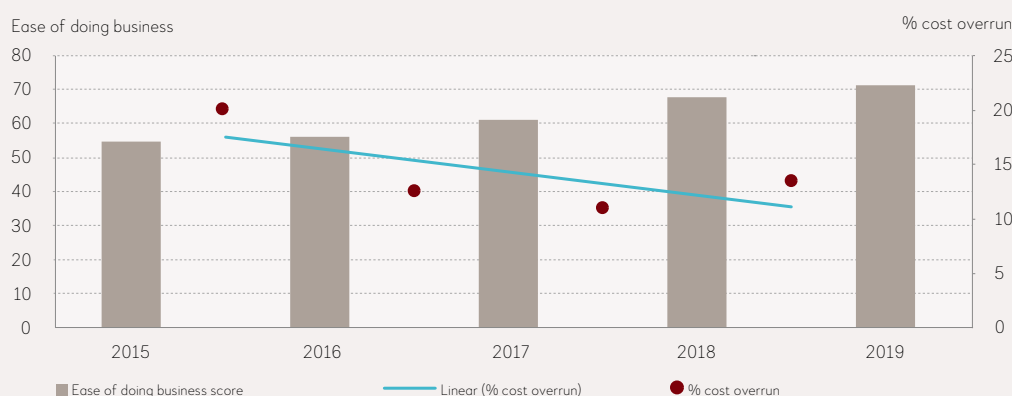
- **Trade policy.** As will be seen in the market outlook section of this report, high barriers to imports of infrastructure inputs can raise the cost of infrastructure construction, for example in the solar photovoltaic (PV) sector. Asian countries still have significant trade barriers that can contribute to raising costs.

In summary, infrastructure construction costs vary substantially across Asian countries. Countries with high costs find it more difficult to attract private finance for infrastructure projects, making it harder for them to fill their infrastructure gaps. A number of factors, from the regulatory environment, competitive environment and governance, can inflate infrastructure construction costs. Yet there is hope for countries with high costs—the experience of India shows that measures to streamline processes, inter alia, can help manage these costs.

BOX B: Reducing Infrastructure Cost Overruns in India

India has achieved a significant decline in cost and time overruns in infrastructure construction, through a combination of policy measures and improved efficiency in implementation. As shown in **Figure B.1** below India has significantly improved its performance in the World Bank's Doing Business indicators over the past five years.

Figure B.1: Improvements in the Ease of Doing Business and Percent Cost Overrun for Infrastructure Projects in India, 2015-2019



Data Source: AIB Staff Calculations Based on World Bank,^[34] PMI and KPMG.^[95]

Over the same period, India has also succeeded in reducing the cost of obtaining construction permits (based on data from the World Bank's Doing Business indicators), a cost which may be an important source of infrastructure construction costs. India also made significant improvements in the EIU's Business Environment Rankings over the same period.

Table B.1: EIU Business Environment Rating in India

	2015	2016	2017	2018	2019
EIU Business Environment Rating	5.2	5.3	5.4	5.5	5.6
Cost of obtaining construction permits	27.5	26.8	23.6	5.7	0

Data Source: EIU and World Bank.^[36]

In addition, at the same time, India reduced the percentage of projects with a time overrun, which corroborates the story that the country has improved the efficiency of infrastructure construction with its reforms.

Table B.2: Percent of Projects With a Time Overrun

	2015	2016	2017	2018
Percent of projects with a time overrun	44	32	27	19

Data Source: PMI and KPMG.^[97]

A number of key policy reforms and other government initiatives have accounted for the significant improvement in reducing time and cost overruns. India has used digital technology and online platforms to streamline the process of obtaining building permits and other approvals and also to improve the commissioning, project management and transparency of infrastructure projects.^[38]¹⁶ This underlines how good infrastructure project governance has the potential to avoid unnecessary cost overruns.

¹⁶ Some specific platforms used for this purpose: (a) Pro-Active Governance and Timely Implementation, which is used to monitor, review important projects, and help expedite decisions; (b) eSuidha Project Management System to fast-track approvals/commissioning of large public/PPP projects; (c) single Competent Land Acquisition account system, which rationalizes the payment of compensation for land acquisition.

5

PLANNING FOR THE FUTURE AND AVOIDING STRANDED ASSETS



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5.1 What Are Stranded Assets?

Stranded assets are assets that have suffered from unanticipated or premature write-downs, devaluations, or conversion to liabilities. They are associated with the terms “economic loss”, “impairment”, “stranded costs” and “financial loss.”^[39] Recently, much public attention has been on the temporary or permanent stranding of assets as a result of a climate change event (e.g., a flood), or as a result of a rapid and disruptive low-carbon energy transition (e.g., renewables). Therefore, when investing in infrastructure today, it is essential to consider a wide variety of factors and scenarios, in both the short- and long-term, that could potentially lead to stranding during an infrastructure investment’s lifetime, and ultimately how to plan for and avoid it.

How should stranded assets be avoided or managed? Governments, companies and financial institutions should always attempt to measure and manage the exposure of infrastructure investments to external risks that can strand assets and internalize these risks in their decision-making and in their financial and economic models.

Central banks can play a critical role in raising awareness, preparing markets for the impacts of stranded assets and reducing investment in potential stranded assets. The Reserve Bank of India and the Bank of England have already engaged on the topics of asset stranding, energy transition or climate change.^[40] More specifically, the Bank of England’s Prudential Regulation Authority has been assessing the exposure of the

UK banking sector, estimated at GBP11 trillion (USD14.3 trillion), to climate change, to ensure adequate robustness and soundness of firms and enhance the resilience of the financial system.^[41]

Furthermore, in September 2019, the Malaysian Central Bank established a Joint Committee on Climate Change to:^[42]

- Build capacity through the sharing of knowledge, expertise and best practices in assessing and managing climate-related risks.
- Identify issues, challenges and priorities facing the financial sector in managing the transition toward a low-carbon economy.
- Facilitate collaboration between stakeholders in advancing coordinated solutions to address emerging challenges and issues.

The Malaysian Central Bank concluded that financial institutions will need to start reporting their exposure to climate-related financial risks. Since then, other central banks in Asia have followed suit and started to look at the impact of climate change and stranded assets.

However, the perception of the risk of stranded assets depends on the time horizon of different investments. There is a need for new tools to help better assess potential stranding as a result of climate-related physical and transition risks that will vary under different climate scenarios and differ by region, country and sector.



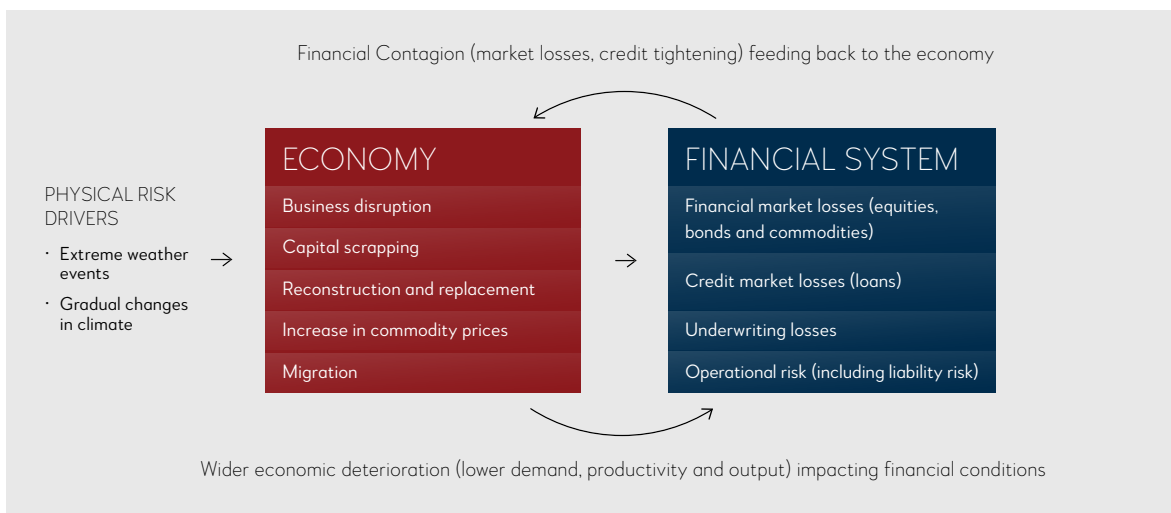
5.2 Climate-Related Physical and Transition Risks

Every sector is likely to be impacted by some combination of climate-related physical (Figure 12) and transition risks (Figure 13), including agriculture, energy, forestry, and tourism. According to the Bank of England, “physical risks are a result of climate and weather-related events, such as heatwaves, droughts, floods, storms and sea level rise. They can potentially result in large financial losses, impairing asset values and the creditworthiness of borrowers. Transition risks result from the process of adjustment toward a low-carbon economy. Changes in policy, technology and sentiment could prompt a reassessment of the

value of a large range of assets and create credit exposures for banks and other lenders as costs and opportunities become apparent.”^[43]

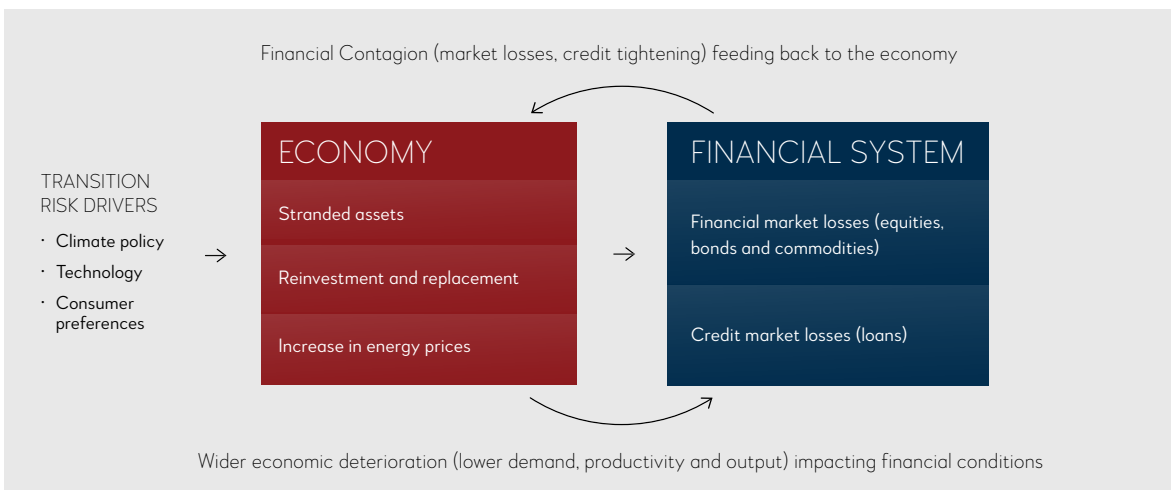
In the energy sector, there are various transitional and physical risks that can lead to the stranding of fossil fuel infrastructure investments such as government policies (e.g., carbon pricing, air pollution regulations), financial (e.g., high fossil fuel prices, low-cost renewables), behavior (e.g., evolving social norms and needs) and environmental considerations (e.g., climate change, water scarcity, proximity to national parks), among many others.

Figure 12: Examples of Climate-Related Physical Risk Impact on Financial Risks



Source: Network for Greening the Financial System^[44].

Figure 13: Examples of Transition Risk Impact on Financial Risks



Source: Network for Greening the Financial System^[45].

Ultimately, renewable energy assets could also become stranded if impacted by extreme climate events such as typhoons, floods and droughts as well as disruptive technologies (e.g., cheaper and more efficient solar photovoltaic panels, negative wholesale market prices). For example, rising temperatures in the Himalayas could increase glacier melts and potentially lead to landslides, lake outbursts, flash floods and even reduced water flows.^[46] Furthermore, in 2018-2019, severe droughts were experienced in Cambodia, Myanmar and Sri Lanka, which significantly affected hydropower production and led to regular blackouts. Overall, the level of financial impact will depend on the scale, pace and timing of the asset stranding.

Factoring in potential energy pricing as well as environmental and climate change-related policies is relatively straightforward in existing financial

and economic models, while potential physical and transition risks derived from climate change requires credible projections. The government or company can choose to assess their exposure to climate-related physical and transition risks by project or at portfolio/national level. If assessing at the portfolio or national level, the main criterion becomes the level of exposure to climate risk which the company (e.g., shareholders) or government (e.g., taxpayers) are willing to accept, and the potential losses as a result. However, sovereign debt could be significantly exposed if a country is more susceptible to climate change impacts. It is also important to highlight the fact that insurance companies could be affected if several assets suffer from losses and damages as a result of climate change.

5.3 Moving Toward Paris Alignment Is Important but We Need to Consider All Measures to Avoid Stranded Assets

What does it mean to be Paris-Aligned? In the simplest terms, it means that investment needs to be climate-resilient and consistent with the Paris Agreement's long-term mitigation goal of limiting global warming to well below 2-degrees and pursuing a 1.5-degree scenario.

Determining if an asset is incompatible with the Paris Agreement's well below 2-degrees scenario is complex, and there is a range of assessment methods with different assumptions and weighting criteria. Under the same methodology, using different weighting, the same asset could be deemed aligned or not Paris-aligned.

Current approaches for assessing compatibility with climate targets include Science-based Targets (SBT), the Transition Pathway Initiative (TPI), the Paris Agreement Capital Transition Assessment (PACTA), and the Deep Decarbonization Pathway Project. TPI and PACTA are primarily focused on institutional investors and listed equity portfolios. The Deep Decarbonization Pathway Project is focused on assessing country-level ambition and progress on climate mitigation. SBT has a broader range of stakeholders and is primarily focused on raising levels of climate ambition, particularly from companies. The other main differences are that PACTA has the capacity to look at five-year ahead CAPEX (capital

expenditures) plans to see how company CAPEX will change carbon emission pathways, while TPI examines how company management is approaching climate change and reviews annual reports and company strategy documents to assess this.

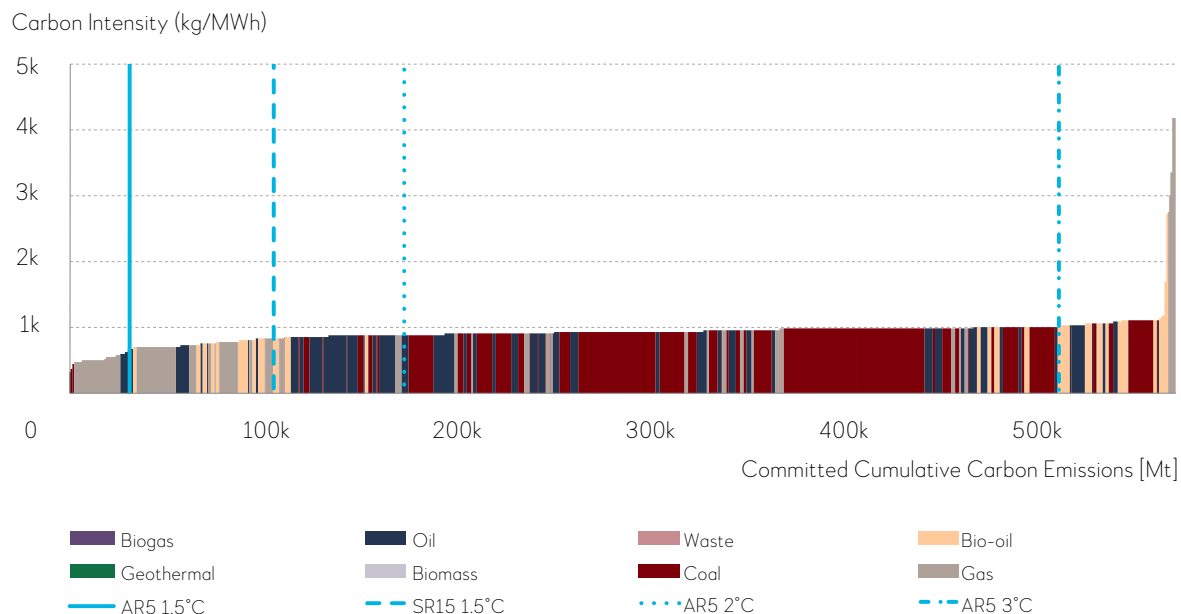
The approaches outlined above generally focus on the flow of emissions, not the stock of emissions in the atmosphere or the interaction between stock and flow (i.e., carbon budget). Whether either asset is compatible with a given carbon budget depends on how much of the global budget is left (a moving number) and how much of this is allocated to the sector and the country in which the asset is located. It also depends on anticipated utilization of the asset and the asset's carbon efficiency. Therefore, the carbon budget allocation for each country can be different.

An optimal approach for assessing (in) compatibility with a warming threshold should therefore take account of carbon lock-in and the interactions between the stock of carbon in the atmosphere and the annual flows, acknowledging that to achieve any warming threshold requires net zero emissions globally and across all sectors. The global carbon budget can be allocated to sectors and countries in different ways. But all things being equal, the longer it takes to achieve net zero, the greater the number of assets,

companies, and portfolios that will be incompatible with any given warming threshold. Figure 14 provides an example of a carbon lock-in curve used to assess the carbon budget implications of current and planned assets in power generation

worldwide (based on their carbon intensity) and their compatibility with the 1.5-, 2-, and 3-degree scenarios (based on the respective carbon budgets). This kind of assessment can also be applied at the regional and country levels.

Figure 14: Global Carbon Lock-In Curve for the Power Sector by Fuel Type



Source: Smith School of Enterprise and the Environment, University of Oxford.

Note: Intergovernmental Panel on Climate Change's Assessment Report 5—(AR5). Intergovernmental Panel on Climate Change's Special Report on Global Warming of 1.5°C (SR15).



UN Photo by Mark Garten.

There is a range of studies assessing the potential stranding of energy sector assets, particularly covering the premature closure of coal power plants as a result of transitional risks. In Japan, it is estimated that a total USD71 billion worth of existing coal power plants could be stranded as a result of cheaper renewable energy generation and subsequent lower utilization rates of these coal power plants.^[47] In India, the Institute for Energy Economics and Financial Analysis (IEEFA) estimates that the potential stranding of coal power plants is worth USD40 billion to USD60 billion, for the same reasons as indicated for Japan. The repercussions would be felt by several Indian banks exposed to these assets. A report by the Standing Committee on Energy in March 2018 stated that there were 34 coal power plants (40GW) categorized as financially stressed in India.^[48] The United Nations also highlighted climate-related physical risk could cost the Asia-Pacific region around USD160 billion per year by 2030.^[49]

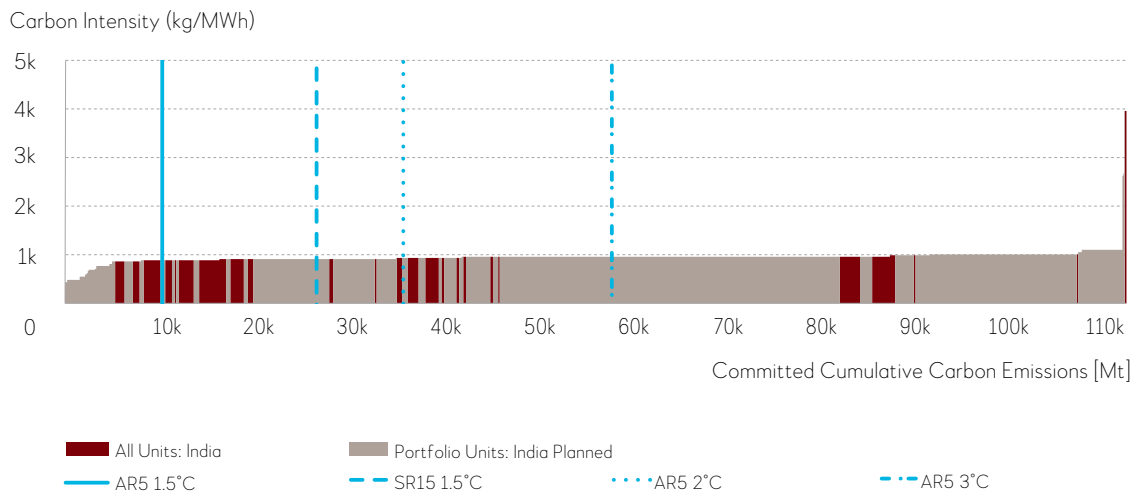
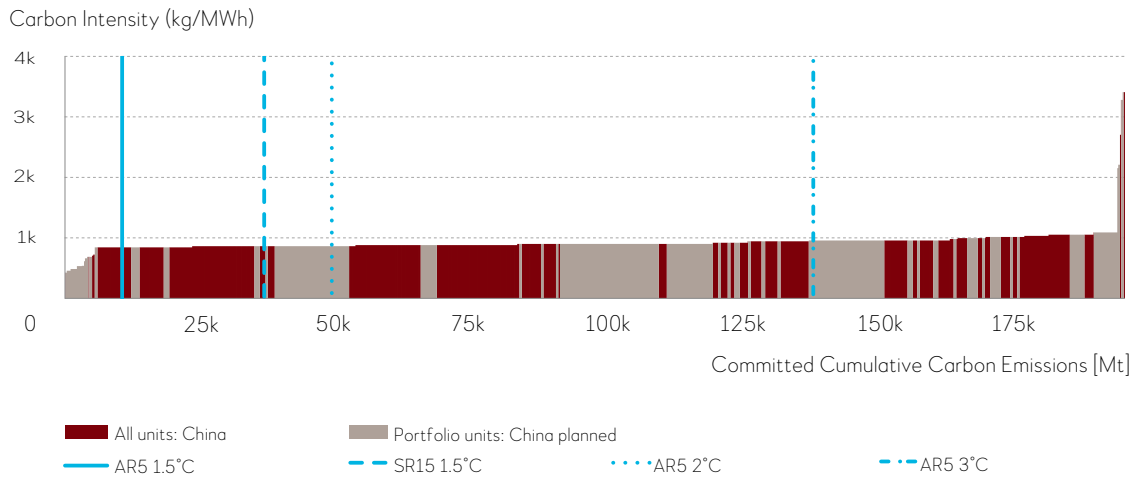
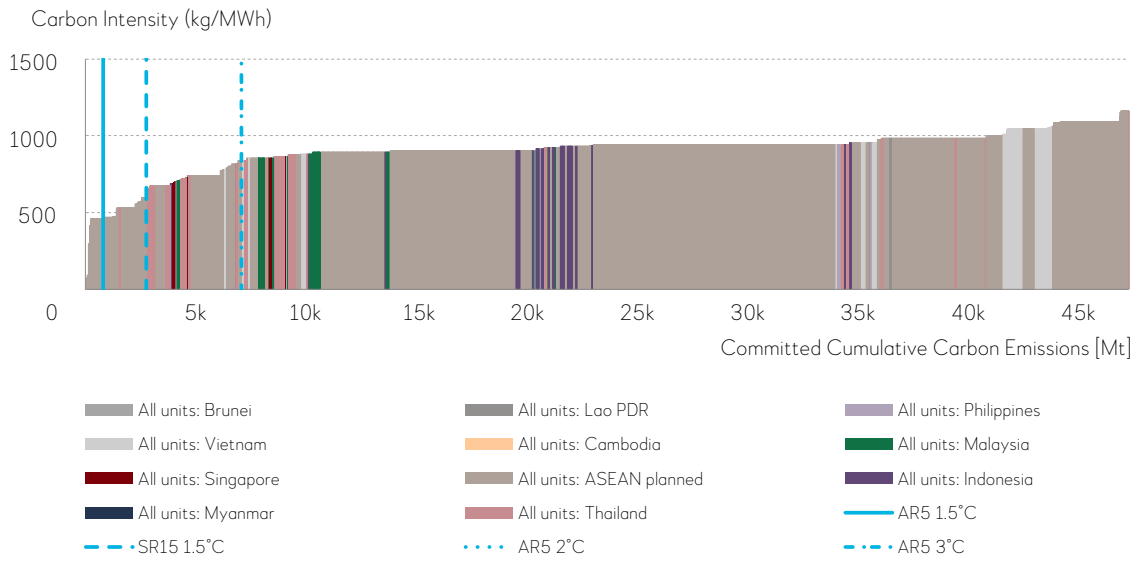
As described above, the risk exposure and impact are not only felt at the country level but also at the company and investor level. An example of this is General Electric, once one of the most valuable companies in the world. Its management and its shareholders, according to IEEFA, “misjudged the pace of the global energy transition and subsequent collapse of the gas turbine and thermal power construction market.”^[50] Another example is the recent bankruptcy of Pacific Gas and Electric, a major US utility, as a result of major liabilities caused by extreme wildfire events.^[51] This showcases a failure to adequately understand potential physical climate-related risks and the respective insurance needs. In China, a subsidiary of Datang Group, one of largest power generators in the country operating a coal power plant in Gansu province, applied for bankruptcy in 2019 as a result of China’s policy to rapidly transition to low-cost solar and wind energy.^[52]

The existing studies are not only limited to assessing potential stranded assets as a result of physical and transitional risks. For example, as shown in [Figure 15](#), the University of Oxford Smith School of Enterprise and the Environment Studies estimates that 57 percent of Southeast Asia’s planned fossil fuel power plants are incompatible with the Paris Agreement based on a 2-degree budget. Comparatively, for China and India, the percentage would be 58 percent and 45 percent respectively.^[53]

Asian countries are committed to the Paris Agreement and gradually making additional efforts to ensure their NDCs (Nationally Determined Contributions) are ambitious and Paris-aligned. However, not all targets set by the NDCs are backed by scientific approaches against different climate change scenarios. [Figure 15](#) attempts to illustrate the need for countries to adjust their planned power capacity additions to be aligned with the Paris Agreement according to different scenarios. In addition, countries that choose to invest in new gas power generation should consider the best available technology (e.g., highest efficiency, lowest emissions). They should also factor in both the financial and economic assessments of climate risks and the potential change in business model (from being a baseload provider to a more peak-load provider to reflect the expected growth in renewable energy and energy storage).

While being Paris-aligned is clearly an important part of avoiding stranded assets, investors and policy makers will need to have a more holistic overview to avoid stranding. As mentioned above, a project that is deemed aligned with the Paris Agreement can still be a stranded asset—for example, a new hydropower dam could be affected by severe long-term droughts or diminishing upstream glaciers. Likewise, a transport infrastructure that does not take proper account of future trade patterns could also see its value diminished prematurely. It is thus important to plan ahead, collect relevant data, and think in terms of potential scenarios.

Figure 15: ASEAN, China and India Planned Power Assets on a Global Carbon Lock-In Curve for the Power Sector



Source: Smith School of Enterprise and the Environment, University of Oxford.

Note: Association of Southeast Asian Nations—ASEAN. Intergovernmental Panel on Climate Change's Assessment Report 5—(AR5). Intergovernmental Panel on Climate Change's Special Report on Global Warming of 1.5°C (SR15).

5.4 Measuring Stranding Risk and Avoiding Poor Investment Choices

Methodologies for measuring stranded asset risks are still evolving rapidly and being improved. Most approaches are top-down and rely on reported data that is time-bound and quickly outdated, and sometimes insufficiently granular or incomplete depending on the countries and/or sectors being analyzed. For example, while the data available on the power sector is comprehensive, data availability is typically low for the construction and industrial sectors.

One possible approach is to go bottom-up through five steps of different degrees of complexity:

1. Gather project data.
2. Identify current and future risks and impacts.
3. Set scenarios and see how the risks and impacts change over time.

4. Assess how these risks and impacts will be managed.
5. Incorporate these risks and impacts in credit risk, valuation, and financial and economic models as appropriate.

This proposed approach allows a company or project sponsor to better understand and manage climate-related risks. The company can have the same fundamental risk exposure as its competitors but may have a lower risk because it has a plan and strategy to manage and mitigate such risks or ultimately divest.

The landscape for assessing climate risk, Paris Alignment and stranded assets is changing. Governments, companies and financial entities are increasingly committed and already dedicating resources and efforts to build a



replicable model. However, consensus on the approach and methodology has been hard to achieve and therefore countries and organizations should set different thresholds and benchmarks suited to their needs.

The challenges highlighted in this chapter are not easy to solve. Greater effort is needed to harmonize approaches to enable consensual and transparent decisions, while allowing for some flexibility. Governments, thought leaders and international stakeholders need to continue to foment further discussion and sharing of experiences in a constant pursuit for a common understanding. AIIB, together with other MDBs and international organizations, can create platforms for discussion as well as work with the private sector to develop common tools

and frameworks available to the wider public. Examples of AIIB's projects supporting such discussions include the [Asia Climate Bond Portfolio](#) and AIIB Asia [ESG Enhanced Credit Managed Portfolio](#) projects.

Once financial institutions see the value of having analytical frameworks and associated data systems that allow them to better assess and manage climate risks, Paris Alignment and stranded assets, the expectations are that these will build their internal capacity and expertise. The ones at the forefront of climate thinking will be the clear future winners.



6

MOBILIZING FINANCE: RECENT TRENDS AND GIVING A STRONGER PUSH TOWARD SUSTAINABLE INVESTMENT



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6.1 The Sustainability Challenge

In 2019, scorching global temperatures led to the second-hottest August in the northern hemisphere on record and significant arctic ice melting.^[54] September saw climate strikes and protests globally. This further elevated public consciousness about the impact of climate change. At the same time, according to a 2019 United Nations Environment Programme report, the G20 accounting for 80 percent of emissions is not on track to meet the pledges of the Paris Agreement.^[55] Key to addressing this crisis is the role of finance which is laid out clearly in the Paris Agreement, which is “making finance flows consistent with a pathway toward low greenhouse gas emissions and climate-resilient development.”

However, due to the lack of public financing and aid for developing economies, mobilizing private capital toward addressing climate and broader sustainability efforts is crucial. Since the adoption of the “From Billions to Trillions” agenda in 2015, MDBs have focused on mobilizing private capital to meet the SDG investment needs. This chapter will show that there is a clear trend toward a broad-based increase in capital allocation by institutional investors to sustainable investment assets. In addition, the motivations for this increase are driven by several key factors, including financial performance and green reputation benefits but important market and policy challenges remain.



6.2 Promising Trends

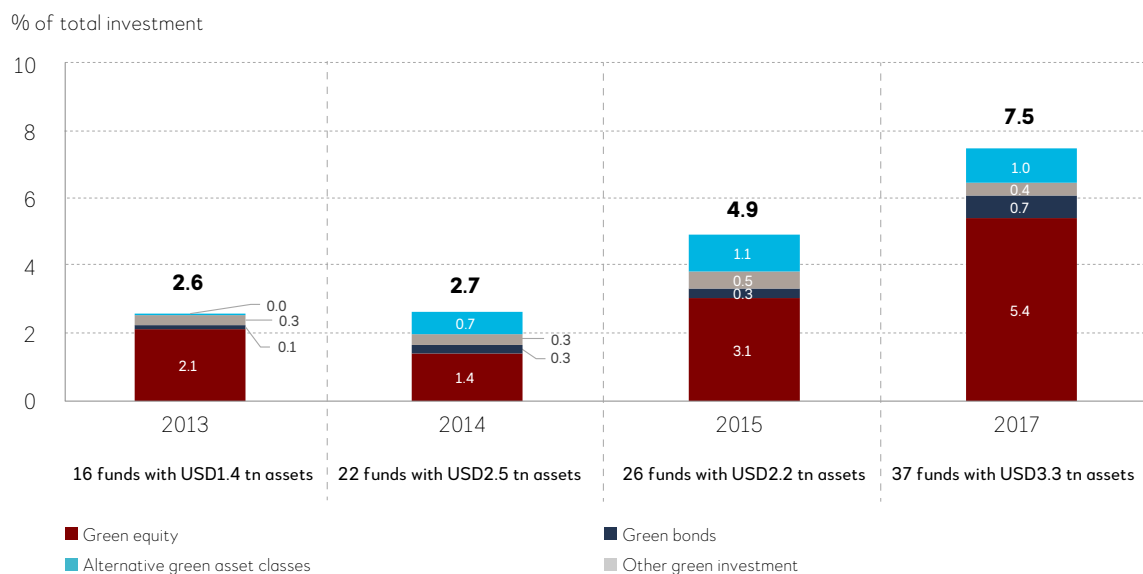
Over the past few years, many institutional investors have demonstrated clear intentions to invest sustainably.^[56] What is more compelling is the actual capital allocation. According to the OECD surveys, large pension funds have reported an increase in capital allocation to green investment assets from 2.6 percent to 7.5 percent over 2013-2017 (Figure 16).¹⁷ Increases were seen across different asset classes, such as green bonds, green equity indexes (e.g., FTSE4Good, S&P Global Eco Index, S&P Global Water Index), alternative green assets (e.g., infrastructure projects that improve energy efficiency, recycling, or reduce CO₂ emissions), and others.

This demand has coincided with greater supply, as estimated by the Global Sustainable Investment Alliance (GSIA), using its environmental, social and governance (ESG) investment definition.¹⁸ According to GSIA, global “sustainable investing assets” grew 126 percent from 2010 to USD30.7 trillion by 2018, with public equities and fixed income accounting for 51 percent and 36 percent shares respectively (Figure 17). Green bonds, a more specific fixed income definition, saw its global issuance rise from USD3 billion to USD168 billion over 2013-2018 (Figure 18).

¹⁷ OECD Annual Survey of Large Pension Funds and Public Pension Reserve Funds 2014, 2015, 2018, 2019.

¹⁸ The seven ESG investment strategies are: negative screening, positive screening, norms-based screening, ESG integration, sustainability-themed investing, impact investing, and corporate engagement. More details at GSIA, Global Sustainable Investment Reviews for 2010, 2012, 2014, 2016 and 2018, available on www.gsi-alliance.org

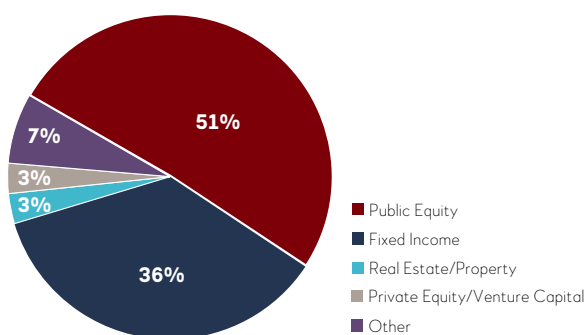
Figure 16: Capital Allocation of Large Pension Funds to Green Investment Assets, 2013-2017 (Percent)



Note: There is no data in 2016.

Data Source: OECD Annual Survey of Large Pension Funds and Public Pension Reserve Funds, 2014, 2015, 2018, 2019.

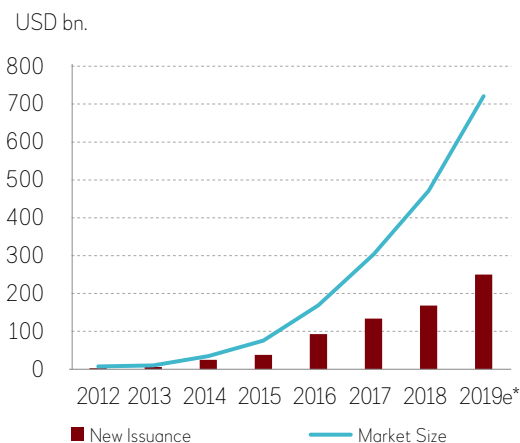
Figure 17: Global Sustainable Investing Asset Allocation, 2018



Data Source: Global Sustainable Investment Alliance.

However, the increase in allocation is mainly for publicly traded securities. The OECD surveys have observed that pension fund allocations in unlisted infrastructure assets, much less sustainable unlisted infrastructure, have been flat over 2013-2017.¹⁹ The same surveys also pointed out that, in general, institutional investors are not investing much in

Figure 18: Green Bond Market (USD bn)



* estimated as of Dec. 2019

Data Source: Bloomberg; Climate Bonds Initiative.

greenfield infrastructure in emerging markets (EM). AIIB has observed several major obstacles inhibiting increasing EM infrastructure investment by institutional investors, namely a significant J-curve for cash flows from greenfield assets, excessive perception of EM risks, and large efforts required to make projects “bankable”.^[57]

¹⁹ Meanwhile, several investors not covered in the OECD surveys are known to have a strong presence in this sector, such as Canada Pension Plan Investment Board (CPPIB), Ontario Municipal Employees Retirement System, Temasek Holdings, and Abu Dhabi Investment Authority. There are a few notable exceptions such as Sweden AP1, BBC Pension Scheme, CPPIB, New Zealand Superannuation Fund, with certain allocations to infrastructure in emerging markets including Asian countries. More details at the OECD Annual Survey of Large Pension Funds and Public Pension Reserve Funds, 2014, 2015, 2018, 2019.



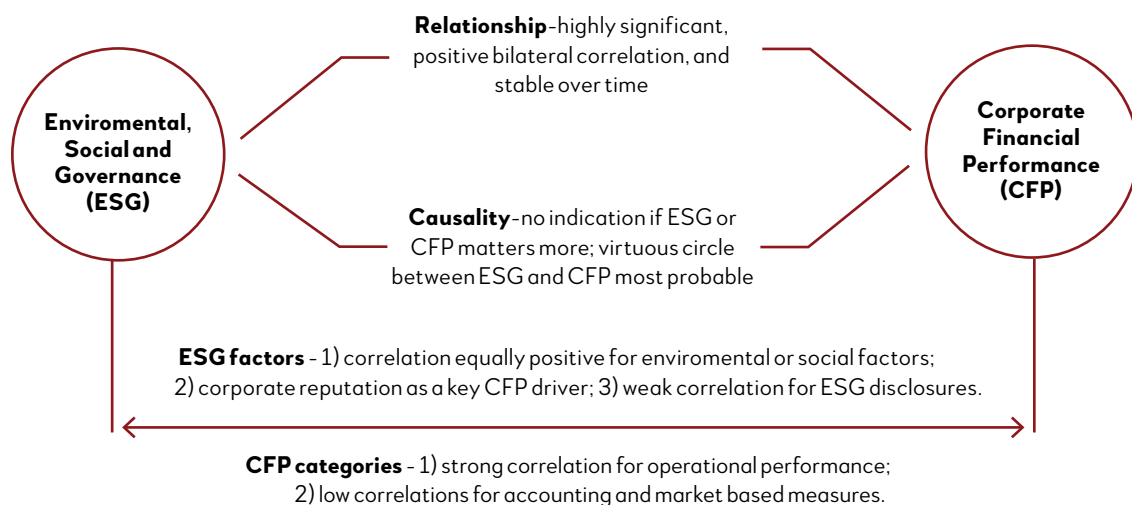
AIIB China Beijing
Air Quality
Improvement and
Coal Replacement
Project

6.3 Motivations for Sustainable Investment

The growth of sustainable investing assets raises an important question—what are the key motivations for investor demand? First, one could conjecture that improved financial performance may be a key motivation. Several studies observe a positive and stable relationship

between ESG factors and the corporate financial performance (CFP) as summarized in **Figure 19**. The correlations are also strong for sub-indicators such as operational performance and corporate reputations, likely forming a virtuous mutual reinforcement between ESG and CFP.^[58]

Figure 19: Summary of Research Findings on the Relationship between ESG and CFP



Data Source: AIB Staff summary based on the research by Busch, Friede, Lewis, and Bassen (2018); Friede, Busch, and Bassen (2015); Clark, Feiner, and Viehs (2015).

It is observed that corporations with better ESG performance tend to be less risky, less prone to defaults, all things being equal. Moody's study found that, based on 7,052 projects from 1983 to 2016, green use-of-proceeds project finance bank loans had lower default rates than non-green.²⁰ More recent research efforts among commercial banks have focused on quantifying how environmental and climate risks can be translated into default risks, as shown by the synthesis reports conducted by the G20 Sustainable Finance Study Group.^[59]

Observations from investment professionals are that risk-adjusted returns for public market ESG indexes are in many instances higher than the main equity market index benchmarks.²¹ For alternative investments, the G20 Sustainable Finance Study Group 2018 synthesis report cited an internal study of International Finance Corporation's real sectors' portfolio from 2010 to 2015 which found that clients with better sustainability performance outperformed those with weaker sustainability performance on all financial indicators. However, it is important to note that a literature review finds

²⁰ Moody's cites that the difference is likely due to subsample characteristics other than greenness; also, the findings vary significantly across regional subsets, with the results more robust in developed economies. More details at Moody's (2018), Default and recovery rates for project finance bank loans, 1983-2016: Green projects demonstrate lower default risk.

²¹ Of course, the results robustness of such retrospective investment research may be discussed. Also, in investors' framework of factor investing, ESG may be largely explained by traditional smart beta factors such as low-volatility and high-quality, rather as a stand-alone factor. More details at Amundi (2018), the Alpha and Beta of ESG investing; JP Morgan (2016), ESG—Environmental, Social and Governance Investing.

evidence of a correlation between ESG factors and performance, but not causality. There is also a hint of self-selection—firms that are financially strong participate in more ESG or green-compliant activities, given the reputational effects.^[60]

Growing issuance suggests strong demand to be large among fixed income investors, especially buy-and-hold investors. Investors appear to

benefit from demonstrating their sustainability credentials by investing in green bonds, even though more recent research shows some shortcomings such as lower liquidity, lower coupon yield and longer duration.²²

6.4 Giving Sustainable Investment a Bigger Push

Despite the optimism for sustainable investments, there exist significant roadblocks. One challenge has been the lack of standardized sustainable finance terminology in the market. For example, a 2018 UBS survey found that 72 percent of surveyed investors found sustainable investment terminology confusing. Similarly, a November 2019 paper by the Institute for International Finance cited studies by Schroders, Aon, Morningstar pointing to broad confusion by investors about the proliferation of terms used to describe sustainable finance (Appendix 2).^[61] Terms such “sustainable”, “green”, “climate-aligned”, and “responsible” finance are often conflated, confused or, worse, misused, given the lack of broad commonly agreed taxonomies.

According to the Schroders study, 57 percent of respondents cited “lack of information/ understanding” as a factor in preventing them from investing or investing more in sustainable investments. Lack of standardization had led some investors tend to question the reliability of such ESG information, given that such data is often voluntary on a self-reported basis, and is therefore unverifiable.^[62]

To address these issues, there has been progress in consolidating these standards at supranational or national levels, such as in the European Union (EU) and in China.^[63] At the same time, industry participants and alliances such as the Institute for International Finance, GSIA and Principles for Responsible Investment are initiating efforts to harmonize efforts, and key multilateral financing

institutions have begun to align their operations with standards, thus adding to credibility of these standards. For example, in March 2019, the International Finance Corporation began to offer loans in accordance with the Green Loan Principles. More work is needed in this right direction, such as to bridge differences across countries and industry sector, to connect between industrial, financial, and climate policies, to accelerate the early stage implementations.

Second, there is a need for more forceful policy signals. Take carbon pricing as an example, which is covered by Article 6 of the Paris Agreement. According to an OECD study, in 2018, the pricing gaps between actual carbon prices and real climate costs in 42 OECD and G20 countries, averaged 76.5 percent.^[64] At the same time, even though an increasing number of investors, banks and companies have embedded carbon prices in their business strategies and operations, less than 5 percent of companies have carbon prices consistent with achieving the Paris Agreement goals.^[65] If policy makers institute better price signals to reflect environmental or climate change concerns (e.g., removal of fossil fuel subsidies, carbon tax etc.), this will become a strong driver of improved financial returns to sustainable investments. This will then turn correlations into causation and incentivize more sustainable investment.

MDBs have an opportunity to play an important role in bridging finance with development goals, and crowding in private capital, into key areas

²² Some evidence of pricing benefits from primary issuance (i.e., lower coupon rate) has also been documented in International Finance Corporation. 2018. Creating Green Bond Markets. Observations about green bonds performance are from Olivier Zerbib (2017) the Green Bond Premium, and Olivier Zerbib (2019) the effect of pro-environmental preferences on bond prices.

such as unlisted infrastructure assets and private equity. AIIB has observed that MDBs are generally viewed as trusted partners, given their preferred credit status and ability to leverage public sector relationships, and with information and market access that can help improve risk management.^[66] There is a variety of proven methods of private sector investors collaborating with MDBs.^[67] More recently, to mobilize finance toward sustainable investment, a number of public sector players have provided proactive and strategic interventions, through risk mitigants in the forms of loans, guarantees, co-investments and cornerstone stakes, and also transaction enablers through warehousing and pooling to catalyze investment activities.^[68] The setup of the GBP250-million UK-India Green Growth Equity Fund with public money as cornerstone investment, and AIIB's Infrastructure Private Capital Mobilization Platform are recent examples of such.

In summary, there are promising and encouraging trends on sustainable investment with clear growth and interests at multiple levels. Reputation benefit is an important key driver for actions on sustainability, though it is unlikely to be sufficient. There is also a need to address issues concerning self-selection of reporting or even "green-washing". Stronger policy support in pricing environment and other externalities, together with harmonizing of various standards, can give greater impetus toward sustainable investment. MDBs have an opportunity to play an important role both in mobilizing finance toward sustainable investments through the products they offer to private sector investors as well as the standards they uphold. Ultimately, collective efforts are needed for greater mobilization toward sustainable investments that can further contribute to the objectives of the SDGs and the Paris Agreement.

7

BALANCING INVESTMENT WITH DEBT SUSTAINABILITY

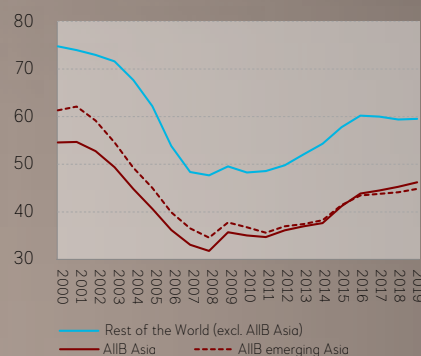
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There is a perception that public debt levels and risks are increasing across the world, eroding the fiscal space available to fund development spending, especially for infrastructure.²³ Is it the case in Asia? To answer this question, this chapter reviews the sovereign debt and credit risk picture among AIIB regional members and finds that debt distress risk remains generally low and credit profiles are generally healthy.²⁴ While there are specific vulnerabilities (especially among smaller economies) that require individual attention, the amounts involved are relatively small and do not appear to pose a systemic risk. Accordingly, most countries have room to invest more to address their large infrastructure needs.

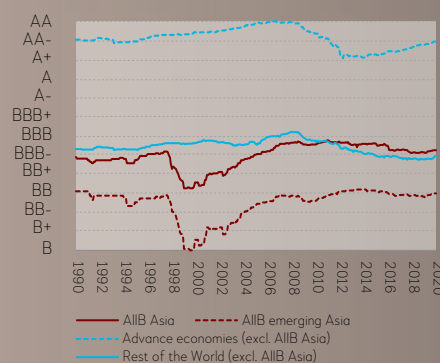
Even so (and given finite fiscal space), to maximize investment while keeping debt ratios under control, projects selected for implementation should have demonstrable economic benefits. Likewise, investment should not be unduly curtailed in countries with higher debt levels. Instead, priority should be given to projects that generate positive cash flows to the government, enabled by good macroeconomic frameworks and the right financing structures and terms.

Figure 20: Public Debt Among AIIB Members (as percent of GDP, average across economies)



Data Source: IMF World Economic Outlook, October 2019; data for 2019 estimated.

Figure 21: Average Sovereign Credit Ratings



Data Source: S&P, Fitch and Moody's; see also footnote 26.

²³ See, for example, World Bank. 2019. *Addressing Debt Vulnerabilities in IDA Countries: Options for IDA19*, or World Bank. 2020. *Global Waves of Debt: Causes and Consequences*. The latter report portrays the recent global debt increase in developing and emerging economies as the "largest, fastest, and most broad-based [debt] wave yet", although it refers to total debt, including new private sector borrowing.

²⁴ Asia refers to AIIB "regional" (i.e., Asian) members. There are currently 44 regional members accounting for about 95 percent of the Asian population and GDP: Afghanistan (AFG), Australia (AUS), Azerbaijan (AZE), Bahrain (BHR), Bangladesh (BGD), Brunei Darussalam (BRN), Cambodia (KHM), China (CHN), Cyprus (CYP), Fiji (FJI), Georgia (GEO), Hong Kong, China (HKG), India (IND), Indonesia (IDN), Iran (IRN), Israel (ISR), Jordan (JOR), Kazakhstan (KAZ), Republic of Korea (KOR), Kyrgyz Republic (KGZ), Lao People's Democratic Republic (LAO), Malaysia (MYS), Maldives (MDV), Mongolia (MNG), Myanmar (MMR), Nepal (NPL), New Zealand (NZL), Oman (OMN), Pakistan (PAK), Philippines (PHL), Qatar (QAT), Russia (RUS), Samoa (WSM), Saudi Arabia (SAU), Singapore (SGP), Sri Lanka (LKA), Tajikistan (TJK), Thailand (THA), Timor-Leste (TLS), Turkey (TUR), United Arab Emirates (ARE), Uzbekistan (UZB), Vanuatu (VUT), Vietnam (VNM).



7.1 Higher Public Debts but Generally Healthy Ratings

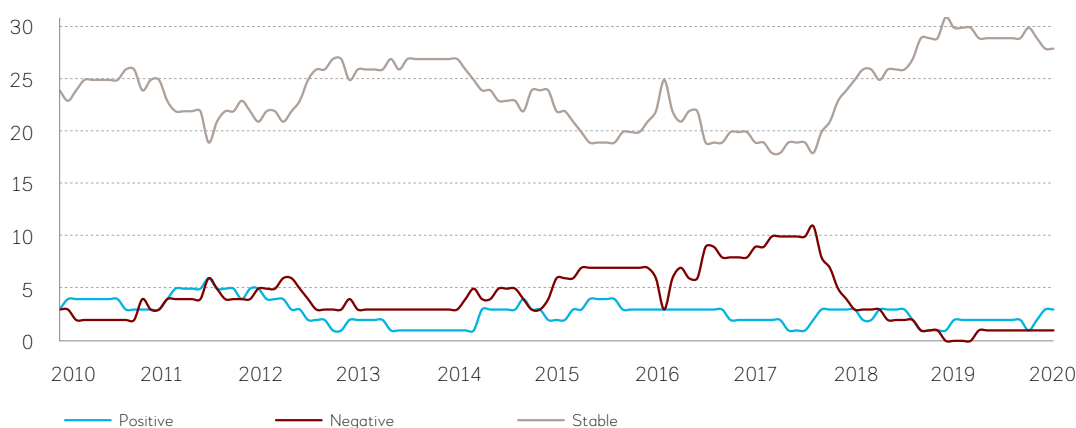
The financial crisis in the late 2000s was a turning point. In the previous years, benign macroeconomic conditions and debt relief initiatives brought about a decline in public debt levels across the world (Figure 20). After the crisis, fiscal deficits widened considerably to accommodate the shock. Advanced economies began a gradual, if somewhat uncertain fiscal adjustment, while emerging and developing economies continued with larger primary deficits to support a rapid growth of expenditures, both for consumption and investment. Easy global financial conditions made debt affordable and facilitated additional borrowing. The 2014 commodity price collapse, to which many countries did not adjust in time, and the 2015-2016 slowdown added to debt. As a result, the average debt-to-GDP ratio increased globally by more than 10 percentage points between 2011 and 2016, and has since stabilized.²⁵

While public debt levels in AIIB regional members have followed global trends, the overall debt metrics in Asia are relatively better. The average debt-to-GDP ratio has increased from around 35 percent in 2011, after the dust from the financial crisis had settled, to around 47 percent in 2019. Likewise, the effects of the 2014 commodity price crash and the 2015-2016 slowdown are reflected in the faster pace of debt accumulation during those times. Since 2016, debt in AIIB regional members has continued to creep up, albeit at a slower pace. Overall, public debt levels in Asia are

distinctly lower than the global average, thanks to earlier, relatively more conservative fiscal policies. Debt levels are expected to stabilize in the next five years. Headroom therefore exists to cautiously accommodate more investment, as explained later in this chapter.

Sovereign ratings—another way to look at creditworthiness—support the view of a generally healthy state of sovereign credit in Asia.²⁶ The mean sovereign rating for all AIIB regional members is between BBB- and BBB, and for AIIB regional emerging market members, it is BB.²⁷ In contrast to the overall gradual erosion of sovereign credit in the rest of the world—by more than a full notch since the crisis—Asia’s average credit has been relatively stable or increasing until 2014. Looking at Asian emerging markets, the average rating has been supported by the improving creditworthiness of Fiji, Georgia, Indonesia and the Philippines. On the other hand, the decline in the average credit score since the peak in March 2014 can be attributed to the impact of the decline in oil prices (downgrades of several Gulf countries as well as Kazakhstan) and idiosyncratic macroeconomic stress (downgrades of Mongolia and Turkey). Among the 13 (out of 44) AIIB regional members for which rating trends are not available, debt metrics derived from their respective Debt Sustainability Analyses (DSA) have, since 2014, remained similar in nine cases, deteriorated in three and improved in one.

Figure 22: Outlook in Credit Ratings



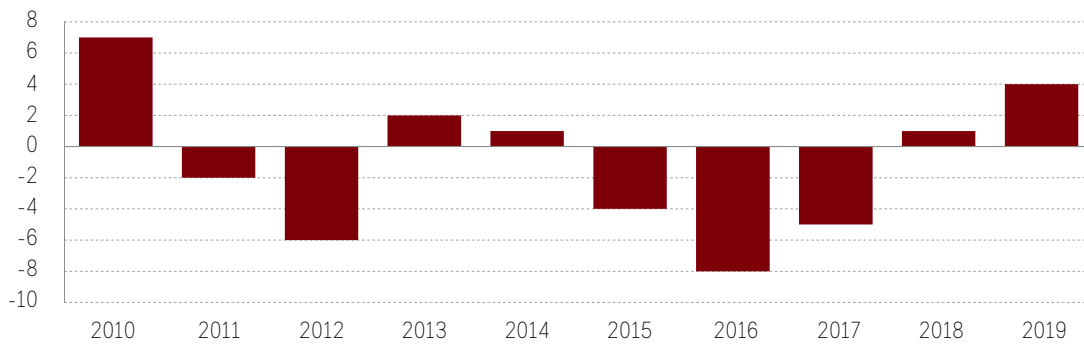
Data Source: S&P, as of Jan. 1, 2020.

²⁵ Data for 2019 throughout this article are estimations. “Public debt” generally refers to public and publicly guaranteed debt of the general government.

²⁶ Information on sovereign ratings as of Jan. 1, 2020 from S&P, supplemented with Fitch and Moody’s. Over time, rating agencies have been expanding their rating universe, adding sovereigns with lower and lower ratings, so a simple average of ratings would exhibit a spurious steep downward trend, at least until 2008. The analysis adjusts for that, treating non-rated members’ sovereigns as if they had been rated, and following the average trend. Accordingly, historic values should be treated as an index, rather than actual average rating.

²⁷ The analytical subgroup “AIIB regional emerging markets” consists of all low- and medium-income AIIB regional members.

Figure 23: Net Upgrades of Sovereign Credit Ratings of AIIB Regional Members

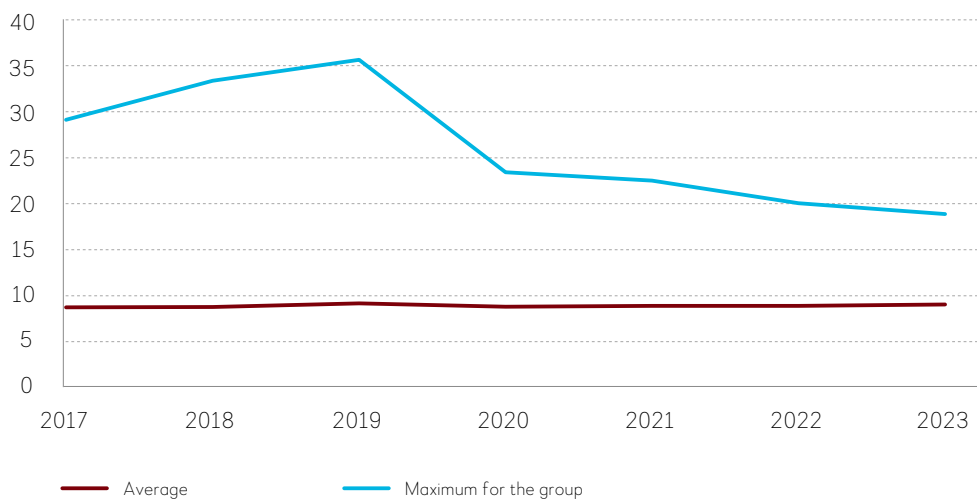


Data Source: S&P, Dec 2019; expressed in number of notches.

Looking forward, the sovereign credit outlook is stable overall. Ninety percent of all rated AIIB regional members have a stable outlook attached to their ratings, while the number of ratings with a positive outlook is now higher than those with a negative one (Figure 22). The net number of

upgrades (upgrades less downgrades) in 2019 has been unambiguously positive for the first time in many years (Figure 23). The projections for public-sector gross financing needs are about 9 percent to 10 percent of GDP per year on average—relatively affordable (Figure 24).

Figure 24: Gross Public Financing Needs (AIIB Regional Emerging Market Members, as Percent of GDP)



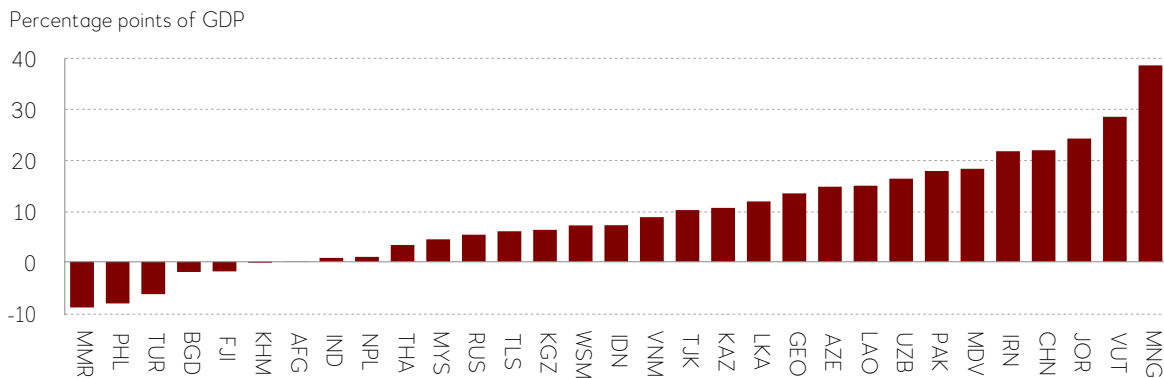
Data Source: IMF (2019 estimated figures, 2020-2023 projected figures).

7.2 Specific Debt Vulnerabilities in Some Smaller Economies

That said, specific debt vulnerabilities exist, especially among smaller economies, but they are not systemic in nature. Looking beyond the average, the pace of debt accumulation over the past decade has been uneven—from a reduction of 10 percentage points of GDP to an increase by almost 40 points (Figure 25). Debt levels also vary among AIIB’s Asian emerging market members, ranging from close to zero to almost 100 percent of GDP (Figure 26). This more granular picture reveals that in as many as 10 AIIB Regional Members, public debt is a concern.²⁸ In addition, five AIIB Regional Members are under an IMF program and 10 are under a debt limit, either

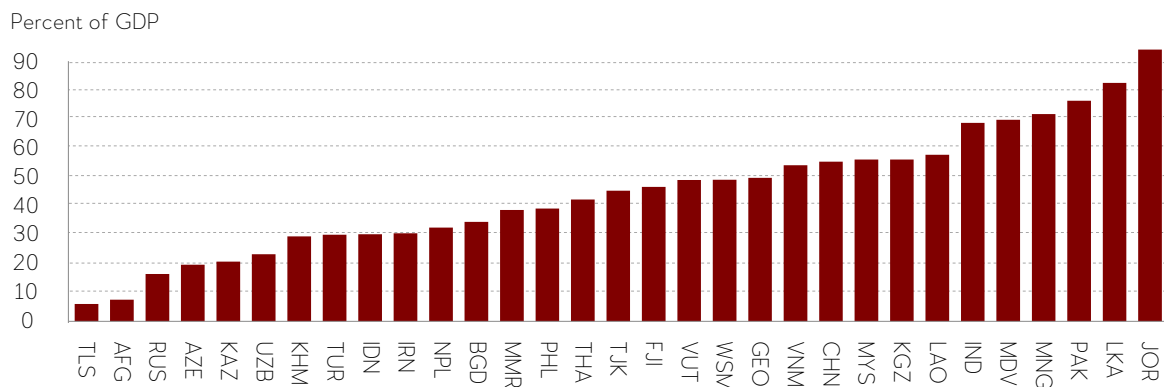
in the context of the IMF program or under the International Development Association’s (IDA) non-concessional borrowing limits. In most cases, debt is deemed sustainable in principle, provided fiscal consolidations and reforms are sustained. Nor does the situation pose a systemic risk, as the amounts involved are relatively small compared to the totality of sovereign debt in Asia. A consequence is, however, that a lack of fiscal space and the related borrowing limits put in place to safeguard debt sustainability may be constraining the necessary infrastructure investment in those countries. The investment aspect is discussed later in this chapter.

Figure 25: Increase in the Public Debt, 2011-2019



Data Source: IMF World Economic Outlook October 2019, estimated.

Figure 26: Public Debt, 2019



Data Source: IMF World Economic Outlook October 2019, estimated.

²⁸ That is, a country is either declared to be in high risk of debt distress per the IMF’s most recent DSA or has debt levels and public gross financing needs exceeding the established safe threshold (typically, 75 percent and 15 percent of GDP, respectively).

While there are several common traits underlying debt vulnerabilities in AIIB regional members, the direct factors tend to be idiosyncratic. On the one hand there is weak capacity to carry debt, related to low incomes, low domestic savings, volatile exports, limited economic diversification, low domestic revenue mobilization, exposure to shocks and generally low external competitiveness. This is compounded by institutional weaknesses reflected in the difficulties of collecting more revenues, fixing loss-making SOEs, removing subsidies, ensuring

a clean and profitable banking sector, reducing corruption, and conducting generally prudent macroeconomic policies. On the other hand, there are persistent fiscal deficits due either to delays in adapting macrofiscal policies to changing circumstances (Bahrain, Pakistan, Sri Lanka) or to large debt-financed infrastructure spending (Lao PDR, Maldives, Mongolia, Samoa, Tajikistan), or both. Finally, there are also genuinely exogenous shocks, such as fallout from conflicts (Afghanistan, Jordan) or natural disasters and climate change (Lao PDR, Samoa).

7.3 New Trends in Borrowing

In addition to the above developments, the mix of creditors and debt instruments has become more complex, which calls for sounder debt management. Both globally and in Asia, official concessional lending from traditional creditors has not kept pace with demand. For example, between 2007 and 2016, debt owed by low-income and developing countries to traditional multilaterals and Paris Club countries fell by more than 10 percentage points of GDP.^[69] One structural reason is that developing economies are growing fast and have external financing requirements which cannot be fully met by developed economies that are growing more slowly. There are also constraints for concessional finance to grow quickly enough due to fiscal pressures in developed economies. Borrowers thus turned to alternative sources of finance, such as new non-traditional official creditors (e.g. Gulf countries and, notably, China) and international bonds (“Eurobonds”)—see paragraphs below. Off-budget financing has also become more popular, including public-private partnerships (PPPs), guarantees, or borrowing by state-owned enterprises (SOEs). Better market access, the growing availability of credit, and the diversification of sources are all positive developments, but there is a need for more transparency, and a more coordinated effort to manage borrowing risks.

In this context, China has stepped in to fill the gap, playing a bigger role in the supply of development finance over the past decade. Such additional resources and expertise have been welcome and are

often transformative. Among AIIB regional members, China’s bilateral lending is a small portion of the overall financing for larger countries, but may be a larger portion for some smaller economies. China’s Ministry of Finance’s recently-issued guidance on debt sustainability in low-income recipients of Chinese investment was a step in the right direction, IMF said.²⁹ China’s financial institutions are encouraged to use this guidance as reference in their lending operations. Also, the China-IMF Capacity Development Center is a recent effort to step up capacity development activities in Asia, including in areas like debt management.

There is also a broader global trend of greater reliance on private credit, including Eurobonds, by subinvestment grade sovereigns around the world. Market access has been facilitated by ultra-low interest rates. Globally, in the past three years, gross annual international bond issuances from such markets have been running at about USD35 billion, an almost seven-fold increase from 2010. Several AIIB members leveraged this opportunity.³⁰ The outstanding stock of Eurobonds has reached about 6 percent of GDP on average for AIIB regional emerging market issuers and has exceeded 15 percent of GDP for some of them (Jordan, Mongolia). However, private commercial debt is not without problems, including shorter maturities, not necessarily suitable for funding longer-term infrastructure projects, and higher interest rates.³¹ Eurobond “bullet repayment” schedules can pose refinancing risks that need to be managed.

²⁹ IMF’s Christine Lagarde’s speech at the Beijing Forum on April 26, 2019.

³⁰ One recent debut was Uzbekistan, at the beginning of 2019, with USD1 billion of five- and 10-year bonds with a coupon of 4.8 and 5.4 respectively (the issue was heavily oversubscribed).

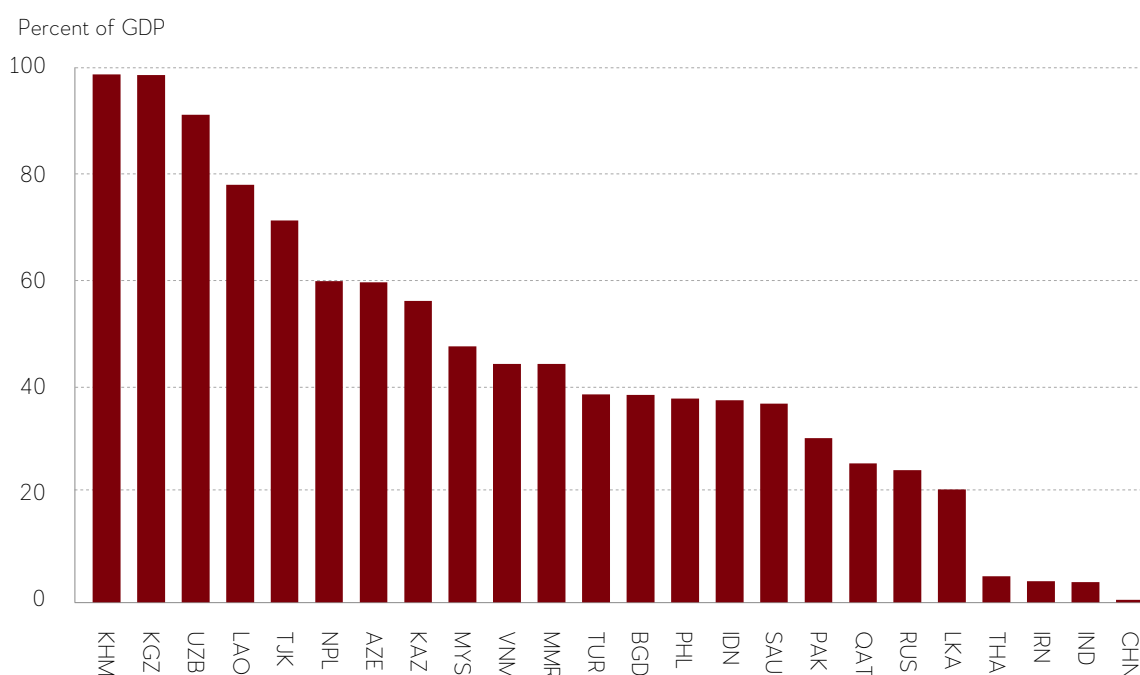
³¹ Rates of 7 percent or more in USD terms are typical for countries with lower ratings, depending on market conditions.

7.4 Improving Policy Frameworks, Mitigating Against Macroeconomic Imbalances

Returning to the investment aspect, framing the infrastructure development discussion around debt sustainability misses the fact that debt should be seen as an enabler, rather than an impediment. The factors that determine a successful project are not necessarily related to the level of debt incurred by a project, but more to fundamental drivers such

as the project's economic cost-benefit and the way it is structured. Other circumstances, such as macroeconomic policies, often codetermine whether infrastructure debt remains sustainable or not. Thus, finding creative ways around fiscal constraints is key to unlocking critical infrastructure pipelines in developing countries.

Figure 27: Share of FX Debt (in Percent of Total Public Debt)



Data Source: IMF Fiscal Monitor, April 2018.

Of course, it would not be easy to raise infrastructure spending by a few percentage points of GDP. Even for countries with low or moderate debt levels, the existing fiscal space would soon come under strain. Yet, borrowing for infrastructure will remain an indispensable element of the financing mix. Investing better is about the prioritization of investments and avoiding poor choices. Viewed in this light, high debt is a symptom of money badly spent—particularly past investments not bringing commensurate increases in growth needed to offset the impact on debt ratios, that is to “grow

out of debt”. Hence, to make the needed scale-up of infrastructure investment sustainable, AIIB regional members will need to invest in projects with credibly high economic returns.³²

However, when governments are unable to recapture some of the newly created economic benefits through general taxation, even good investments can end up adding to the debt burden. But cutting investment should not be the principal way of ensuring debt sustainability—this would risk entrenching a self-reinforcing low-growth low-fiscal-space

³² The calculation of economic benefits should include life cycle considerations (i.e., account for future operation and maintenance, and other long-term costs, not just the initial costs), and, of course, include realistic projections of benefits and rigorous assessments of risks.

low-investment cycle. In such environments, not only does a project need to have credibly large economic returns, but it should also be financially self-sustained. This means selecting projects with positive cash flows that would accrue directly to a government entity in the form of export revenues, direct sales, tariffs, user charges, or other cost recovery methods.³³

The viability of infrastructure projects can be further enhanced by a sound and flexible macroenvironment that militates against a build-up of macroeconomic stress and imbalances due to higher infrastructure investment rates. While policies may vary by country, prescriptions include averting large exchange rate misalignments, filtering out unnecessary trade protectionist measures (both tariff and non-tariff) that would increase the cost of imported inputs and hence the total project costs (see **Box D**), putting fiscal frameworks in place for investing more counter-cyclically and increasing public savings to make space for more investment, as well as promoting a sound financial sector to encourage private savings. The last measure would also allow investors to finance themselves in local currency thus removing the FX risk—which can be substantial for many Asian countries (**Figure 27**), and which acts as a deterrent to more infrastructure investment.

At the project level, viability is also about putting in place appropriate project structures with enabling terms for financing, efficient risk sharing and well-structured investor incentives. This point can be illustrated with two examples of projects in Greece and Mozambique—countries that sit at opposite ends of the economic development spectrum—where, despite the national governments being at or near default, a focus on getting the project structure right led

to successful infrastructure development (see **Box C**). Their ability to overcome formidable financial challenges shows the high potential for creative approaches: leveraging capital from private investors and development institutions, implementing strategic risk transfer, and careful and limited deployment of government resources.

While this report does not advocate an indiscriminate ramp-up of infrastructure spending, its analysis does indicate that, with enabling factors in place, good projects can be implemented even in countries with high debt or otherwise constrained fiscal space.

How can the current debt sustainability framework (DSF) accommodate large, quality projects in high-debt countries? The DSF—the prevailing international framework for assessing debt vulnerabilities and coordinating official borrowing—has undergone several refinements and now appears to be serving countries and their development partners well. The IMF has been playing an important role—for example, AIIB uses the IMF’s DSA assessment as the first point of reference in ensuring its lending is consistent with a country’s fiscal sustainability. However, for smaller economies, large infrastructure projects face some headwinds right at the start, even if financially self-sustained with large credible long-term economic returns. They may trigger debt distress risk warnings, due to substantial upfront costs, or fail to find financing because of ceilings on non-concessional borrowing. Countries should work with the IMF, IDA and other development partners to address such trade-offs with appropriate flexibility, while safeguarding debt sustainability, in order to ensure that large, high-quality investments are not unduly constrained.

³³ While user fees tend to be politically sensitive and difficult to implement, resistance may be easier to overcome if they apply to newly built infrastructure that would not materialize otherwise. According to ADB’s 2017 report, *Meeting Asia’s Infrastructure Needs*, user fees for public utilities tend to be low in emerging Asia, often insufficient to cover operation and maintenance costs, and there is substantial scope to increase such fees while protecting vulnerable groups. On the positive side, technological advances provide ever new ways to apply and enforce user fees more effectively. In any case, measures may need to be put in place to insulate project revenue streams from governance and political risks.

BOX C:

Investing in High-Debt Countries: Two Case Studies

Greece: A Textbook Case of Fiscal Challenges

Few countries evoke the archetype of sovereign fiscal constraint more strongly than Greece did at the height of the European debt crisis. To avoid sovereign default, the country accepted bailouts from the European Union (EU) and the International Monetary Fund (IMF) that were tied to fiscal austerity and government spending cuts. Nevertheless, throughout this period, Greece managed to maintain infrastructure investment and continue to implement projects that were already in the pipeline.

In the transportation sector, it did this by turning to public-private partnerships (PPPs) by way of granting term concessions to private firms. Those firms took on the responsibility for designing, building, financing, and operating an asset in exchange for the right to collect user fees, such as tolls. A focus on risk transfer to the private sector, and leveraging of new revenue streams, enabled the government to lower the fiscal burden it faced from the projects.



One such project is the Olympia Odos highway. Envisioned to connect Athens with Tsakona in the southwest of the country's Peloponnese peninsula, the original PPP agreement for the EUR2.8 billion project was signed in 2008, when Greece's public debt-to-GDP ratio was already above 100 percent. Given the country's already-limited ability to commit public financing to the project, it was financed through a combination of multilateral funding from the EU and the European Investment Bank, private financing from banks and equity investors, toll revenue, and a limited amount of Greek public funding. The Greek financial crisis led to a reduction in traffic and a commensurate reduction in toll revenue. As a result, construction on new sections was halted

in 2011 until the project's various stakeholders agreed to reduce the scope of the project to one critical segment linking Athens and Patras, the country's second largest port. The project budget was trimmed to EUR1.5 billion, but the most important component of the project would be built. The highway has reduced travel time to Patras from neighboring areas by up to 20 percent, enabling faster access to the port for agricultural and other exports.

Greece's public debts remain high. The project demonstrates the ability of Greece to attract alternative financing to the country's infrastructure projects at a time when it was unable to commit significant public resources investments. Importantly, international investors and multilateral institutions were able to step in to fill a financing gap as a result of alternative structuring whereby financiers could be repaid by users instead of solely by Greece's public budget.

Mozambique

Mozambique is not an AIIB member but it presents an interesting case study, with a GDP per capita of only USD500. Mozambique has similarly embraced alternative contracting as a mechanism to finance infrastructure projects in the face of its own enormous public finance challenges. The country's fiscal challenges are illustrated by a public-debt-to-GDP ratio that skyrocketed from an already high 88 percent in 2015 to 120 percent in 2016 upon the disclosure of USD1.4 billion of additional debt that was not officially approved by the country's parliament. Mozambique defaulted in 2017.

Despite its fiscal condition, Mozambique has successfully structured PPPs in its power sector, an important area for investment—only 29 percent of the country's population has access to electricity. With the discovery of large natural gas reserves, Mozambique sought to develop natural gas-powered electricity generation closer to Maputo, its capital, as a low-cost alternative to the city's imported electricity from South Africa. In recent years, the country has been able to successfully develop two new gas plants near Maputo, increasing generation capacity of the country by over 10 percent. Both projects were developed through PPPs, and EDM, Mozambique's state-owned electric utility, has signed long-term power purchase agreements with both plants. The agreements were designed to provide a level of revenue security to these projects. As a result, the government of Mozambique was able to minimize the amount of capital it needed to commit while enabling conditions that were sufficient to attract private capital.

In 2018, one of the projects, the 175MW Central Térmica de Ressano Garcia power plant was able to complete a successful refinancing with multiple participating multilateral and private lenders, even as the IMF assessed the country's public debt to be on "an unsustainable path." This is due to the confidence that lenders had in the project's financial structure. Indeed, one advisor to the refinancing suggested that it represented "a major signal to the international investor community that investment in Mozambique infrastructure designed to service the Mozambican public is viable".



Photo Credit © Salam Habash

8

INFRASTRUCTURE FINANCE MARKET OVERVIEW (2019-2020)^{The EIU}

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The Asian Infrastructure Finance 2019 report indicated that the Asian infrastructure finance market was at an inflection point. It highlighted rising geopolitical issues, market volatility, and skepticism about globalization leading to trade tensions, all of which threatened to disrupt supply chains and impact long-term financing.³⁴

One year later, and with the same potential disruptors still lurking in the background, the Asian infrastructure financing market seems to have taken a downward turn. Given the long gestation period, reduced investment in infrastructure financing for a particular year is not likely to be felt soon, and hopefully the dip in 2019 might be temporary and the quick bouncing back of financing will make

good on the loss of healthy project pipelines. Importantly the market is also cautiously optimistic about renewables and transport in Asia. However, it could also be that there are deeper structural disruptions at work, hindering future market growth.

Despite the uncertainty around market trajectory, the pressing need for infrastructure financing in Asia still holds strong, as mentioned in **Chapter 1**. This section looks at the key near-term trends that shaped the Asian infrastructure finance market in the current year and may potentially impact the course ahead.³⁵ It also incorporates insights from interviews to better understand market sentiments for the infrastructure and project finance market.³⁶

³⁴ As this report was finalized, the 2019 novel coronavirus COVID-19 came as an unexpected shock in late 2019 and early 2020. Given the developing and fluid situation, this section is unable to ascertain the full impact of the outbreak. Nevertheless, the early indications are that economic activity would rebound in the second half of 2020, with fiscal and monetary policies around the world becoming more supportive.

³⁵ Note that interviews with market participants and research for Chapter 8 and Chapter 9 were conducted before the onset of the COVID-19 outbreak in late 2019 and early 2020. While the unexpected outbreak should not undermine long-term demand trends, there could be an impact on infrastructure financing activity in the first half of 2020.

³⁶ The scope of analysis in Section 8.1, Section 8.2 and Chapter 9 is as follows: (i) private financial transactions; (ii) "other" sector refers to oil and gas, mining and social defense; (iii) interviewees are market participants across eight countries profiled in this report and listed in Appendix 3; (iv) references to Asia in this section refer to the Asia-Pacific region (including Australasia), as well as Russia and Turkey, consistent with AIFB's regional membership. (v) Data retrieved from IJGlobal as of Jan. 31, 2020.

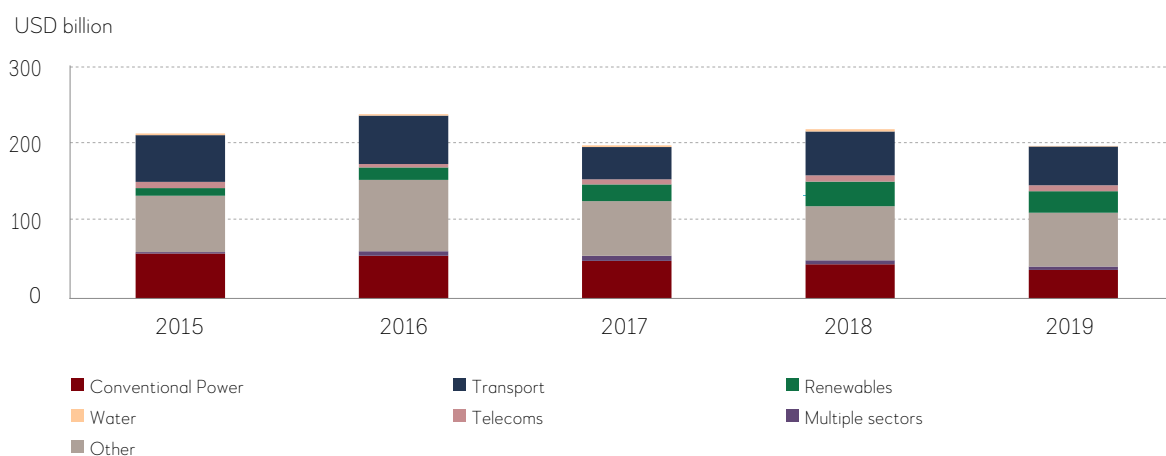


8.1 Decline in Private-Sector Infrastructure Activity—More Incidental Than Structural

Private sector infrastructure financing activity in Asia declined in 2019 compared to the previous year; however, with a seemingly strong project pipeline for the next year, markets continue to remain optimistic. The total value of private transactions reaching financial close in Asia declined from USD218 billion in 2018 to USD196 billion in 2019 (Figure 28), a decline

of around USD22 billion. The transport sector recorded the highest transaction value at USD50 billion in 2019 and accounts for nearly 25 percent of the total financing activity. This was followed by the oil and gas sector with a transaction value of USD46 billion and conventional power with a transaction value of USD37 billion, respectively.

Figure 28: Value of Closed Private Transactions in Asia, 2015-2019

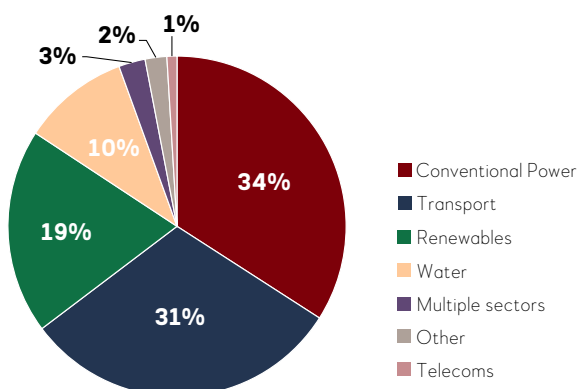


Data Source: IJGlobal.

Figure 29 illustrates the share of each sector's contribution to the total decline of USD22 billion in 2019. Conventional power sector witnessed the highest absolute decline among all sectors (USD7.31 billion), followed by transport at USD6.58 billion, and the renewables and water sectors at USD4.17 billion and USD2.19 billion

respectively. It is interesting to note that conventional power accounts for 34 percent of the decline, indicating a significant shift away from conventional power; this is explored further in the present report. Multisector, oil and gas and telecommunication sectors declined marginally.

Figure 29: Sectoral Share in Total 2019 Decline Value

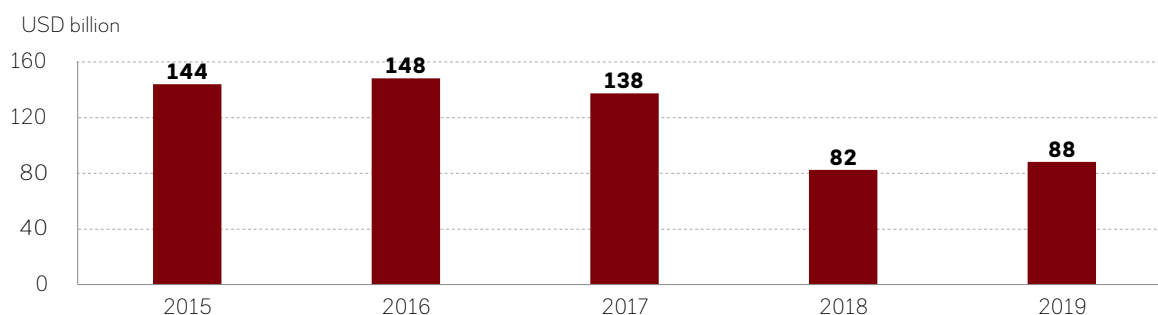


Data Source: IJGlobal.

Using a different dataset, **Figure 30** shows syndicated loans to infrastructure sectors in eight markets in Asia. The value of syndicated loans declined from USD148 billion to USD82 billion in 2018 due to market headwinds, with a small

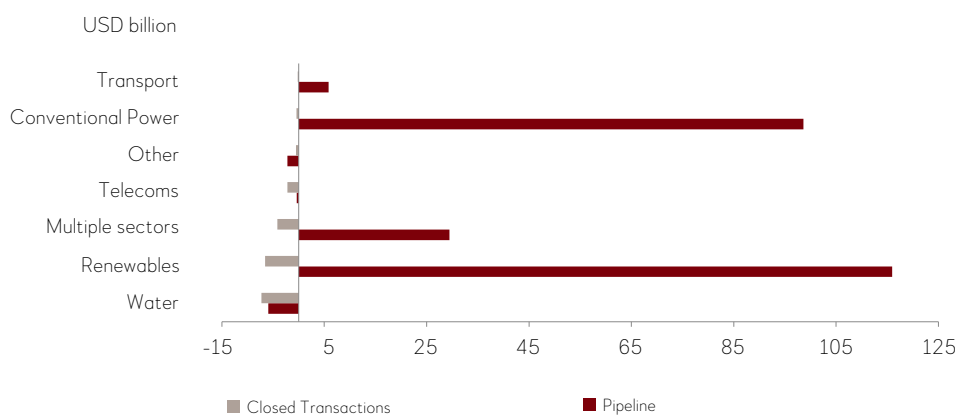
rebound seen in 2019 to USD88 billion. In other words, financing activity through the loan market is still significantly below the high levels seen from 2015 to 2017.

Figure 30: Closed Infrastructure Transactions in Syndicated Loan Market, 2015-2019



Data Source: Refinitiv. Transactions in this figure cover the energy and power (and water and sanitation), telecommunication and industrials subsections (transport and construction engineering). Only eight developing economies in Asia are covered in this chart due to data availability. They are Bangladesh, China, India, Indonesia, Pakistan, Philippines, Russia, and Turkey.

Figure 31: A Decline in Closed Private Transactions Alongside an Increase in the Project Pipeline, 2018-2019



Data Source: IJGlobal.

As shown in **Figure 31**, the pipeline of open and announced projects has significantly increased since 2018 across all sectors, except oil and gas and water, suggesting a potential rebound in the next 12 months.³⁷ It is possible that not all the announced deals will materialize, but interviewed market participants also reported that they did not expect the decline in 2019 to be sustained, and expected transaction activity to increase over the next year. Interviewees attributed the 2019 slowdown in deal activity to mostly global macroeconomic uncertainty, localized challenges and election cycles in key markets.³⁸ Hence, the decline in 2019 activity seems incidental rather than structural.

Global macroeconomic uncertainty resulted in major headwinds to the Asian economy. Escalation of trade tensions between the US and China caused currency fluctuations in a number of emerging markets in Asia. Financial market risk aversion kept investors away from long-term investments. Interviewed market participants concurred that while the trade tensions did not have a direct impact on infrastructure projects that are already underway, it led to a broader shift in sentiment, as investors became more cautious with regard to new investments in Asia, many adopting a wait-and-see approach.

³⁷ The pipeline includes projects in various stages of progress: from the initial announcement to just before the financial close, and those that had any official project announcement or activity in 2019. Given this, the pipeline figures should be seen as indicative.

³⁸ India, Indonesia, the Philippines and Thailand.

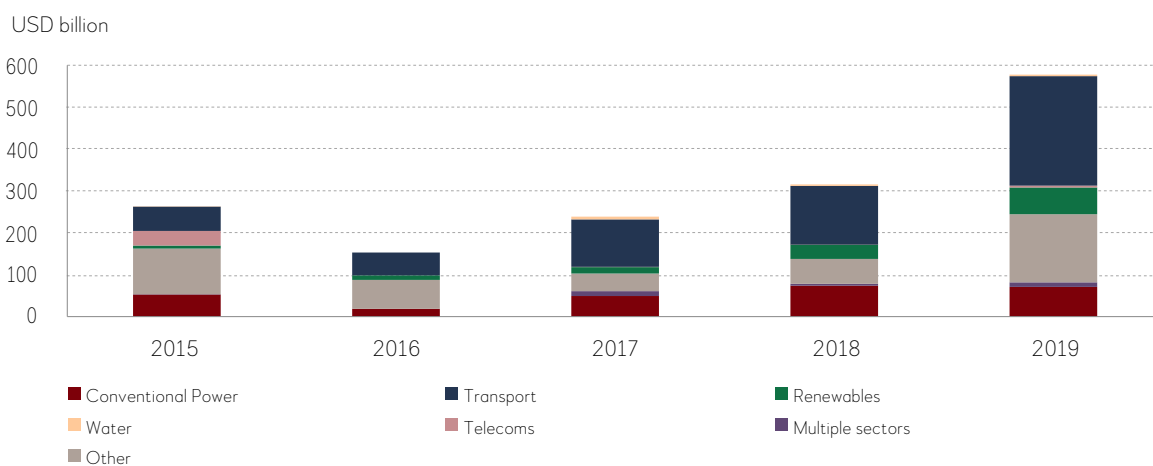
The first half of 2019 was an active election cycle for much of Asia, as a number of key regional economies held their general elections through April to May. Investors leaned toward caution and preferred to postpone key investment decisions.³⁹ Indonesia, in particular, witnessed a 73-percent decline during 2019.

Market participants across the spectrum have concurred that while banks have the risk appetite to lend, unpredictable regulatory environments and a lack of proper risk allocation mechanisms for project prioritization are not conducive for the Asian infrastructure finance market to grow and prosper. The tight liquidity conditions in India following the

collapse of a key non-bank lender, local content requirements in the renewables sector in Indonesia and the program of unsolicited proposals in the Philippines are some key examples of local challenges in the focus countries.

Despite the weaker financing close in 2019, the project pipeline in Asia has reached a five-year high (Figure 32).⁴⁰ The value of open and active transactions stood at USD565 billion in the current year—a robust increase from last year.⁴¹ Market participants are optimistic about the outlook for the next 12 months as they see a sizable pipeline of projects, provided this is complemented by support from the region’s policy makers.

Figure 32: Value of Open and Announced Private Transactions in Asia, 2015-2019



Data Source: IJGlobal

On a sectoral level, the transport sector leads the project pipeline in Asia. With USD256 billion of projects in the pipeline, it accounts for 45 percent of open transaction values. This is in line with the focus of Asian countries on building connectivity infrastructure such as roads, railways, bridges, ports etc. India, Indonesia and the Philippines have all outlined huge fiscal spending to improve their transport infrastructure. The only two sectors that have witnessed a smaller pipeline in 2019 in comparison to the previous year are the conventional power sector and water sector, albeit their decline was small.⁴²

Many governments in Asia have signaled their intention to address the challenges facing the infrastructure sector. Regional governments have increasingly focused on collaborating with the private sector. For instance, India’s 2019-2020 Budget Speech clearly outlines measures to promote private-sector participation in infrastructure financing. The Philippine government’s “Build, Build, Build” program provides a list of projects and sectors that the government is focusing on, providing clear direction for market participants.

³⁹ Besides investors’ caution, new projects and investment activity in the public sector usually witness a slowdown as governments are likely to be bound by a model code of conduct in the months preceding an election.

⁴⁰ The strong increase in the pipeline in 2019 might be due to projects delayed or held over from other previous periods. However, the information in the dataset does not allow precise estimation. This caveat also applied to country-specific analyses later in the report.

⁴¹ While the healthy pipeline is a good sign, it is, of course, not guaranteed that all will reach financial close.

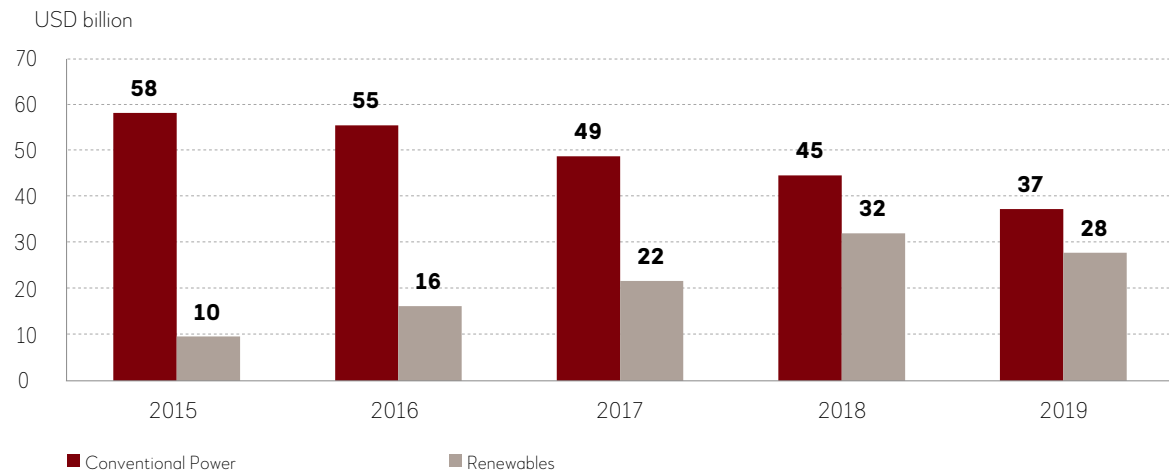
⁴² However, the pipeline of general transmission and distribution projects increased in 2019, indicating that the decline in power projects came in traditional energy generation and transmission and distribution tied to coal and gas.

8.2 Asia on the Path to More Sustainable Energy

Asia's energy transition from conventional to renewable is well underway. Between 2015 and 2019, investments in conventional power in Asia declined from USD58 billion to USD37 billion. At the same time, investments in renewable energy nearly tripled from USD10 billion to USD28 billion (Figure 33).

Though the renewables investments, in absolute size, continue to be smaller than the conventional power investments, its share in total energy investments is steadily rising in Asia. The gap between the values of investments in both sectors has narrowed since 2015. This ratio of conventional to renewables investments has fallen from 5.8:1 in 2015 to 1.3:1 in 2019.

Figure 33: Value of Closed Power Sector Private Transactions in Asia, 2015-2019

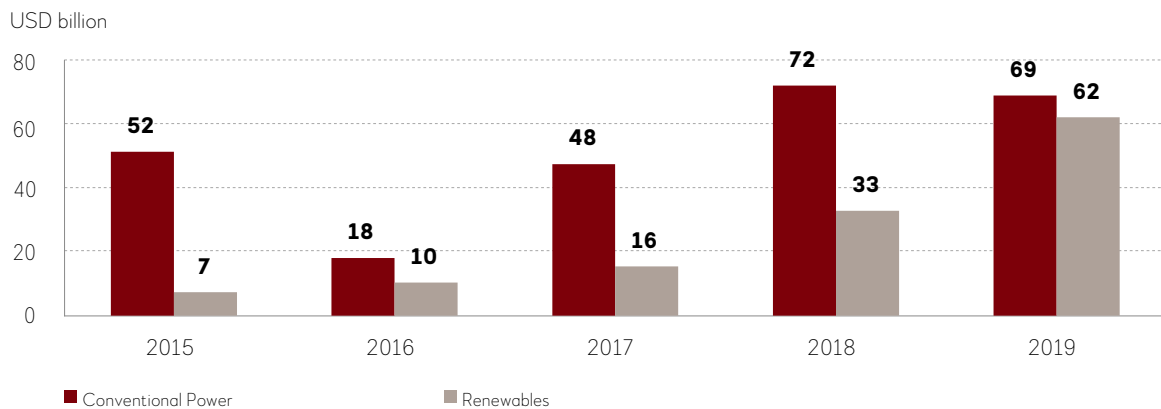


Data Source: IJGlobal

Market participants noted one key factor contributing to this decline: China's policy shift away from feed-in tariffs to a market-based approach (i.e., auction). This is critical because China accounts for nearly half of the global investment

in renewable energy. Market participants believe investment activity will grow over the next year. This is also reflected in Asia's healthy project pipeline for renewable projects valued at USD62 billion in 2019—a significant rise from USD33 billion in 2018.

Figure 34: Value of Open and Announced Power Sector Private Transactions in Asia, 2015-2019



Data Source: IJGlobal.

Market participants also noted that there is rising interest from private players, such as banks, to finance renewable sector projects across Asia. The targets set by Asian governments are also supportive of boosting renewable energy generation in the region.

Corporate off-takers are likely to provide a boost to renewable energy investments. Traditionally, the key off-taker for most energy projects was the state-owned energy utilities. Lately, this has changed as several multinationals, mostly European and North American, have begun to sign power purchase agreements (PPAs) to purchase power directly from renewable energy producers (corporate PPAs) in a bid to reduce their carbon footprint. This trend has gained significant traction since 2013—more so in the Americas and the European, Middle Eastern and African regions but also, of late, in the Asia-Pacific region. For example, in January 2019, Google signed a long-term corporate PPA (>10 years) where it agreed to purchase electricity from the 10MW solar farm in Tainan city for its Changhua data center. In 2018, Microsoft signed a PPA with the Sunseap Group in Singapore to purchase 100 percent of the electricity generated by its 60MW solar rooftop portfolio.^[70] Through 2018 and 2019, Australia has witnessed a number of corporates such as Telstra, Kellogg and Coca-Cola Amatil signing up to purchase wind and solar power.^[71]

Other countries such as Japan, Republic of Korea and Vietnam are in discussions to bring about changes to their laws in order to bring in direct power purchases. Corporate PPAs offer a range of advantages—easing the process of raising funds as the project benefits from an assured cash flow. For power producers, corporate purchasers are an attractive alternative to state utilities which are often unprofitable, leading to delayed payments.

More market reforms are needed to ensure smoother energy transition and increased efficiency. For instance, some SOEs are off-takers for renewable energy but are also owners of coal plants (leading to incentive conflicts). Other challenges are high local content requirements, unfavorable tariff schemes and government subsidies to fossil fuels.^[72] In some instances, power generators face a single off-taker, creating risks for power generators as they face the risk of not receiving payment for the power generated.

As the share of renewable energy grows, the transmission and distribution networks will have to adapt to the intermittent nature of renewable power generation, as well as invest in energy storage systems—these will have to go hand in hand. In the short- to medium-term, Asia's reliance on coal will continue given the variable nature of renewable energy and Asia's voracious demand for power. However, overcoming these challenges and giving renewables the support they need to grow is crucial for Asia if it intends to get on the sustainability track.



8.3 Investing Better With Innovative Capital Structures

Asia's infrastructure gap has been widely discussed. Developing countries in Asia invest only around 65 percent of the total amount required each year^[73] and limited capital availability continues to remain one of the key challenges in the implementation of infrastructure projects.

In order to bridge this gap in infrastructure financing, Asian countries need significant private capital. In Asia, project finance has mostly played out in the form of project loans through bank lending in both the greenfield and brownfield stages. The role of bank lending in both these stages is critical—at the greenfield stage, the risk is higher due to the inability of the project to generate cash flow; at the brownfield stage, when the project is operational, bank lending is crucial for the refinancing of loans. However, the inherent disadvantage of bank lending in financing infrastructure is the problem of asset-liability mismatch—banks have short term liabilities (deposits) and long-term assets (infrastructure loans). This mismatch creates significant pressure on their balance sheets.

8.3.1 Institutional Investors—Pension Funds

With substantial liquidity available for investment, institutional investors are significant sources of capital. This section only focuses on a particular category of institutional investors: pension funds that are especially important to the infrastructure sector.

Pension funds have long-term annuity-type liabilities and these funds have mandates to invest in long-term, low-risk securities with predictable income streams. The long-term nature of infrastructure projects and relatively stable returns from underlying assets (during the operating stage) is complementary to the requirements of pension funds, as revenue streams from infrastructure projects are comparatively stable and underpinned by long-term service contracts.^[74]

However, pension funds are mostly passive investors with low risk appetites and lack the technical know-how that other traditional lenders (such as banks) have. Their preference to invest in brownfield projects that generate stable revenues limits their scope to participate in the entire life cycle of a project.

In Asia, infrastructure financing through bank lending is proving to be unsustainable, as heavy exposures to the infrastructure markets in countries such as India and Pakistan have led to huge burdens on their balance sheets, particularly in the case of non-performing assets. Therefore, the need for Asian countries to diversify from bank lending into alternative capital sources to finance infrastructure projects is becoming increasingly apparent.

Specifically, three new methods of funding infrastructure projects are emerging as alternatives to bank lending in Asia. While these methods are not new to the infrastructure financing market, they are witnessing considerable uptake:

- Institutional investors (pension funds and insurance companies).
- Bond finance.
- Asset securitization.

In the recent past, pension funds from developed countries have shown an active interest in the Asian infrastructure market. Throughout 2017 and 2018, Canadian pension funds such as the Ontario Teachers' Pension Plan (Ontario Teachers), Caisse de dépôt et placement du Québec (CDPQ), Public Sector Pension Investment Board (PSPIB) and Ontario Municipal Employees' Retirement System (OMERS) have been active investors in the Indian infrastructure sector. In September 2019, the Canada Pension Plan Investment Board (CPPIB) announced their first infrastructure investment in Indonesia—the acquisition of a 45 percent interest in PT Lintas Marga Sedaya (LMS), the concession holder and operator of the Cikopo-Palimanan (Cipali) toll road. This operational toll road is an important link in Java Island's transportation network. In August 2019, Ontario Teachers along with AustralianSuper, announced their first investment in the Indian infrastructure sector. They each intend to invest USD250 million in the National Investment and Infrastructure Fund Ltd., India's sovereign wealth fund for infrastructure investment.

8.3.2 Bond Finance

Project bonds provide an opportunity for borrowers to tap into capital markets for debt. For an infrastructure project, project bonds issued by the special purpose vehicle are an alternate form of debt finance.⁴³ The advantage of project bonds as a means of debt financing a project is the flexibility that they offer in structuring the issue. They could have flexible or fixed interest rates and come in tranches that could be issued in different currencies and for different tenors. Bonds are particularly suitable for passive investors, such as pension funds, as they are credit-rated and offer portfolio diversification. Additionally, project bonds are often guaranteed by the issuing institution—a bank or the government—and can also be listed on stock exchanges, providing additional liquidity to the investors.

Bond finance to raise capital for infrastructure projects has been quite prevalent in developed countries with robust capital markets. Traditionally in developing Asia, project bonds have not been a very popular form of debt finance because of underdeveloped financial markets, many of which lack investment-grade sovereign ratings and active secondary markets.

The general risk involved in project bonds is similar to those of corporate bonds. However, the scope of project bonds as debt finance is limited by the risk preferences of bond investors. Investors in project bonds are mainly passive institutional investors such as pension funds who prefer brownfield projects that have pre-existing investment-grade credit ratings. For these reasons, the scope of project bonds as a source of debt finance is limited to a particular type of project and to countries with investment-grade sovereign benchmarks.

Since 2017, there has been a revival in Asia's project bond markets. In July 2019, Vietnam issued its first project bond, refinancing the 1,240MW Mong Duong 2 Power station. The issue was USD678.5 million in senior secured notes, due in 2029 at a rate of 5.125 percent. In May 2019, the monetary authority of Hong Kong, China issued its first sovereign green bond. In February 2019, Indonesia's Lestari Banten Energi, an independent power producer (IPP), priced a USD775 million non-recourse senior secured bond offering, which is Indonesia's second bond offering since the



Paiton Energy issue in 2017—both offerings were for refinancing existing power plants. In December 2018, Indonesia raised USD1.25 billion in its first Asian sovereign sukuk green bond sale. In April 2018, Indonesia's Star Energy Geothermal (Wayang Windu) offered green project bonds worth USD580 million at 6.75 percent. In October 2017, Thailand's Nam Ngum 2 Power Co. raised USD179.3 million through a project bond for its Lao PDR-based 615MW hydropower plant. In August 2017, Indonesia's Paiton Energy raised a USD2.75-billion non-recourse debt through multiple sources and was listed on the Singapore Exchange. In 2016, Aboitiz Power in the Philippines issued bonds worth USD225 million to refinance a 676.9MW geothermal project.

The uptake in project bond issuances in Asia over the past few years signals a growing appetite for an alternative to bank financing in Asian countries. As banks seek to reduce exposure to infrastructure projects, bond finance could provide a viable alternative. Most bond issuances have been refinancing transactions. Similar to pension funds, bond finance also presents a critical opportunity for Asian markets as it allows bank capital to be freed up to be invested in greenfield projects. However, the use of bond finance in Asian countries will be limited to markets with investment-grade ratings. Market sentiment is positive in terms of future outlook for bond finance as a key source of debt financing at the brownfield stage of projects. Interviewed market participants have affirmed that there is an active interest in using bond finance as a preference for projects at the refinancing stage.

⁴³ Project bonds are a type of corporate bond, issued by the project company, which is the special purpose vehicle.

8.3.3 Asset Securitization

Asset securitization benefits the infrastructure sector as it helps in building infrastructure as an asset class. It involves a group of loans that are pooled and created into a marketable financial instrument where lenders and sponsors come together to create a basket of marketable securities. The two primary stakeholders in a securitization transaction—lenders and investors—have a complementary role in the transfer of risk and sharing of benefits. Sponsors play an intermediary role as financial advisors who structure the deals, creating the marketable pool of securities and inviting investors. Lenders, which are mostly banks, provide the loans for creating the marketable pool which gives them the opportunity to offload project loans from their balance sheets

to the investors, thus transferring risk. Asset securitization is conducive to the infrastructure financing market as it increases liquidity in the market, releasing capital for lenders and offering an investment opportunity for investors.

In July 2018, Bayfront Infrastructure Capital, a special purpose vehicle, issued Asia's first infrastructure project finance securitization, sponsored by Clifford Capital. The deal involved a USD458 million portfolio of 37 project finance and infrastructure loans spread across 16 countries and eight industry subsectors in the Asia-Pacific region and the Middle East. Class A, B, C notes were listed on the Singapore Exchange. The deal was designed to mobilize institutional capital for infrastructure debt. **Table 1** below provides further details of the transaction.

Table 1: Details of Bayfront Securitization Transaction

Class	Amount (USD million)	Ratings (Moody's)	Spread (applied over six-month LIBOR)	Legal Maturity Date
A	320.6	Aaa (sf)	145 bps	Jan. 11, 2038
B	72.6	Aa3 (sf)	195 bps	Jan. 11, 2038
C	19.0	Baa3 (sf)	315 bps	Jan. 11, 2038
Subordinated (retained, not offered)	45.8	Not rated	N.A.	Jan. 11, 2038

Data Source: EIU

bps = basis points

sf = structured finance

This transaction—being a landmark event for Asia's infrastructure market—has crucial implications for Asian bank lending as it furthers the development of infrastructure as an asset class. It opens up an avenue for banks to offload infrastructure debt from their balance sheets and transfers the risk to investors. It allows banks to carry out capital recycling and creates a new asset class for investors.

The commonality across all three alternative sources of capital—pension funds, bond finance and asset securitization—is their relevance and

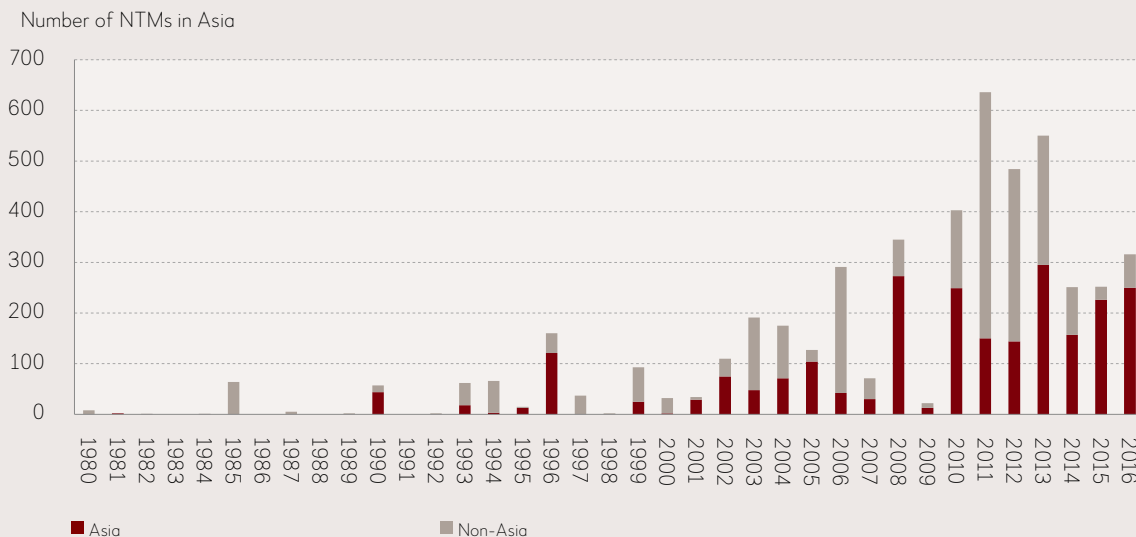
suitability for financing brownfield projects. At the operational stage, revenue streams from projects are more stable and risks are generally lower—thereby allowing more funders to participate in refinancing infrastructure loans. The availability of supplementary capital sources at the brownfield stage allows bank lenders to step out and focus on greenfield projects, thus releasing the stress on the banks to fund Asia's infrastructure development projects across their entire life cycle. This implies that more projects could be financed simultaneously, and that the Asian infrastructure gap could be narrowed or even closed sooner.

BOX D:

Preliminary Analysis of Rising Protectionism in the Renewable Energy Sector

Development of renewable energy (RE) is essential for countries to meet their development and environmental goals, particularly the commitments under the 2015 Paris Agreement and the UN Sustainable Development Goals (SDGs).⁴⁴ Against the backdrop of growing RE demand, countries have put in place measures aiming to develop domestic capabilities in this sector, for example through incentives, such as local content rules, subsidies, and favorable access to financing, often with protectionist intent. In fact, non-tariff measures (NTMs) in the RE sector have been increasing globally, and one sees similar trends in Asia (Figure D.1).⁴⁵ Asia accounts for over three-quarters of NTMs in the RE sector imports implemented between 2014 and 2016. Both developed and developing economies have been contributing to the increase in such NTMs.

Figure D.1: Number of Non-Tariff Measures on Imports of Renewable Energy Goods⁴⁶



Data Source: UNCTAD NTM Database.

In contrast to NTMs, there is a declining trend in import tariffs—a more direct form of protectionism—for RE products. Since the creation of General Agreement on Tariffs and Trade in 1948 as well as subsequent trade liberalization efforts by World Trade Organization members around the world, tariffs have been reduced across all product groups, including among RE goods.

Figure D.2 shows a significant decline of average applied tariffs between 2000 and 2017 among top Asian importers of RE goods. Moreover, average applied tariff rates in these economies for all (non-agricultural) products and for RE products are similar, suggesting that further tariff reductions may not boost trade in RE products.⁴⁷

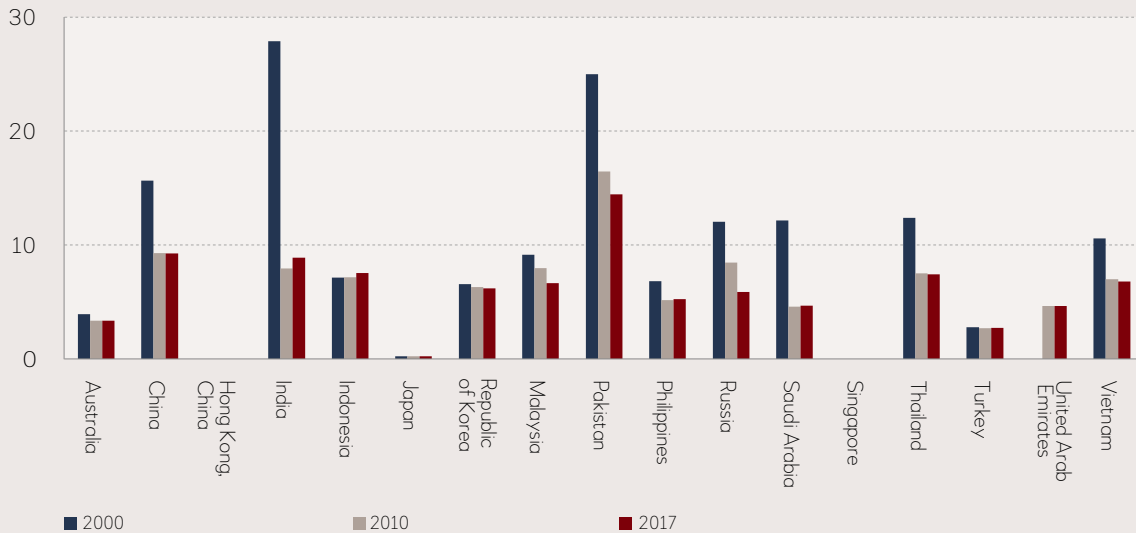
⁴⁴ Renewable energy goods are identified based on the Combined List of Environmental Goods.

⁴⁵ AIB Members. <https://www.aiib.org/en/about-aiib/governance/members-of-bank/index.html>

⁴⁶ The chart presents the number of outstanding NTMs by the year of implementation. Expired NTMs are not included. Data is as of the most recent NTM survey per country. Accordingly, numbers for the most recent years may be an underestimate. One NTM is counted if the importing country has an NTM for any exporting country for a given combination of NTM type and HS6-level product. The results are robust to other NTM specifications. HS stands for Harmonized System (Classification of Goods).

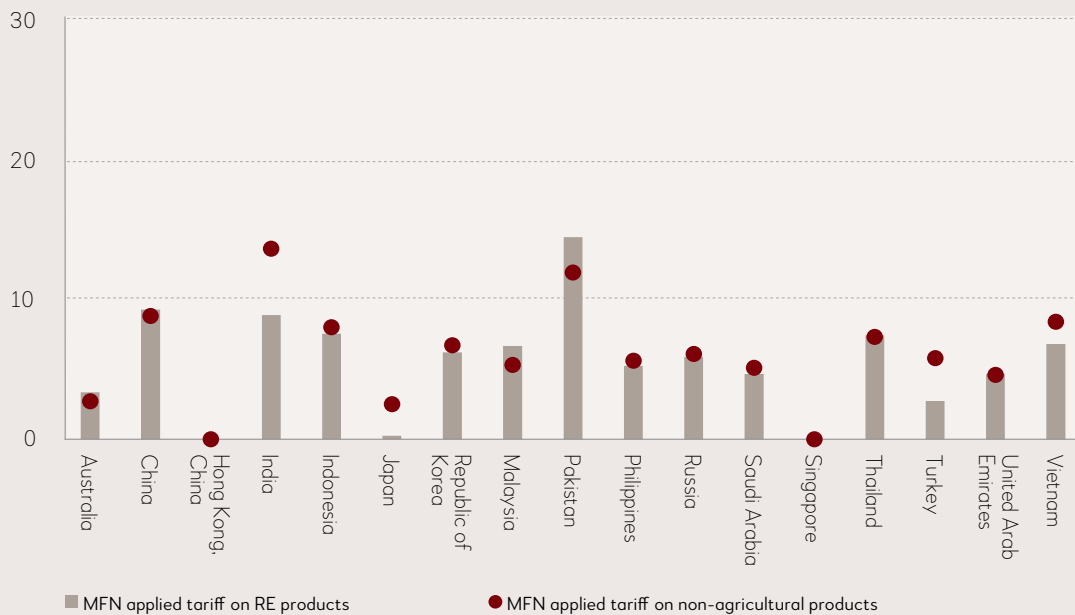
⁴⁷ That said, tariffs in some markets, such as Pakistan and Thailand, remain relatively high.

Figure D.2: Average Most Favored Nation (MFN) Applied Tarrifs, 2000-2017



Data Source: WITS TRAINS Dataset and other data sources from WTI, ITC, UNCTAD.^[76]

Figure D.3: Tariff Rates on Renewable Energy Vis-à-Vis Non-Agricultural Products



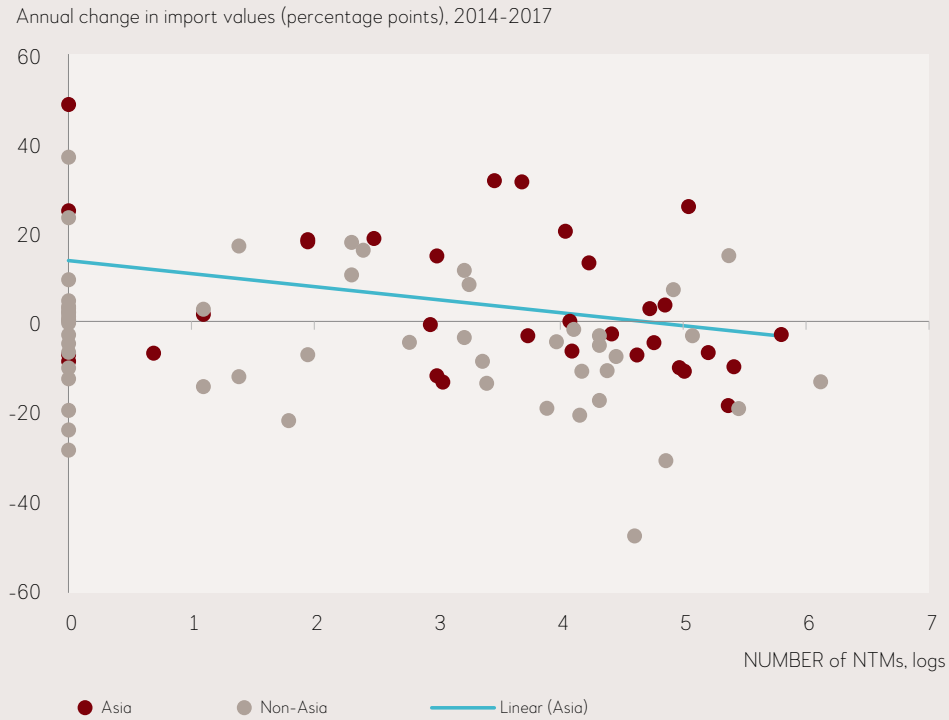
Data Source: WITS TRAINS Dataset and other data sources from WTI, ITC, UNCTAD.^[77]

A number of countries have tried to rationalize, from their national perspective, the use of incentives, such as local content rules, with a goal toward boosting local jobs and developing infant industries.^[75] Other perceived benefits include reduced import dependency in the protected sector.

However, protectionist measures have a potentially negative impact. Looking at RE trade flows, scatterplots in Figure D.3 present preliminary evidence that countries with more NTMs have slower import growth on balance, suggesting the potential trade distortion effects of excess NTMs. This negative correlation is likewise pronounced when only considering Asian countries, as well as for the solar and wind energy sectors (Figure D.4).⁴⁸

⁴⁸ Identification of products under the wind and solar energy sectors is based on a classification by Wind, 2010.

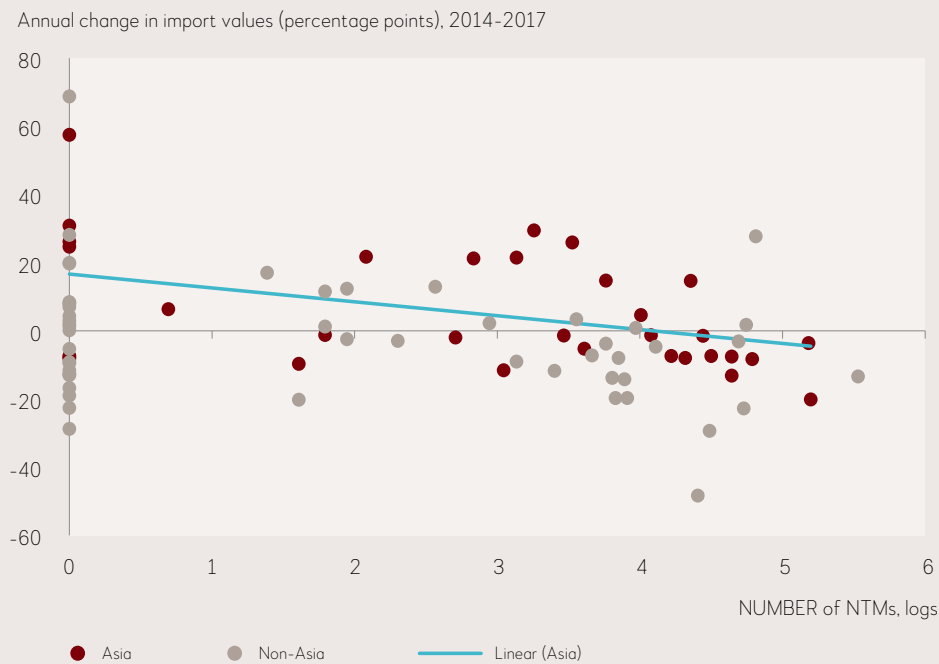
Figure D.4: Renewable Energy Sector:
Import Flows and Non-Tariff Measures



Data Source: CEPI-BACI Data base.

Note: The fitted line presented is for Asia only. A similar negative slope can be observed when considering all countries.

Figure D.5: Solar and Wind Sectors: Import
Flows and Non-Tariff Measures



Data Source: BACI International Trade database, UNCTAD NTM database.

Note: The fitted line presented is for Asia only. A similar negative slope can be observed when considering all countries.

Furthermore, trade restrictions can potentially lead to higher costs for the industry^[78] and affect project costs by pushing auction bid prices upward.^[79] Also, such restrictions may force producers to make do with inferior technology compared with more advanced substitutes (often imported from developed markets) and this may increase operations and maintenance costs of RE infrastructure. In any case, they would likely translate to higher prices for consumers, which would be antithetical to enabling affordable energy access to households and industry, potentially affecting countries' SDG commitments.

Given that import tariffs are already low, countries may effectively boost trade flows by further reducing excessive protectionist

measures. In line with the East Asian industrialization experience (e.g., Japan, Republic of Korea, Singapore), countries have grown through key measures that facilitate foreign trade and investments, such as enhancing productive infrastructure. Possible alternatives to achieve similar economic goals without protectionist measures could be considered, such as improving the domestic manufacturing capabilities of RE sectors through technological skills trainings.^[80] From a project standpoint, the experience of MDBs have also shown that facilitating market competition can help countries invest in high-quality infrastructure,⁴⁹ such as through open bidding in procurement activities, enticing local private sector participation via online procurement platforms and having complaints-responsive procurement procedures.^[81]



³ For example, (World Bank, April 2018) named “value for money” as a core procurement principle. This is a move away from lowest-cost bids to bids that provide the most bang for the buck, considering costs, quality and related factors (e.g., sustainability).

9

COUNTRY WRITE-UPS

9.1	Bangladesh	81
9.2	China	85
9.3	India	91
9.4	Indonesia	95
9.5	Pakistan	99
9.6	Philippines	103
9.7	Russia	107
9.8	Turkey	111





9.1 Bangladesh

Infrastructure Cost and Activity

Bangladesh is currently the fastest growing economy in South Asia, growing over 7.5 percent in the last three years. Bangladesh is also rapidly urbanizing with nearly half of its population expected to be living in urban areas by 2025. These trends, combined with a policy push to achieve universal electricity access for Bangladesh's population, present a tremendous growth opportunity for the country's infrastructure sector in the near future.

In his 2019-2020 Budget Speech, the Finance Minister acknowledged that the path to achieving double-digit growth for Bangladesh would be through the timely implementation of all nationally important infrastructure projects. In view of this, a budgetary allocation of USD17 billion (27.41 percent of the total) to social infrastructure sectors and USD19.5 billion (31.46 percent of the total) to physical infrastructure sectors was announced. Bangladesh's aspiration to ensure uninterrupted electricity access to all households is expected to underline the government's focus on power transmission and distribution in the coming years. Attaching top priority to the railway sector, the government has undertaken a 30-year master plan spanning from 2016 to 2045 at a cost of USD65.5 billion. Several urban development projects focused on decongestion received the go-ahead in 2019. In particular, the government signed a concession contract with a consortium of companies from China to upgrade the Dhaka Bypass under a PPP arrangement. Bangladesh

also plans to establish 100 economic zones in the country, which will have significant infrastructure requirements.

In Bangladesh, it is the government that largely spearheads the financing of infrastructure projects. The country's banking sector is not yet structurally ready to lend to long-term infrastructure projects. The sector has been experiencing a rise in non-performing loans, governance issues and government borrowing which has stifled credit growth. The percentage of bad loans to total lending has been above 9 percent for the past three years. Though the central bank offered some stress relief to the commercial banks in terms of easy debt restructuring in 2019, it is less likely that this will help banks to sustainably improve their loan collection. This is because over the long term, these restructured loans will become less profitable and the lending capital locked up in these low-profit, long-term loans will create liquidity challenges that will limit the banks' capacity to lend to other parts of the economy.^[82]

The reliance on multilateral loans for building Bangladesh's infrastructure underscores the lack of long-term infrastructure financing from the private sector. Capital flows from these multilateral institutions are expected to continue in the coming years. ADB has a pipeline of 31 firm projects worth USD4.3 billion and 21 standby projects worth USD3.8 billion between 2019 and 2021.^[83] The World Bank approved loans totaling

USD620 million to Bangladesh in 2019, mostly geared toward urban infrastructure and renewable energy projects, and has a pipeline of 10 projects worth USD270 million.^[84] AIIB approved loans for two projects totaling USD220 million in 2019 with a pipeline of USD1.4 billion worth of loans to five projects.^[85] Bangladesh is also the largest beneficiary of the Islamic Development Bank Group's (IsDB) financing and has received a total funding of USD21 billion from IsDB as of 2019.^[86]

Official development assistance (ODA) loans and government-to-government support have played an important role in the development of Bangladesh's infrastructure projects. This trend continued in 2019 with Germany providing a USD180 million low-interest loan to Bangladesh to help finance its renewable power generation projects, including solar plants. The funding is for a 36-year term at 0.75 percent interest and is part of more than USD3 billion worth of financial and technical support supplied to Bangladesh by Germany since 1972. The Japan International Cooperation Agency (JICA) signed with Bangladesh ODA loans totaling USD1.2 billion

in 2019 for key infrastructure projects in the transport and energy sectors. Bangladesh has also signed memoranda of agreement with Bhutan, India, and Nepal to facilitate the cross-border trade of electricity.

A majority of the interviewed market participants expect infrastructure borrowing costs to remain unchanged in the next 12 months and only a minority of them expect borrowing costs to rise owing to the boom in the economy and increase in overall demand. Most of the non-banking financial institutions interviewed expressed their preference to invest in the power and energy sector with a special focus on renewable energy projects. Projects focused on physical connectivity and economic zones in Bangladesh stood next in preference for investors. The market participants also expect to see an increase in the average size of transactions in the next 12 months. Compared to last year's 12-month average, there has been an increase in both the 10-year and 20-year government bond yields in 2019.

Government Bond Returns and Syndicated Loan Spreads

10-year government bond returns (12-month average, Refinitiv)	8.430% (2019) 7.171% (2018)
20-year government bond returns (12-month average, Refinitiv)	9.041% (2019) 8.307% (2018)
Syndicated loan spreads, 2019	No transactions in the given period

Range of Infrastructure Borrowing Cost

Foreign Currency ⁵⁰	<ul style="list-style-type: none"> • LIBOR + 2.5% to 3.5% (Syndicated or direct (limited recourse) project finance) • EURIBOR + 3% to 3.2% (Syndicated or direct (limited recourse) project finance) • LIBOR + 400 bps (Secured senior debt)
Local Currency	<ul style="list-style-type: none"> • 6% to 12% + risk premium of 2.25% to 5%, depending on credit rating + tenor premium of 1% to 3%, depending on loan tenure (Syndicated or direct (limited recourse) project finance)

Data Source: Interviews with market participants.

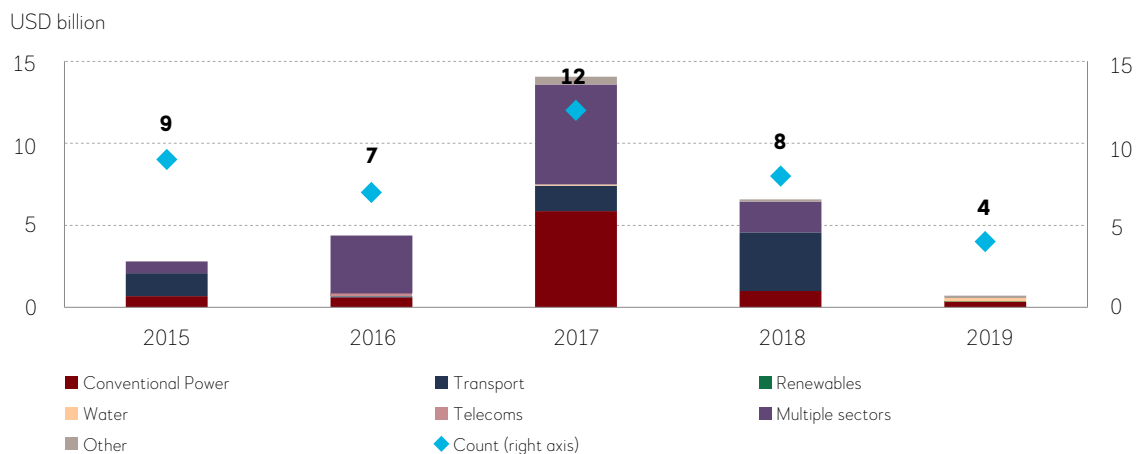
⁵⁰ All foreign currency loans in Bangladesh require prior approval from the Bangladesh Investment Development Authority (BIDA).

Bangladesh's total closed private transaction activity slowed down in 2019. There were only four transactions worth USD0.7 billion that reached financial close in 2019, compared to USD6.6 billion in 2018. Of these, the most noteworthy deal was the Teknaf solar PV plant with a generation capacity of 28MW, the country's first closed solar transaction in the last five years.

The pipeline of open and announced private transactions, however, looks positive. Substantial activity is expected in the conventional power, renewables and water sectors. Bangladesh has a burgeoning demand for energy; to meet its

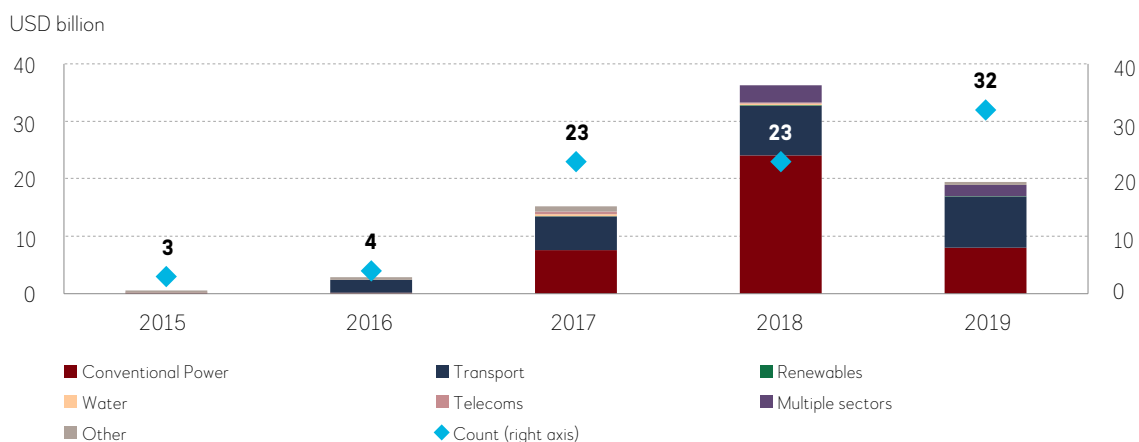
overall target of ensuring electricity supply to all households, the government plans to achieve 60,000MW of generation capacity by 2041. The government is currently in the process of signing contracts for the establishment of 18 new power plants, with a capacity to generate 5,801MW of electricity, and an invitation for tender for seven power plants, with a generational capacity of 1,410MW of electricity, is in progress.^[87] In terms of finance type of open and announced projects in 2019, project finance accounted for 73 percent (USD14.2 billion) while public sector finance accounted for 27 percent (USD5.2 billion).

Figure 35: Value and Count of Closed Transactions by Sector—Bangladesh



Data Source: IJGlobal.

Figure 36: Value and Count of Open and Announced Transactions by Sector—Bangladesh



Data Source: IJGlobal.

Key Infrastructure Projects in Bangladesh

- 1 The Padma Multipurpose Bridge Project with an estimated project cost of USD3.9 billion is aimed at increasing connectivity in Bangladesh through a multipurpose road-rail bridge across the Padma River. It is being developed by the Bangladesh Bridge Authority.

- 2 The Dhaka Mass Rapid Transit Development Project, currently being developed by the publicly owned Dhaka Mass Transit Company Limited, aims to alleviate traffic congestion and mitigate air pollution in Dhaka City and adjacent areas through the construction of a mass rapid transit system. The total estimated cost of the project is USD2.6 billion.

- 3 The Matarbari Port Development Project, undertaken by the Ministry of Shipping, aims to strengthen port logistics capacity in Bangladesh through the construction of a new commercial port in the Matarbari area in the Chattogram Division, thereby contributing to Bangladesh's enhanced connectivity with neighboring countries. It is expected to be operational in 2023. The total estimated cost of the project is USD4.6 billion.



AIB China Beijing
Air Quality
Improvement and
Coal Replacement
Project

9.2 China

Infrastructure Cost and Activity

China's economic growth slowed from 6.6 percent in 2018 to 6.1 percent in 2019, its slowest growth since the early 1990s.^[88] The slowdown has mainly been attributed to the US-China trade tension, combined with a longer-term slowdown in growth as China's economy matures and reaches higher income levels.^[89]

The stock of recorded aggregate financing to the real economy⁵¹ in China stood at 223 percent of GDP at end-2018, but the true level is likely to be significantly higher, given that this statistic does not include the substantial off-balance-sheet lending of banks. Furthermore, concerns about borrowers' repayment capacity are increasing as China's economic growth slows. At the same time, banks are not expected to deleverage as government policy is not focused on encouraging this, but instead on bolstering the slowing economy—for example, the People's Bank of China has lowered the reserve requirement ratio multiple times since the beginning of 2018. Bank lending is still growing, though at a somewhat slower rate—12.3 percent in 2018, down from 15.8 percent in 2017. One bright spot for the Chinese banking

sector is that with higher leverage, Chinese banks are setting new records for profitability, with net income growing 4.7 percent to CNY1.83 trillion in 2018.^[90]

China's government is likely to use increased public investment to stimulate the economy in order to counter the slowdown in growth; this is likely to lead to an increase in infrastructure demand from the government.⁵² Overall infrastructure investment increased by 4.5 percent in the first nine months of 2019 compared to the previous year; this increase slowed to 4.2 percent in October, as a result of local governments reaching their infrastructure investment limits that month.^[91] However, the country's State Council (cabinet) also indicated that it would bring forward the 2020 quota for infrastructure investment by local governments. In October 2019, China's National Development and Reform Commission (NDRC), the country's top economic planning body, approved eight major projects concentrated in the energy sector with a total investment value of USD6.4 billion. New infrastructure investment plans also include an integrated development plan for the Yangtze River Delta region (see Box on Key Infrastructure Projects in China), as well as the roll out of gigabit broadband services to 300 cities and the improvement of fiber to the home coverage to

⁵¹ An indicator published by the People's Bank of China represents a broader measure of credit and liquidity (than the commonly used money and quasi-money indicator M2) that includes financing through the banking system and financing through the capital market, such as initial public offerings, loans from trust companies and bond sales.

⁵² China's definition of infrastructure investment in the central government budget is significantly narrower than the definition used for the infrastructure investment estimation in this report. The central government budget does not include the local government budget for the public investment. Additionally, it is likely to significantly underrepresent the true level of spending, as the government also uses interest subsidies, loans from quasi-public enterprises, bond issuances by central and local governments and capital markets to encourage infrastructure investment.

90 percent of all broadband access.^[92] This may also include pursuing greater collaboration with ASEAN, given the recent agreement in November 2019 to deepen cooperation in this area.^[93] Interviewed market participants also expect transaction volumes in infrastructure to increase in the next 12 months.

China's government is taking further steps to increase infrastructure investment by the private sector and local government. The State Council decided to lower the minimum capital ratio requirement for certain infrastructure projects by up to 5 percent.^[94] The government is also relaxing restrictions on the use of local government bonds and local governments have issued new bonds for infrastructure financing.^[95] In addition, the government has indicated that it will pursue new

forms of project financing, employ different types of financial instruments and attempt to attract more private capital into key infrastructure projects.^[96]

Interviewed market participants expect borrowing costs to remain stable in the next 12 months. The 10-year sovereign bond yield decreased by 45 basis points in the 2019 as compared with the monthly average of previous year. Though the People's Bank of China (PBOC) cut its loan prime rate by five basis points, this is considered to be a very small reduction. Chinese banks remain reluctant to lower their lending rates due to the anticipated lower profit margins. Moreover, if the PBOC continues the rate cut, doing so might risk causing inflation to rise further.^[97]

Government Bond Returns and Syndicated Loan Spreads

10-year government bond returns	3.200% (2019)	
	3.652% (2018)	
Syndicated loan spreads, 2019 (Refinitiv; over hard currencies: USD, EUR, GBP, JPY)	Construction:	Other + 522 bps <i>LIBOR + 223 bps</i> <i>523 bps (Fixed Coupon Rate)</i> <i>490 bps (Fixed Coupon Rate)</i>
	Energy:	Other + 211 bps
	Others: ⁵³	<i>LIBOR + 360 bps</i> <i>Hong Kong, China IBOR + 270 bps</i>
	Transport:	Other + 467 bps <i>441 bps (Fixed Coupon Rate)</i>
	Telecoms:	<i>LIBOR + 305 bps</i>
	Water:	Other + 482 bps <i>588 bps (Fixed Coupon Rate)</i>

Note: Figures in italics indicate fewer than five transactions in 2019.

Range of Infrastructure Borrowing Cost

- | | |
|----------------|---|
| Local Currency | <ul style="list-style-type: none"> • 4.4% (corporate project bonds (secured)) • 4.7% (corporate project bonds (unsecured)) • 2-3% (Loans to government (non-investment grade sovereign credit rating)) |
|----------------|---|

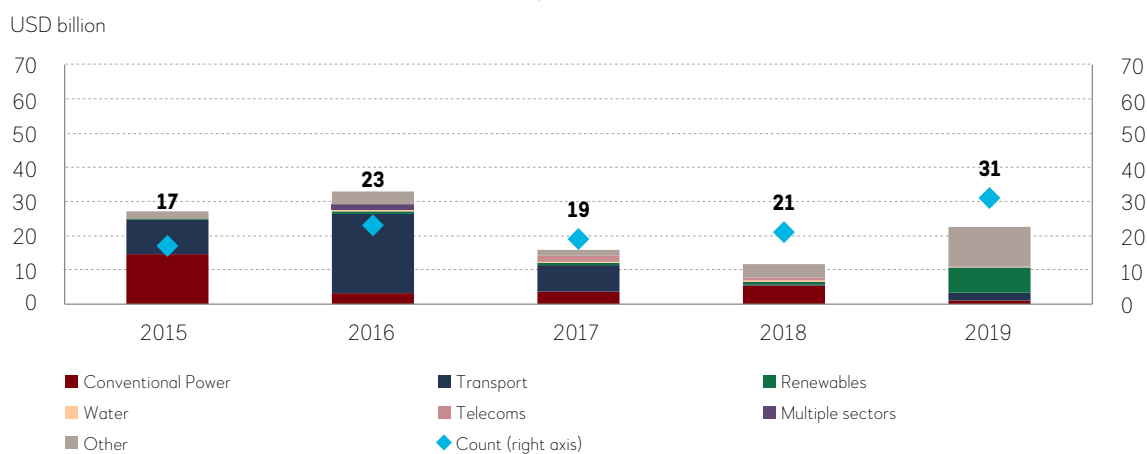
Data Source: Interviews with market participants.

⁵³ "Other" includes oil and gas or mining/social infrastructure.

China's infrastructure investment plans cover a broad range of sectors, notably energy (as mentioned above), telecommunications, transport, and water conservation. For telecommunications, the country is expected to continue to expand internet access, following the 2015 plan to invest USD21.1 billion by 2020 to extend broadband access across the country. In line with this, the number of broadband subscriptions is expected to increase from 407.4 million in 2018 to 434.5 million today and to increase further to 455.2 million in 2020.^[98] The country is also significantly increasing investment in transport infrastructure. In March 2019, the government announced investments of USD254 billion in road construction and waterway projects and USD119 billion in railway construction projects.^[99] Moreover, investment in road and rail transportation increased by 7.7 percent and 11 percent respectively in the first eight months of 2019 compared to the first eight months of 2018.^[100] Other projects announced by the government include major water conservancy projects, aviation and next-generation information infrastructure.^[101]

Privately financed infrastructure projects in China estimated to be less than 10 percent of the overall investment, as much investment comes from central and local governments. Closed private transactions increased by 93 percent from USD11.69 billion in 2018 to USD22.60 billion in 2019, but these sums represent only a fraction of overall infrastructure investment in China.⁵⁴ The largest contributor to closed private transactions is the Other sector.⁵⁵ Renewables projects also increased sharply from USD778 million in 2018 to USD7.34 billion in 2019. In terms of finance type of closed projects in 2019, corporate finance transactions accounted for 16 percent (USD3.6 billion), project finance transactions accounted for 72 percent (USD16.4 billion) and public sector finance transactions accounted for 12 percent (USD2.7 billion). These public-sector finance transactions cover SOEs and development finance institutions (i.e., development banks, multilaterals or export credit agencies).

Figure 37: Value and Count of Closed Transactions by Sector—China



Data Source: IJGlobal.

China's investment in renewables shows strong picking up. The value of privately financed closed (USD7.34 billion) and open (USD5.01 billion) renewable projects in 2019 is significantly larger than in 2018 (USD0.77 billion for closed and USD1.26 billion for open, respectively). However, the government funding for renewables

projects appears to be declining while subsidies for renewable energy are phasing out, including the removal of feed-in tariffs for solar energy. Wind and solar generation facilities now compete directly at auction with other forms of power generation. Though wind and solar power are increasingly able to win such competitions, new

⁵⁴ Moreover, it should be noted that it is entirely possible for overall infrastructure investment in a given year to increase while closed transactions decrease; this is because much investment can occur under existing projects that reached financial close in previous years.

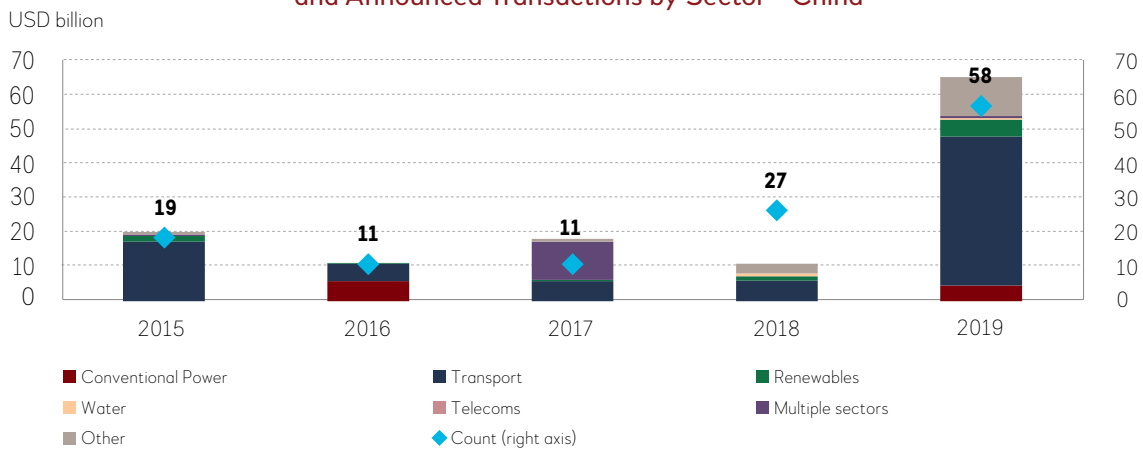
⁵⁵ One USD10-billion project in the oil and gas sector is the Zhanjiang City Petrochemical Plant.

solar installations were expected to fall by around 50 percent in 2019, compared to 2018.^[102]

For 2019, the open and announced total private transaction in China is USD66.6 billion, the highest level in the last five years. It was USD11.19 billion in 2018 and USD18.58 billion in 2017. The main sectors contributing to China's pipeline of open and announced transactions in 2019 were transport (USD44.28 billion or 66 percent of

total transaction value), followed by renewables (USD5.01 billion). On the financing types for the open and announced projects in 2019, corporate finance transactions accounted for 2 percent (USD1.2 billion), project finance transactions accounted for 54 percent (USD36.1 billion), public sector finance transactions accounted for 38 percent (USD25.5 billion), and design-build PPP transactions accounted for 6 percent (USD3.8 billion).

Figure 38: Value and Count of Open and Announced Transactions by Sector—China



Data Source: IJGlobal.

Key Infrastructure Projects in China

1 The Intercity Railway along the Yangtze River Project is a provincial government-led investment initiative by the National Development and Reform Commission (NDRC) that covers eight new regional intercity railway tracks with a total length of 278.33 km. The estimated total cost of the project is USD34.35 billion. The project is expected to be an important part of the rail network in the Yangtze River Economic Belt. It is also expected to reduce the commuting time from Nanjing to other districts and cities within the province. The funding source is split between provincial and local governments (50 percent) and bank loans (50 percent). The expected completion date is 2025.^[103]

2 The Chongqing-Kunming High-Speed Rail Link is a 699km-long railway connecting two cities in southwestern China, designed with a speed limit of 250 km per hour. The estimated project cost is USD19.9 billion.^[104] Construction started in September 2019 and is expected to be completed by 2025. The project aims to strengthen trade and economic links between central Yunnan province and the Chengdu-Chongqing city cluster, as well as Western China.^[105] The line is designed to carry 30 million passengers in each direction per year. Around 48 percent of the financing will come from the central government, with the remainder coming from China Railway and the provincial governments of Chongqing, Sichuan and Yunnan.^[106]

3 The Guizhou Expressway PPP Project aims to enhance transportation links in southwestern China, between Nayong, Zhijin, Liuzhi, Qinglong and Qianxinanzhou. The Guizhou Provincial Department of Transportation has selected a consortium to begin construction. The project's cost is USD2.11 billion, with the main financing source expected to be bank loans and other forms of financing to a project company created for the engagement.^[107]



Photo Credit © Jonas Jacobsson.





9.3 India

Infrastructure Cost and Activity

India witnessed a slowdown in economic growth in 2019 with growth rates falling to 4.8 percent in the first half of 2019-2020 (April to September), the lowest since 2016. The slowdown has been mainly attributed to the sluggish consumption and investment activity with the manufacturing sector experiencing a contraction in the most recent quarter (July to September). Construction and services activity also remained tepid during the first half of the year.

Availability of infrastructure finance remains constrained as the recent improvement in the health of the banking sector has been offset by a decline in the health of the non-banking sector. Since 2018, the asset quality of India's beleaguered banks has shown some improvement, but balance-sheet liquidity and profitability continued to remain weak for several banks in 2019, constricting infrastructure financing.^[108] The non-banking sector is facing a crisis following the default of one of the most prominent non-banking financial companies in India—Infrastructure Leasing & Financial Services (IL&FS) in 2018, and (more recently) housing finance companies, such as Dewan Housing Finance. In order to address the crisis facing Indian banks, the current government has earmarked USD10.2 billion to resolve the base-capital issues of the state-controlled banks which dominate India's financial system. This will lead to the merger of 10 state-run banks to

create four entities, bringing down the number of government-backed lenders to 12 from the current 20.^[109] The slowdown in India's project finance business further became evident when ICICI Bank's project finance vertical shut down in November 2019. This shutdown was primarily born out of piling bad loans, a large chunk of which came from the infrastructure sector.^[110]

Despite the current economic slowdown, India's enormous need for infrastructure makes it one of the biggest and most important infrastructure markets in Asia.

Recognizing this need, the central government, in its 2019-2020 Union Budget, announced its intention to invest USD1.4 trillion in infrastructure over the next five years. Subsequently, a task force has identified a pipeline of infrastructure projects worth USD1.4 trillion across power, transport, urban and agricultural sectors that would be taken up between 2020 and 2025. Connectivity infrastructure remained the main focus area, with the government pushing for increased investment in projects that would improve logistics, reduce the cost of transportation and increase the competitiveness of domestically produced goods. An estimated investment of USD710 billion (between 2018 and 2030) was announced for rail with PPP being the proposed mechanism to ensure faster development and completion of tracks, rolling stock manufacturing and delivery of passenger freight services.⁵⁶ Cabinet approval of Phase-II of the Faster Adoption and Manufacturing of

⁵⁶ Pradhan Mantri Gram Sadak Yojana, Green Energy Corridor, Bhartamala and Sagarmala projects, Jal Marg Vikas and UDAN Schemes, One Nation--One Grid, Bharat-Net.

(Hybrid &) Electric Vehicles Scheme with an outlay of USD1.4 billion for a period of three years is expected to encourage the faster adoption of electric vehicles in India. State governments have also emerged as an important player in infrastructure spending and over the last decade have outpaced the central government.

Recognizing the need for easy access to low cost capital, the government has proposed a number of measures to enhance the sources of capital for infrastructure financing. It proposes to set up a credit guarantee enhancement corporation regulated by the central bank; adopt an action plan to deepen the markets for corporate bond repos and credit default swaps in the infrastructure sector; and permit investments made by foreign institutional investors in debt securities issued by infrastructure debt fund non-banking finance companies to be transferred or sold to any domestic investor within the specified lock-in period.

Market participants noted that borrowing costs are expected to fall marginally in the next 12 months owing to the decline in key policy rates to reverse the economic slowdown in the country. Banks are also expected to adopt risk-averse strategies amidst paucity in infrastructure projects. A look at the 12-month infrastructure financing cost in India indicates a 71-basis point decline in 10-year government bond yields as compared to the monthly average of the previous year. In September 2019, the government bond yields fell to their lowest since demonetization in 2016. The reason behind plummeting government bond yields is the aggressive bond purchases made by the Reserve Bank of India (RBI), the country's central bank. These bond yields are further expected to decline in the face of global uncertainty and a weak domestic growth outlook.

Government Bond Returns and Syndicated Loan Spreads

10-year government bond returns ⁵⁷ (monthly average, RBI)	6.992% (2019) 7.701% (2018)
Syndicated loan spreads, 2019 (Refinitiv; over hard currencies: USD, EUR, GBP, JPY)	Energy: <i>LIBOR + 98 bps</i> <i>Tokyo IBOR + 102 bps;</i>
	Transport: <i>LIBOR + 60 bps</i>
	Water: <i>Other + 934 bps</i> <i>LIBOR + 107 bps;</i>
	Others ⁵⁸ : <i>Yen LIBOR + 74 bps</i>

Note: Figures in italics indicate fewer than five transactions in 2019.

Range of Infrastructure Borrowing Cost

Foreign Currency	<ul style="list-style-type: none"> LIBOR + a (1% to 2%) margin + a (1% to 2.5%) of markup, depending on credit rating and duration of lending (Syndicated or direct (limited recourse) project finance)
Local Currency	<ul style="list-style-type: none"> 6.5% to 9.5% MCLR⁵⁹ + (0% to 2.5%) of markup (Syndicated or direct (limited recourse) project finance) 5.4% RLLR⁶⁰ + (2.85%) of markup (Syndicated or direct (limited recourse) project finance) 6.5% to 9.5% MCLR + (0% to 2.5%) of markup (Secured senior debt) 6.5% to 9.5% MCLR (Secured corporate project bonds)

Data Source: Interviews with market participants.

⁵⁷ Central Bank, Reserve Bank of India.

⁵⁸ "Other" includes oil and gas or mining/social infrastructure.

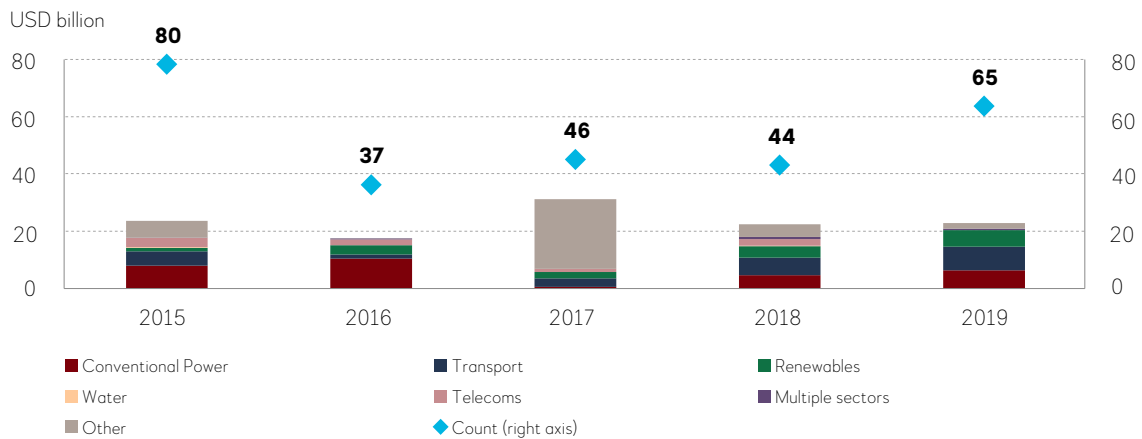
⁵⁹ MCLR is the Marginal Cost of Funds-based Lending Rate and RLLR is the Repo Linked Lending Rate.

Some new and innovative infrastructure financial instruments have emerged in the Indian market in the last five years. For instance, infrastructure investment trusts, real estate investment trusts and toll-operate-transfer arrangements have become a part of the brownfield asset modernization strategy for augmenting infrastructure investment. As per the 2019-2020 Union Budget, the cumulative resources garnered through these instruments and models exceeded USD3.4 billion in 2018-2019. According to the interviewed market participants, these government measures help to provide a clearer picture of risk allocation. As commercial bank lending slows down in India, alternative funding sources are making headwinds into the Indian infrastructure finance market. Global pension funds have emerged as an important source of foreign investment in India's infrastructure sector.^[111]

India's closed infrastructure transaction activity reached USD23.40 billion in 2019, up from USD22.94 billion in 2018. Renewables sector surged by 46 percent to USD5.93 billion in 2019.

Conventional power and transport also increased by 36 percent and 35 percent, respectively, whereas oil and gas declined significantly by 55 percent in value in 2019 in comparison to the previous year. In terms of finance type of projects that reached financial close in 2019, corporate finance transactions accounted for 58 percent (USD13.6 billion), project finance transactions 16 percent (USD3.7 billion) and public sector 26 percent (USD6.1 billion). These public sector finance transactions cover SOEs and development finance institutions (i.e., development banks, multilaterals or export credit agencies).

Figure 39: Value and Count of Closed Transactions by Sector—India



Data Source: IJGlobal.

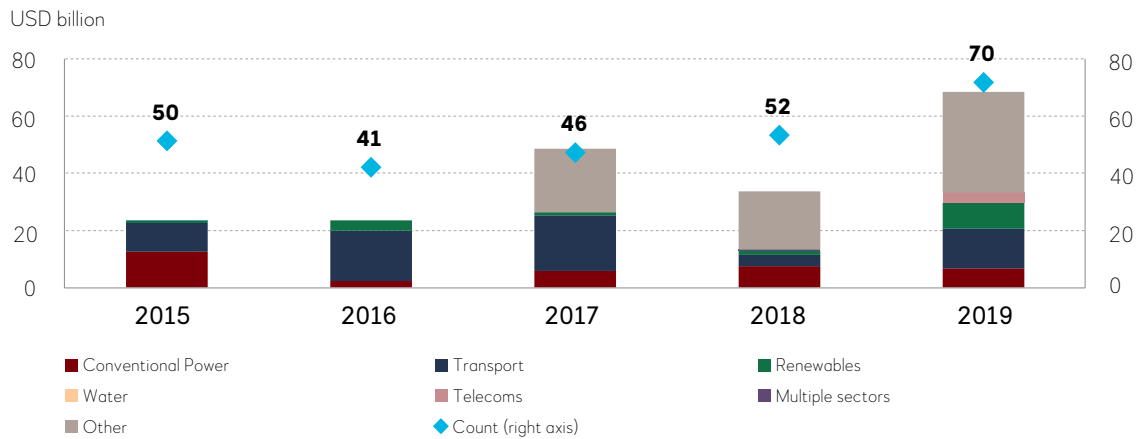
The surge in renewables in India is in line with the government's objective of increasing the share of energy from sustainable sources, with a target of achieving an installed capacity of renewable-based power of 175GW by the year 2022.^[112] Despite a decline in the power and transport sectors, both sectors are expected to grow in the next 12 months. Recent projects in the road sector have contributed to a revival of hybrid annuity models from end-December 2019 and this is expected to continue.

India's open and announced private transaction activity witnessed a significant

increase this year with the pipeline reaching

USD66.71 billion in 2019. The top-three contributing sectors to India's pipeline of open and announced transactions in 2019 were the oil and gas sector (USD34.37 billion), transport sector (USD13.48 billion) and renewables sector (USD8.82 billion). By finance type of open and announced projects in 2019, corporate finance transactions accounted for 23 percent (USD15.6 billion), project finance transactions accounted for 34 percent (USD22.6 billion) and public sector finance transactions accounted for 43 percent (USD28.5 billion).

Figure 40: Value and Count of Open and Announced Transactions by Sector—India



Data Source: IJGlobal.

Key Infrastructure Projects in India

- 1 The Bharatmala Programme with an estimated project cost of approximately USD100 billion is a comprehensive roadways project aimed at developing around 84,000 km of road to decongest the traffic passing through cities, connect rural areas and enhance logistic efficiency. The final phase II of the project is expected to be completed by 2024.
- 2 The “Nal se Jal” scheme intends to provide piped water to every household unit by 2024. It will prompt a huge jump in investments in the water and sanitation sector and is estimated to cost around USD87.6 billion over the next five years. Investments will have to be undertaken in different verticals including pipes, water treatment pumps, valves, and cement, among others.
- 3 The Green Energy Corridor aims at integrating renewable energy in the overall power generation mix in India. Sanctioned by the Ministry of New and Renewable Energy in 2015-2016, the project includes around 9,400 km of transmission lines and substations with a total capacity of approximately 19,000 Mega Volt Ampere. With a total project cost of approximately USD1.5 billion, the funding mechanism consists of 40 percent from a Government of India grant, 20 percent from state equity and 40 percent from a loan from KfW, Germany.



AiIB Indonesia Irrigation
Modernization and Urgent
Rehabilitation

9.4 Indonesia

Infrastructure Cost and Activity

Indonesia's annual economic growth registered a modest decrease from 5.2 percent in 2018 to 5.1 percent in 2019. Despite a series of natural disasters and an uncertain global environment, it remained one of the most stable economies in Asia, supported by strong domestic demand. An increase in formal employment and an expansion in social welfare have underpinned Indonesia's uptick in consumption and, in turn, domestic demand. This growth is expected to continue on the back of low inflation and strong labor markets. Stronger fiscal reserves are expected to allow for greater government investment, including investment into new infrastructure.

Recognizing Indonesia's significant infrastructural gaps, investment in infrastructure is a key priority for the Indonesian government. The government is strongly focused on raising its revenue base to fund infrastructure investments. Yet as of 2018, fiscal income is low at just 13.1 percent of GDP.⁶⁰ Over the next five years (2020-2024), the government's priority areas include development of infrastructure to support basic services, economic development and urbanization. The 2019 national budget allocates

USD29.32 billion⁶¹ to infrastructure development—divided into economic infrastructure (96 percent), social infrastructure (3 percent) and infrastructure support (1 percent). In terms of long-term infrastructure financing needs over the next five years—projected at USD429.7 billion—37 percent is planned from the public budget (USD159 billion), 21 percent from SOEs (USD90.2 billion) and 42 percent (USD180.5 billion) from the private sector.

Although infrastructure investments have traditionally been financed mainly via public funding, the Indonesian government has recently introduced significant reforms and encouraged newer, alternative financing mechanisms to facilitate private sector participation to meet its investment targets. As challenges associated with project readiness (e.g., unclear risk allocation among stakeholders) remain key barriers to private-sector participation, the Indonesian government has adopted a few key initiatives. These include developing a project development facility to enhance project proposal quality during the preparation process, a viability gap fund to increase project feasibility, and availability payment to enhance project bankability. Targeted

⁶⁰ In contrast, the OECD average is about 33 percent of GDP. The fiscal revenue of G20 countries such as Italy and France can go as high as 40 percent of GDP. See <https://data.oecd.org/tax/tax-revenue.htm>

⁶¹ This is around 16 percent of the total announced state budget of USD180 billion for the year 2020.

measures are underway to expand private-sector infrastructure financing as well. For example, the Sustainable Development Goals (SDG) Indonesia One platform was launched in October 2018, which integrates public and private funds through blended finance schemes to channel funds toward infrastructure projects that directly relate to the SDGs. Other channels include equity financing (e.g., Non-Government Budget Investment (PINA)), Sukuk and Green Sukuk financing as well as capital market instruments such as hedging and asset recycling instruments.

The market outlook toward infrastructure financing in Indonesia remained positive, with most resources persons market participants expecting a fall in borrowing costs over the next 12 months on the back of a stable

economic outlook and low inflation. In 2019, inflation has remained below the midpoint of the 2.5-4.5 percent target range, and is expected to remain within the 2-4 percent range in 2020.^[113] Interviewed market participants also noted Indonesia as having one of the most liquid financing conditions among Asian economies. A look at the 12-month infrastructure financing cost in Indonesia indicates that compared to last year's average, there was a marginal increase in both the 10-year and 20-year government bond yields. The 10-year yield increased from 7.441 percent in 2018 to 7.511 percent in 2019, and the 20-year yield increased from 7.971 percent in 2018 to 8.040 percent in 2019.

Government Bond Returns and Syndicated Loan Spreads

10-year government bond returns (monthly average, Refinitiv)	7.511% (2019) 7.441% (2018)
20-year government bond returns (monthly average, Refinitiv)	8.040% (2019) 7.971% (2018)
Syndicated loan spreads, 2019 (Refinitiv; over hard currencies: USD, EUR, GBP, JPY)	Energy: <i>LIBOR + 162 bps</i>
	Renewables: <i>LIBOR + 255 bps</i>
	Other: ⁶² <i>LIBOR + 375 bps</i>
	Telecoms: <i>LIBOR + 175 bps</i>
	Transport: <i>Other + 825 bps</i> <i>Jakarta-IBOR + 250 bps</i>

Note: Figures in italics indicate fewer than five transactions in 2019.

Range of Infrastructure Borrowing Cost

Foreign Currency	• 6%-7% (Syndicated or direct (limited recourse) project finance)
Local currency	• 10.25%-12% (Syndicated or direct (limited recourse) project finance)
	• 8%-10% (Syndicated or direct (limited recourse) project finance)

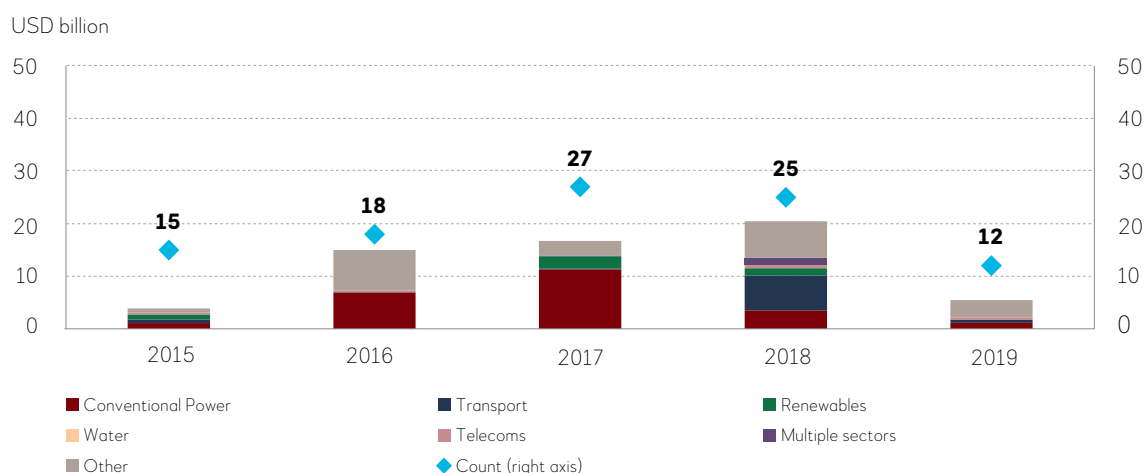
Data Source: Interviews with market participants.

⁶² "Other" includes oil and gas or mining/social infrastructure.

The total value of closed financial transactions in Indonesia declined in 2019 from USD20.45 billion in 2018 to USD5.48 billion in 2019. While interviewed market participants attributed the slowdown in Indonesia in 2019 to macroeconomic uncertainty, the general elections in April and continuing delays in land acquisitions, the lull in activity is expected to be temporary, with a takeoff expected in 2020. The number of closed transactions also declined from a five-year peak of 27 in 2017 to 12 in 2019. The oil and gas sector accounted for the largest share of the value of closed transactions (USD2.51 billion) in 2019, increasing over 45 percent year-on-year. The power and transport sectors both saw a decline, with the power sector declining

from USD3.50 billion to USD1.15 billion and the transport sector declining from USD6.63 billion to USD570 million. In 2019, the renewables and telecommunication sectors saw no closed activity. Indonesia has set a target to reach 23 percent of its primary energy mix from renewable sources—mainly via hydro, bioenergy and geothermal sources. However, financing for renewable energy projects is hindered by a few challenges including a lack of long-term financing options. In terms of finance type of closed projects in 2019, corporate finance accounted for 33 percent (USD1.8 billion), project finance accounted for 54 percent (USD2.9 billion) and public sector finance accounted for 13 percent (USD0.7 billion).

Figure 41: Value and Count of Closed Transactions by Sector—Indonesia

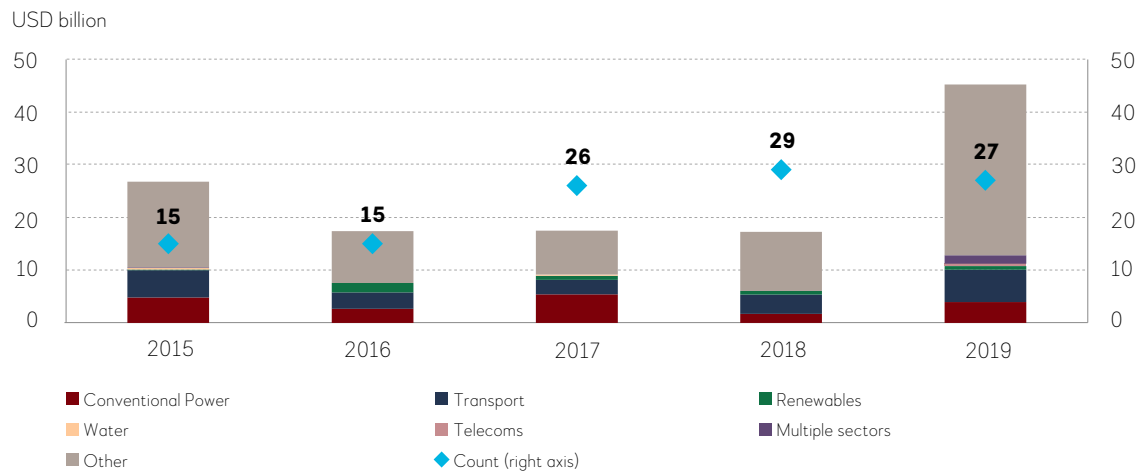


Data Source: IJGlobal.

Indonesia’s open and announced transaction activity increased year-on-year to over USD45 billion in 2019, with the number of deals during both years remaining stable. The overall increase in value was largely due to two mega-scale oil and gas deals (the Abadi Onshore liquefied natural gas (LNG) deal and Tuban Oil Refinery and Petrochemical Plant deal, worth USD15 billion each), currently at the announcement stage, which accounted for over 66 percent of the activity in 2019. The number of open deals were about the same between years—29 in 2018 and 27 in 2019. Between 2015 and 2019, the

oil and gas sector dominated the deal pipeline. Yet, other sectors are catching up. The value of the conventional power sector pipeline increased from USD1.70 to USD3.93 billion. Likewise, the transport sector saw a boost, increasing from USD3.67 billion to USD6.16 billion between 2018 and 2019. Of finance-type of open and announced projects in 2019, corporate finance accounted for 6 percent (USD7.4 billion), project finance accounted for 72 percent (USD89.8 billion) and public sector finance accounted for 22 percent (USD26.7 billion).

Figure 42: Value and Count of Open and Announced Transactions by Sector—Indonesia



Data Source: IJGlobal.

Key Infrastructure Projects in Indonesia

1 The Jakarta-Bandung High Speed Rail Line is a PPP initiative to construct a high-speed rail to link the capital city of Jakarta with the country's textile hub, Bandung, at an estimated total cost of USD6 billion. The project aims to reduce travel time, improve connectivity and grow tourism, manufacturing, logistics and property sectors in the country. Covering a total length of 142 km, the construction work is expected to be completed by 2021. The sponsors for the rail project include Kereta Cepat Indonesia Cina (KCIC), the joint venture of Indonesian state-owned enterprises, and China Railway International with financing to be provided mainly by China Development Bank.

2 Java 1 Floating Storage and Regasification Unit (FSRU) and Combined Cycle Gas Turbine (CCGT) Power Plant-IPP Project is an integrated power project which involves the constructions of 1,760MW Java 1 CCGT power plant, an LNG FSRU, a 500kV power transmission line and a substation. At an estimated total cost of USD1.8 billion, the plant project will support Indonesia's target of achieving 100 percent electrification by 2024. It is expected to supply power to an estimated 11 million Indonesian households upon completion in 2021. The project is being jointly financed by the Asian Development Bank, Japan Bank of Infrastructure Cooperation and the consortium of Mizuho and Nippon Export Investment Insurance.



9.5 Pakistan

Infrastructure Cost and Activity

Although growth has slowed in Pakistan in the last two years, ongoing reforms are expected to yield results and help growth to recover in the near term. Economic growth declined from 5.8 percent in 2018 to 3.3 percent in 2019. The local currency lost around 50 percent of its value against the US dollar in multiple rounds of depreciation since early 2018 and consequently resulted in inflation spiking, thereby constraining Pakistan's overall business environment.

Pakistan's economic growth has been limited by external imbalance and a large debt burden.

The government's ability to fund infrastructure is constrained by large interest payments, which account for 42 percent of total expenditure. The government, under the IMF's three-year financial assistance program, seeks to increase its fiscal space by controlling tax evasion, reducing exemptions and raising tax rates and other duties in order to harness revenues. The fiscal consolidation, along with structural reforms like improving SOE governance and efficiency and improving the business climate, is likely to bolster growth and create much needed space for public investment in infrastructure.

Infrastructure in Pakistan has traditionally been funded by the public sector with foreign assistance being a significant component of the funding. As per the 2019-2020 Budget Speech, the combined allocation for national infrastructure programs was USD12 billion.

Of this, the government set aside under the Federal Public Sector Development Programme an investment of USD6.2 billion or 51 percent of the total planned expenditure for infrastructure development. The highest priority was accorded to the transport and communication subsectors (53 percent), followed by energy (22 percent). USD1.4 billion was proposed for power sector projects for generation, transmission and distribution, including self-financing of power sector corporations but excluding IPPs. USD0.5 billion was also proposed for water sector projects. In an attempt to address the freight share imbalance between roads and rail sectors, the government intends to push a significant share of freightage toward railways to achieve optimal utilization of its inherent capacity and reduce transportation costs, and allocated USD0.2 billion for Pakistan Railways.

Assistance in the form of foreign funding is expected to continue in the future, especially

evidenced through various bilateral and multilateral initiatives. So far, most of the completed and ongoing projects, with support from development partners, have been in the power and transport sectors. The power projects have been largely financed by Chinese firms and banks under the build-operate-transfer model, while road projects have been carried out through a combination of bilateral loans from the Chinese government and fiscal outlays from Pakistan.^[114] PPP mechanisms have been selected for the financing of a number of expressways.

Despite currency volatility, fiscal squeeze and balance-of-payments pressures, interviews with market participants reflect a positive outlook for infrastructure financing in the next 12 months. Interviewed market participants expect the economic situation to improve and borrowing costs to fall over the next 12 months. The decrease in cost is expected to be in the range of 1 percent to 1.25 percent and likely to be effective after June 2020. Furthermore, the average annual government bond yield (10-year) in 2019 was 12.911 percent, up from 9.815 percent in 2018.

Government Bond Returns and Syndicated Loan Spreads	
10-year government bond returns (monthly average, Refinitiv)	12.911% (2019) 9.815% (2018)
20-year government bond returns (monthly average, Refinitiv)	13.521% (2019) 13.003% (2018)
Syndicated loan spreads, 2019 (Refinitiv; over hard currencies: USD, EUR, GBP, JPY)	Energy: <i>LIBOR + 450 bps</i>

Note: Figures in italics indicate fewer than five transactions in 2019.

Range of Infrastructure Borrowing Cost	
Foreign Currency	<ul style="list-style-type: none"> LIBOR + (2.5% to 4%) (Syndicated or direct (limited recourse) project finance) LIBOR + (2.5% to 4%) (Secured senior debt)
Local currency	<ul style="list-style-type: none"> KIBOR⁶³ + (3% to 3.5%) for loans with tenure greater than 10 years (Syndicated or direct (limited recourse) project finance and secured senior debt) KIBOR + (1% to 2%) for loans with tenure up to 7 years (Syndicated or direct (limited recourse) project finance and secured senior debt) KIBOR + (1% to 2%) (loans to government)

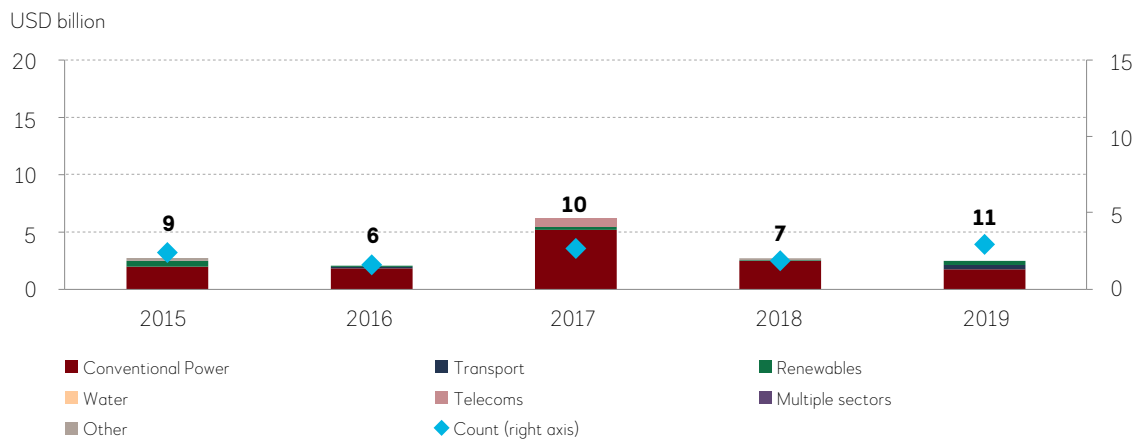
Data Source: Interviews with market participants.

⁶³ Karachi Interbank offered rate.

The total value of closed financial transactions declined slightly from USD3.38 billion in 2018 to USD3.08 billion in 2019, although the number of closed deals increased from 7 to 11 during the same period. The major contributor to this year’s closed transaction value was in power sector, involving two projects: (a) the Matiari-Lahore High-voltage direct current (HVDC) Transmission Line (878 km) PPP project sponsored by the State Grid Corporation of China, amounting to USD1.65 billion; and (b) the Thar Block-II Thar Energy Coal-Fired Plant (330MW) IPP project, amounting to USD0.52 billion. Between 2015 and 2019, the conventional power sector accounted for the largest share of closed transactions value thanks to a few key major deals—8 out of the 14 power transactions in the last five years were valued above USD1 billion, reflective of a critical infrastructure opportunity. This underlines Pakistan’s plans to more than double its generation capacity from

26GW to 62GW by 2025, with most of this planned capacity addition to come from coal-fired and hydro power. However, Pakistan plans to ensure that no additional oil-fired or gas/LNG-fired generation capacity is added post-2021 in order to avoid increasing the expense burden of these fuels. Around 60 percent of Pakistan’s electricity generation is from fossil fuels, and this does not seem likely to abate per Pakistan’s increasing coal imports. The policy push for electricity generation via a dependence on coal, however, comes at the cost of an inactive renewables sector—a trend largely divergent from that of other countries in Asia, which are increasingly shifting to renewable sources. This indicates a missed opportunity from a financing perspective given the relative attractiveness of climate-aligned renewable energy to investors. In 2019, 10 out of the 11 closed transactions in Pakistan were financed through project finance, representing almost 85 percent of the total deal value.

Figure 43: Value and Count of Closed Transactions by Sector—Pakistan

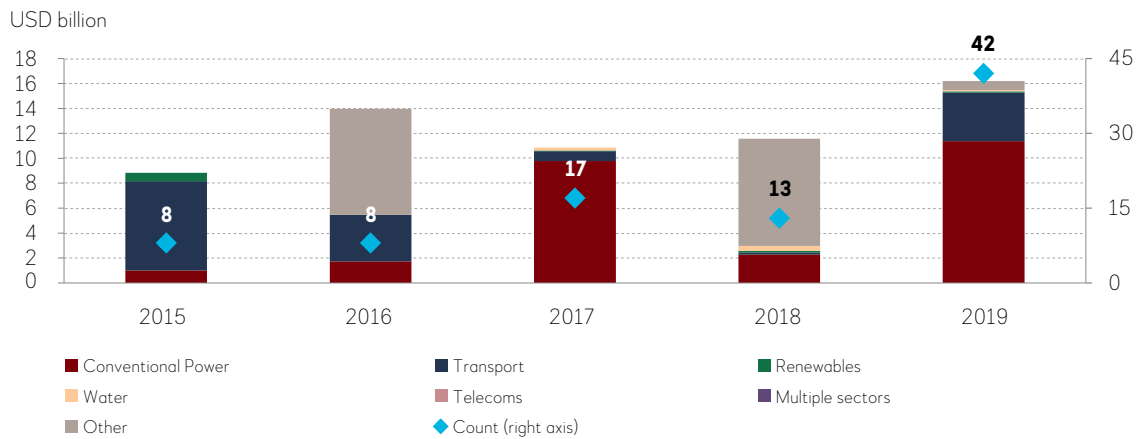


Data Source: IJGlobal.

The 2019 pipeline of open and announced transactions remained on the higher side—increasing to USD16.2 billion in 2019. The conventional power sector accounted for the majority share of this value, with 23 deals in the pipeline valued at USD11.37 billion. The other leading sector was transport, with 11 deals in the pipeline valued at

USD3.89 billion. In terms of finance type of pipeline projects in 2019, project finance accounted for 77 percent (USD12.4 billion), corporate finance accounted for 16 percent (USD2.5 billion) and public sector finance accounted for 8 percent (USD1.3 billion).

Figure 44: Value and Count of Open and Announced Transactions by Sector—Pakistan



Data Source: IJGlobal.

Key Infrastructure Projects in Pakistan

1

The Suki Kinari Hydropower Plant, one of Pakistan's largest private-sector power development projects, is an under-construction hydropower project located on the Kunhar River in Khyber Pakhtunkhwa. It has an installed generation capacity of 870MW. The estimated cost of this plant is USD1.71 billion. The project is one of Pakistan's largest private-sector power development projects. The dam construction will create a 3.1-km-long reservoir with a capacity of 9 million cubic meters of water. The project is being built on a build-own-operate-transfer basis.

2

The Port Qasim Karachi Coal-Fired Power Plant is a 1,320MW coal-fired plant being developed in the southeast of Karachi at an estimated cost of USD2.085 billion. Of this, China Development Bank provided USD125 million and Exim Bank of China provided the rest. The facility comprises two units of 660MW each and is constructed under a 30-year "Build, Own, Operate" (BOO) contract.



9.6 Philippines

Infrastructure Cost and Activity

The economic growth of the Philippines declined from 6.2 percent in 2018 to 5.7 percent in 2019. An uncertain global external environment and delay in the approval of the government's 2019 national budget during the first half of the year were the primary factors that contributed to weakened activity. Overall, the Philippines remained one of the fastest growing economies in Asia in 2019, propelled by strong government spending, monetary easing, and a series of tax reforms aimed at increasing the revenue base. Although real GDP growth is expected to modestly decline owing to a weaker global economic outlook, the Philippine government's large-scale infrastructure program (largely funded by public expenditure) is expected to underpin growth in the medium term. Moreover, stabilizing inflation, which has allowed for monetary easing, will stimulate domestic demand and have a positive impact on growth.

Infrastructure-backed growth is a key policy priority for the Philippine government, which rolled out the *Build, Build, Build* (BBB) Infrastructure Plan in 2017, targeting an investment of USD180 billion spread up to 2022, across a range of transport, water, urban development and ICT and power projects. The BBB program is aimed at addressing the country's critical infrastructure needs while enhancing growth and reducing poverty. While the initial list of high-impact projects under the BBB strategy included 6 airports, 9 railways, 3 bus rapid transits, 32 roads and bridges, and 4 seaports, this list was expanded in November 2019 to include

100 projects. When the BBB program was rolled out, it marked a shift in financing structures from the PPP modality to a combination of government revenue and ODA, although ODA retains the largest share of funding for BBB projects: out of the current 46 projects at implementation stage (as of October 2019), 30 are being funded through ODA. The government is currently considering the revival of PPPs as a mode of financing to encourage private-sector participation, as well as amending its tax rules to improve project revenue flows.

In line with its overarching growth strategy aimed at achieving economic growth by increasing public spending on infrastructure, the government prioritized infrastructure development and social services in its 2019 national budget. The Department of Public Works and Highways and the Department of Transportation (DOTr) were the top two recipients in the overall infrastructure budget (USD9.35 billion representing almost an 82-percent share). The government plans to increase its allocation to these two departments further to USD12.02 billion in its proposed 2020 budget.

While the public budget and ODA remain the two largest sources of financing, the infrastructure market in the Philippines is increasingly seeing private sector participation via newer channels. Since 2016, there has been an increase in unsolicited proposal submissions, one of the newer channels initiated by the government. Joint venture arrangements comprising partnerships between private-sector

players and municipal governments have also seen an uptake. In 2017, the Philippine Stock Exchange issued new listing and disclosure rules for PPP projects, allowing PPP companies to harness equity via the capital market to invest in major PPP projects. While only nine of the original list of 75 BBB projects had private participation, the government has recently added 26 PPP projects to its revised list of 100 projects under the program.^[115]

Due to a combination of easing inflationary pressures and low interest rates, half of the interviewees expect a decline in

borrowing costs. Other interviewees expect them to remain unchanged. A look at the 12-month infrastructure financing cost in the Philippines indicates that compared to last year's average, there was a decline in both the 10-year and 20-year government bond yields. The decline in yields can be attributed to lower expectations of headline inflation and a credit rating upgrade in April 2019. Interviewed market participants expect lending rates to reduce further and anticipate continuing liquidity in the local financing market on the back of strong capital market issuances in 2018.

Government Bond Returns and Syndicated Loan Spreads	
10-year government bond returns (monthly average, Refinitiv)	5.332% (2019) 6.694% (2018)
20-year government bond returns (monthly average, Refinitiv)	5.643% (2019) 7.291% (2018)
Syndicated loan spreads, 2019 (Refinitiv; over hard currencies: USD, EUR, GBP, JPY)	<i>Energy: LIBOR + 120 bps</i> <i>Others⁶⁴: LIBOR + 95 bps</i>

Note: Figures in italics indicate fewer than five transactions in 2019.

Range of Infrastructure Borrowing Cost	
Local Currency	<ul style="list-style-type: none"> • 5.75%-9% (Syndicated or direct (limited recourse) project finance) • 6.75% (corporate bonds)

Data Source: Interviews with market participants.

On the back of a relatively strong Asian economy and domestic fiscal spending, closed transaction activity in the Philippines increased to USD6 billion in 2019 from USD4.7 billion in 2018. While the conventional power and water sectors witnessed a decline, the increase in closed activity in the transport sector backed by a policy push for this sector contributed to the bulk of this increase—total value in this sector increased from USD2.68 billion in 2018 to USD3.40 billion in 2019. Correspondingly, the deal count increased from 8 to 15 year-on-year. The transport sector

alone accounted for 57 percent of the total value of closed transactions in 2019. In terms of finance type of closed projects in 2019, corporate finance accounted for 34 percent (USD2.0 billion), project finance accounted for 40 percent (USD2.4 billion) and public-sector finance accounted for 26 percent (USD1.5 billion).

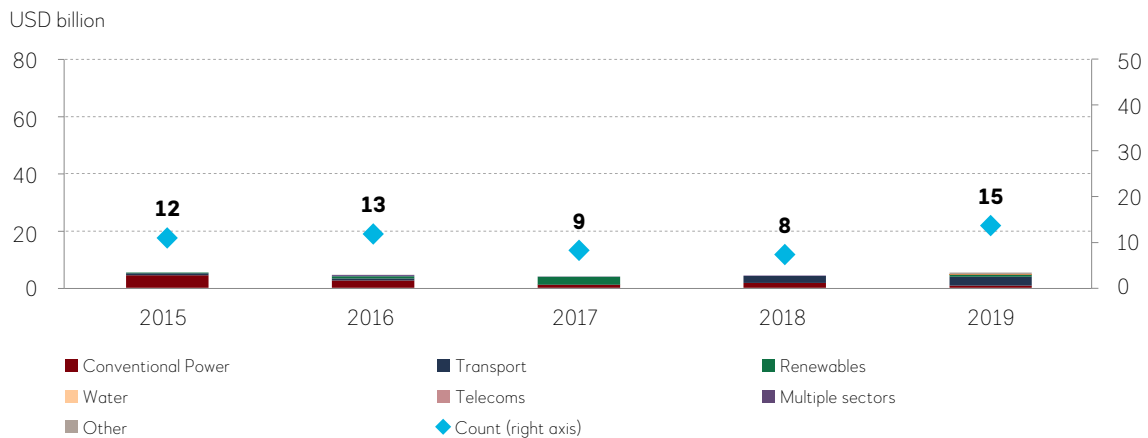
Yet existing structural challenges remains an impediment to infrastructure growth, e.g., in the renewables sector. Between 2015 and 2017, the Philippines closed an average of

⁶⁴ "Other" includes oil and gas or mining/social infrastructure.

USD1.4 billion worth of deals per year, while 2018 saw no closed activity in the renewables sector. In 2019, the volume of closed transaction increased to USD910 million. While the progressive tax hike on coal implemented in the Philippines starting in 2018 is expected to drive the country's transition to clean energy over the next few years,^[116] coal-fired power plants are still the country's largest source of

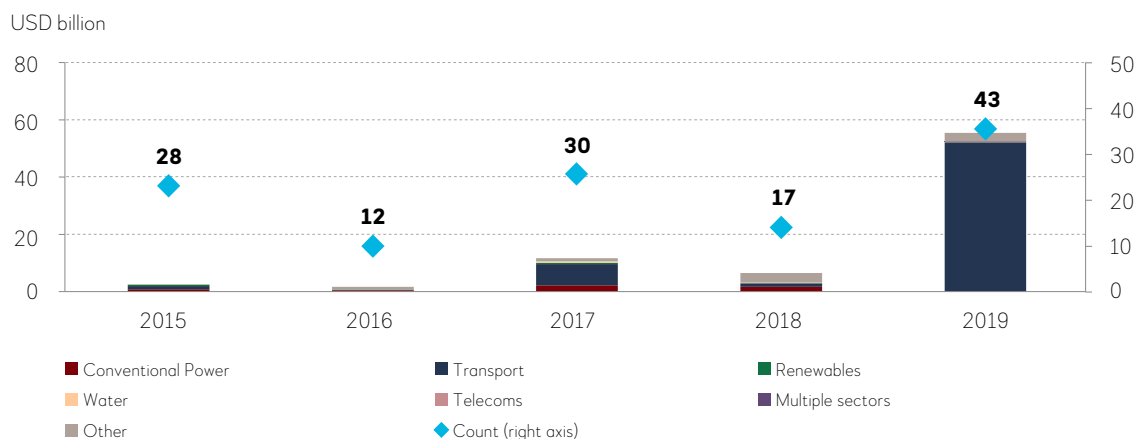
electricity. Interviewees noted that the country does not yet have an appropriate regulatory framework for renewables, even though decarbonization is increasingly discussed in the Philippines. Nevertheless, the monetary authority is increasingly cognizant of the need to manage climate change risk, which may change bank lending preferences in favor of renewables.

Figure 45: Value and Count of Closed Transactions by Sector—Philippines



Data Source: IJGlobal.

Figure 46: Value and Count of Open and Announced Transactions by Sector—Philippines



Data Source: IJGlobal.

The Philippines' open and announced transaction activity increased significantly to USD67.19 billion in 2019. 2019 tops the value of open and announced transactions in the last five years. The five-year pipeline trajectory coincides with the rolling out of the government's BBB strategy, as pipeline activity increased significantly starting 2017. Over the last three years, the transport sector has been the largest driver of the infrastructure pipeline, with a total of 55 deals at the pre-financing or financing

stage, as opposed to just six between 2015 and 2016. The transport sector alone contributed to over 94 percent of the 2019 pipeline. A few major oil and gas and social infrastructure transactions contributed to the pipeline. In terms of the finance type of projects in pipeline in 2019, project finance accounted for 63 percent (USD42.7 billion), corporate finance accounted for 22 percent (USD14.9 billion), design-build accounted for 10 percent (USD7.0 billion), and public-sector finance accounted for 4 percent (USD2.7 billion).

Key Infrastructure Projects in the Philippines

1

The Manila-Calamba North-South Commuter Railway (56.5 km) JICA Facility is a segment of the North-South Commuter Railway which will link Tutuban, Manila to Calamba, Laguna. The project is being cofinanced by the Asian Development Bank (ADB) and the Japan International Cooperation Agency (JICA). The total railway network after completion will have a length of 147 km. The project is valued at USD1.52 billion.

2

The Cavite-Laguna Expressway (47.02 km) is an under-construction four-lane expressway that will connect the Bacoor and Kawit, Cavite areas (CAVITEX) with the Laguna and South Luzon Expressway (SLEX). The PPP project is being developed under a 35-year Build-Transfer-and-Operate (BTO) concession with MPCALA Holdings (Metro Pacific Investments Corporation) being awarded the sponsor role. The expressway is expected to ease the traffic in the Cavite-Laguna region. The project is valued at USD1.04 billion.

3

The Bulacan Bulk Water Supply Scheme is a USD410-million PPP project being developed under a 30-year build-operate-transfer facility and will be used for the development of a bulk water supply scheme in the Philippines. The awarding authority for the project is the Metropolitan Waterworks and Sewerage System (MWSS). The facility will serve 24 municipalities in the Province of Bulacan and is expected to help meet the increasing water demand, expand its current service area coverage and increase the number of households served.



9.7 Russia

Infrastructure Cost and Activity

Russia's economic growth slowed from 2.3 percent in 2018 to an estimated 1.1 percent in 2019. This slowdown has been attributed to more moderate export growth, slow implementation of the National Projects and declining global oil prices. The country's medium- and long-term growth outlook is constrained by structural challenges, including an over-reliance on natural resources, high state involvement in the economy, an aging workforce and low investment, including in infrastructure, among other things.^[117]

Infrastructure investment is one of the government's key fiscal priorities, but some analysts argue that budgetary allocations are insufficient. The government allocated USD34 billion to infrastructure in 2019 and public investment will focus on this alongside health and education.^[118] The main areas of focus in terms of planned financial outlay are railway infrastructure (mainly the projects in the high-speed railway development program) and road and bridge construction, with the highest number of projects expected in power and utilities.^[119] However, some analysts argue that total allocated infrastructure investment (including public and private) will be insufficient to meet even basic needs, let alone promote economic growth.^[120] The government's focus on maintaining fiscal stability and budget surpluses may mean that infrastructure

investment from the budget will focus on a limited number of mega-projects.^[121]

That said, infrastructure investment may receive a boost from other sources.

The government plans to finance additional infrastructure projects through a new Development Fund, to be funded through market borrowing. In addition, Russia's sovereign wealth fund, which had assets of USD125.6 billion as of end-2019, will likely supplement budgetary infrastructure investment during 2020.^[122] Also, some projects may benefit from other types of state support, e.g., preferential tax rates, simplified bureaucratic procedures or state guarantees for a minimum return.^[123] This is likely to go some way toward offsetting low fiscal allocations.

Borrowing costs are expected to decline in the next 12 months, on balance. Due to bilateral economic restrictions ("sanctions"), since 2014 it has been more difficult for Russian financial institutions to raise financing in the US and EU financial markets.^[124] This has led to the cost of borrowing from abroad being higher than otherwise, and has limited the ability of Russian institutions to access external funding.⁶⁵ Accordingly, most borrowing is now in local currency, which is more challenging given the generally low level of financial intermediation provided by local banks, already burdened with non-performing loans (although a clean-up of

⁶⁵ This is reflected, for example, in the declining foreign debt of companies and banks (by end-2018, this had fallen to USD398 billion, down from USD448 billion a year earlier) as Russian firms have been unable to refinance some of their foreign currency loans and have had to redeem them as they fall due.

bad debts is taking place). On the other hand, domestic borrowing costs have been declining throughout 2019 as the central bank has been relaxing its monetary policy in order to adjust to lower inflation. Indeed, domestic financing costs in Russia, as proxied 10-year government zero-coupon bond yields, have come down by

about 50bp on average in 2019, and further by 100bp, to 6.4 percent, by the end of the year.^[125] Overall, interviewed market participants expect low interest rates over the next 12 months to encourage competition to finance a relatively smaller pool of bankable infrastructure projects, resulting in a fall in borrowing costs and margins.

Government Bond Returns and Syndicated Loan Spreads

10-year government bond returns ⁶⁶ (average, Bank of Russia)	7.598% (2019) 8.005% (2018)
Syndicated loan spreads, 2019 (Refinitiv; over hard currencies: USD, EUR, GBP, JPY)	Transport: <i>LIBOR + 280 bps</i>

Note: Figures in italics indicate fewer than five transactions in 2019.

Range of Infrastructure Borrowing Cost

Foreign Currency	<ul style="list-style-type: none"> Due to bilateral sanctions, foreign currency borrowing is restricted in Russia. Banks obtain foreign currency from the Bank of Russia.^[127] The rate for 1-year USD or Euro loans is LIBOR + 325 bps.^[128]
Local Currency	<ul style="list-style-type: none"> 6.5 % to over 12% for syndicated or direct (limited recourse) project finance 8.84% to 9.34% for secured senior debt and/or green bonds 8.54% to 9.34% for corporate project bonds (secured) 8.29% for loans to government 8.84% to 9% for combinations of the above financing types

Data Source: Interviews with market participants

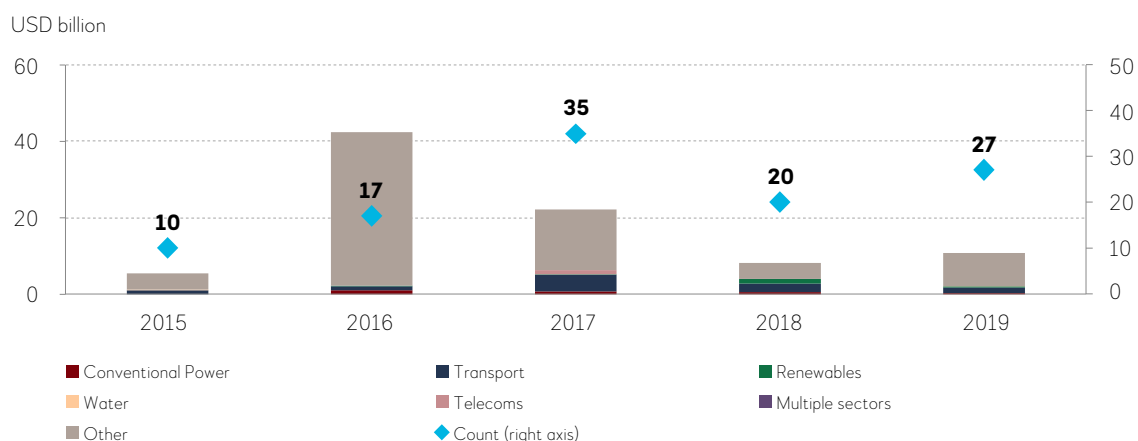
The value of infrastructure transactions with private participation reaching financial close in Russia increased by about 30 percent to USD10.8 billion in 2019 from USD8.2 billion in 2018. However, virtually all the increase came from the “other” sectors (from USD4.2 to USD8.7 billion), which includes natural-resource extraction, a key aspect of the Russian economy, particularly in oil and gas fields, as well as base metals and coal. For most of the other sectors, their value declined by almost 50 percent even though the total number of transactions increased. Corporate finance accounted for 39 percent (USD4.3 billion) of projects closed in 2019, project finance for 44 percent (USD4.8 billion) and public sector finance for 16 percent (USD1.8 billion).⁶⁷

Regarding renewables, closed transactions declined from USD1.2 billion in 2018 to USD346 million in 2019. Russia has signed but not ratified the Paris Agreement, and has yet to pass legislation creating a framework for regulating emissions. The government has a target for renewable energy operations (excluding large hydropower projects) to generate 4.5 percent of Russia’s electricity by 2024. Tenders that allocate renewable energy capacity at beneficial tariffs fixed for a 15-year period have been floated annually in Russia since 2013. Authorities allocated capacity of about 1.8GW for solar-power plants, 3.6GW to wind farms, and 160MW via small hydroelectric projects to be set up in 2019-2023, with companies subject to local content legislation.^[126]

⁶⁶ The Central Bank of the Russian Federation.

⁶⁷ These public-sector finance transactions cover SOEs and development finance institutions (i.e., development banks, multilaterals or export credit agencies).

Figure 47: Value and Count of Closed Transactions by Sector—Russia

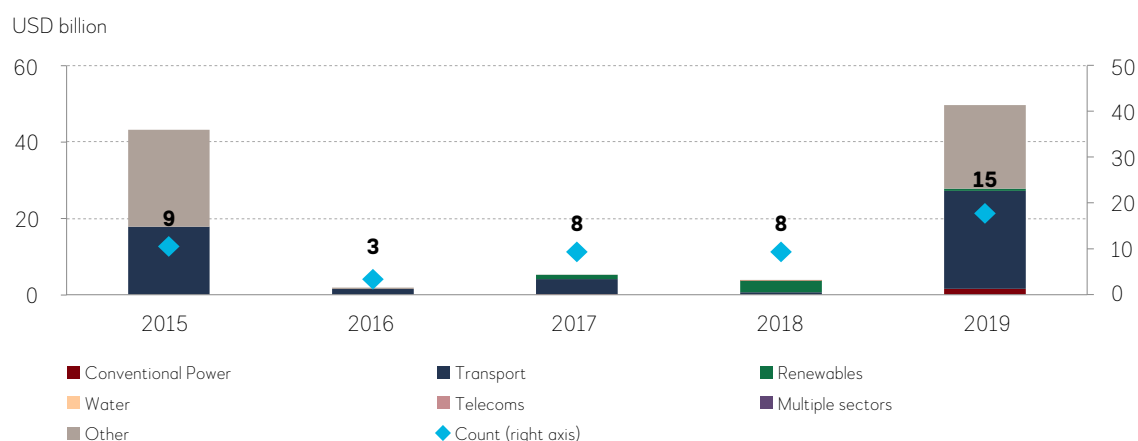


Data Source: IJGlobal.

Despite headwinds, private infrastructure projects in the pipeline increased in 2019. While sanctions will constrain investment in the country’s energy industry, as they restrict the export of dual-use goods, oil-drilling equipment and technology, Russia is determinedly seeking new investment options from Asian investors, particularly in the energy sector.^[129] Importantly, infrastructure transactions are expected to rebound over the next 12 months due to lower borrowing costs, with

which many more projects will become commercially viable. Perhaps as a reflection of this, Russia’s open and announced private transaction activity (“the pipeline”) is quite robust, with a total value of active projects of USD48.6 billion in 2019, including in the the oil and gas sector (USD21.4 billion), the transport sector (USD25.1 billion), and the conventional power sector (USD1.5 billion). Project finance accounts for virtually all transactions in the pipeline.

Figure 48: Value and Count of Open and Announced Transactions by Sector—Russia



Data Source: IJGlobal.

Key Infrastructure Projects in Russia

- 1 Arctic LNG 2 with an estimated project cost of USD21 billion is for the construction of three LNG liquefaction trains of roughly 6.6 million tons per annum. The first liquefaction train in the project is due to export its first LNG cargo by 2023—with the second and third trains to start shipping by 2024 and 2026. The project's shareholders are a group of hydrocarbon companies namely Russia's Novatek (60 percent), France's Total (10 percent), China's CNOOC (10 percent) and CNPC (10 percent) and Japan Arctic LNG (comprising Mitsui & Co. and JOGMEC) (10 percent).
- 2 The Moscow-Kazan High-Speed Rail line link will provide a rail link from Moscow to Kazan, via Nizhny Novgorod. The total cost of the project is estimated at USD20 billion. The project is currently on hold as the government further weighs the costs and benefits.^[130]
- 3 The Moscow, St. Petersburg and Nizhny Novgorod high-speed rail project will provide high-speed rail to link Moscow, St. Petersburg and Nizhny Novgorod at an estimated total cost of USD36 billion. The project is expected to improve connectivity between Russia's two largest cities (Moscow and St. Petersburg) and reduce commuting time. The 659-km Moscow-St. Petersburg link is set to be completed by 2026, whereas the 421-km Moscow-Nizhny Novgorod portion will be completed by 2024.^[131]

9.8 Turkey

Infrastructure Cost and Activity

Turkey's economy slowed down significantly in 2019 as real GDP growth slackened from 2.8 percent in 2018 to 0.9 percent in 2019. The economic slowdown can be attributed to the rebalancing of Turkey's economy, accompanied by substantial currency depreciation of around 40 percent against the US dollar from January to August 2018. The currency slide drove up inflation and increased input costs for companies, limiting their ability to service their foreign currency-denominated debt. The banking sector was also impacted via the bad loans, arising from stress in the corporate sector. While the slowing of economic growth in 2019 is due to the base effects of the 2018 recession in Turkey, output has been gradually stabilizing since the beginning of 2019, with July marking the turning point when growth turned positive. An expansionary economic policy, lower interest rates and inflation, and a relative uptick in domestic spending have aided Turkey's recovery.^[132]

Turkey's foreign currency denominated-debt burden remains a significant barrier to investor sentiment, and consequently, infrastructure

activity and financing. From available data, the Central Government of Turkey had accumulated about USD223 billions of medium- and long-term public net debt stock and USD111 billion of which is foreign currency denominated debt, as of the end of 2019.^[133] This debt increased significantly in volume owing to the opposing effect of the depreciation of the domestic currency. The government amended its foreign currency lending regime in May 2018 and introduced significant restrictions for Turkish entities on obtaining foreign-currency-denominated loans, and foreign-currency-indexed loans.

To stabilize economic growth, the Turkish government launched a reform package in April 2019 that includes, among other measures, the creation of an asset management entity, to which local banks could transfer their bad loans.

Besides this, the Banks Association of Turkey recently introduced the Framework Agreement on Financial Restructuring for large-scale companies (with loans from banks of more than TRY25 million (around USD4.4 million). The Turkish government, in its five-year development plan (2019-2023), set aside TRY754 billion (around USD133 billion) worth of investments over this period, with a focus

on transportation infrastructure (35 percent of total public fixed capital investments).^[134]

Local commercial banks continue to serve as primary debt financiers, while local investors continue to be the primary equity financiers of infrastructure projects in Turkey for private and PPP projects.

Alternative financing tools and sources remain limited. Historically, the main financing models used in project finance include public, private and development bank lending, export-credit agencies, and long-term bond markets. In particular, a substantial number of projects have been financed by international financial institutions either independently or in partnership with commercial lenders. Between

2009 and 2017 (latest year available), Turkey remained the largest recipient of ODA for economic infrastructure and services among emerging European economies.^[135]⁶⁸ Islamic finance is an emerging source of infrastructure finance in Turkey—a large, Muslim-majority country—and has been used in a few projects.^[136]

Market participants expect borrowing costs for infrastructure to remain unchanged over the next 12 months. A look at the 12-month infrastructure financing cost in Turkey indicates a decline in 10-year government bond yields as compared to the average of the previous 12 months. The 10-year bond yield declined from 15.28 percent in 2018 to 15.23 percent in 2019.

Government Bond Returns and Syndicated Loan Spreads											
10-year government bond returns (monthly average, Refinitiv)	15.23% (2019) 15.28% (2018)										
Syndicated loan spreads, 2019 (Refinitiv; over hard currencies: USD, EUR, GBP, JPY)	<table border="0"> <tr> <td><i>Telecoms:</i></td> <td><i>LIBOR + 210 bps</i></td> </tr> <tr> <td></td> <td><i>535 bps (Fixed Coupon Rate)</i></td> </tr> <tr> <td></td> <td><i>EURIBOR + 25 bps</i></td> </tr> <tr> <td colspan="2"><hr/></td> </tr> <tr> <td><i>Transport:</i></td> <td><i>LIBOR + 400 bps</i></td> </tr> </table>	<i>Telecoms:</i>	<i>LIBOR + 210 bps</i>		<i>535 bps (Fixed Coupon Rate)</i>		<i>EURIBOR + 25 bps</i>	<hr/>		<i>Transport:</i>	<i>LIBOR + 400 bps</i>
<i>Telecoms:</i>	<i>LIBOR + 210 bps</i>										
	<i>535 bps (Fixed Coupon Rate)</i>										
	<i>EURIBOR + 25 bps</i>										
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<i>Transport:</i>	<i>LIBOR + 400 bps</i>										

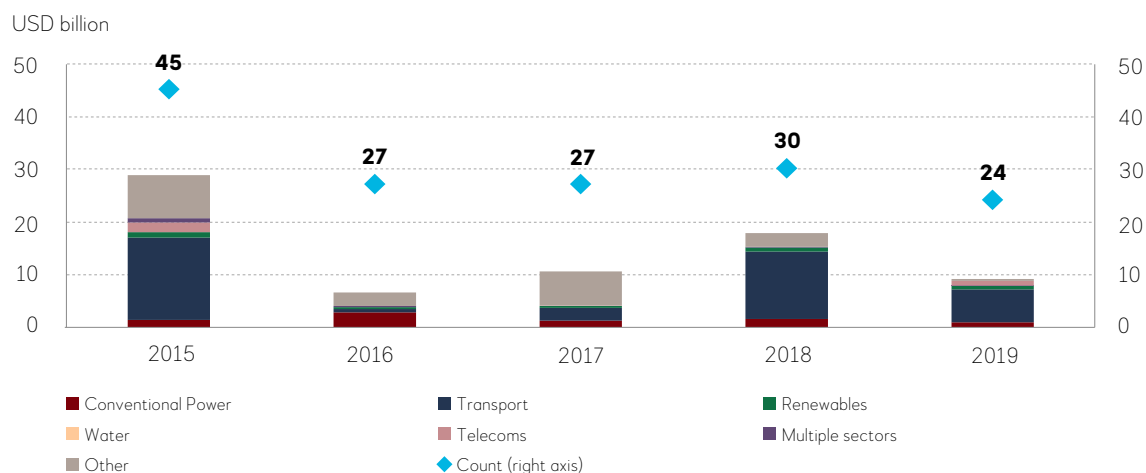
Note: Figures in italics indicate fewer than five transactions in 2019.

Range of Infrastructure Borrowing Cost	
Foreign Currency	<ul style="list-style-type: none"> • LIBOR + 5%-6% • EURIBOR + 7%
Local Currency	<ul style="list-style-type: none"> • For local currency lending, generally followed benchmarks include LIBOR and EURIBOR • For long-term projects: LIBOR + 5% or EURIBOR + 4%

Data Source: Interviews with market participants.

⁶⁸ For a full breakdown of what is included under “economic infrastructure and services”, see <https://stats.oecd.org/Index.aspx?DataSetCode=CRS1>

Figure 49: Value and Count of Closed Transactions by Sector—Turkey



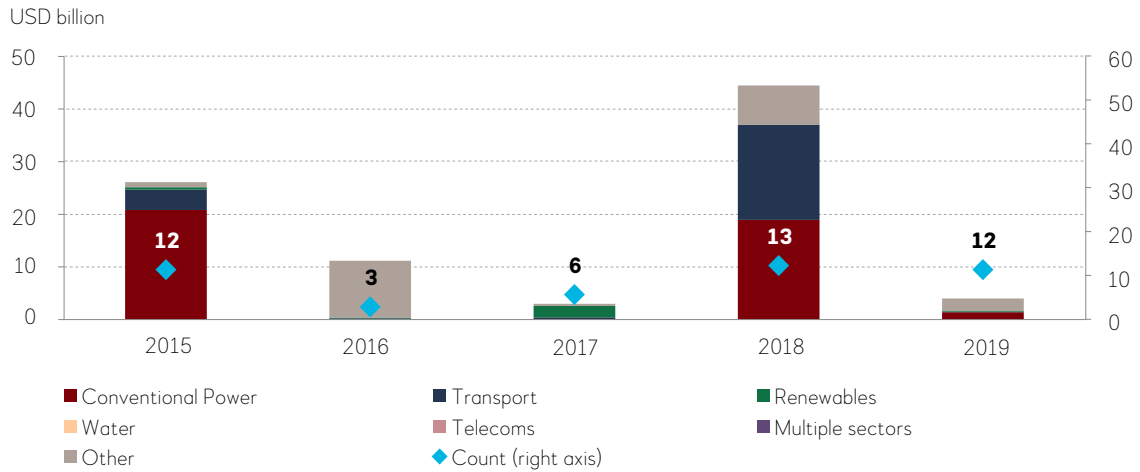
Data Source: IJGlobal.

The value of closed transactions declined from USD17.7 billion in 2018 to USD9.1 billion in 2019 (Figure 49). The number of deals that reached financial close in 2019 was also lower at 24 deals, compared to 30 deals in 2018. The transport sector closed USD6.2 billion worth of deals (69 percent of total deal value) in 2019, with the USD4.4 billion Kınalı-Odayeri (171 km) and Kurtkoy-Akyazı (90 km) Sections of the Northern Marmara Motorway Project—being conducted under a PPP structure—accounting for most of the deal value. Other than transport, the renewables and conventional power sectors closed USD718 million and USD877 million worth of transactions in 2019 respectively. Despite being strategically located between natural gas-producer and consumer economies, the country closed no deal in the oil and gas sector, as opposed to 12 deals in total valued at USD6.2 billion in the sector in the preceding four years (Figure 49). Of the infrastructure transactions that reached financial close in 2019, corporate finance (75 percent

of transaction value), project finance (21 percent of transaction value), and public-sector finance (4 percent of transaction value) emerged as the dominant type of financing.

Turkey’s overall open and announced transaction pipeline has taken a hit on the back of a sovereign credit rating downgrade that influenced investment sentiment—the total value of open transactions in 2019 was just USD4.2 billion. In 2019, activity in the power sector was almost negligible. This low performance can be attributed to power companies facing multiple issues such as a heavily regulated electricity market, a fluctuating exchange rate, rising energy costs, uncertainties on feed-in-tariff mechanism, and the need to restructure their debts.^[137] In terms of finance type of pipeline projects in 2019, corporate finance accounted for 3 percent (USD0.4 billion) and project finance accounted for 97 percent (USD4.1 billion).

Figure 50: Value and Count of Open and Announced Transactions by Sector—Turkey



Data Source: IJGlobal.

Key Infrastructure Projects in Turkey

1

Sections of the Northern Marmara Motorway Project (261 km) PPP - Additional Facility 2 is a major refinancing project closed in September 2019. This project involves refinancing of the remaining sections of the motorway using the USD4.4 billion proceeds. The motorway comprises two sections: the 171-km Kurtkoy-Akyazi section on the Asian side, and 90-km Kınalı-Odayeri section on the European side. A group of 10 banks arranged the refinancing. The debt has two tenors, reflecting the different concession lengths of the two sponsors.

2

Istanbul İkitelli Integrated Health Campus, expected to be the world's largest health campus built on seismic isolators, achieved financial closure in 2017. The Project has an integrated health campus consisting of eight hospitals (6 main hospitals, a psychiatric hospital and a physical treatment and rehabilitation hospital) with a total capacity of 2,682 beds.

Appendixes

Appendix 1:

Regression Framework (Chapter 2)

This appendix provides more elaboration on the regression coefficients presented in **Chapter 2**. Following Esfahani and Ramirez, the growth model is

$$Y = K^{\alpha} N^{\beta} (QL)^{1-\alpha-\beta}$$

Where K and N are infrastructure and non-infrastructure capital stock respectively, L is labor, and Q the Total Factor Productivity (TFP) in a labor augmenting technology. In per capita terms, this becomes

Equation 1

$$y = k^{\alpha} n^{\beta} Q^{1-\alpha-\beta}$$

where y , k , n are expressed in per worker terms. Expressed as growth terms, the equation becomes

Equation 2

$$\gamma_y = \alpha\gamma_k + \beta\gamma_n + (1 - \alpha - \beta)\gamma_Q$$

Where γ_y is the growth rate of output per worker (the same analogues hold for other variables with γ). In a balanced growth path, all endogenous variables grow at the same steady state rate q^* which is underlying TFP growth rate

$$\bar{\gamma}_Q = \bar{\gamma}_y = \bar{\gamma}_k = \bar{\gamma}_n = q^*$$

This allows Equation 2 to be written as

Equation 3

$$\gamma_y = q^* + \alpha(\gamma_k - q^*) + \beta(\gamma_n - q^*) + (1 - \alpha - \beta)(\gamma_Q - q^*)$$

Observed economic growth consists of an underlying steady state rate q^* and the components related to any shocks to infrastructure and non-infrastructure growth, and some TFP shocks $\gamma_y = q^* + \alpha$, which is treated as the error term. This is the key identification equation for subsequent regressions. For worker non-infrastructure GFCF. This completes the characterization of the regression setup and allows the estimation of Equation 3. the subsequent regressions, we need effective measures for the regressors. By definition

$$\gamma_k \equiv \frac{\Delta K}{K} - \frac{\Delta L}{L}$$

Note that capital accumulation follows the standard process

$$\frac{\Delta K}{K} = \frac{GFCF_K}{K} - \delta$$

where $\Delta K = GFCF_K - \delta$ is the net flow of investment into infrastructure, with $GFCF_K$ as new capital formation and δ accounting for the rate of depreciation of existing capital stock. This implies that

Equation 4

$$\gamma_k - q^* = \left(\frac{\Delta K}{K} - q^* \right) - \frac{\Delta L}{L} \approx \left(\frac{GFCF_K}{K} - q^* \right) - \frac{\Delta L}{L}$$

where the approximation ignores the effect of depreciation. In other words, the change in infrastructure stock can be proxied by gross fixed capital formation in infrastructure.⁶⁹ Extending this further, the report uses the first log difference of GFCF per worker as the proxy for $\gamma_k - q^*$. The argument is as follows. Annual GFCF in the economy captures the increase in capital stock. This can also be easily converted into per worker terms, dividing by the number of workers. Nevertheless, annual GFCF investment per worker does not tell us whether the rate of investment is above or below steady state, which is what is required from Equation 4.

On the other hand, a positive log first difference in GFCF (in per worker terms) will correlate to positive shock to per worker capital stock growth away from steady state. Conversely, a negative first log difference in GFCF will correlate with a negative shock to per worker capital stock growth.⁷⁰ The term $\gamma_k - q^*$ can be thus be better measured by the first log difference in per worker infrastructure GFCF. Similarly, $\gamma_N - q^*$ is measured by the first log difference in per

Appendix 2:

Literature Review of Some Meta-Analysis Studies on Environment, Social and Governance and Corporate Financial Performance (Chapter 6)

This Appendix provides a summary of studies that highlight the linkages between ESG and financial performance.

Fulton, M., Kahn, B. and Sharples, C. 2013. Sustainable Investing: Establishing Long-Term Value and Performance.

- Based on an examination of 56 research papers, two literature reviews and four meta studies, this paper shows that different categorization is needed for socially responsible investing (SRI), Corporate social responsibility (CSR) and ESG. CSR and, more importantly, ESG factors are correlated with superior risk-adjusted returns at the securities level. Meanwhile, SRI, which tends to rely on exclusionary screens, which neither add little upside nor underperform. Also, many academic studies agree that companies with high ratings for CSR and ESG factors have lower cost of capital in terms of debt (loans and bonds) and equity.

Friede, G., Busch, T. and Bassen, A. 2015. ESG and Financial Performance: Aggregated Evidence from More than 2000 Empirical Studies. *Journal of Sustainable Finance & Investment*. 5(4): 210–233.

- Based on combined findings from around 2,200 individual studies, 90 percent of studies find a non-negative relationship between ESG and financial performance. Among these studies, many report findings of positive correlations.

Clark, G.L., Feiner, A. and Viehs, M. 2015. From the Stockholder to the Stakeholder: How Sustainability Can Drive Financial Outperformance.

- Based on a metastudy of 200 different studies, the paper shows that 90 percent of the studies find that sound sustainability standards lower the cost

⁶⁹ This is an approximation. Supposing the depreciation rate is small, the GFCF (which is a flow) in each year would be closely matched to the increase in capital stock. Most capital stock series are constructed using rolling annual GFCF figures (net increase after accounting for depreciation).

⁷⁰ Note that in the scenario of the negative first difference, capital per worker could still be rising, but it will be rising at a rate that is below steady state.

of capital of companies; 88 percent of the research show that solid ESG practices result in better operational performance of firms; and 80 percent of the studies show that stock price performance of companies is positively influenced by good sustainability practices.

Busch, T., Friede, G., Lewis, M. and Bassen, A. 2018. Digging Deeper into the ESG-Corporate Financial-Performance-Relationship. DWS Investment Research

• This is an update of Friede, et al. (2015). Based on a detailed examination of previous meta-analyses, the study finds that there has been a highly significant, positive, robust and bilateral ESG-CFP correlation. The correlations strength is comparably high for both environmental and social factors. Of the various ESG dimensions, the study find corporate reputation to be a key financial performance driver.

Table 2: Range of Sustainable Finance Terms

<p>Exclusion Investments</p> <ul style="list-style-type: none"> Best-in-class screening Biblical investing Clean investing Divestment <p>Ethical investing</p> <p>Ethically minded investing</p> <ul style="list-style-type: none"> Exclusionary screening Faith-based investing <p>Impact</p> <p>Impact investing</p> <ul style="list-style-type: none"> Jewish investing Negative screening Norm-based screening <p>Positive screening</p> <p>Screening investing</p> <ul style="list-style-type: none"> Shariah investing Values-based investing 	<p>Inclusion Investments</p> <ul style="list-style-type: none"> Aligned B-Corporation (B-Corp) Best-in-class screening Climate bonds Environmental, social and governance investing (ESG) ESG corporate bonds ESG equity themes ESG focused <p>ESG integration</p> <ul style="list-style-type: none"> ESG investing ESG thematic investing <p>Ethical investing</p> <p>Ethically minded investing</p> <ul style="list-style-type: none"> Focused integration Gender-lens investing Gender-smart investing Green bonds 	<ul style="list-style-type: none"> Green investing High ESG rating equities <p>ESG integration</p> <p>Impact investing</p> <ul style="list-style-type: none"> Improving ESG equities Integration Long term investment themes Mission-aligned investing <p>Positive screening</p> <ul style="list-style-type: none"> Responsible investing <p>Screening investing</p> <ul style="list-style-type: none"> SI focused SI integration Socially responsible investing (SRI) Socially conscious investing Sustainability themes Sustainable bonds Sustainable thematic investing Tactical ESG Thematic investing <p>Values-based investing</p>
<p>Philanthropic Investments</p> <ul style="list-style-type: none"> Blended finance Blue bonds Community investing Development finance institute Bonds/DFI bonds Development Impact Bonds Humanitarian Impact Bonds <p>Impact</p> <ul style="list-style-type: none"> Impact bonds Impact capitalism Impact economy <p>Impact investing</p> <ul style="list-style-type: none"> Social bonds Social enterprise Social entrepreneurs Social finance Social Impact Bonds Social Impact investing Social investing Sustainable finance <p>Triple bottom line</p> <ul style="list-style-type: none"> Universal ownership 	<p>Impactful Investments</p> <ul style="list-style-type: none"> Active ownership Collaborative engagement Company activism Company engagement Company executive collaboration Corporate activism Corporate engagement Development finance institute Bonds/DFI bonds SDG engagement <p>Impact</p> <p>Impact investing</p> <ul style="list-style-type: none"> Multilateral development bank (MDB) bonds/MDB bonds Shareholder action <p>Triple bottom line</p>	

Note: DFI stands for Development Finance Institute.

Data Source: AIB Staff summary from the Institute for International Finance. 2019. The Case for Simplifying Sustainable Investment Terminology.

Appendix 3:

Additional Acknowledgments

The analysis presented in this report is based on in-depth interviews with key stakeholders in infrastructure financing and construction, conducted between October and November 2019. Additional insights and data were obtained from associations, government agencies and private sector stakeholders based in several of the focus countries. Our thanks due to the following individuals and organizations, as well as other experts who prefer to remain anonymous:

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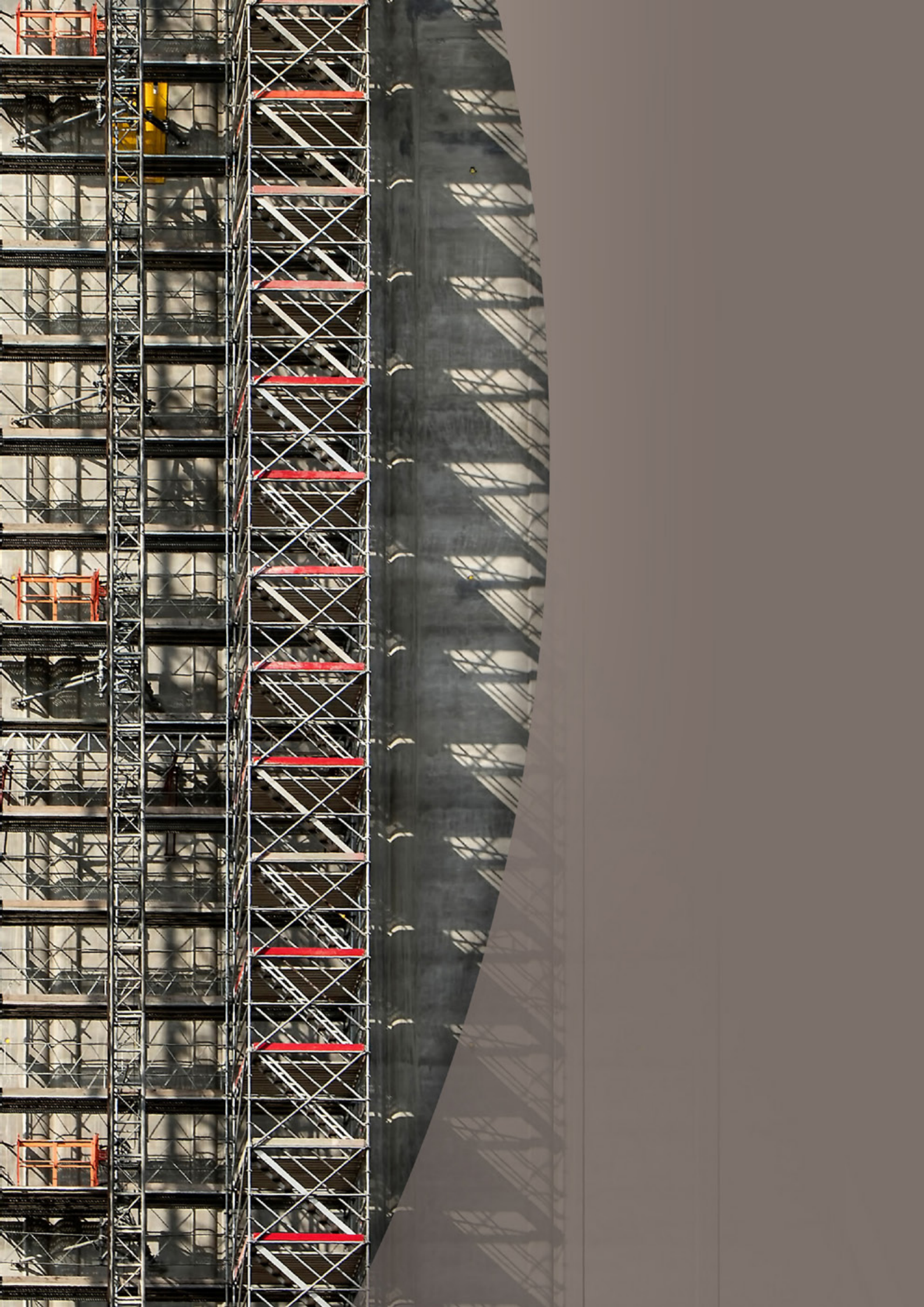
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The unexpected outbreak of the COVID-19 pandemic will pose serious risks to infrastructure development, even though the underlying needs and demand remain strong. The global recession, financial market and supply chain disruptions, budgetary pressures, will become major headwinds to infrastructure development. Developing economies are already facing a large infrastructure financing gap. Furthermore, the outbreak has underscored the importance of investment in quality public health, healthcare and information and communications technology (ICT) focused infrastructure.

Post-crisis, there is an urgent need to mobilize financing towards infrastructure, particularly in the areas of public health, health care, sanitation and information and communications technology, so as to help economies develop the tools and infrastructure they need to become more resilient and adaptable to these challenges.

The Asian Infrastructure Finance Report 2020 examines how to invest in adequate infrastructure for development, as well as to prevent and mitigate the impact of future shocks. Bottlenecks in infrastructure, which constitute major constraints for many developing countries, must be removed or eased considerably before these countries can hope to grow and meet their sustainable development goals.

This report focuses on two key themes. First, it elaborates on what is needed to “invest better”, which would then create the conditions to catalyze more public and private infrastructure investment. Second, it reemphasizes the importance of infrastructure investments in raising economic growth and productivity for developing economies.