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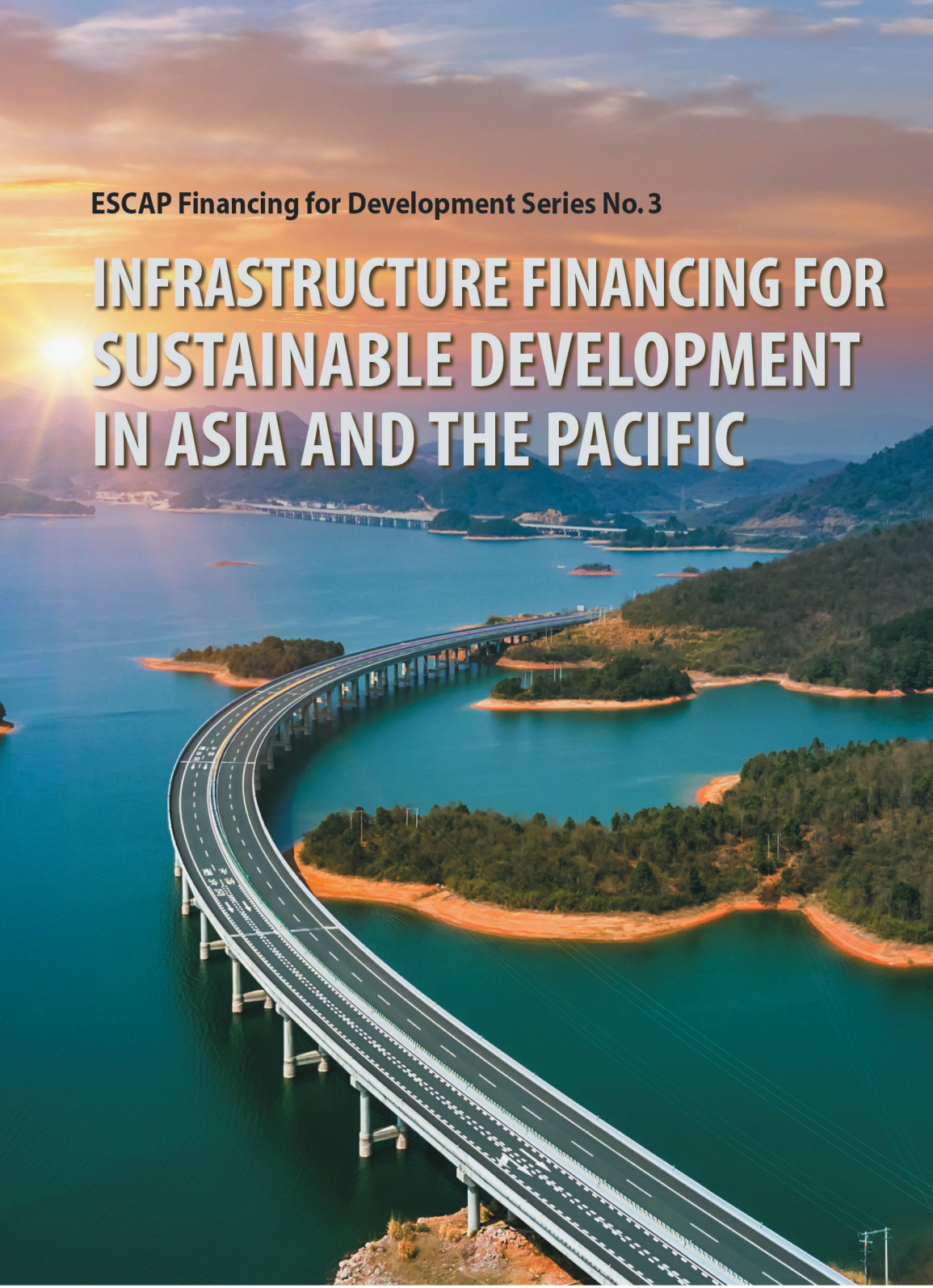
INFRASTRUCTURE FINANCING FOR SUSTAINABLE DEVELOPMENT IN ASIA AND THE PACIFIC



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Infrastructure Financing for Sustainable Development in Asia and the Pacific

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Foreword

The 2030 Agenda for Sustainable Development sets out 17 goals that span the economic, social and environmental pillars of development. Four years have passed since the agenda's adoption, and the Asia-Pacific region has thus far witnessed slow progress in achieving many of these goals. At the current pace of progress, the region is likely to miss every single goal by the 2030 deadline. There is therefore a pressing need to catalyse collective action by governments, institutions and individuals alike, in a concerted bid to accelerate progress towards the Sustainable Development Goals (SDGs).

A critical component that connects all the SDGs is the development of sustainable infrastructure. Although the importance of infrastructure is specified explicitly in Goal 9, infrastructure development has a direct or indirect impact in attaining all seventeen of the SDGs. But investing in infrastructure is perceived as being financially burdensome, complex and risky, prone to the misallocation of resources, corruption, difficult to make economically viable, and generally hard to 'get right'. This in turn can make it particularly difficult to raise the financing needed to enact high quality infrastructure projects. There is therefore a need to re-evaluate some aspects of infrastructure finance and investment, as a key part of any attempt to accelerate progress towards a more sustainable Asia and the Pacific.

This book advocates a shift in perspective towards infrastructure financing. In particular, a more informed, strategic and efficient mobilisation of resources is recommended, focusing not only on leveraging additional funding and participation from the private sector, but also on how policy-makers and government agencies go about the process of infrastructure planning and implementation.

The chapters that follow suggest that a more holistic approach is needed, one that: i) strengthens efforts in regional collaboration, especially for those countries most in need of support; ii) focuses on the commercial viability of infrastructure projects and the wider enabling environment for large-scale investment projects; iii) recognises the need for a more engaged private sector; beyond the conventional role of contractor or sub-contractor; iv) improves the institutional capacity of relevant states agencies and empowers them to be more effective in their critical inputs; v) looks for innovative new products and modalities that can stimulate prospective

investors; and vi) mainstreams issues of sustainability into all infrastructure investment activity, whether related to environment, biodiversity, or climate change, or other factors. Just as infrastructure development is a thread that runs through the SDGs, SDGs also serve as a compass in the pursuit of sustainable infrastructure development.

As the leading inter-governmental organization in the region, the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) enjoys a privileged position in promoting sustainable infrastructure for two reasons. Firstly, as the United Nations secretariat arm responsible for implementing and monitoring the 2030 Agenda in Asia and the Pacific, ESCAP has developed expertise in interventions that seek to address the complexities and challenges of sustainable development. Secondly, by providing regional platforms for dialogue, ESCAP has helped drive cooperation and shared learning among countries at various stages of development. Lessons learned, both good and bad, need to be analysed, disseminated and harnessed to inform future planning. *The Infrastructure Financing and PPP Network of Asia and the Pacific*, launched in 2018, is a good illustration of how ESCAP is seeking to pool insights on infrastructure financing issues in Asia and the Pacific, mobilise valuable financial and technical inputs from the private sector, and stimulate more effective regional cooperation. Infrastructure development is increasingly viewed as something that cannot be enacted by countries independent of each other, but requires bilateral, sub-regional and regional perspectives, planning and intervention.

This year, the United Nations General Assembly will convene its first High-level Dialogue on Financing for Development since the adoption of the Addis Ababa Action Agenda in 2015. This book seeks to provide timely contribution to that dialogue and hopefully places sustainable infrastructure at the core of the financing for development discussions. I therefore encourage readers to consider the key messages conveyed in this book, as we seek to improve the way Asia and the Pacific goes about financing sustainable infrastructure, working together to achieve the SDGs.

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ESCAP

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Explanatory notes

Groupings of countries and territories/areas referred to are listed alphabetically as follows:

- **ESCAP region**: Afghanistan; American Samoa; Armenia; Australia; Azerbaijan; Bangladesh; Bhutan; Brunei Darussalam; Cambodia; China; Cook Islands; Democratic People's Republic of Korea; Fiji; French Polynesia; Georgia; Guam; Hong Kong, China; India; Indonesia; Iran (Islamic Republic of); Japan; Kazakhstan; Kiribati; Kyrgyzstan; Lao People's Democratic Republic; Macao, China; Malaysia; Maldives; Marshall Islands; Micronesia (Federated States of); Mongolia; Myanmar; Nauru; Nepal; New Caledonia; New Zealand; Niue; Northern Mariana Islands; Pakistan; Palau; Papua New Guinea; Philippines; Republic of Korea; Russian Federation; Samoa; Singapore; Solomon Islands; Sri Lanka; Tajikistan; Thailand; Timor-Leste; Tonga; Turkey; Turkmenistan; Tuvalu; Uzbekistan; Vanuatu; and Viet Nam.
- **Least developed countries**: Afghanistan, Bangladesh, Bhutan, Cambodia, Kiribati, Lao People's Democratic Republic, Myanmar, Nepal, Solomon Islands, Timor-Leste, Tuvalu and Vanuatu. Samoa was part of the least developed countries prior to its graduation in 2014.
- **Landlocked developing countries**: Afghanistan, Armenia, Azerbaijan, Bhutan, Kazakhstan, Kyrgyzstan, Lao People's Democratic Republic, Mongolia, Nepal, Tajikistan, Turkmenistan and Uzbekistan.
- **Small island developing States**: Cook Islands, Fiji, Kiribati, Maldives, Marshall Islands, Micronesia (Federated States of), Nauru, Niue, Palau, Papua New Guinea, Samoa, Solomon Islands, Timor-Leste, Tonga, Tuvalu and Vanuatu.
- **East and North-East Asia**: China; Democratic People's Republic of Korea; Hong Kong, China; Japan; Macao, China; Mongolia and Republic of Korea.
- **North and Central Asia**: Armenia, Azerbaijan, Georgia, Kazakhstan, Kyrgyzstan, Russian Federation, Tajikistan, Turkmenistan and Uzbekistan.
- **Pacific**: American Samoa, Australia, Cook Islands, Fiji, French Polynesia, Guam, Kiribati, Marshall Islands, Micronesia (Federated States of), Nauru, New Caledonia, New Zealand, Niue, Northern Mariana Islands, Palau, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu and Vanuatu.

- **South and South-West Asia**: Afghanistan, Bangladesh, Bhutan, India, Iran (Islamic Republic of), Maldives, Nepal, Pakistan, Sri Lanka and Turkey.
- **South-East Asia**: Brunei Darussalam, Cambodia, Indonesia, Lao People's Democratic Republic, Malaysia, Myanmar, Philippines, Singapore, Thailand, Timor-Leste and Viet Nam.

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In dates, a hyphen (-) is used to signify the full period involved, including the beginning and end years, and a stroke (/) indicates a crop year, fiscal year or plan year.

Abbreviations and acronyms

AAAA	Addis Ababa Action Agenda
ABMI	Asian Bond Market Initiative
ACIS	Advanced Cargo Information System
ACMECS	Ayeyawady-Chao Phraya-Mekong Economic Cooperation Strategy
ACP	African, Caribbean and Pacific Group of States
ADB	Asian Development Bank
ADBI	Asian Development Bank Institute
AF	Adaptation Fund
AIFC	Astana International Financial Centre
AIIB	Asian Infrastructure Investment Bank
APEC	Asia-Pacific Economic Cooperation
ARA	Autonomous revenue authority
ASEAN	Association of Southeast Asian Nations
ASEAN-GBS	ASEAN Green Bond Standards
ASYCUDA	Automated Systems for Customs Data
BBG	Bay of Bengal Gateway
BOOT	Build-own-operate-transfer
BOT	Build-operate-transfer
BRI	Belt and Road Initiative
CA	Concession agreement
CAREC	Central Asia Regional Economic Cooperation
CASA-1000	Central Asia-South Asia power project
CBI	Climate Bonds Initiative
CECIF	China-EU Co-investment Fund
CEO	Chief executive officer
CFC	Climate Finance Centre
CGIF	Credit Guarantee and Investment Facility
CIF	Climate Investment Fund
CLO	Collateralized loan obligation
CoST	Construction Sector Transparency
CP	Cooperation Priority
CPEC	China Pakistan Economic Corridor

CPPPC	China Public Private Partnerships Center
CSN	Country with special needs
DBO	Design-build-operate
DFI	Development finance institution
DFID	Department for International Development, United Kingdom
EBRD	European Bank for Reconstruction and Development
EDF	Électricité de France
EDFI	Électricité de France International
EDL	Électricité du Laos
EEU	Eurasian Economic Union
EGAT	Electricity Generating Authority of Thailand
EGCO	Electricity Generating Public Company of Thailand
EIB	European Investment Bank
EIU	Economist Intelligence Unit
ESCAP	United Nations Economic and Social Commission for Asia and the Pacific
ESG	Environmental, social and governance
EU	European Union
F$	Fijian dollar
FAO	Food and Agriculture Organization
FDI	Foreign direct investment
G20	Group of Twenty
GBP	Green Bond Principles
GCF	Green Climate Fund
GEF	Global Environmental Facility
GFDRR	Global Facility for Disaster Reduction and Recovery
GHG	Greenhouse gas
GIF	Global Infrastructure Facility
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
GMS	Greater Mekong Sub-region
GWh	Gigawatt
HCMC	Ho Chi Minh City
HSR	High speed rail
IBRD	International Bank for Reconstruction and Development
ICT	Information and communications technology
IDA	International Development Association

IDB	Inter-American Development Bank
IEA	International Energy Agency
IFAD	International Fund for Agricultural Development
IFC	International Finance Corporation
IFCA	Investment Facility for Central Asia
IFI	International financial institution
IIGF	Indonesia Infrastructure Guarantee Fund
IMF	International Monetary Fund
IPO	Initial public offering
IsDB	Islamic Development Bank
ITD	Italian-Thai Development Public Company Limited
ITRC	Infrastructure Transitions Research Consortium
IWT	Indus Water Treaty
JICA	Japan International Cooperation Agency
JV	Joint venture
Lao PDR	Lao People's Democratic Republic
LDC	Least developed country
LHSE	Lao Holding State Enterprise
LLDC	Land-locked developing country
MDB	Multilateral development bank
Micronesia (FS)	The Federated States of Micronesia
MIGA	Multilateral Investment Guarantee Agency
MoU	Memorandum of understanding
MW	Megawatt
NFRK	National Fund of the Republic of Kazakhstan
NGO	Non-governmental organisation
NISMOD	National Infrastructure Systems MODel
NPPF	National Pension and Provident Fund
NT1	Nam Theun 1
NT2	Nam Theun 2
NTPC	Nam Theun 2 Power Company
O&M	Operation and maintenance
ODA	Official development assistance
OECS	Organisation of Eastern Caribbean States
OOF	Other official flow

PCRAFI	Pacific Catastrophe Risk Assessment and Financing Initiative
PCRIC	Pacific Catastrophe Risk Insurance Company
PHP	Philippine peso
PIF	Pacific Islands Forum
PMU	Project Management Unit
PPA	Power Purchase Agreement
PPCR	Pilot Program for Climate Resilience
PPIAF	Public-Private Infrastructure Advisory Facility
PPP	Public-private partnership or purchasing power parity
PRG	Partial risk guarantee
PRI	Principles for Responsible Investment or political risk insurance
PRIF	Pacific Regional Infrastructure Facility
PSC	Public sector comparator
R&D	Research & development
RBI	Raiffeisen Bank International AG
RECI	Regional Economic Cooperation and Integration
RGSM	Regional Governments Securities Market
SAPP	Southern African Power Pool
SASEC	South Asia Sub-regional Economic Cooperation
SCO	Shanghai Cooperation Organization
SDG	Sustainable Development Goal
SEZ	Special economic zone
SIDS	Small island developing State
SME	Small and medium-sized enterprise
SOE	State-owned enterprise
SOFAZ	State Oil Fund of the Republic of Azerbaijan
SPV	Special purpose vehicle
SPX	South Pacific Stock Exchange of Fiji
SSE	Sustainable Stock Exchanges
TAPI	Turkmenistan-Afghanistan-Pakistan-India
TCX	Currency Exchange Fund
TNC	Transnational corporation
TOF	Infrastructure take-out facility
UHC	Universal health coverage
UNCTAD	United Nations Conference on Trade and Development

UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
USSR	Union of Soviet Socialist Republics
V20	Vulnerable Twenty
VAT	Value-added tax
VGF	Viability gap funding
WEF	World Economic Forum
WFP	World Food Programme
WLCC	Whole life cycle costing
WSS	Water supply and sanitation

Introduction

Infrastructure Financing Strategies for Sustainable Development in Asia and the Pacific

Infrastructure financing is a prerequisite in the pursuit of sustainable economic growth and social development. None of the United Nations Sustainable Development Goals (SDGs) can be achieved without some direct or indirect input from infrastructure. And quality infrastructure, in particular, is the great enabler, serving as the platform on which improved incomes, livelihoods and human well-being can be delivered. But investing in infrastructure is capital intensive, and so funding infrastructure development comes with considerable challenges for policy-makers. These challenges in turn necessitate well-thought-out strategies that can bring about the desired economic, social and environmental impacts, and at a price tag that can be afforded, whether in Asia and the Pacific or beyond.

Since the adoption of the 2030 Agenda for Sustainable Development, much attention has been devoted to estimating the cost of the SDGs and conceptualising how to fund them. ESCAP (2019) recently estimated the additional investment required in the developing countries of Asia and the Pacific at $ 1.5 trillion per year, equivalent to 5 per cent of their combined GDP in 2018[1]. These additional investments can be classified into two broad categories: i) government 'transfer payments', necessary to reduce poverty, establish social protection floors, reduce the incidence of malnutrition or fund the operation of schools and public hospitals and clinics, and so on; and ii) 'infrastructure investment'. This book builds on the calculations in ESCAP (2019) by disaggregating the $ 1.5 trillion total into $ 600 billion per year in transfer payments and $ 900 billion per year for infrastructure investment[2]. Given the importance of the first element, transfer payments, the achievement of the SDGs will require tax revenues to increase, an issue that has been already addressed in ESCAP (2018). Turning to the second element, infrastructure investment, this book argues that policy-makers in Asia and the Pacific need not only to harness additional financial resources, but also move towards a more holistic

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1 This average figure for the region as a whole may not seem large, but for some countries the commitment is significantly higher. For example, the average for the region's least developed countries is closer to the equivalent of 16 per cent of the GDP per year.

2 It should be noted that infrastructure investments also include transfer payments, such as for the repair and maintenance of highways. Nonetheless, a significant part of these investments are up-front construction costs that can be financed by other means.

approach to infrastructure financing. Such an approach has the potential to unlock considerable efficiency gains, reduce redundancies of effort, and provide a more conducive (and less risky) enabling environment that will stimulate greater private sector participation.

Due to the large financial requirements entailed in infrastructure development, without robust and transparent governance mechanisms, opportunities for corruption and other illicit practices can be considerable. For example, the selection of infrastructure projects and their location can be influenced by powerful stakeholders and interested parties, such as elected national and local politicians, executives of national and local authorities, investors and developers, land speculators and others who stand to benefit from a project's approval and design. This can lead to the selection of over-budget and/or under-performing assets, thereby wasting scarce resources and distorting the allocation of public funds. This can not only serve to deter legitimate private sector investors and financiers, but also cause bilateral and multilateral development partners to scale back or withdraw their funding assistance. To address this risk, and in light of the additional resources that Asia-Pacific developing countries need to invest in infrastructure, so as to achieve the SDGs, this book advocates a more sustainable approach to financing infrastructure development. This approach includes the creation of a robust governance structure and conducive enabling environment that leads to a more efficient allocation of public funds, and creates a more solid basis for mobilising private sector capital from both domestic and international players. For that purpose, governments need to consider how best to: i) allocate their own resources to support the SDGs; ii) leverage the development finance architecture and related regional cooperation platforms to finance infrastructure; and iii) incentivise and harness private sector financing sources for sustainable development.

Selecting optimal infrastructure to contribute to the SDGs requires effective mechanisms for infrastructure financing that should be: i) inclusive – such as ensuring universal access to transport, power, water and sanitation, urban housing, telecommunications, education, healthcare and other public services; ii) sustainable – such as mitigating against climate change through energy efficiency, expanding the use of renewable energy, and protecting eco-systems from further degradation and ameliorating the loss of biodiversity; and iii) resilient – protecting a country's citizens and its economic assets from losses incurred due to intensifying inequality, natural disasters and climate change. This suggests not only that sensible investment in infrastructure development is a pre-condition for achieving the SDGs, but also that the SDGs provide a compass with which to navigate the process of infrastructure financing.

Consistent with the Group of Twenty (G20) principles for promoting quality infrastructure[3], this book advocates for the adoption of sustainable infrastructure financing strategies based on three inter-related pillars. First, infrastructure financing should be planned and prioritised in accordance with the aims of the SDGs. Secondly, governments need to provide adequate support for the planning, funding and implementation of infrastructure projects and their financing strategies. Thirdly, the private sector needs to be more meaningfully brought into the implementation of infrastructure development, whether as investors, financiers or developers and operators.

The first pillar, orienting infrastructure investment around achievement of the SDGs, would entail reforms that can help improve infrastructure planning, and better identify the optimal projects to attain the economic, social and environmental dimensions contained in the SDGs. The resulting priorities and implementing plans could then generate a strong pipeline of sustainable and viable infrastructure projects. Given the long-term nature of infrastructure projects, it is desirable that governments seek to commit to implement sustainable infrastructure strategies that extend beyond the normal political cycles. Of course, such strategies could, and indeed should, be adjusted over time, as new information and insights become available, learning experiences are accumulated, and circumstances inevitably change.

The second pillar requires capable inputs and support from the public sector to ensure the efficient selection and implementation of infrastructure projects. It is important to streamline and coordinate the process of infrastructure project preparation, throughout all sectors and levels of government. The production and sharing of good-quality information is essential in the planning stage, as are accurate forecasts of the costs and benefits of new infrastructure. Streamlined procurement procedures, rigorous financial planning, and robust contractual arrangements are needed to ensure the effective execution of projects. As always, the goal is to maximise value-for-money for taxpayers and expend scarce public financial resources in the most efficient, equitable and impactful manner possible.

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[3] The six principles are: i) maximising the positive impact of infrastructure to achieve sustainable growth and development; ii) raising economic efficiency in view of life-cycle costs of infrastructure; iii) integrating environmental considerations in infrastructure investments; iv) building resilience against natural disasters and other risks in infrastructure development; v) integrating social considerations in infrastructure investment; and vi) strengthening infrastructure governance (G20, 2019).

The third pillar is to meaningfully engage the private sector as a partner in the implementation of sustainable infrastructure development projects. The private sector is often reluctant to invest in or co-finance public infrastructure projects because of legitimate (and not inconsiderable) risks and uncertainties. These need to be allayed in various ways, such as providing stable legal and regulatory frameworks, having trusted dispute settlement procedures in place, and the development of appropriate financial instruments and markets that can help package, diversify and mitigate the risks of financing infrastructure projects, so as to better align them with the needs of long-term investors. In sum, the private sector needs to be offered an attractive value proposition, based both on the quality of the projects to be pursued, and the effectiveness by which these projects are to be implemented.

The holistic approach to infrastructure financing outlined in this book is congruent with a recent report by the Secretary General of the United Nations (United Nations, 2019) which argues that private sector finance is constrained by: i) difficulties in identifying a pipeline of 'bankable' SDG projects; ii) weak domestic financial systems and capital markets in many countries; and iii) a lack of common definitions, standards, measurement and reporting related to sustainable investments. To address this problem, the report recommends strengthening national and sub-national capacities to develop and implement 'bankable', transformational projects, and to manage, monitor and report on project implementation. Similarly, a recent World Economic Forum report (WEF, 2019) highlights the difficulties that developing countries face in compiling convincing pipelines of infrastructure projects that both contribute to a country's sustainable development objectives and are structured in a way that is attractive for private sector financing. The following chapters in this book propose some answers in both these respects.

With Asia and the Pacific as its geographical frame of reference, this book aims to identify the key challenges and potential solutions to financing quality infrastructure that is inclusive, sustainable and resilient. This is done across five core chapters. Chapter 1 sets out a strategic framework by which policy-makers can better identify, formulate and go about establishing a portfolio of sustainable infrastructure projects. It argues that the practice of infrastructure planning in many countries is often characterised by fragmentation, typically relying on bottom-up, project-by-project assessments of costs and benefits to develop new infrastructure projects. Given the complex inter-relationships that exist between the economic, social and environmental aspects that characterise sustainable development, this approach is unlikely to lead to an optimal portfolio of infrastructure projects that can lead to the achievement of the SDGs. Further, in-built biases and other factors run significant risks in terms of

wastage and the misallocation of scarce resources. This chapter therefore advocates the need for the public sector to better coordinate and streamline the planning and preparation of infrastructure projects, using a holistic, top-down approach. As incubating projects progress towards potential implementation, more local stakeholder engagement and consultation is then needed to help ensure that the specificities of the project design, construction and operations are sustainable. And private sector inclusion needs to be considered long before the procurement stage. Governments have a responsibility to ensure that their public infrastructure projects are effective in achieving national development goals, and contribute towards meeting international commitments, such as the SDGs. Further, there is an inherent obligation to try and implement such projects in the most efficient manner possible. In so doing, they can not only maximise value-for-money in the allocation of finite fiscal resources, but also enhance the interest of private sector investors, thereby harnessing additional funds and reducing the cost of non-state participation in infrastructure projects. Beyond potential access to funding, private sector actors have a lot to contribute in designing and structuring large-scale projects, and it is a resource that should not be overlooked. But at the very beginning, when a country is conceptualising how to go about developing a portfolio of sustainable infrastructure projects, congruent with the SDGs, that is a job for policy-makers and public consultation.

Both chapters 2 and 3 recognise that public spending alone will not be enough to meet the infrastructure needs of most countries, and stress the critical role of private sector participation in infrastructure financing. In this context, chapter 2 underlines the importance of developing capital markets for sustainable infrastructure financing, and particularly the utility of developing bond markets and related debt instruments as a means to inject greater liquidity into infrastructure financing, particularly from institutional and portfolio investors. Despite a relatively advanced stage of economic development in large parts of Asia and the Pacific, bonds and other 'fixed income' instruments still account for only a small fraction of total infrastructure financing, roughly on a par with the Middle East, North Africa and Sub-Saharan Africa. Banks are the fundamental basis of a healthy financial system of a nation, but developing capital markets – and the various financial instruments that trade on these markets – can provide additional advantages and are a good complement to bank lending, particularly in terms of reducing maturity and currency mismatches. Excessive dependence on bank loans to fund infrastructure projects, which typically take a considerable time to complete and can have short-term pay-back periods, expose infrastructure investors and operators – as well as local banks and financiers as a whole – to greater systemic risk. Not only can periods of financial distress bring about currency mismatch problems for banks that have lent aggressively – or even been obliged to lend

aggressively as a result of government directives – to large-scale infrastructure projects, but the asymmetric lending pattern itself can trigger financial distress and economic instability. In this sense, bond markets provide a means by which the funding needs of infrastructure projects can be better aligned with financial investors also seeking exposure to long-term debt obligations, and thereby lessen the maturity mismatch risks that come with bank lending. There is also potential to better harness alternative financial instruments, such as green and 'sukuk' bonds.

Chapter 3 goes beyond the issue of increasing overall liquidity for underwriting infrastructure investment, and examines the potential of harnessing positive 'externalities' emanating from infrastructure development projects, as an alternative means to generate and distribute the financial returns achieved, and thereby attract greater private sector interest and investment. As noted earlier, investment in sustainable infrastructure is a prerequisite for achieving the SDGs; the socio-economic impacts and financial rewards emanating from individual infrastructure projects extend well beyond the specifics of the projects themselves, as traditionally conceived and financially accounted for in project finance. If that is the case, and private sector investors are being encouraged to become more engaged in infrastructure development, then they should also have an opportunity to share in some of the 'spill-over' effects. From the perspective of finance and investing, it is not unreasonable to explore ways in which the wider socio-economic benefits, or externality effects, emanating from an infrastructure project can be monetised and shared by private sector participants. Just as private sector investors are inherently expected to share in the risks entailed in an infrastructure project that they are participating in, they should also be given the opportunity to share – to some degree at least – in the wider returns, if they can be captured. However, to successfully capture the externality effects and redistribute part of them to the private sector, governments need to implement robust governance structures, necessary not only to attract and assure private sector infrastructure investors and operators, but also guard against the potential for abuse and rent-seeking. This includes ensuring transparency and good governance principles are adhered to when harnessing externality effects through this mechanism, just as one should in more conventional public procurement exercises around infrastructure development. The means used to calculate any 'externality returns' also need to be clear and transparent, and not open to subjective interpretation or opacity.

Chapter 4 analyses the particular challenges presented by cross-border infrastructure development, where multiple sovereign jurisdictions and state agencies are involved, and the process of putting together viable and sustainable infrastructure projects is inevitably more complex. Despite the

clear benefits arising from cross-border infrastructure, it is perhaps not surprising that such investment remains scarce, as the challenges of making such projects work are magnified. To successfully promote cross-border infrastructure development, countries need to improve their 'soft' infrastructure, including the overall business environment, the institutional capacities of relevant state agencies, the legal and regulatory frameworks, incentives to attract foreign direct investment (FDI), and regional coordination and cooperation for smoothly developing cross-border infrastructure. In so doing, they can lessen the real and perceived risks of the cross-border infrastructure projects, and increase the likelihood of success. In an infrastructure project that spans multiple sovereign borders, investors and financiers will typically deem the overall risks of the project as a whole to be roughly commensurate to the country with the weakest enabling environment (i.e. 'the chain is only as strong as the weakest link in the chain'). It is also important to guard against geo-strategic and other political drivers unduly influencing the selection of cross-border infrastructure projects that ultimately result in an inefficient use of finite resources, and a sub-optimal set of socio-economic impacts. A regional approach to project selection, preparation and implementation can help to guard against these kinds of risks and challenges, and the Belt and Road Initiative (BRI) is widely regarded as the most ambitious attempt thus far at such an approach.

Chapter 5 focuses on the more pronounced infrastructure financing challenges faced by both land-locked developing countries (LLDCs) and small islands developing states (SIDS). Issues of remoteness, geographical distances, relatively small economies and private sectors, thinly dispersed populations, limited small public agencies and capacity constraints all serve to make the enactment of sustainable infrastructure development in these countries more difficult, and particularly when it comes to galvanising private sector participation. And yet an inverse correlation typically exists between the institutional capacities of the LLDCs and SIDS to implement quality infrastructure projects and their needs in this regard, particularly in the context of the SDGs. The impact of climate change, for example, is often most pronounced in these economies, whether from rising sea levels or much more erratic weather patterns and other natural phenomena. This then compounds the risks associated with infrastructure development in these countries, thereby adding to the financial costs of getting projects done. In this context, it is clear that the role of international development partners, including ESCAP, multilateral development banks and other development finance institutions, will remain front and centre in the task of co-funding and developing sustainable infrastructure in the SIDS and LLDCs, leveraging enhanced regional cooperation.

Finally, in the context of limited public funds and the limited borrowing capacity of developing countries in Asia and the Pacific, private sector investment in infrastructure projects needs to be stepped up. Unfortunately, despite numerous initiatives with this precise aim in mind, there has not been the kind of major pick up in private sector investment that policy-makers would have desired. To this end, in September 2018, ESCAP, in collaboration with the China Public Private Partnership Center (CPPPC), initiated an infrastructure financing and public-private partnership (PPP) network in Asia and the Pacific, intended to leverage private sector finance for sustainable infrastructure investment. The objectives of the network are to help member states overcome difficulties in implementing and financing infrastructure projects and to encourage private sector participation in financing infrastructure in the region (Subhanij and Lin, 2018). The network aims in particular to help countries that may struggle to conceive, develop and showcase a pipeline of infrastructure projects that are suitable for private financing, as ESCAP recognises that a lack of well-prepared projects is a critical challenge to attracting private sector investment. The network therefore provides for peer learning opportunities, private sector collaborations, a standardised information platform, as well as capacity building on PPP and on how to go about blending different financing sources. The network builds on the sustainable infrastructure financing strategies explored in this book, and encourages member countries to think more strategically about how best to harness and combine the range of public, private, domestic and international financing sources that currently exist. The network also advocates for the creation of laws and regulations that not only attract more infrastructure investment, but also *better* infrastructure investment, and the kind of infrastructure investment that will help the countries of Asia and the Pacific attain the SDGs.

It is very much hoped that the ideas proposed in this book will help stimulate policy discussion around the sustainable infrastructure financing strategies for Asia and the Pacific.

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Chapter 1

Infrastructure for the SDGs: Strategies, Governance and Implementation

1. Introduction

The achievement of multiple Sustainable Development Goals (SDGs), which form the core of the 2030 Agenda for Sustainable Development (United Nations, 2015b), requires not only additional investments in infrastructure, but also a reorientation of such investments. While recent policy-oriented research has focused extensively on estimating the financing gaps that need to be addressed to achieve the required levels of infrastructure, and the various financing options for that purpose, there has been relatively less discussion on the *kind* of infrastructure that is consistent with the vision of the 2030 Agenda, and how it can be planned, built and managed in an efficient manner[4]. This chapter seeks to contribute to the current policy debate on infrastructure and, as Rozenberg and Fay (2019, p. 2) put it, the shift "away from a simple focus on spending more and toward a focus on spending better on the right objectives". To spend on the right objectives, we first need to understand what kind of infrastructure is needed for the achievement of the SDGs. Such infrastructure projects should be: i) inclusive – ensuring universal access to education, health, water and sanitation, urban housing, transport and other services; ii) sustainable – contributing to mitigating the impact of climate change through, for example, improving energy efficiency throughout the economy, expanding the use of renewable energy, conserving increasingly scarce water resources, and protecting ecosystems from further degradation; and iii) resilient – protecting the population and economic assets from losses due to natural disasters and climate change.

Infrastructure for the SDGs, whether it is funded and financed by governments, the private sector, or hybrids like public-private partnerships (PPP), is 'public infrastructure' in the sense that "the government has a primary role in, and responsibility for, deciding whether and how [it] is provided in the interests of the broader community and on the source of revenue streams to pay for [it] over its life" (Poole, Toohey and Harris,

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4 For examples of recent work on infrastructure financing gaps and financial tools, see ADB (2017), Ehlers (2014), ESCAP (2017; 2019a) and OECD (2015). Focus on the second issue has been more recent. Some useful references include: EIU (2019), Fay and Rozenberg (2019), Thacker and others (2019), and UNEP (2019).

2014, p. 98). This includes infrastructure provided by private sector firms, such as telecommunications firms or water and electricity utilities, that operate under a policy and regulatory framework established by sovereign governments. Therefore, the tools that governments have at their disposal for the provision of infrastructure for the SDGs include not only direct investments in infrastructure projects, but also establishing the right environment to guide private investment in infrastructure. A major difficulty in the implementation of large public infrastructure projects has been the frequency of instances when actual construction and operating costs significantly exceeded costs forecasted during the planning stage. For instance, in a large study of infrastructure mega-projects, Flyvbjerg, Bruzelius and Rothengatter (2003) found that cost over-runs of 50 to 100 per cent in real terms are common, and in another study of 258 large transportation projects across 20 countries, Flyvbjerg, Skamris and Buhl (2002) found that 90 per cent of projects went over-budget. Such disparities between forecasted and actual costs, as well as disparities that often occur between the forecasted and actual numbers of users of the infrastructure, have resulted in projects being less economically viable than anticipated, and even the enactment of wholly unviable projects[5].

Focusing on the strategic planning, governance and implementation of infrastructure projects, this chapter proposes multi-disciplinary and cross-sectoral approaches to infrastructure financing that can identify the optimal projects to invest in for the achievement of the SDGs. It also discusses the whole life cycle of infrastructure projects, encompassing not only the construction, design and operation and maintenance (O&M) phases, but also the planning, preparation, and procurement phases. Such an approach is expected to enhance effectiveness and efficiency in public infrastructure that can stimulate the interest of private sector financiers and investors, and reduce the cost of private sector participation in infrastructure projects.

2. What kind of infrastructure is needed to achieve the SDGs and how much will it cost?

Infrastructure is defined as "the basic physical and organizational structures and facilities [...] needed for the operation of a society [...]"[6]. They provide essential services to people, such as water, energy, sanitation, protection from hazards, such as floods, and allow people to access services

[5] For instance, Ansar and others (2014) found in a study of 245 dam projects across 65 countries that average construction costs were 96 per cent higher than originally budgeted for, in real terms, and exceeded the average projected monetary benefits by just 40 per cent higher than the originally estimated costs.

[6] Lexico (2019).

such as healthcare and education, and to participate in the economy by accessing markets and commuting to work. But infrastructure development can also have negative environmental and social impacts, such as the displacement of people during construction, the destruction of ecosystems, enabling urban development in hazardous locations, such as floodplains, or leading to an excessive use of fossil fuels for power generation or transport which, in turn, can lead to harmful air quality and greenhouse gas emissions (Thacker and others, 2019). Because infrastructure assets last for many decades, the choice of infrastructure to be built today has long-term consequences, and so developing the right kind of infrastructure is critical for the prospects of achieving the SDGs.

There is no full consensus about the precise definition of sustainable infrastructure. The Inter-American Development Bank (IDB) (2018b, p. 11), for example, defines sustainable infrastructure as "infrastructure projects that are planned, designed, constructed, operated, and decommissioned in a manner to ensure economic and financial, social, environmental (including climate resilience), and institutional sustainability over the entire life cycle of the project". The United Nations (2016, p. 3) defines the related concept of 'resilient infrastructure' as "infrastructure systems, including their interconnected ecosystems and social systems, [that are able] to withstand disruption, continue to function and retain their structural capacity [... in the event of] both natural hazards (such as earthquakes, hurricanes, flooding and drought) and man-made hazards (such as human errors and malevolent attacks)". While this definition is comprehensive, some would argue that resilience is only one of the dimensions of sustainable infrastructure.

We therefore propose adopting a working definition of infrastructure for the SDGs that emanates from the specific targets set by the 2030 Sustainable Development Agenda. The selected targets refer explicitly to infrastructure, or clearly imply its need for their achievement. They comprise: i) directly mentioning infrastructure or relate to traditional infrastructure sectors, such as energy; or ii) aiming at the provision of universal access to various services; or iii) aiming at enhancing access and use of information and communications technology; or iv) aiming at increasing resilience to climate hazards and natural disasters; or v) aiming at restoring natural capital and eco-systems. Although the resulting list of 19 targets, shown in table 1.1, is only indicative, it nevertheless covers 11 of the 17 SDGs and provides a sobering illustration of the required infrastructure[7]. Thus, we define infrastructure for the SDGs as the basic physical and organizational

[7] Thacker and others (2019) conducted a more thorough exercise to identify the direct and indirect influence of five infrastructure sectors (energy, water, solid waste, transport and digital communications) on the SDG targets and came up with a list of 121 targets.

structures and facilities needed for the achievement of the SDG targets, as listed in table 1.1.

Table 1.1

SDG targets and the role of infrastructure

Goals	Targets
2 End hunger, achieve food security and improved nutrition and promote sustainable agriculture	**2.a** Increase investment, including through enhanced international cooperation, in rural infrastructure [...] to enhance agricultural productive capacity in developing countries [...]
3 Ensure healthy lives and promote well-being for all at all ages	**3.8** Achieve universal health coverage (UHC), including [...] access to quality essential health care services [...]
4 Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all	**4.3** By 2030, ensure equal access for all women and men to affordable and quality technical, vocational and tertiary education, including university
	4.a Build and upgrade education facilities that [...] provide safe, non-violent, inclusive and effective learning environments for all
5 Achieve gender equality and empower all women and girls	**5.b** Enhance the use of enabling technology, in particular information and communications technology, to promote the empowerment of women
6 Ensure availability and sustainable management of water and sanitation for all	**6.1** By 2030, achieve universal and equitable access to safe and affordable drinking water for all
	6.2 By 2030, achieve access to adequate and equitable sanitation and hygiene for all [...]
7 Ensure access to affordable, reliable, sustainable and modern energy for all	**7.1** By 2030, ensure universal access to affordable, reliable and modern energy services
	7.2 By 2030, increase substantially the share of renewable energy in the global energy mix
	7.3 By 2030, double the global rate of improvement in energy efficiency
9 Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation	**9.1** Develop quality, reliable, sustainable and resilient infrastructure [...] to support economic development and human well-being, with a focus on affordable and equitable access for all
	9.4 By 2030, upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes [...]
	9.a Facilitate sustainable and resilient infrastructure development in developing countries through enhanced financial, technological and technical support [...]
	9.c Significantly increase access to information and communications technology and strive to provide universal and affordable access to the Internet in least developed countries by 2020

Table 1.1 (continued)

Goals	Targets
11 Make cities and human settlements inclusive, safe, resilient and sustainable	**11.1** By 2030, ensure access for all to adequate, safe and affordable housing and basic services and upgrade slums **11.2** By 2030, provide access to safe, affordable, accessible and sustainable transport systems for all [...]
13 Take urgent action to combat climate change and its impacts	**13.1** Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries
14 Conserve and sustainably use the oceans, seas and marine resources for sustainable development	**14.2** By 2020, sustainably manage and protect marine and coastal ecosystems to avoid significant adverse impacts, including by strengthening their resilience, and take action for their restoration in order to achieve healthy and productive oceans
15 Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss	**15.1** By 2020, ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and drylands, in line with obligations under international agreements

Source: ESCAP based on United Nations (2015a).

Note: For brevity, the descriptions used for most targets are shortened.

This working definition provides an indication, not only of the sectors, but also of the *characteristics* of the infrastructure required to achieve the SDGs. In addition to facilitating universal access to various services, this infrastructure needs to be reliable, sustainable and resilient (target 9.1). Sustainable infrastructure is infrastructure that increases resource-use efficiency throughout the economy, and relies on a greater adoption of clean and environmentally sound technologies (targets 7.2, 7.3 and 9.4), while resilient infrastructure is infrastructure capable of protecting economic assets and the population from climate-related hazards and natural disasters (target 13.1). In addition to standard infrastructure sectors – such as buildings, transport, energy or information and communications technology (ICT) – the SDGs require investments in marine and terrestrial ecosystems (SDGs 14 and 15). Such ecosystems can clearly be understood as physical structures needed for the attainment of selected SDGs; as such, they fit our working definition of infrastructure for sustainable development.

Developing such an infrastructural platform to achieve the SDGs poses substantial technical, organizational and financial challenges, especially in least developed and developing countries. The United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) (2019b) has estimated the additional investment needs for achieving the SDGs in the

developing countries of Asia and the Pacific to be around $ 1.5 trillion per year, on average, equivalent to 5 per cent of their aggregate GDP in 2018. These estimates are based on costing models developed by specialized international agencies, such as the World Health Organization for health, the United Nations Educational, Scientific and Cultural Organization for education, and the International Energy Agency (IEA) for energy. ESCAP (2019b) grouped its estimates into five broad areas: i) basic human rights - end poverty and hunger; ii) investing in human capacity - health, education, and gender equality; iii) enabling infrastructure - transport, ICT, and water and sanitation; iv) securing humanity's future - clean energy and climate action; and v) living in harmony - sustainable consumption and biodiversity[8]. The estimates presented in that publication include both the additional cost of investment in infrastructure and other interventions, such as government transfer payments, which are very important for areas i) and ii). Table 1.2 disaggregates the cost of additional infrastructure investment for each of the areas, based on the modelling results and estimates used in ESCAP (2019b).

The estimated total cost of additional investment in infrastructure in the five areas is $ 906 billion per year. This represents 62 per cent of the total cost of achieving the SDGs in the developing countries of Asia and the Pacific. Of this amount, the largest share (48 per cent) needs to be allocated to clean energy and climate action, followed by transport, information and communications technology and water and sanitation (22 per cent), sustainable consumption and biodiversity (17 per cent), health and education facilities (13 per cent), and rural infrastructure (1 per cent). The distribution of additional infrastructure investment is revealing: investments to protect the planet, represented by areas 4 and 5, amount on average to almost two-thirds of the total, which is three times the estimated additional investment requirements in traditional infrastructure sectors such as transport, ICT and water and sanitation. Similarly, additional investments in social infrastructure, such as health and educational facilities, are more than half as high as those for traditional infrastructure. These estimates clearly illustrate the need to carefully prioritize future infrastructure investments if the SDGs are to be achieved by 2030.

3. Governance and institutional challenges

The implementation of large public infrastructure projects has frequently been marred by substantial cost over-runs and/or benefits shortfalls.

[8] These areas correspond, approximately, with the following SDGs: i) Goals 1 and 2; ii) Goals 3 and 4; iii) Goals 6, 9 and 11; iv) Goals 7 and 13; and v) Goals 14 and 15. For details, see the technical appendix to chapter 3 of ESCAP (2019b).

Table 1.2

Cost of additional investment required for achieving the SDGs in Asia and the Pacific

Areas	Total cost	Infrastructure component		
	Billions of United States dollars per year	Billions of United States dollars per year	Percentage of	
			Area cost	Infrastructure cost
Area 1: Basic human rights - end poverty and hunger	**373.1**	**6.0**	**1.6**	**0.7**
Close the gap between earned incomes and the poverty line	32.0			
Social protection floor	317.0			
Package of nutrition-specific interventions	3.5			
Investments in agriculture, agroprocessing, rural infrastructure, research & development (R&D) and extension	20.6	6.0		
Area 2: Investing in human capacity - health, education and gender equality	**296.0**	**115.7**	**39.1**	**12.8**
Health facilities	158.0	50.4		
Facilities for universal pre-primary to upper-secondary education	138.0	65.3		
Area 3: Enabling infrastructure - transport, ICT, and water and sanitation	**196.0**	**196.0**	**100.0**	**21.6**
Roads and railways	126.0	126.0		
Fixed broadband and mobile phone subscriptions	56.0	56.0		
Access to improved water sources and sanitation facilities	14.0	14.0		
Area 4: Securing humanity's future - clean energy and climate action	**434.0**	**434.0**	**100.0**	**47.9**
Universal access to electricity; renewable energy; and energy efficiency in transport, industry and buildings	434.0	434.0		
Area 5: Living in harmony - sustainable consumption and biodiversity	**156.0**	**154.3**	**98.9**	**17.0**
Reduce pressures on biodiversity, enhance protected areas, and restore ecosystems	156.0	154.3		
Total cost	**1 455.1**	**906.0**	**62.3**	**100.0**

Source: Based on ESCAP (2019b).

Notes: For details on the SDG costing exercise, please refer to the online technical appendix of ESCAP (2019b). For the estimation of the infrastructure component, area 1 includes only rural infrastructure; area 2 includes estimates of infrastructure investments in education and health facilities; areas 3 and 4 are assumed to include only physical infrastructure; and area 5 is based on strategic goals B (i.e. reduce the direct pressures on biodiversity and promote sustainable use), C (improve the status of biodiversity by safeguarding ecosystems, species and genetic diversity) and D (enhance the benefits to all from biodiversity and ecosystem services) of the Aichi Biodiversity Targets.

Authorities responsible for such projects often attribute those disparities to adverse events that could not have been foreseen at the planning stage, due to the complexity of the projects, changes in the scope of the project after work commenced, unexpected geological features, or the opposition of some stakeholders – in other words, to random 'bad luck'. However, the frequency with which such cost over-runs and/or benefit shortfalls occur invites a need for more systemic explanations. Flyvbjerg (2009) proposes two alternative explanations based, respectively, on: i) faulty forecasting methods; and/or ii) mis-alignments of incentives of key stakeholders. Both affect the planning stage of infrastructure projects and can lead to the adoption of poor decisions.

The first explanation is based on a cognitive bias that is well documented in psychology and behavioural economics, known as optimism bias, which is characterized by an over-estimation of the likelihood of positive events, and an under-estimation of the likelihood of negative events (Sharot, 2011). In the context of infrastructure planning, this bias is more likely to arise when using a bottom-up decision making technique, based on extensive details of the specific activity being considered, such as a highway project. This approach, sometimes referred to in forecasting as the inside view, contrasts with the so-called outside view, which allows for more objective assessments, by using data from a broad reference class of similar projects to forecast outcomes for the current project (Flyvbjerg, 2009). The second explanation is based on the interests of key stakeholders, such as local authorities, developers and landowners, local politicians, officials and consultants, all of whom potentially stand to benefit from the project's approval and design. In the absence of appropriate mechanisms to ensure that objective evaluations of prospective projects are conducted, such stakeholders have an incentive to present the project in the best light, which can then result in the selection of sub-optimal projects (Flyvbjerg, 2009). The significant amounts of money involved in major public infrastructure projects, and the opportunities for rent-seeking that they create, are often at the root of this problem.

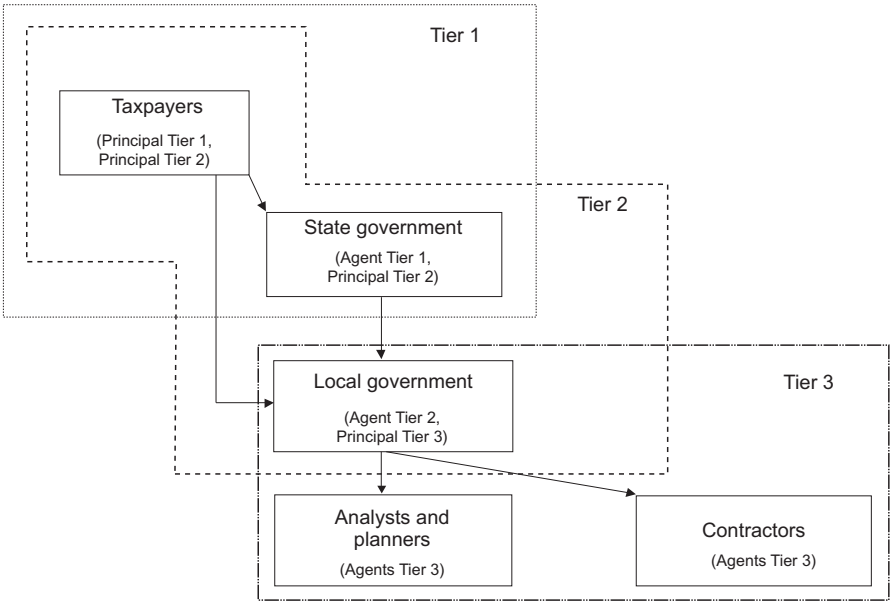
To understand how perverse incentives in the planning stage of infrastructure projects can lead to inefficiencies and cost over-runs during their implementation, it is useful to consider the decision to implement a project within a principal-agent framework[9]. Figure 1.1 shows an example

[9] The principal-agent framework is commonly used in economics to analyse situations where a person or entity (the principal) engages other persons or entities (the agent) to act on their behalf, such as a company's Board of Directors, serving as representatives of all shareholders, selecting a new chief executive officer (CEO). This framework allows one to identify situations where an agent may have incentives to act in his or her own best interests, which may not be adequately aligned with those of the principal, or even at direct odds with the interests of the principal.

of multi-tier principal-agent relationships for an urban infrastructure project. The figure and its description are from Flyvbjerg (2009).

Figure 1.1

Example of multi-tier principal-agent relationships in an urban infrastructure project



Source: Flyvbjerg (2009).

The first tier is the relationship between taxpayers (the principal) and the national government (the agent), which is supposed to act in their best interest. Taxpayers expect the project to deliver the largest possible benefits to the community, by incurring minimal costs, attenuating risks, and reaching completion within an agreed timeline. However, individuals in the national government often have their own set of interests, such as getting re-elected. The second tier has the local government acting as the agent for both taxpayers and the national government. The local government has a duty to taxpayers to propose infrastructure that provides the largest benefits to the community, and that are delivered within the agreed budget and on time, and it has a duty to the national government to suggest the best allocation of the taxpayer funds, and to provide accurate forecasts needed to make an informed decision. However, given the competition with other local governments for finite national resources, the local government has an interest in understating the risks and costs, and over-

stating the benefits, in a bid to get the project prioritised and approved by the national government. The third tier involves local government as the principal of agents hired to provide specific services, such as analysts, planners, and contractors. Analysts and planners are engaged to gather the information necessary for making the final decision on whether to start the project. They have an incentive to provide information that is compatible with pleasing the local government, having the project approved, and being re-engaged on the next project. This illustrative example shows that in each tier there is the potential for agents to act in their own best interests, rather than the best interest of the principal, resulting in an undesirable outcome.

The potential for approving poor projects that will end up costing much more, and bring fewer benefits than planned, is exacerbated when there is asymmetric information and different time horizons between principals and agents. Although some government agencies have responsibilities in ensuring the technical and financial feasibility of projects, they might not have access to sufficient or accurate information about specific projects on which to conduct the best analysis (or lack the capacity to do the best analysis). Also, the time horizon of governments is often limited by election cycles, whereas taxpayers expect to benefit from a major infrastructure project for decades. With large projects often taking 10 to 15 years from the start of planning to the start of operations, governments may be motivated to approve projects that they believe will most improve their chances of getting re-elected, rather than projects offering the greatest long-term benefits (EIU, 2019; Flyvbjerg, 2009). Although the specifics and complexity of the principal-agent analysis will vary across infrastructure projects, countries and sectors, the importance of understanding the configuration of these relationships in specific contexts should not be under-emphasized. Such analyses can help identify risks arising from a mis-alignment of interests in each stage of developing infrastructure projects, and provide guidance on the mitigation of such risks through appropriate contractual or institutional arrangements.

Additional challenges to effectively design and implement infrastructure projects that support the achievement of the SDGs are related to the organizational structures, planning practices and capacities of governments to select and implement portfolios of projects that provide the most value to people, and facilitate progress in the three principle dimensions – economic, social and environmental – of sustainable development. A difficulty in linking the different elements of sustainable development is due to the 'silos' that commonly exist within governments, and between those executing different stages of infrastructure (EIU, 2019). These 'silos', which are prevalent even within specific infrastructure sectors, create barriers to communication across government offices and various line-ministries dealing with different aspects of infrastructure projects, all of

which need to be considered simultaneously in order to select the optimal ones for the achievement of the SDGs. The practice of infrastructure planning in most countries is also characterized by fragmentation. As noted in a recent study by the International Transport Forum (2017), most countries rely on bottom-up, project-by-project assessments of costs and benefits to develop new infrastructure, even though national planning strategies are predominantly based on estimates of national population and economic growth. Given the complex relationships between technical, economic, social and environmental aspects that characterize sustainable development, such an approach is unlikely to lead to the selection of the most effective portfolio of infrastructure projects for the achievement of the SDGs.

Box 1.1

The government's multi-faceted role in infrastructure projects

Irrespective of whether an infrastructure project is delivered through a public-private partnership (PPP) arrangement or a more conventional public procurement, the government should have a significant role in all stages of its implementation. Some of the responsibilities that the government should undertake for that purpose are identified below:

- Developing and proposing specific infrastructure projects;
- Providing feedback and suggestions to improve on-going and future projects, ensuring that they are consistent with the country's sustainable infrastructure plan and/or project pipeline;
- Monitoring the legal, regulatory and enforcement framework for the delivery of infrastructure projects; and proposing their improvement, in consultation with stakeholders and entities from different levels of government;
- Considering, for example, issues of land acquisition, permits and licenses, and dispute resolution mechanisms;
- Providing capacity building to staff of regional and local implementing institutions;
- Monitoring the economic performance, payments, and social and environmental impacts of on-going projects, and providing feedback to implementing institutions if any problems are detected; and
- Ensuring that on-going and future projects are adequately funded through budget appropriations, and that payments to contractors and operators are made on time.

Source: ESCAP.

4. Proposed institutional reform to improve the planning and delivery of infrastructure for the SDGs

An optimal approach to planning infrastructure development in a manner that supports the SDGs should ideally include both 'top-down' and 'bottom-up' elements. The United Nations Environment Programme (UNEP) (2019) proposes a matrix approach to the restructuring of

institutional arrangements, based on the horizontal integration of all government bodies responsible for different infrastructure sectors, combined with a vertical integration between national, regional and local levels of government. The proposed new institution, which could take the form of a national commission or council, has the potential to offer significant improvements in up-stream infrastructure planning, the identification and reduction of social and environmental risks, and ensuring consistency between national-level policies and implementation at the regional and local levels. Such an institution could be mandated to prepare strategic assessments of the country's long-term sustainable infrastructure needs and cross-sectoral sustainable infrastructure plans, as well as advise the government on new legislation and regulations needed to facilitate the implementation of the plan (IDB, 2018a). In addition to increasing coherence across sectors and levels of government, cross-sectoral sustainable infrastructure plans can help facilitate the creation of appropriate project 'pipelines' of viable and bankable projects that will attract private sector financing (EIU, 2019).

Recent examples in developed countries of such infrastructure planning institutions include Australia's Department of Infrastructure, Regional Development and Cities founded in 2017, and the United Kingdom's independent National Infrastructure Planning Commission, founded in 2015 (EIU, 2019). The latter has a mandate to provide the government with impartial expert advice on major long-term infrastructure challenges. It assesses the United Kingdom's national infrastructure needs and assets, as well as the technologies that change over time, and at the start of each five-year parliament it produces a report with recommendations for infrastructure projects and priorities (EIU, 2019). Box 1.2 summarizes the key attributes of the proposed infrastructure planning institutions.

In preparing cross-sectoral infrastructure development plans, it is important that planning institutions consult with key stakeholders from the private sector and civil society, including professional engineering bodies, academic researchers in working relevant areas of science and technology, including social sciences and environmental sciences, businesses, financial institutions, and representatives from civil society. This consultation process helps ensure that the widest range of social, economic and environmental opportunities and challenges associated with infrastructure development are fully taken into account (UNEP, 2019). This bottom-up process can complement and improve the effectiveness of top-down planning, and help ensure that national-level policies are in line with local needs. Further, for infrastructure planning institutions to work effectively, it is critical to ensure that they have sufficiently qualified human resources, with the necessary technical, economic, social, environmental, and financial knowledge. For that purpose, capacity building efforts may be needed, and

Box 1.2

Key attributes for infrastructure planning institutions

Integrated approaches to infrastructure planning should be supported by independent planning bodies that provide policy-makers and other stakeholders with consolidated information upon which to make decisions. They play a critical role in ensuring that decisions are made across sectors, taking into account issues that might not factor into short-term political decision-making, and seek to reduce the cost of projects by assessing the costs and benefits at a systems-level. Some of the key attributes for infrastructure planning institutions include the following:

- Must include sustainability as a primary guiding concept;
- Must provide an integrated plan for infrastructure development across sectors;
- Must be anchored in clearly defined and long-term objectives, which may take the form of a national plan or policy;
- Should be open and collaborative, seeking stakeholder engagement from the outset of the planning process. This is crucial to encourage openness and transparency, and to add credibility to the planning exercise. At the same time, stakeholder engagement helps to inform policy-makers about relevant business models and technological innovations;
- Must be at least quasi-independent, although it cannot be too removed from political decision-making;
- Should be developed as an apex body to monitor and, if need be, supervise line ministries' infrastructure development strategies and plans; and
- Ideally should have greater-than-advisory powers, in that the government must justify rejecting recommendations.

Source: ESCAP based on International Transport Forum (2017) and UNEP (2019).

this is an area where North-South and South-South cooperation initiatives could be fruitfully deployed. In addition to human resources, infrastructure planning institutions can take advantage of new tools and modelling platforms that are now available. One example is the National Infrastructure Systems MODel (NISMOD), developed by the United Kingdom's Infrastructure Transitions Research Consortium (ITRC)[10]. NISMOD enables academia, industry and policy-makers to access infrastructure datasets, simulation and modelling results (EIU, 2019), which can be useful inputs to deliberations on national sustainable infrastructure strategies and plans.

An infrastructure planning institution should be able to minimize the trade-offs across the economic, social and environmental dimensions of sustainable development, and find solutions with positive outcomes in more than one dimension. For that purpose, it could consider cost-effective, nature-based solutions, such as planting trees and plants in urban settings

[10] ITRC is a consortium of seven universities located in the United Kingdom, led by Oxford University.

to reduce air pollution, sequester carbon emissions and reduce the temperature during hot days, or restoring mangrove forests in coastal areas to protect shorelines and communities from coastal flooding (Cohen-Sacham and others, 2016). It would also be able to factor in the risks of future climatic conditions and natural hazards in its infrastructure plans, for instance by avoiding infrastructure developments in locations that are most exposed to climate-related hazards (UNEP, 2019). Its plans could also keep in mind the 'lock-in' effect of infrastructure decisions on carbon emissions, by considering the impact on future carbon emissions associated with construction and operations[11], and include recommendations for policies and regulations to encourage the transition to more efficient energy systems, appliances and lighting[12]. It can also set up regulations to streamline processes to promote transparency and efficiency in the implementation of infrastructure projects throughout the country. For that purpose, various initiatives and tools are globally available. For example, the Infrastructure Transparency Initiative, also known as the Construction Sector Transparency (CoST), a global initiative launched with support from the World Bank in 2012, aims at promoting the disclosure, validation and analysis of infrastructure data to empower stakeholders to hold decision-makers to account. CoST works with governments, the private sector and civil society to promote reforms that can reduce mismanagement, inefficiency and corruption on infrastructure projects. Similarly, the International Infrastructure Support System, developed by the Sustainable Infrastructure Foundation of the Asian Development Bank (ADB), provides templates for countries to prepare projects, enables teams to work together online, and has features that allow the sharing of information with investors and the public (EIU, 2019).

Effective institutional reform to facilitate the planning and implementation of infrastructure for the SDGs also needs to consider the implementation end. And it may be desirable to streamline infrastructure implementation support functions into a single national entity covering all sectors of infrastructure. An example of such an institution is the United Kingdom's Infrastructure and Projects Authority, established in 2016, which has a mandate to ensure that infrastructure projects are delivered efficiently and effectively, and to improve performance over time. For that purpose, it supports and de-risks the most complex and high-risk projects, develops the skills and capabilities of the people who deliver projects, and oversees the project life cycle from policy, initiation, and financing to independent

[11] For instance, Muller and others (2013) estimate that if current infrastructure construction technologies continue to be employed until 2050, they would account for between 35 and 60 per cent of the carbon budget available by that time, if the average temperature increase is to be limited to 2°C above the pre-industrial era.

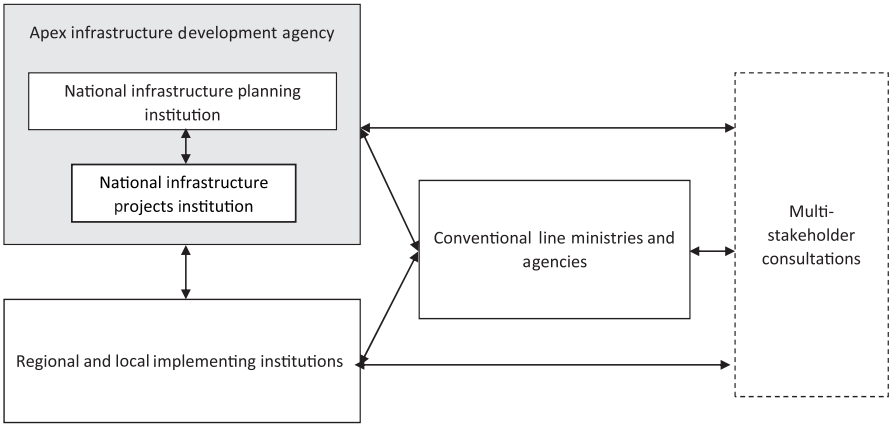
[12] The IEA (2012) estimates that improvements in energy efficiency could contribute to a reduction of around half of total carbon emissions by 2050.

assurance. Such a national infrastructure projects institution can support the delivery of specific projects that are consistent with the vision and project pipeline proposed by the national infrastructure planning institution.

A recent initiative in the region to streamline public institutions for the planning and implementation of infrastructure projects is New Zealand's new infrastructure commission. The commission will be an autonomous state entity with an independent board of between five and seven members, who will bring a range of perspectives, including private sector expertise (New Zealand, Treasury, 2019). Its mandate will include improving how the country coordinates and plans new infrastructure and maintains existing infrastructure, in consultation with central and local governments, the private sector, and other stakeholders. The commission will also have procurement and delivery support functions to help government agencies and local authorities in planning and implementing major infrastructure projects (New Zealand, Treasury, 2019). The commission combines the planning and project implementation institution into a single apex body. Figure 1.2 shows a schematic representation of such an apex agency, and its relationships with stakeholders.

Figure 1.2

Streamlining government entities for planning and implementing sustainable infrastructure



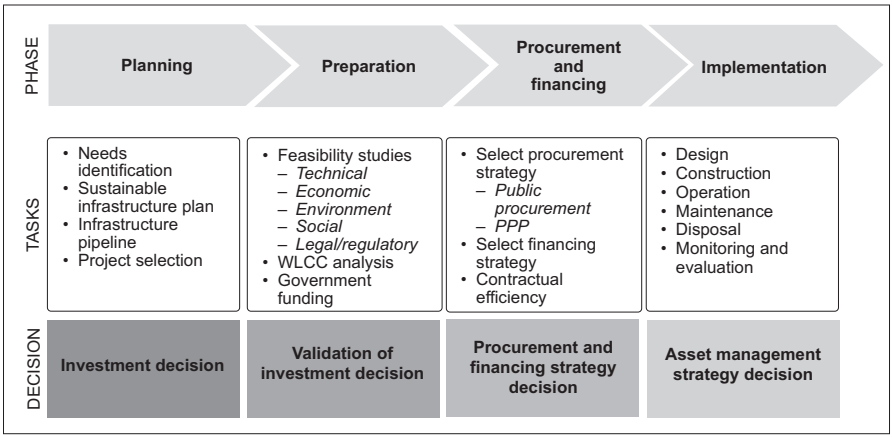
Source: ESCAP.

5. Improving efficiency in project implementation through a whole life cycle approach

While establishing an effective institutional architecture for the selection of the most appropriate infrastructure projects for the achievement of the SDGs should be a top priority, ensuring that those same projects are delivered in the most efficient and cost-effective manner is also important. The advantages of bundling various stages of infrastructure project development – such as design, construction and O&M – in a bid to ensure effective delivery at minimum cost can also be reaped by both government and the private sector through appropriate coordination.

Figure 1.3 shows the four stages of the life cycle of infrastructure projects that governments need to consider in order to ensure their effective delivery at minimum cost. They span: i) planning, ii) preparation, iii) procurement and financing, and iv) implementation. While the first three phases often fall under government responsibility, the implementation phase can be managed either by the public sector, the private sector, or as part of a PPP arrangement[13]. Each phase of a project is characterized by a decision, as explained below.

Figure 1.3
A life cycle approach to infrastructure development



Source: ESCAP.

Note: Whole life cycle costing (WLCC).

[13] It must be mentioned, however, that various PPP schemes, such as build-operate-transfer (BOT) and design-build-operate (DBO), can cover the entire life cycle of infrastructure projects.

The planning phase starts from identifying needs, and ends with project selection as a good investment decision. The investment decision should be based on the net economic, social and environmental benefits of the selected project, as compared with other projects (Chan and others, 2009), and the decision should be taken irrespective of whether the delivery mode will be public procurement or PPP. Given the need to consider how the project fits within the country's sustainable infrastructure plan, the recommendation for its approval should ideally be done by a national infrastructure planning institution. Stakeholder consultations at the local level can be conducted by the relevant regional or local implementing institutions, to better assess the needs for the project, and identify any problems that need to be considered in the project design and implementation.

During the preparation phase, the regional or local implementing institution conducts feasibility studies on the market, technical, economic, commercial, legal, environmental and social aspects of the project, with support from the national infrastructure projects institution. These studies require a proper budget, institutional capacity and the engagement of relevant stakeholders, in order to cost the project effectively and identify risks during the whole life cycle. Tools such as whole life cycle cost (WLCC) analysis are commonly employed in this stage[14]. This stage should also consider the government funding requirements of the project and evaluate: i) whether the investment has the highest rate of return relative to other uses of public funds (Chan and others, 2009); and ii) the level of subsidy that may be needed to achieve the desired levels of public access to the services to be provided. By the end of the preparation phase, the government should be able to validate the investment decision and decide whether to go ahead with the project.

During the procurement and financing strategy phase, the government can first determine how the private sector is to be involved in the provision of services during the whole life cycle of the project. The main options are public procurement, through which one or more private sector contractors are engaged to deliver different parts of the project – such as construction or O&M – or a PPP, and which typically bundles construction and O&M in a single contract. The procurement decision determines the optimal way to procure the project services, and should be taken independently of the financing modality. If the decision is to procure all services with an

[14] The WLCC of a project is the present value of the aggregate cost of procuring, installing, maintaining, refurbishing, disposing and operating costs directly attributable to owning or using an asset over its economic or service life (Regan, Love and Smith, 2016). WLCC analyses often show that projects with higher initial costs are more cost effective, largely by lowering procurement costs in later stages of the project.

individual private company, then the country's PPP law, if available, and related procedures should be followed. In that case, the procuring agency would be responsible for the overall management of the concession contract with the private company, while the company would manage any sub-contracts required for the implementation of the project.

A national infrastructure projects institution would play an important role in advising the relevant regional or local implementing institution about what procurement modality would be most appropriate for the project. For that purpose, tools such as the public sector comparator (PSC) can be used to determine whether a private sector proposal offers value for money in comparison with the most efficient form of public procurement (World Bank, 2014). After determining the best procurement option, the government can consider financing options. The financing strategy decision can determine: i) the timing of government funding; and ii) whether public or private financial instruments should be employed. For instance, in the case of public financing, debt financing – as opposed to tax financing – shifts the burden of underwriting the infrastructure from current taxpayers, who will benefit marginally from the project, to future taxpayers, who will benefit more from the project (Poole, Toohey and Harris, 2014). During the procurement and financing strategy stage, it is also important to ensure that all contractual arrangements for the implementation of the project have an appropriate allocation of risks, whether delivered as PPP or through public procurement. For that purpose, contracts should allocate risks to those best able to manage them, and ensure that any additional transaction costs are justified in terms of reducing risks or enhancing efficiency (Chan and others, 2009).

The implementation phase encompasses project design, construction, O&M and asset disposal at the end of the project cycle. This is typically the phase when public resources are spent and when the results and outcomes of the project are delivered. To ensure that the benefits of the project are in accordance with expectations, and tackle any problems that could occur along the way, it is important to take an appropriate decision about the management of the project assets. For that purpose, a systematic and well-structured contract management approach is necessary. This requires the regional or local implementing institution to set up a system to monitor and manage the implementation of the infrastructure contract(s), including establishing a contract management team. Project monitoring requires the collection of relevant economic, financial, social and environmental information. This information should be reported to the national infrastructure projects institution, which can assess each project according to relevant benchmarks, and propose correcting measures to the regional or local implementing institution, if so needed.

6. Improving public sector efficiency to encourage private sector participation in infrastructure

Much of the recent literature on infrastructure financing has focused on the size of the financing gaps to be bridged, and the need to further engage the private sector for that purpose. There is a common perception that the private sector can mobilize additional resources that complement public resources, as well as improve project efficiency (Fay, Martimort and Straub, 2018). It is important to keep in mind, however, that the public sector has traditionally provided, and continues to provide, the lion's share of public infrastructure in most countries. According to Fay and others (2019), globally, the public sector funds between 87 and 91 per cent of infrastructure investments in low and middle-income countries[15]. Furthermore, between 2015 and 2016 the private sector's participation in infrastructure investment dropped by 37 per cent in developing countries, reaching the lowest level, measured as a percentage of the GDP, in 10 years (Harris and Chao, 2017). Although private sector investment in infrastructure appears to have recovered in 2017 and 2018, it remains low in relation to historical levels (ESCAP, 2019a). Figure 1.4 shows that private sector infrastructure investment in Asia and the Pacific increased markedly between 2000 and 2010, at an average annual rate of 14 per cent; however, between 2011 and 2018 it was highly volatile and remained below its 2010 peak. Throughout 2000–2018, private sector investment in infrastructure was heavily concentrated in a few countries; with India, China, Turkey, the Russian Federation, and Indonesia receiving close to 80 per cent of the total.

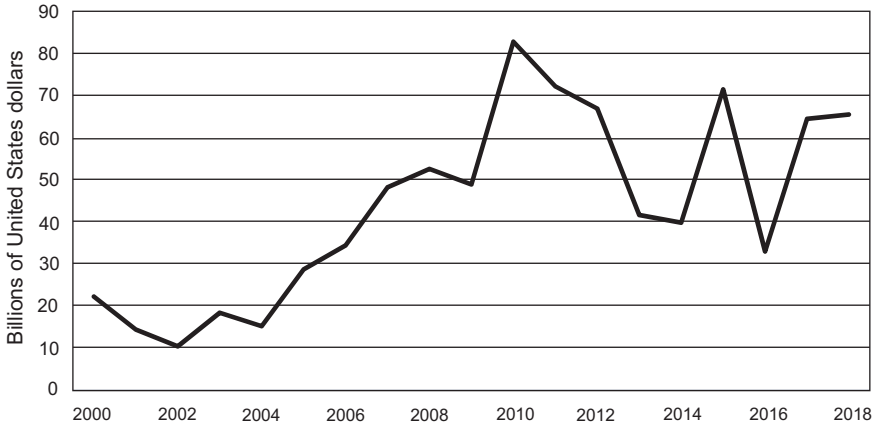
Looking ahead, the role of the public sector in funding public infrastructure is likely to remain large[16]. This is due in large part to the inclusive character of infrastructure for the SDGs and its goal of facilitating universal access to services, such as healthcare, education, water and sanitation, energy and urban transport. (Also see chapter 3 that discusses the use of 'externalities' as a means by which the private sector can be incentivised to engage in infrastructure by widening the scope of financing available.) In least developed and developing countries, where large segments of the population are poor or have modest incomes, the possibility of recovering

[15] There are wide variations across regions of the world, from a low of 53–64 per cent in South Asia, to a high of 98 per cent in East Asia.

[16] It is important to keep in mind the distinction between funding and financing. Funding is about who ultimately pays for the infrastructure, while financing is about the timing of such payments (with expected larger capital returns in the future). For example, financing can underwrite the large up-front capital expenditures required in the construction phase of an infrastructure project to be postponed to the operation and maintenance phase, when the project will generate revenues from either user fees and/or government subsidies.

Figure 1.4

Private investment in infrastructure in Asia and the Pacific, 2000–2018



Source: ESCAP based on World Bank (2019), accessed on 10 July 2019.

the cost of providing such services through user fees alone is limited. In planning such projects, then, governments need to make sure that public funding is available[17].

An important argument in favour of enhancing the participation of the private sector in infrastructure investment is the expected efficiency gains associated with better contractual arrangements under PPPs, vis-à-vis traditional government procurement. This contractual modality transfers risk from the principal (i.e. the government's procurement authority) to the agent (i.e. the private sector operator), thereby contributing to a better alignment of incentives between principal and agent. Such an arrangement is expected to reduce the potential for excessive costs during the O&M phase due to any faults in the design or construction of the assets[18]. For example, if a single firm both builds and operates a particular project, it has an incentive to build it well in order to avoid high maintenance and repair costs during the operation phase.

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[17] A mechanism sometimes employed by governments to partially subsidize infrastructure projects that cannot be fully funded by user fees is viability gap funding (VGF). See Hyun, Nishizawa and Yoshino (2008) and Regan (2018) for details.

[18] In practice, however, other contractual elements can reduce or eliminate these efficiency advantages. For example, if the government retains demand risk through the provision of guarantees on the minimum returns for the private operator, the latter will have fewer incentives to take measures to minimize costs through the project life cycle (Poole, Toohey and Harris, 2014). It is a form of moral hazard.

These potential efficiency gains have often been highlighted to justify the higher cost of capital for PPPs, which has been estimated to average around 2 to 3 per cent more than the cost of government debt (Yescombe, 2007). However, the evidence of efficiency gains from PPPs for infrastructure projects is somewhat inconclusive (Araújo and Sutherland, 2010; KS and others, 2016). Engel, Fischer and Galetovic (2010) propose an alternative explanation for the higher cost of PPP financing, based on inefficient contractual schemes that assign exogenous risks to the private partner. To illustrate this point, they consider the example of a fixed-term contract where the income for the private sector partner comes exclusively from user fees. If demand is lower than projected during the term of the contract, the private sector partner will face substantial demand risk, and will factor this into the return it requires in order to participate in the project. An alternative that eliminates such a risk is a variable-term contract, which ends at the time when the cumulative present value of revenues from the project equals a stipulated amount. Based on their analysis, Engel, Fischer and Galetovic (2010) conclude that in the absence of efficient contractual schemes, there is no financial reason to prefer PPPs over public provision (and they also suggest that PPPs rarely free-up public funds).

However, inefficient contractual arrangements between public and private partners are not the only reason why private sector investors may be reluctant to invest in public infrastructure projects, or require a high rate of return or guarantees to participate in them. Inderst and Stewart (2014) mention a number of additional reasons, including a lack of political commitment over the long-term, lack of infrastructure project pipelines, fragmentation of the market among different levels of government, and regulatory instability. Indeed, a paucity of infrastructure project deal 'pipelines', containing commercially viable infrastructure projects, was recently highlighted by the Secretary General of the United Nations as a major challenge to channelling additional finance towards the SDGs (United Nations, 2019).

All these reasons strongly reinforce the need for the public sector to streamline the planning and preparation of infrastructure projects. Governments have an obligation to ensure that their public infrastructure projects are the most effective to achieve national development goals and meet international commitments, such as the SDGs, and of implementing such projects in the most efficient manner. In so doing, they can not only maximize the value for money emanating from scarce fiscal resources, but also enhance the interest of private sector investors, and reduce the costs of private sector participation in infrastructure projects.

7. Concluding remarks

This chapter has sought to make a strong case for improving the quality of public infrastructure projects in collaboration with the private sector and other stakeholders so that they support the achievement of the SDGs and maximize taxpayers' value for money. While a lot of attention has been put on the large additional financial resources needed for infrastructure development, and the need to further engage the private sector for that purpose, recent literature has emphasized the need to prioritize the *quality* of the infrastructure to be built, and to ensure that public funding is used in the most efficient manner. These considerations are particularly important for the implementation of infrastructure projects to support the achievement of the SDGs. This chapter sought to highlight some of the challenges in effective implementation of infrastructure projects in general, and infrastructure for the SDGs in particular, with a focus on governance issues.

With regard to solutions, the chapter discussed the efficacy of streamlining infrastructure planning and project preparation through new upstream institutions. These institutions can: i) facilitate the flow of quality information for the evaluation of infrastructure needs to achieve the SDGs; ii) systematically reduce social and environmental risks by bringing multi-disciplinary and cross-sectoral perspectives; iii) maximize efficiencies in project implementation throughout the country; and iv) ensure consistency between national-level policies and implementation at the regional and local levels. Further, streamlining the management of individual projects, using a whole life cycle approach – encompassing the planning, preparation, procurement and financing, and implementation stages of projects – is of significant utility. While the ideas proposed in this chapter focus mostly on improving the effectiveness and efficiency of public infrastructure projects, such improvements are also likely to incentivize private sector participation in infrastructure.

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Chapter 2

Infrastructure Financing through the Capital Markets

1. Introduction

As discussed in the previous chapter, the scale of investment required for infrastructure development in Asia and the Pacific is estimated to be significant, relative to current investment levels. In addition to infrastructure development, additional spending is needed to tackle poverty and hunger, provide education, healthcare services, clean energy, and address climate action and biodiversity. As the total additional investment requirements amount to $ 1.5 trillion per year on average, or about 5 per cent the region's aggregate GDP, a key question is: how to finance such sizeable investment? Governments have conventionally been the principal investors in the infrastructure sector in developing countries worldwide, including in Asia and the Pacific (Fay and others, 2011; Hansakul and Levinger, 2016; UNCTAD, 2014), but there are competing demands for finite public funds from numerous other sectors seeking to provide public goods and services. Clearly, only a portion of the total infrastructure financing gap in Asia and the Pacific can be met by public investments alone, especially in the case of least developed countries where the financing needs are paramount (ESCAP, 2019). However, there is room for the private sector to contribute more to infrastructure financing, particularly given that infrastructure service provisioning is considered to be more commercially viable, relative to other areas of public service provision, such as health and environmental protection, which are far harder to 'monetise'. Indeed, a greater role for private sector participation in infrastructure development and financing was formally recognized in the Addis Ababa Action Agenda (AAAA), agreed in 2015[19]. However, for both governments and private investors to step up their investment in infrastructure, a suitable mix of financing instruments, platforms, and vehicles are needed.

Infrastructure development can be financed from various sources. The taxonomy of such financing mechanisms can be presented from various dimensions, such as: public versus private sources, domestic versus foreign sources, money versus capital markets, debt versus equity, and company

[19] United Nations (2015, paragraph 8).

versus project levels[20]. In traditional terms, governments may rely on tax revenues, sovereign and municipal bond issuances, 'policy bank' loans, state-owned bank and enterprises, as well as grants and subsidized borrowing from multilateral and development finance institutions to help underwrite infrastructure development. For the private sector, potential project financing methods include, among others: commercial bank loans, equity financing, corporate bonds, project bonds issued by special purpose vehicles (SPVs), and infrastructure funds. Amid such a wide range of potential financing options, this chapter focuses on how to strengthen the role of domestic capital markets and infrastructure-related bonds to help aid infrastructure financing in Asia and the Pacific.

Compared to bank loans, which are currently the dominant source of infrastructure financing, bonds have at least two advantages. First, banks typically hold short-term liabilities (e.g. bank deposits), so they are not well suited to hold long-term assets (e.g. infrastructure project debt) on their balance sheets, as this creates a perilous *maturity* mismatch. Secondly, when infrastructure project loans to developing economies are provided by international banks, they are often in an international currency, such as United States dollars, while the revenues accrued by the projects are typically in a local currency. This creates a *currency* mismatch that then poses convertibility and exchange rate risks (Hyun, Park and Tian, 2017). Indeed, interest among policymakers in Asia and the Pacific in developing local-currency bond markets in the region has increased since the 1997-1998 Asian financial crisis, when financial turmoil was triggered in large part by excessive short-term foreign-currency borrowing that resulted in a perfect storm of both currency and maturity mismatches (ADB, 2017). Further, there is some evidence that developing economies with a more developed local-currency bond market exhibit greater financial stability during periods of global financial stress (Park, Shin and Tian, 2018). And bond market development appears to be positively linked with economic growth in several Asia-Pacific economies (Hue and Tram, 2019).

More broadly, new global capital requirements have the potential to reduce the capacity of commercial banks to finance long-term projects, such as those found in the infrastructure sector. For example, Basel III places a limit on credit exposures to a single counterparty to 25 per cent of a bank's core capital. As a result, large banks tend to limit their debt to large projects, and the ability for smaller banks to finance large projects is significantly constrained, particularly in countries where perhaps a handful of companies dominate the infrastructure development 'space'. Moreover,

[20] For example, Della Croce and Gatti (2014); OECD (2015); Regan (2018); Schroders (2017); World Bank (2019a).

Basel III also requires 100 per cent high-quality liquid assets for the kinds of SPVs often used in infrastructure project finance.

Despite such advantages of bonds over bank loans, this chapter does not argue that bonds can fully replace bank loans as the main source of infrastructure funding in Asia and the Pacific's developing economies, at least in the short term. This is primarily because bond markets are either non-existent or remain modestly small in most countries in the region, and the process of developing robust and effective domestic capital markets is a long-term endeavour. Their establishment and operations also entail both sunk and running costs that need to generate a return of some kind to justify their existence, not wholly unlike infrastructure projects. (Indeed, some policy-makers view capital markets as a form of public utility, and like some high-profile infrastructure projects, capital markets are sometimes perceived as totems of a country's economic ambitions.) Furthermore, bonds are not always suited to all types and stages of infrastructure projects. For example, the construction phase of infrastructure projects typically carries high credit and time risks[21], which make them less appealing to 'fixed income' (i.e. debt) investors (Ehlers, Packer and Remolona, 2014). Rather, the principal thesis of this chapter is that bonds exhibit significant potential to complement bank loans for infrastructure financing, though this potential remains largely untapped in many countries in Asia and the Pacific at present. A large part of this chapter discusses what countries could usefully do to realize such potential[22]. It also explores how the region could develop capital markets that support sustainable development, from the varying perspectives of governments, bond issuers, investors, and market regulators.

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[21] Credit risk refers to the risk that the bond will never be paid back, or the collateral will have to be sold at a loss if the project is not completed. Timing risk refers to the risk of delayed revenue generation and payments due to construction delays. Relative to bank loans, bonds are more suitable for the operational phase of infrastructure projects, which is characterized by stable positive cash-flows (which can even be 'securitised') and lower risk of default.

[22] As domestic bond markets do not exist or are small in many countries of the region, the discussion in this chapter focuses primarily on how countries could develop or expand a bond market. While this chapter also discusses policies relating to infrastructure bonds, such as bonds issued by infrastructure companies and projects, the utility of these relatively advanced financing instruments becomes relevant only after a country has developed more fundamental elements of the financial sector, such as the banking sector and a government bond market.

2. Infrastructure bond financing: where does Asia-Pacific stand?

This section takes stock of where Asia and the Pacific stands on the use of bonds to finance infrastructure development. It first presents some data on the sources of funding of infrastructure finance and then highlights some areas of regional cooperation and integration aimed at promoting the wider use of infrastructure bond financing in the region.

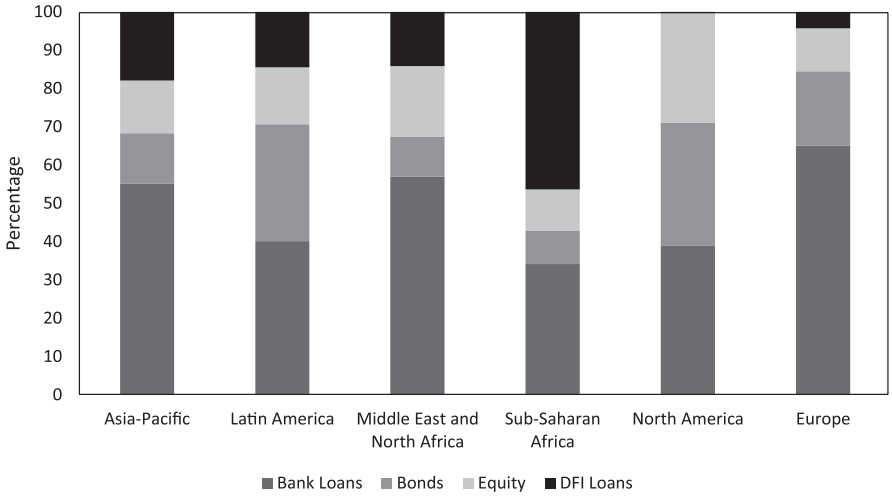
2.1. The use of bonds for infrastructure financing

The use of bonds to finance infrastructure development in Asia and the Pacific is not as frequent as some other regions of the world. Figure 2.1 depicts the different sources of funding for infrastructure finance across different parts of the world in 2018, spanning project finance, corporate finance (excluding company acquisitions), and public sector finance transactions (excluding publicly funded infrastructure development)[23]. The infrastructure sectors included here are: transport, power, renewable energy, water and sewage, and telecommunications. The figure shows that bonds accounted for only 13.1 per cent of total infrastructure finance in Asia and the Pacific in 2018. This is largely on a par with the Middle East, North Africa and Sub-Saharan Africa, but markedly lower than in Europe (at about 20 per cent), and Latin America and North America (both at about 30 per cent). Bank loans accounted for the majority of infrastructure finance in Asia and the Pacific, at 55.2 per cent. The remaining balance came from equity financing (13.8 per cent) and loans from development finance institutions (17.9 per cent).

Overall, infrastructure finance in the region has stood at around $ 125 billion annually (see panel A of figure 2.2), but the value of bonds issued for infrastructure financing increased from about $ 11.0 billion in 2015 to $ 16.6 billion in 2018. Nonetheless, the average share of funds raised from bonds during the period 2015-2018, was just 10.8 per cent; smaller than both bank loans (50.1 per cent) and equity financing (25.9 per cent). For project finance only, which typically accounts for close to half of all

[23] *Project finance* includes transactions such as funding 'greenfield' and 'brownfield' projects, expansion of existing assets, refinancing existing project finance debt, and funding straight acquisitions of infrastructure assets. These transactions normally have at least one private sector sponsor, while debt financing is on a non-recourse or limited-recourse basis. *Corporate finance* includes infrastructure financing through equity or debt, or a combination of both, on a basis that is not non-recourse or limited-recourse. *Public sector finance transactions* include infrastructure financing that is entirely driven by state-owned entities, and/or financed entirely by development finance institutions (DFIs) on the debt side. Only transactions with a total deal value of at least $ 1 million are included here.

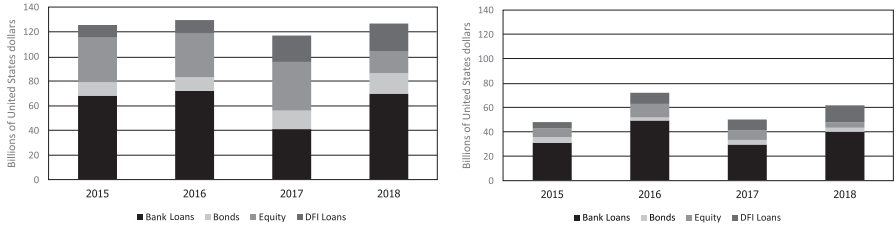
Figure 2.1
Regional differences in sources of funding for infrastructure finance, 2018



Source: ESCAP based on IJ Global (2019).
Note: Development finance institution (DFI).

Figure 2.2
The size of infrastructure and project finance in Asia-Pacific, 2015-2018

Panel A. Infrastructure finance *Panel B. Project finance*



Source: ESCAP based on IJ Global (2019).
Note: Development finance institution (DFI).

infrastructure finance, the dominance of bank loans over other sources of funds is even more pronounced (see panel B of figure 2.2).

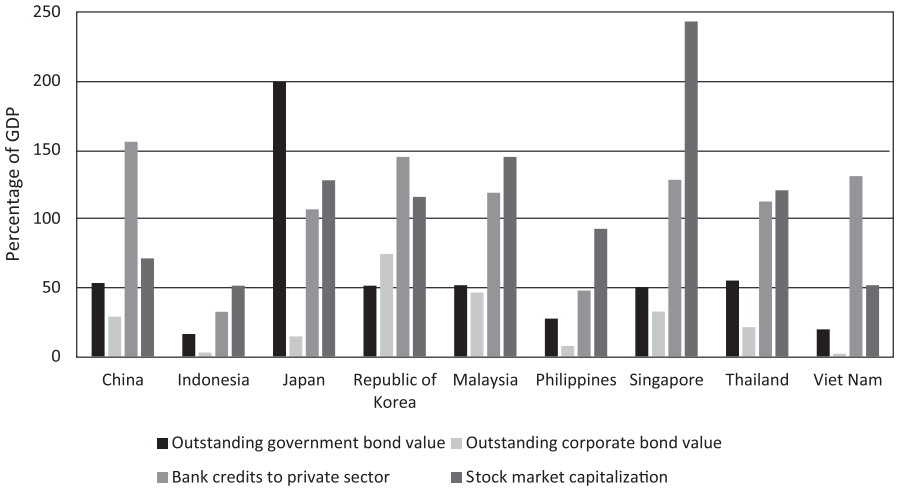
The limited use of infrastructure bond financing in Asia and the Pacific mirrors the region's small bond markets, relative to the size of bank credit and equity market activity. In China, the Republic of Korea and six emerging economies of South-East Asia[24], which together account for about

[24] Indonesia, Malaysia, Philippines, Singapore, Thailand and Viet Nam.

65 per cent of the combined GDP of developing economies in Asia and the Pacific, the outstanding values of local-currency government and corporate bonds are smaller than the respective size of bank credits extended to the private sector (see figure 2.3). Similarly, when comparing the size of corporate bond markets and equity markets, the stock market capitalizations of the same six developing economies of South-East Asia are between three and 28 times larger than the outstanding values of local-currency corporate bonds. In the less developed countries of the region, where bond markets are either non-existent or at a nascent stage of development, the role of bonds as a financing instrument – whether in general or specifically for infrastructure finance – is even more limited.

Figure 2.3

The size of bond markets, bank credits and stock markets in select Asia-Pacific countries



Source: ESCAP based on ADB (2019a) and World Bank (2019b).

Notes: Only bond obligations denominated in local currencies are considered here. Government bonds include obligations by the central government, local governments, the central bank, and state-owned entities.

2.2. Regional cooperation on bond market development

As figure 2.3 illustrates, the level of bond market development is diverse even among the key developing economies of Asia and the Pacific. In South-East Asia, the size of bond markets varies considerably, from between 76 per cent and 98 per cent of GDP in Malaysia, Singapore and Thailand, to between 19 per cent and 35 per cent of GDP in Indonesia, the

Philippines and Viet Nam. (Cambodia, Lao People's Democratic Republic (Lao PDR) and Myanmar currently do not have fully active bond markets, although some tentative first steps have been made.) Such variation in bond market development provides an opportunity for experiences and lessons learnt to be exchanged between regional peers. Indeed, the Association of Southeast Asian Nations (ASEAN)+3 (i.e. all the members of ASEAN, plus China, the Republic of Korea and Japan) countries launched the Asian Bond Market Initiative (ABMI) in 2003, which is aimed at strengthening regulatory frameworks and the necessary bond market infrastructure. Also, under the ABMI umbrella, the Credit Guarantee and Investment Facility (CGIF) was established in 2010 to provide guarantees on corporate bonds (mainly in local currencies) issued by firms in the ASEAN+3 countries. In addition to securing long-term financing, the CGIF also seeks to reduce firms' dependency on short-term foreign currency borrowing, and address both currency and maturity mismatches. As of end-2018, the CGIF had issued 20 credit guarantees with a combined value of $ 1.41 billion. Also, under the ABMI, the ASEAN+3 Multi-Currency Bond Issuance Framework helps facilitate intra-regional fixed income transactions, by promoting common market practices and standardized conditions for bond issuance, such as disclosure standards and common documents. Supported by this initiative, the Lao PDR has issued (baht-denominated) government bonds on Thailand's capital market, for use in financing infrastructure investment. Cambodia has also announced plans to establish a local currency bond market in the near term. Another cooperation initiative is the Asian Bond Market Forum, which was established in 2010 as a common platform for bond market experts from Asia and the Pacific region, to foster the standardization of market practices and harmonization of regulations relating to cross-border bond transactions. And a bond-pricing portal among five banks in Indonesia, Malaysia, the Philippines, Singapore, and Thailand was launched in 2013 to serve as a precursor for an electronic trading platform.

3. Why bond financing is not more widely used for infrastructure

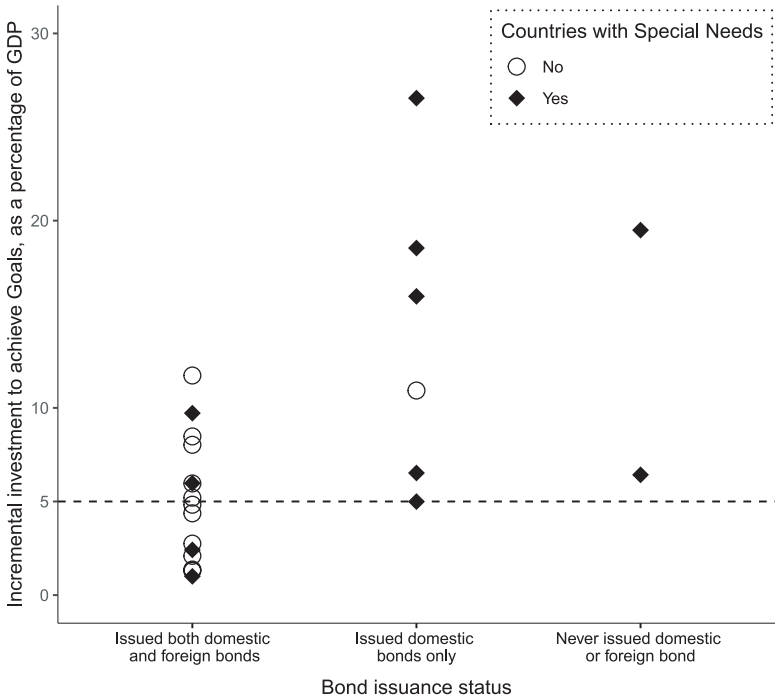
The previous section illustrated that bonds are used much less than bank loans and equity financing to underwrite infrastructure development in Asia and the Pacific. Assuming that an adequate number of investable infrastructure projects are available, this section identifies factors that explain why governments and other market players, such as infrastructure companies and SPVs, choose not to – or are unable to – use bonds as a means of financing infrastructure development projects.

3.1. Factors relating to bond issuers

The issuance of public bonds is not common in the developing economies of Asia and the Pacific. Between 1995 and 2016, of the 47 countries with available data, 20 countries have never issued any government bonds, 11 countries have publicly issued domestic bonds only, and just 16 countries have publicly issued both domestic and foreign bonds (ESCAP, 2018). Most countries that have never issued a public bond are either a least developed country (LDC) or a small island developing state (SIDS). As figure 2.4 clearly shows, these are also countries in which the required additional investments needed to achieve the Sustainable Development Goals are estimated to be large (ESCAP, 2019), and a kind of inverse correlation exists. Even among the countries that have previously issued public bonds, the scale of bond issuances has generally been modest. The average annual amount of domestic public bond issuance across 24 developing economies in Asia and the Pacific was equivalent to about 2.6 per cent of GDP during the period 1995-2016.

Figure 2.4

Investment needs on the SDGs and bond issuance status

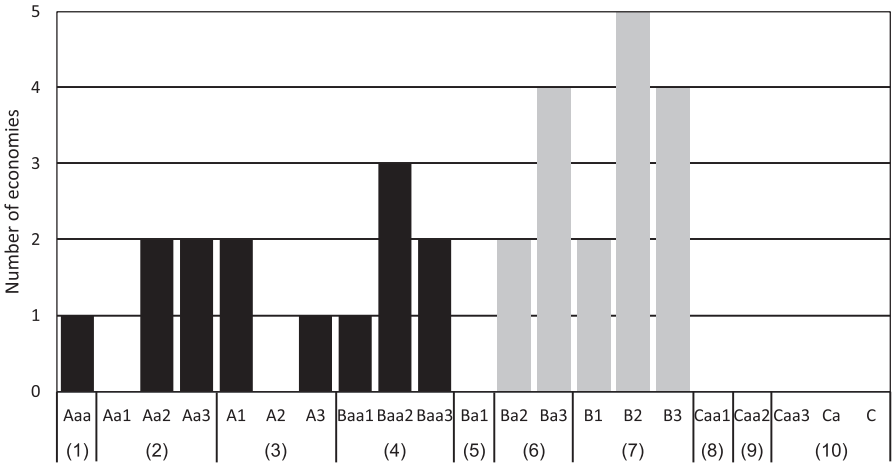


Source: ESCAP (2019).

Why are sovereign bonds not more widely used to support public spending, including on infrastructure investment? A quantitative study conducted by the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) (2018) revealed that countries that have a larger total debt stock, face wider fiscal and current account deficits, exhibit a weaker regulatory framework and have less open trade regimes and less developed financial systems find it more difficult to issue public bonds[25]. Most of these economic and institutional factors, together with public revenue collection capacity and past economic growth records, are taken into account when calculating sovereign credit risk ratings. In this context, numerous governments in Asia-Pacific have limited access to bond markets because of poor (or none) sovereign credit risk ratings[26]. Figure 2.5 shows that over half of the developing economies in the region are

Figure 2.5

Sovereign credit risk ratings across developing economies in Asia and the Pacific



Source: ESCAP based on Trading Economics (2019).

Notes: The ratings are based on Moody's indicators: (1) is prime; (2) is high grade; (3) is upper-medium grade; (4) is lower-medium grade; (5) is non-investment grade; (6) is speculative; (7) is highly speculative; (8) is substantial risks; (9) is extremely speculative; and (10) is in default, with little prospect for recovery.

[25] These results are also consistent with those of other studies, such as Csonto and Ivaschenko (2013); Mu, Phelps and Stotsky (2013); and Presbitero and others (2016).

[26] Not all countries in Asia and the Pacific have a sovereign rating. Three ratings agencies dominate the field, and there is a charge incurred if one wants to initiate and monitor a country's rating. They are therefore often only rated when there is a specific need, such as an impending sovereign debt issue. Without sovereign ratings serving as a benchmark for the economy as a whole, it is problematic to get a municipal, bank, company or project bond rated.

currently rated as non-investment grade or worse (so-called 'junk bond' status).

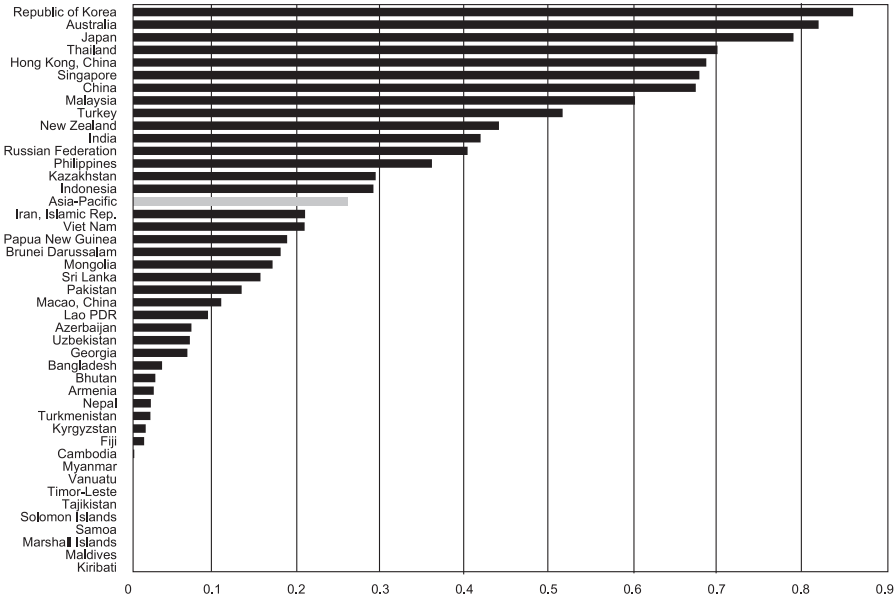
Poor sovereign credit risk ratings for many economies in Asia and the Pacific have a direct and adverse impact on the credit risk ratings of corporations and projects in those countries. Although the ratings of infrastructure companies and projects depend considerably on their financial flows and risk mitigation measures, the lower sovereign rating in itself creates a hurdle for bond investors, since virtually all bond issuers are rated somewhere below the 'benchmark' sovereign rating of the host country. Meanwhile, credit risk ratings are also an issue for corporate bond markets. As corporate bonds are usually clustered in higher credit ratings, corporations that do have access to bond market funding are primarily: i) well-rated and often listed public sector entities such as state-owned enterprises; ii) large infrastructure companies with a diversified project portfolio and investment-grade rating; and iii) project finance companies or special purpose vehicles (SPVs) that have a stand-alone or credit-enhanced investment-grade rating. In South-East Asia, the top ten bond issuers account for between 60 per cent and 90 per cent of individual countries' total corporate bond issuance. Such a high concentration of bond issuers limits market depth, creates the risk of higher market volatility, and increases investors' exposure to sector-specific risks.

3.2. Factors relating to bond market structure, intermediaries and architecture

Another factor that tends to limit the use of infrastructure-related bond markets in Asia and the Pacific is the low development level of domestic capital markets. Except for a few economies in the region, which serve as some of the world's leading financial centres, most capital markets in the region remain generally small, with low levels of market liquidity, which undermines their potential role in channelling available savings into investments for sustainable development, including various infrastructure sectors. Figure 2.6 shows the International Monetary Fund's (IMF's) Financial Market Development Index across 45 countries in Asia and the Pacific countries in 2016. The index measures the: i) depth (i.e. market size and liquidity); ii) access (i.e. the ability of individuals and companies to access financial services); and iii) efficiency (i.e. the ability of institutions to provide financial services at low cost) of stock and bond markets (Svirydzenka, 2016). The results clearly show a diverse level of capital market development in the region. Capital markets in countries such as Australia, Japan, and the Republic of Korea are considered highly developed. In contrast, countries in North and Central Asia, and South and South-West Asia, exhibit largely under-developed capital markets, except in

Figure 2.6

Capital market development in Asia and the Pacific: IMF financial market development index, 2016



Source: ESCAP based on IMF (2019).

India, Kazakhstan, the Russian Federation and Turkey. Further, capital market development level remains particularly low in all Pacific island developing economies.

Another indicator that has been created to measure the level of capital market development, specifically among selected emerging Asia-Pacific economies, is the McKinsey Asian Capital Markets Development Index (McKinsey & Company, 2017). The index comprises three components: i) funding at scale, which measures the size of equity, government and corporate bond issuances, availability of long-term debt issuances, the size of foreign portfolio investment, and inflation-adjusted cost of equity and debt; ii) investment opportunities, which captures the stock of capital market assets and risk-adjusted returns; and iii) market efficiency, which reflects the quality of pricing information, such as availability of information on past market trends and information that can be used to predict future market trends. Overall, the result is congruent with the IMF's financial market development index (see figure 2.7, panel A). Across the three components, countries tend to perform better on the funding at scale, followed by investment opportunities, and market efficiency. For example,

in Pakistan and Viet Nam, while the size of capital markets and investment opportunities are rated as moderate, the availability of pricing information is considered to be very shallow (see figure 2.7, panel B).

As the above indices suggest, an effective bond market comprises of several elements. Overall, the literature highlights the following components: i) an effective legal framework for the issuance process, such as frameworks for different types of issuers and investor protection; ii) a sizeable investor base, such as retail, institutional and foreign investors; iii) a diverse set of products, such as corporate, sovereign and project bonds; iv) adequate market liquidity, such as trading volume and secondary bond market; v) knowledgeable financial intermediaries, such as business analysis capacity of investment banks and securities firms; vi) an enabling market infrastructure, such as credit rating agencies, bond pricing agencies, and clearinghouses; and vii) other broader issues, such as strong corporate governance, contract enforcements, harmonization of international standards, and transparency (ADB, 2015; ESCAP, 2018 and Merican-Cheong, 2014). The capital markets in most developing countries of Asia and the Pacific region lack several of these elements.

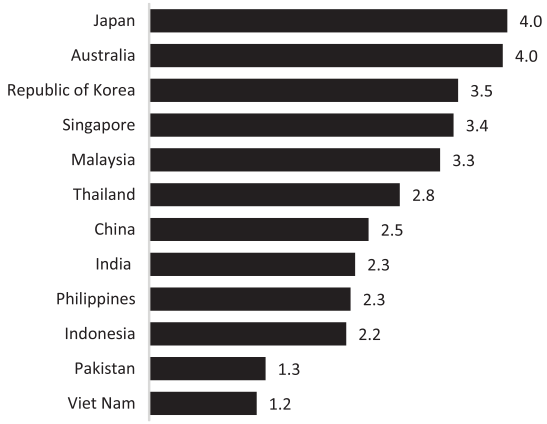
Narrow investor base

In most Asia-Pacific countries, domestic commercial banks remain the largest group of investors in locally issued corporate bond markets. In addition to the likelihood that tighter international capital adequacy requirements may force banks to reduce their exposure to bond markets, broadening the investor base is important, because it helps to reduce market volatility and decrease the exposure of one type of investor to sector-specific risks. However, the role of (non-bank) institutional investors in infrastructure financing remains limited. Institutional investors typically refer to a group spanning pension funds, mutual funds, sovereign wealth funds, and insurance companies. Assets under management by institutional investors in the developing economies of Asia and the Pacific are estimated to be large, standing at $ 14.2 trillion in 2016 (ESCAP, 2018). The large amount of financial assets under management, and the fact that the liabilities of many institutional investors are longer term in nature, are both consistent with investment in long-term development projects such as infrastructure, and thus suggests that institutional investors have considerable potential to contribute to infrastructure financing. And yet these funds are generally not being channelled into long-term financing. In China, for example, institutional investors hold only 3 per cent of total outstanding government bonds. The equivalent share is also moderate in Indonesia, Japan, Malaysia and the Republic of Korea, at between 17 per cent and 38 per cent (figure 2.8). More broadly, institutional investors accounted for just 0.7 per cent of investment in infrastructure projects with

Figure 2.7

Capital market development in Asia and the Pacific: McKinsey Asian capital markets development index

Panel A: Overall index value

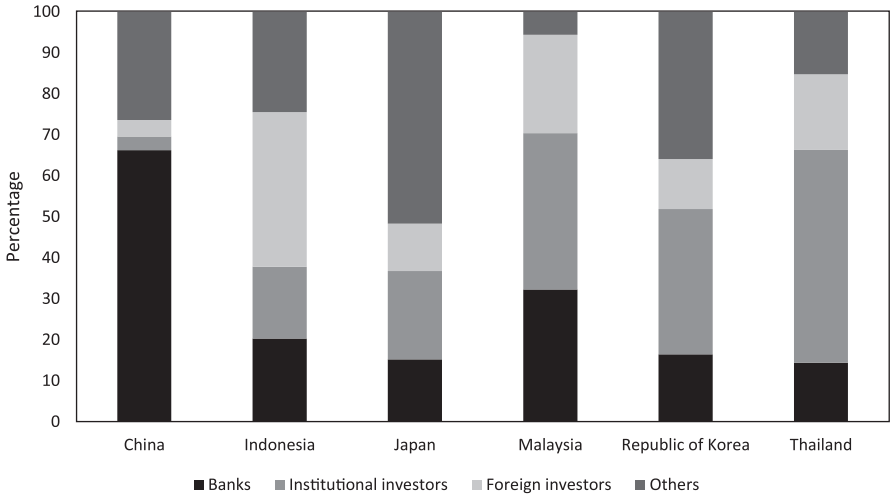


Panel B: Development level, by component

	Funding at scale	Investment opportunities	Market efficiency
Japan			
Australia			
Republic of Korea			
Singapore			
Malaysia			
Thailand			
China			
India			
Philippines			
Indonesia			
Pakistan			
Viet Nam			

Source: ESCAP based on McKinsey & Company (2017).

Figure 2.8
Holders of government bonds in selected Asia-Pacific countries



Source: ESCAP based on ADB (2019b).
Note: Institutional investors here are primarily pension funds and insurance companies.

private sector participation in developing economies worldwide in 2018 (World Bank, 2019). As a result, a large part of such financing still comes from traditional bank loans.

Studies have suggested several reasons why engagement by institutional investors in infrastructure projects remains limited. First, while liabilities of institutional investors are long-term, the incentive system still motivates fund managers to take a short-term view of their investments. About two-thirds of pension funds review the performance of fund managers on a quarterly basis, although 60 per cent of them agree that the key investment period is longer than a year (Aviva, 2014). Secondly, the laws and regulations that govern the fund management industry in some countries remain overly restrictive. For example, Biswas (2016) noted that institutional investors in numerous Asia-Pacific economies are not permitted by law to invest directly in real estate or infrastructure. Thirdly, many domestic institutional investors lack the required expertise to assess and manage the specific kinds of risks associated with infrastructure projects (Verougstraete and Areas, 2018). Fourthly, the political risks in financing infrastructure projects are often perceived as high, as returns can be significantly influenced by abrupt changes in government policies and regulations (Genberg, 2015). Fifthly, Alexander (2018) has noted that the profit profile of infrastructure assets tends to exhibit a 'j-curve' (i.e.

investors must be willing to tolerate sunk investment for several years, sometimes due to construction delays, before operations begin and cash flows are generated). Finally, Della Croce and Yermo (2013) have highlighted the limited availability of financing vehicles and debt instruments, as well as the lack of high-quality infrastructure data and clear benchmarks; a situation that makes it more difficult to assess the levels of risk.

Limited diversity of products

Among other non-conventional financial products, the potential of Islamic finance remains largely untapped. Islamic finance refers to financial services that are compliant with *Sharia* Islamic law and principles[27]. Some of the key features that distinguish Islamic finance from conventional finance are its emphasis on an asset-based (as opposed to a debt-based) approach, prohibition of financial transactions with interests or in speculative activities, and linkages to the real economy, such as production and trade sectors. Moreover, Islamic finance promotes risk-sharing by forbidding the sale of debt, thus requiring lenders to share the risk of default. These principles make Islamic finance particularly suitable for long-term investment in sectors such as infrastructure. Yet, the share of the total global worth of Islamic financial services, held by financial institutions based in Asia and the Pacific, was surprisingly low, at 22 per cent in 2017, or about $ 425 billion in value terms (see figure 2.9). Although the region has an important role in *sukuk* (the Islamic equivalent of bonds), accounting for close to 60 per cent of the world's outstanding value of this instrument, this is mainly attributable to the active market in just one country – Malaysia.

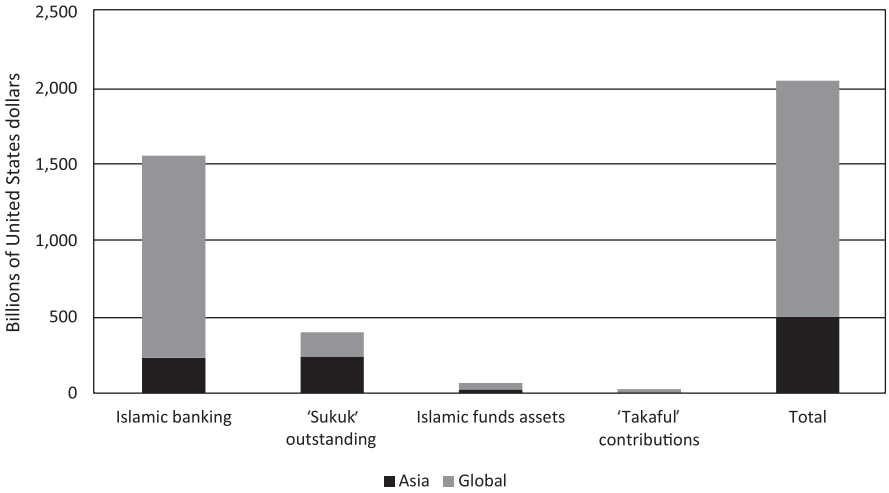
Limited market liquidity

While the primary issuance of bonds has continued to expand in many Asia-Pacific countries, the trading volumes and overall liquidity of the secondary markets for 'fixed income' paper remain fairly limited. (Secondary markets are where previously issued securities are bought and sold to investors). Limited market liquidity is important because illiquid bond markets cannot provide investors with easy, pre-term exits at transparent and realistic exit prices. And where this is the case, it is quite likely that fund managers will be prohibited from buying such bonds, for fear that they will be unable to 'offload' the paper at a later date, should a pressing need arise. Or if they are not prohibited, they will demand a higher rate of return on the bond to compensate them for taking on this

[27] *Sharia* is the code of laws followed by the Muslim community based on the *Quran* (Islam's religious book) and the *Sunnah* (the teachings and lifestyle of Prophet Muhammad).

Figure 2.9

Total worth of Islamic financial service industry, 2017

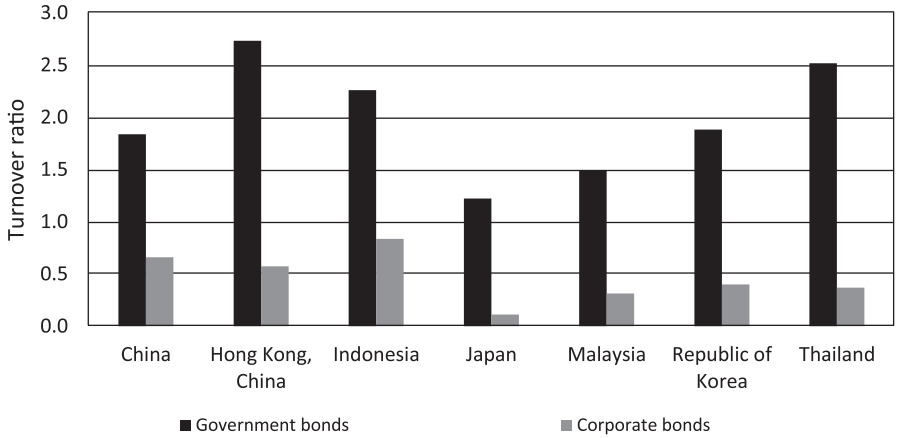


Source: ESCAP based on Islamic Financial Services Board (2018).

Notes: *Sukuk* is the Islamic equivalent of a bond, while *takaful* is the Islamic alternative to conventional insurance.

Figure 2.10

Government and corporate bonds turnover ratios in selected Asia-Pacific economies



Source: ESCAP based on ADB (2019b).

additional risk. One indicator of constrained market liquidity is in the size of the bid-ask 'spread' in the price of a bond on the secondary market, between investors wishing to buy and those wishing to sell. A large spread suggests that there is insufficient liquidity. Another indicator is the bond turnover ratio, which is measured as a ratio between the value of bonds traded relative to the average amount of bonds outstanding. In several major Asia-Pacific economies during the period 2015-2018, the average bond turnover ratio for corporate bonds was low, at 0.1-0.8, compared with 1.2-2.7 for government bonds (figure 2.10). The primary reason for such low liquidity is that most corporate bonds have shorter-term tenors (i.e. length of time to maturity) of less than five years, which then adversely impact secondary market liquidity, because investors tend to hold the bond to maturity.

Weak credit rating mechanism

Credit ratings seek to provide investors with reliable assessments, and support them in making informed decisions. Ratings form an important evaluation instrument in credit markets, especially in emerging markets where there tends to be significant information opacity and asymmetries. Overall, credit rating mechanisms in Asia and the Pacific face several challenges. First, many countries in the region still do not have local credit rating agencies, partly because of their small market size, which then impacts on the viability of providing an independent and commercially sustainable ratings service. Available information suggests that there are at least 40 national rating agencies that have their headquarters in the region, but many of these are concentrated in major economies, such as China, India and the Republic of Korea[28]. Secondly, many credit rating agencies have limited and irregular access to authentic corporate information, typically due to a lack of adequate regulations needed to support strong governance oversight and reporting mechanisms. Thirdly, despite some efforts to make ratings by domestic agencies in the region comparable (IIMA, 2013), the degree of compatibility remains low due to the use of different methodologies, criteria, definitions, and benchmarks. Fourthly, local credit rating agencies sometimes operate under a conflict of commercial interest, as they 'cross-sell' their services (e.g. credit rating agencies earning income from providing consulting services to bond issuers). Finally, local agencies are often not equipped with sufficient analytical capabilities to capture the specificities and complexities of large infrastructure projects. For example, the rating of bonds used to underwrite greenfield and brownfield infrastructure projects typically require different forms of analysis, because of divergences in their revenue streams, cost structures and public financial support.

[28] The Association of Credit Rating Agencies in Asia (2019) and Ratingplatform (2019).

4. Leveraging capital markets for infrastructure financing: selected policy options

This section discusses two broad groups of policies that governments, bond market regulators and other market players could take to address such impediments. The two groups are: i) providing an enabling economic environment; and ii) further strengthening the bond market architecture.

4.1 Ensuring an enabling economic environment

A government's ability to issue sovereign bonds, and the complementary role this has in the development of a corporate bond market, depends not only on the quality of government operations, but also on other economic-wide factors, including macro-economic stability and financial sector development. Inflation and currency fluctuations are particularly important for infrastructure bonds. High inflation pushes up operating costs, which is one of the main risks in forecasting and managing adequate project revenues for long-term infrastructure projects. Under the 'availability payment' model, in which regular payment is made by public procuring authorities to the project company for performance (typically assessed against the key performance indicators specified in the concession agreement), irrespective of demand for the project, governments may consider 'indexing' a portion of payments to current inflation rates. Alternatively, in cases where revenues from an infrastructure project are based on user charges, building in appropriate increases in user charges to compensate for inflation is also possible.

Foreign bondholders are also exposed to currency risk, as the project revenues are typically in a local currency, while bond payments are often in a 'hard' international currency. Foreign investors, therefore, benefit from hedging instruments, such as swaps, that allow them to mitigate part of this risk. However, infrastructure assets are widely deemed to be difficult to hedge for, even when swap markets function well, because project finance lending is usually based on cash flows, and a common need for waivers during the construction phase. In this regard, in the case of termination payments under concession agreements, there should be appropriate compensation for the additional costs incurred in cases of early termination of a project. Further, bondholders should also be assured that the relevant procuring authority has sufficient creditworthiness, or credit support from a government or multilateral development bank, to make these payment obligations enforceable.

In less developed economies, commercial banks largely operate in the retail finance space (i.e. serving individual and small business customers), and offer short- or medium-term loans in relatively small denominations. Therefore, notwithstanding their economic roles as financial intermediaries, their ability to offer long-term debt for large-scale infrastructure projects is often constrained, due to the risks of maturity and other mismatches. Nonetheless, a robust banking sector is crucial for the development of a bond market. In addition to providing lending to smaller infrastructure projects, local banks can serve as both the issuers of corporate bonds themselves and subscribers of sovereign and infrastructure-related bonds. Moreover, the overall availability of bank credit in an economy often influences liquidity in the bond markets. The banking sector and bond markets thus play a complementary and potentially synergistic role.

4.2 Further strengthening bond market structure, intermediaries and architecture

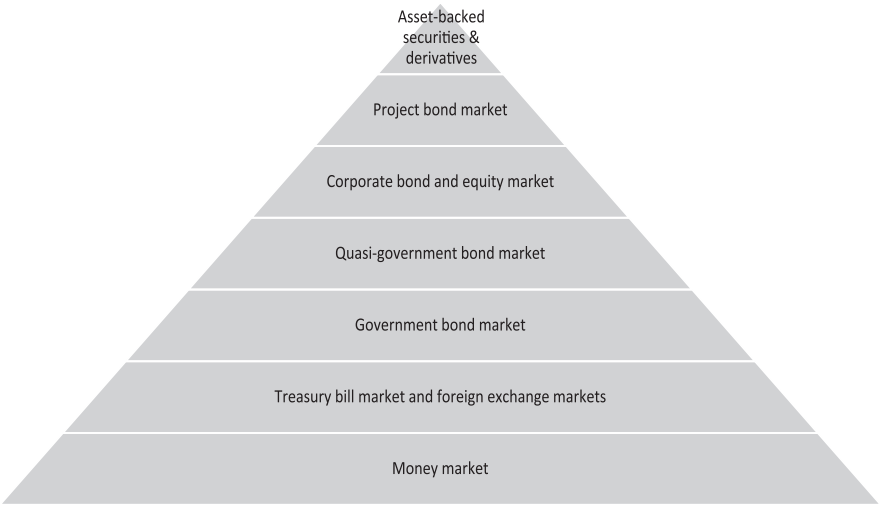
There are various policy actions that can be taken to develop a well-functioning capital market[29]. Here we focus on a set of selected policy options aimed at deepening the sovereign bond market, widening the investor base, diversifying financial instruments, increasing market liquidity, improving a risk transfer and credit enhancing mechanism, and protecting investor rights. This section also highlights selected policy measures that can be used to specifically support the development of corporate bonds and infrastructure project bonds. Clearly, depending on a country's current stage of capital market development, some policy options are more relevant than others. For example, for countries at an early stage of development, establishing (or expanding) a sovereign bond market is most relevant. For countries with a relatively more developed capital market, policies aimed at increasing market liquidity and protecting investor rights become more relevant, while policies to promote infrastructure company and project bonds in particular can only be considered once the basic fundamentals of a capital market are in place.

Deepening a sovereign bond market to facilitate the development of corporate and project bonds

Traditionally, as a debt capital market matures, countries will first see sovereign bond issuance, followed by the issuance of corporate bonds and then project-based bonds, including those issued by infrastructure companies and SPVs (figure 2.11). In a corporate bond structure, the rating and pricing are based primarily on the balance sheet of a multi-asset

[29] For example, ADB (2019b) and Verougstraete and Aras (2018).

Figure 2.11
Hierarchy and sequencing of domestic financial market development



Source: ESCAP based on Karacadag, Sundararajan and Elliot (2003).

infrastructure company that oversees development and operation of the project, rather than on the project's actual cash flows. In contrast, a project bond structure is based purely on the project's revenues, without recourse to other flows generated by project initiator, and bond proceeds can be only used for specified set of project-related investments (see box 2.1 on two examples of infrastructure project bonds in Asia and the Pacific). As such, infrastructure project bonds are usually complex because each project is unique, with different risk allocations and expected rates of return. For example, different infrastructure sectors have differing profiles for regulated long-term concession contracts that help secure revenues for debt repayment. More broadly, a lack of uniform data to benchmark the infrastructure asset class also weakens a portfolio manager's ability to predict returns for investors.

A well-developed sovereign bond market plays a critical role in supporting the development of corporate and project bonds that tend to be more complex in nature. In particular, government bonds generally offer the lowest coupon rates, thus serving as a reference point and providing yield curve benchmarks and price discovery for other bond issuers. Moreover, relatively risk-free assets, such as government bonds, also help increase investors' familiarity with a bond market, which potentially makes them more comfortable to invest in riskier assets, such as infrastructure project bonds.

Box 2.1

Examples of infrastructure project bonds in Asia and the Pacific

In the Philippines, the Tiwi-MakBan Climate Project Bond was issued in 2015 with a tenor of 5-10 years. The issuance, which was the first credit-enhanced local-currency project bond for the Philippines, helped to raise $ 225 million to finance two of the world's largest geothermal projects. The project benefited from a partial credit guarantee by the Asian Development Bank, which helped it to secure a favourable credit rating. This model demonstrates an opportunity for Asia-Pacific issuers to access domestic debt capital markets for projects that would not otherwise qualify for financing.

In Indonesia, the Paiton Energy Debt Refinancing Project Bond was issued in 2017 for $ 2.75 billion, making it one of the largest transactions in the project bond space. Listed in the Singapore Exchange, the proceeds were used to prepay outstanding debt facilities and shareholders loans, and for general corporate purposes of the independent power producer PT Paiton Energy. The financing package comprised a 20-year bond of $ 800 million, a 13-year bond of $ 1.2 billion, and a 6-year corporate loan facility of $ 750 million. The company provided an unconditional guarantee for the debt financing package.

Source: ESCAP based on Thomas (2016) and Inframation (2019).

Widening the investor base: the role of institutional investors

Governments can pursue a wide range of policy options to increase the contribution of institutional investors to infrastructure financing. Among others, the Asian Development Bank (ADB) (2013) and ESCAP (2017) emphasize the importance of: i) facilitating foreign investment, through relaxing certain capital controls, increasing the availability of hedging instruments, and supporting the development of foreign financial institutions which can act as facilitators of institutional investors; ii) promoting financial integration through harmonizing standards and regulations, which helps to reduce cross-border transaction costs; iii) strengthening the role of local credit rating agencies, which can potentially provide more in-depth information relative to international rating agencies; iv) incorporating the concept of shared social and environmental values into the design of infrastructure projects, thus making them more appealing to impact-oriented institutional investors; and v) reviewing tax policies, including potentially offering favourable tax treatment for infrastructure-linked investment. In addition to improving the enabling environment for institutional investors, some countries have – somewhat controversially – adopted financial regulations that mandate infrastructure financing by institutional investors. For example, in India, one regulatory agency stipulates that life insurers must invest 50 per cent of their portfolio in government bonds, 35 per cent in other approved securities, and 15 per cent in infrastructure firms. However, it is also

required that three quarters of insurance companies' total funds must be invested in highly rated securities, so their contribution in financing infrastructure financing products or infrastructure projects during construction (which typically carry low ratings) is severely constrained.

Diversifying financial instruments: the role of Islamic finance

There are several policy actions that can be pursued to further increase the role of Islamic finance (ESCAP, 2018). First, the tax and regulatory framework can be made more conducive to Islamic finance. In many cases, while interest payments from some conventional financial instruments are tax-deductible, returns from profit-sharing 'sukuk' instruments remain fully taxable. Secondly, the standardization of guidelines for structuring Islamic financial products can help these products become more appealing to a larger pool of investors. Thirdly, deeper domestic capital markets help facilitate secondary trading and overall liquidity of Islamic financial products, and provide a stronger benchmark for their pricing in the long-term. (Available data show that only a fifth of all 'sukuk' issued globally in 2014 had a maturity period of at least 10 years compared with a term of up to 20 years for many conventional infrastructure bonds in the region.) Fourthly, more capable Islamic financial institutions and an enabling legislative framework are needed to carry out the kinds of complex structuring usually entailed in infrastructure project financing. For example, the transfer of assets into SPVs is required in some cases, which may create a risk that the government will lose control of the asset in case of a default. Finally, a shortage of Islamic finance experts has led to notable discrepancies in practices involving Islamic financial transactions, thus undermining investor confidence in this part of the wider financial industry.

Governments in Asia and the Pacific are already making efforts to boost infrastructure investments through greater use of Islamic finance. In Malaysia, where funds raised from 'sukuk' have been used to finance infrastructure projects like airports, seaports and roads, favourable tax treatment is given to Islamic financial products. In Pakistan, the government accorded tax neutrality for 'sukuk' issuance, while Islamic banking institutions are allowed to opt-out from benchmarking certain products against interest-based benchmarks. In Australia, tax laws are reviewed to ensure parity between Islamic and conventional financial products, while tax guidance on Islamic financing is published in Hong Kong, China. At the multilateral level, a plan to set up an Islamic infrastructure bank has been put forward by the Islamic Development Bank (IsDB) and countries such as Indonesia and Turkey. Moody's, a ratings agency, has forecast that by 2020, total sovereign and supranational *sukuk*

issuance will pass the all-time high of $ 93 billion, reached in 2012, up from $ 78 billion achieved in 2018[30].

Increasing market liquidity

A policy effort to increase the liquidity of secondary markets for bonds should seek to create a structured pre-term exit option, which is backed by a bankable commitment in the form of bond buybacks and exchanges. In addition, there is also a need to improve cash management capacity and risk management practices of market participants, broaden the range of sophisticated market instruments and derivatives, and strengthen the legal infrastructure and enforceability of repurchase agreements. In this regard, Park (2016) noted that key reforms might usefully include: i) enhancing the market architecture to provide greater transparency; ii) promoting market-making activities; iii) introducing prudential norms and risk management practices for market participants; iv) increasing the size of benchmark bonds and extending the yield curve to longer tenors; v) moving towards market-based implementation of monetary policy by stimulating the interbank repurchase market; and vi) fostering greater institutional investment and foreign participation.

Improving a risk transfer and credit enhancing mechanism

The 'bankability' of bonds is largely a function of their risk profile. Improving a bond's risk profile is possible through a range of potential fiscal support and regulatory policies, such as tax benefits, duty waivers, insurance products, and appropriate guarantees against default. On tax benefits, governments may consider waiving the withholding tax of infrastructure-related bonds. Meanwhile, as the share of 'non-bankable' infrastructure projects in developing countries is often high, at between 55 and 65 per cent in Asia and the Pacific, according to an estimate by Marsh & McLennan Companies (2018), guarantees against default may need to be provided by governments and multilateral financial institutions (ASIFMA–ICMA, 2016). For example, on infrastructure projects where private investors bear the demand risk (e.g. toll payments on road projects), state guarantees on a proportion of the company's revenue stream can help to increase the perceived 'bankability' of the project as a whole. One example of an initiative to de-risk infrastructure projects is the Indonesia Infrastructure Guarantee Fund (IIGF). The Fund aims to improve the creditworthiness of public-private partnerships (PPPs) for infrastructure projects by providing guarantees on the financial obligations of public contracting agencies participating in PPP consortia. The IIGF provides

[30] Moody's Investors Service (2019).

compensation if the economic feasibility of the PPP project is compromised due to events, such as early termination or project default, as a result of changes in law, expropriation, currency inconvertibility, or force majeure. Hyun (2017) and Ashurst (2018) have highlighted other case studies in Bangladesh, India and the Republic of Korea. Outside Asia and the Pacific, the Project Bond Credit Enhancement in Europe takes the form of a loan that is given to the project company from the outset, or a contingent credit line in event of a project revenue shortfall.

Protection of investor rights

Bond buyers face various risks, such as: i) expropriation risk; ii) lack of transparent, adequate and timely business reporting by bond issuers; and iii) insider trading and preferential off-market deals. A strong regulatory framework that provides a suitable level of protection of bondholders' rights is crucial for market participation by large investors, and for the overall growth of domestic capital markets. In this regard, a robust investor protection framework should usefully include: i) a bankruptcy law that helps to determine the rights and obligations of market participants; ii) effective contract enforcement; iii) separate treatment and management of assets owned by intermediaries and clients; iv) acquisition of licenses for brokers and advisors to operate; and v) legal resources in support of market participants and efficient conflict resolution, which allow investors to initiate legal actions against entities such as brokers, dealers, corporate issuers, clearinghouses and the government itself. At a contract level, a provision on cross-default agreements, which puts a bond issuer in default if it defaults on a different obligation, also helps enhance investor protection.

Policy measures to support corporate bond markets

In several emerging Asia-Pacific countries, various measures to promote the development of corporate bonds have been in place (Goswami and Sharma, 2011). Among others, initiatives to facilitate the issuance process of corporate bonds include allowing corporate entities to issue project bonds (China); introducing a bond pricing agency to provide reference bond prices (Indonesia); waiving the listing fees or providing tax incentive for issuing debt securities (Malaysia and Thailand); and allowing foreign governments and financial institutions to issue local currency bonds onshore (Thailand). Moreover, there are also supportive measures introduced for corporate bonds that have already been issued, such as allowing locally-listed banks to trade bonds on the stock exchanges (China), setting up an electronic trading platform for government and corporate bonds (Hong Kong, China), introducing a bond market stabilization fund (Republic of Korea), and increasing the limit on foreign

institutional investors to invest in local currency corporate bonds (India). In December 2018, Wuhan Metro Group in China issued $ 400 million in "green senior unsecured perpetual securities", listed in Hong Kong, China. The company has a mandate from the municipal authorities of Wuhan, the capital of Hubei province in China, to exclusively own and operate the city's growing metro system. The funds raised from the bond issue are being used to help underwrite a series of eligible activities consistent with the International Capital Market Association's 'Green Bond Principles'[31].

Regulatory and financing frameworks to support infrastructure project bonds

In emerging markets, the regulatory frameworks for debt offerings often contain requirements that are not well suited for projects structured on a limited or non-recourse basis. Examples include a requirement for issuers to meet specific financial ratios or have a minimum number of years of operation. In this regard, securities regulators should review and adjust certain regulations, such as disclosure practices of sensitive information on infrastructure projects and flexibility for tailor-made solutions aligned with the diversity of infrastructure assets. Meanwhile, as infrastructure project financing typically has many creditors (such as commercial banks, export credit agencies and individual bond-holders), managing inter-creditor arrangements to provide waivers and consents in the underlying project can be challenging, due to divergent interests, and project companies need to work with procuring authorities and legal advisors to determine the best arrangement. On finance structuring, infrastructure projects usually require underlying products that address some of the distinctive issues in infrastructure projects, such as liquidity and tenor, user charges and exclusivity, changes in law cover, first loss default, and change in ownership. Tailoring financial products should aim to leverage the attributes of different infrastructure sectors and projects, while keeping in mind those risk factors that pertain to the nature and complexity of a specific infrastructure project. An example is the use of an 'availability payment' model to reduce project risks. Under this model, the government regularly pays the project company, based on its performance, rather than on actual user demand for the project.

5. Towards capital markets for sustainable development

This chapter has so far discussed some of the factors that constrain the use of bonds and capital markets for infrastructure financing, and identifies policy options to address such impediments. A broader contextual issue,

[31] For details, see: ICMA (2018)

however, is how to develop a capital market that not only fulfils its primary economic objective of channelling savings into investments, but also one that supports the achievement of the 2030 Agenda for Sustainable Development. As the introductory chapter of this book points out, funding and developing sustainable and quality infrastructure is fundamental to attain the SDGs. So how can countries in Asia and the Pacific move towards capital markets that simultaneously support medium-term macro-economic and financial stability, and the pursuit of social inclusiveness and environmental sustainability?

5.1. A prudent approach to capital market development

A prudent approach to capital market development should focus not only on promoting the growth and depth of the market, but also needs to be mindful of potentially adverse economic (and other) impacts that capital market development – like any act of 'development' – may have. We have already noted that more active market participation by institutional investors and foreign investors can help to increase market size and liquidity. Yet, policy-makers need to be careful when pursuing policies aimed at unlocking the potential of these investors. For example, relaxing regulations that currently constrain institutional investors from investing directly in infrastructure projects, such as through bond issuance, may well result in increased portfolio risk. Clearly, any attempt to liberalise the existing legal and regulatory frameworks needs to be done at a pace that allows the relevant agencies to observe the net effects, and potentially be able to counter-act any unanticipated and unwelcome consequences that might pose a systemic risk of some kind. More active participation by foreign investors means that local bond markets become more exposed to global financial conditions and the perils of contagion. In cases of capital flight and financial distress, this could lead to exchange rate volatility and weaken the balance sheets of financial institutions, firms and domestic investors. Meanwhile, rapidly liberalizing capital controls can potentially lead to greater financial instability, especially amid weak regulatory supervision (Genberg, 2015), while closer financial integration can increase currency risks. Thus, a prudent capital account liberalization that keeps in mind these potential risks, as well as other country-specific contexts, should be pursued.

Another area where a prudent approach to capital market development is important is in the use of state guarantees to de-risk bond-holding. While such guarantees help support investor confidence and make infrastructure-related bonds more attractive, an accountable and transparent de-risking process is needed (Sundaram and Chowdhury, 2019). In particular, the amount of committed fiscal resources needed to provide guarantees, which could otherwise be spent on different development projects, should be

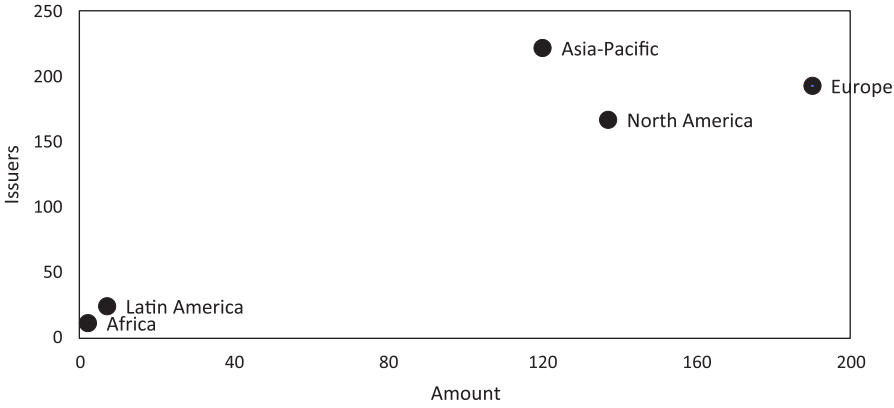
weighed against the potential benefits that such guarantees entail. A guarantee that actually fails to unlock greater investment and/or induce a lower rate of investment return means that the funds earmarked to underwrite that guarantee have effectively been wasted, and would have been better used in another way. Guarantees need to be very specific, relate to specific issues over which the relevant government agencies have some control, and should not be sweeping in scope. Interest groups and civil society organizations can play a role here in ensuring that the public is fully aware of the opportunity costs surrounding the commitment of finite fiscal resources to de-risk investments in infrastructure projects. Finally, while it was noted earlier that appropriate increases in user charges on infrastructure projects could be allowed to lessen the risk of high inflation on the operating costs of companies, the extent of such increases should be carefully considered. For example, user charge increases should be reviewed in conjunction with other socio-economic variables that allow for the overall financial strength of user households, and particularly low-income groups within the population. If high inflation is broad-based, then poor and near-poor households will also be struggling to meet higher living costs, just as much as the infrastructure service providers on whom they may depend, with virtually no chance of some kind of indexed adjustment in their incomes offered to mitigate the consequences.

5.2. Bonds for sustainable development: the case of green bonds

Asia and the Pacific is becoming a key global player in green bond markets. As of end-2018, the cumulative amount of green bonds (i.e. bonds that are earmarked for funding environment-friendly projects such as renewable energy, clean transport and sustainable water management[32]) that have been issued domestically and internationally by Asia-Pacific economies since 2007 was $ 120 billion. Although this is smaller than the amounts issued in Europe ($ 190 billion) and North America ($ 137 billion), the number of issuers in Asia and the Pacific was higher than those in other regions of the world (see figure 2.12). When considering 2018 alone, Asia and the Pacific accounted for about 35 per cent of the global issuance value of green bonds (CBI, 2018a), of which China accounted for close to a quarter of the global share, issuing $ 31 billion worth of green bonds, thereby making it the world's second largest green bond issuing country

[32] Green bond is one example of sustainability-oriented bonds, broadly defined as bonds whose proceeds are used for promoting social development and environmental sustainability. Other examples of sustainability-oriented bonds are: i) blue bond which is primarily used to finance marine and ocean-related projects, and ii) social impact bond, which allows private investors to invest in public projects that deliver measurable social and environmental outcomes.

Figure 2.12
Cumulative green bond issuance in world's regions since 2007



Source: CBI (2018b).

after the United States. Other large issuing countries in Asia and the Pacific during 2018 included: Australia, India, Indonesia, and Japan. Box 2.2 highlights some of the past and forthcoming sovereign green bond issuances in the region. Annex 2.1 also provides a profile of green bond issuance for infrastructure financing in Asia and the Pacific.

Green bonds hold significant potential for issuers in Asia and the Pacific, as global investors are increasingly interested in sustainable infrastructure assets in emerging markets. However, the Global Sustainable Investment Alliance (2017) noted that only 0.8 per cent of total funds under management in Asia and the Pacific (excluding Japan) used strategies that included a sustainability component; much lower than the 50 per cent reported in Europe. A recent survey revealed that around two-thirds of Asian investors are willing to make their investments more sustainable, compared to 97 per cent of European investors (HSBC, 2017). To increase the issuance of green bonds in Asia and the Pacific, and enhance the region's access to international green bond markets, three policy issues are highlighted here: i) creating a common framework on green bonds; ii) facilitating green bond issuances through knowledge sharing and financial incentives; and iii) increasing demonstration effects through sovereign bond issuances[33].

[33] ADB (2018) has explored other policy areas, such as incorporating green bond markets in national policy goals, and regional initiatives in the ASEAN+3 economies.

Box 2.2

Examples of sovereign green bonds issued in Asia and the Pacific

Past issuances in Fiji and Indonesia

As part of Fiji's strategy to transition to a low carbon and climate-resilient economy, the country issued a sovereign green bond worth $ 50 million, with dual 5-year and 13-year tenors in 2017. This makes it the first developing country to issue such a bond type. Among others, eligible projects include renewable energy, energy and water efficiency, resilience to climate change, clean and resilient transport, pollution reduction, and wastewater management.

In Indonesia, the country issued the world's first green sovereign *sukuk* in 2018. It also became the second country to issue green *sukuk*, following several issuances in Malaysia in 2017. The issuance of this five-year sovereign green *sukuk*, which raised $ 1.25 billion, appealed to both Islamic investors and green investors. The proceeds are used to support the implementation of climate change mitigation targets and climate adaptation plans, including projects on renewal energy efficiency, resilience to disaster risk reduction, sustainable agriculture and transport, green tourism, and green buildings.

Forthcoming issuance in Bhutan

Over the years, the Government of Bhutan has mainly relied on external grants, concessional borrowing, treasury bills and bank loans to finance its capital expenditures. While such a financing modality has supported fiscal spending and contributed to rapid economic development in Bhutan, these financing sources have some limitations. For example, the ability to tap external grants and concessional borrowing will diminish as Bhutan's income level rises. The use of treasury bills and bank loans to finance fiscal shortfalls also carries related risks, such as volatility in interest rates, asset-liability mismatches, and limited options to finance specific finance needs. Meanwhile, the country's financing gap is estimated to be sizeable. For the 12th Five-Year Plan (2018-2023) an outlay of 310 billion Ngultrum is foreseen, with financing gaps amounting to about 29 billion Ngultrum. There is, therefore, a need for Bhutan to explore an alternative financing strategy, and enhance the role of government debt securities in expanding the fiscal space. ESCAP has been providing technical assistance to Bhutan since December 2017 to issue a sovereign (green) bond in 2019. This would make Bhutan the first country that is classified as both a less developed country and a landlocked developing country to issue a sovereign (green) bond. With assistance from ESCAP, a Committee on Government Bond Issuance has been successfully set up to work on key implementation issues, such as the amount of funds to be raised, potential bond-holders, bond yield, maturity period, and the value of each unit of the bond.

Sources: CBI (2017), Dorji (2018) and ESCAP (2019).

Creating a common framework on green bonds

The lack of clarity in the definition of green bonds is one of the principal challenges to the establishment of a global and/or regional green bond market (G20, 2017; Paulson Institute, 2017). Although the first green bond was issued by the European Investment Bank in 2007, an effort to create conceptual clarity was only initiated with the release of the Green Bond Principles (GBP) by the International Capital Market Association in 2014. The GBP has four central components: the use of proceeds; the process for project evaluation and selection; the management of proceeds; and reporting. Importantly, the first component contains a list of 10 project categories that are considered eligible to be funded with green bond proceeds. Examples of infrastructure-related categories in this first component include: renewable energy, clean transportation, sustainable water and wastewater management, and green buildings (ICMA, 2018).

Several countries in Asia and the Pacific have acknowledged the need for a common framework on green bonds. In 2017, Japan adopted the 'Green Bond Guidelines', and India released the 'Disclosure Requirements for Issuance and Listing of Green Debt Securities', while ASEAN introduced the 'ASEAN Green Bond Standards' (ASEAN-GBS). These initiatives closely resemble the GBP. Nonetheless, there remain differences in the lists of eligible green projects across countries in the region. For example, the ASEAN-GBS explicitly excludes all power generation projects based on fossil fuels, while China includes clean coal as a green category. When green bonds are issued in markets with different lists of eligible green projects, these bonds may then require an external review to verify that they comply with the green guidelines in both the issuer's and the investor's home country. As this process increases the transaction costs of issuing green bonds, having a common green bond framework is critical.

Facilitating green bond issuances through knowledge sharing and financial incentives

Two of the main challenges in establishing an efficient green bond market in Asia and the Pacific are: i) a lack of knowledge of green finance among potential green bond issuers; and ii) a failure to compensate these market players for the additional expenditure that green bond issuances typically require. In this regard, capacity building and financial support could play a more active role. On capacity building, several governments have taken concrete steps in this direction. In Indonesia, for example, regulators have issued policy guidance to Indonesian non-sovereign issuers (i.e. companies) who intend to issue green bonds internationally. In particular, the 'Roadmap for Sustainable Finance in Indonesia 2015-2019' aims to expand learning networks for capacity building through a university research

centre on sustainable finance (CBI, 2018b). Also, through a university research centre, China has set up a platform for knowledge sharing on best practices of scaling up green and sustainable finance.

On providing financial support, countries have initiated measures that render green bond issuance more attractive for some financial institutions and corporates. In Singapore, for example, the monetary authority carries the costs of the external review process to verify the green character of bonds for investing parties, while in Hong Kong, China, the government subsidizes 50 per cent of such costs. In China, local governments offer various kinds of support, such as interest subsidies, guarantees for green bond financed projects, fast-track approval processes, and coverage of issuance costs. Moreover, China's central bank introduced the green macro-prudential assessment system in 2017, which gives scores to banks based on the proportion of their portfolio consisting of 'green loans', and by the banks' history of green bond issuance. The central bank also expanded the guarantee scope of its medium-term lending facility to include green finance instruments as suitable collateral.

Increasing demonstration effects by sovereign issuances

When sovereign governments and development banks have successfully issued international bonds, past experience suggests that the demonstration effect stimulates the private sector and other financial institutions to follow suit. Such demonstrations allow other market players to derive insights on how to issue their own green bonds that comply with green bond regulations in both the issuers' and the investors' home countries. The process typically begins with the highest credit rated public institutions, and gradually evolves through semi-public, corporate, asset-backed, and then project-specific bonds. In 2017, the Chinese Development Bank issued a quasi-sovereign international green bond in Germany, which met both conventional European and Chinese 'green' requirements. As a sovereign-backed Chinese institution, this provided a clear demonstration effect, leading to a rapid increase in Chinese green bonds being issued abroad. And in 2018, the Indonesian government became the first Asian sovereign to sell a green bond internationally, through the issuance of a 'green *sukuk* bond' joint listing in Singapore and Dubai. The Islamic character of the bond also led Islamic investors in Asia and the Pacific to buy a large proportion of the bond, even though such investors are usually not associated with sustainability strategies (Vizcaino, 2018).

5.3 Responsible investment in bond markets

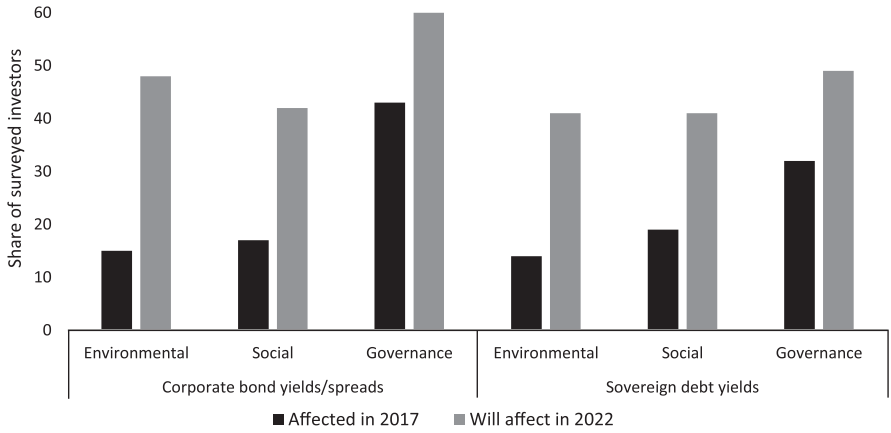
Mainstreaming environmental, social and governance (ESG) factors into the investment analyses and strategies of bond issuance and trading could help promote sustainable capital markets, and could be particularly potent in the context of bonds used to underwrite infrastructural development. The traditional focus of bond investors has typically been on stable financial returns, which are determined by factors such as the interest rate, inflation rate, liquidity risk and credit risk rating. To contribute to the development of sustainable capital markets, investors could also incorporate ESG factors into their investment research, processes, and decisions. Examples might usefully include: i) air pollution and water and energy resources for environmental issues; ii) human rights and workers' health and safety for social issues; and iii) business integrity and audit and tax practices for governance issues. By considering these kinds of factors, ESG integration can also help enhance investors' risk management strategies by identifying risks that are not revealed by financial information alone. For example, one study shows that bonds issued by American companies with better ESG ratings tend to yield higher rates of returns than the comparable market benchmark (Hoepner and Nilsson, 2017).

Among these three dimensions of ESG, investors usually view corporate governance issues as having a more tangible impact on financial returns than environmental and social issues. In a 2017 survey of financial professionals in major economies within Asia and the Pacific, up to 43 per cent of respondents believed that governance issues 'always' or 'often' affected corporate bond yields/spreads, relative to only 15-17 per cent for environmental and social issues (figure 2.13). Nonetheless, perceptions of a link between environmental and social issues on financial returns is gaining momentum, particularly as they pertain to infrastructure finance instruments, such as bonds issued to help underwrite the costs of construction and operation. At least 40 per cent of respondents believe that environmental and social issues will affect the yields of corporate bonds and sovereign debts by 2020 (CFA Institute and PRI, 2019).

The process of ESG integration can be viewed as having three components (CFA Institute and PRI, 2018). The first component is research, which identifies and collects relevant ESG information that affects a company, sector and/or country. The second component is fundamental securities and portfolio analysis, in which investment managers assess the impact of relevant ESG factors on the investment performance of a specific company, sector and/or country. For example, ESG information may be used to adjust credit risk assessments and projected future cash flows that were previously based solely on financial information. (The impact of ESG factors on different maturities of bonds issued can be also be analysed.) The

Figure 2.13

Share of surveyed investors in Asia and the Pacific who believe ESG factors affect bond yields



Source: CFA Institute and PRI (2019).

third component is the investment decision itself; that is, whether to invest in a bond, based on data collected and assessments carried out in the first two components.

Despite a rising interest among fund managers in ESG integration, which is driven by a mix of client demand and regulatory requirements and incentives, the implementation of ESG integration faces several barriers. Among others, these include: i) a limited understanding of ESG concepts; ii) different investment cultures; and iii) the availability, timeliness and consistency of ESG data. A limited understanding of ESG concepts partly arises because, as noted earlier, there are currently no agreed definitions on ESG integration. Different corporations, sectors and countries adopt different lists on ESG factors and terminology. On investment culture, even a broad view that sustainable investments are deemed to be desirable may not be as widespread as one might think. For example, in one survey of institutional investors in Asia and the Pacific, close to one fifth of the 175 respondents did not believe in sustainable investments, while another 14 per cent of respondents noted that their investment committees were not comfortable making sustainable investments (Schroders, 2018). Finally, on ESG data availability and consistency, pertinent information is often limited in developing economies, while there remain significant variations in disclosure and reporting standards and analytical approaches (e.g. the relative weighting of environmental, social and governance factors). While these barriers are applicable for ESG integration in general, implementing

ESG integration for fixed income assets, such as bonds, pose additional challenges (Inderst and Stewart, 2018). For example, in the case of a sovereign bond, the challenge is how to engage with the relevant government agencies, as such an interaction tends to be uncommon. More broadly, fixed income indices are typically difficult to compile than for equities, as this involves multiple bond types and issuers, unlisted companies, and non-corporate entities.

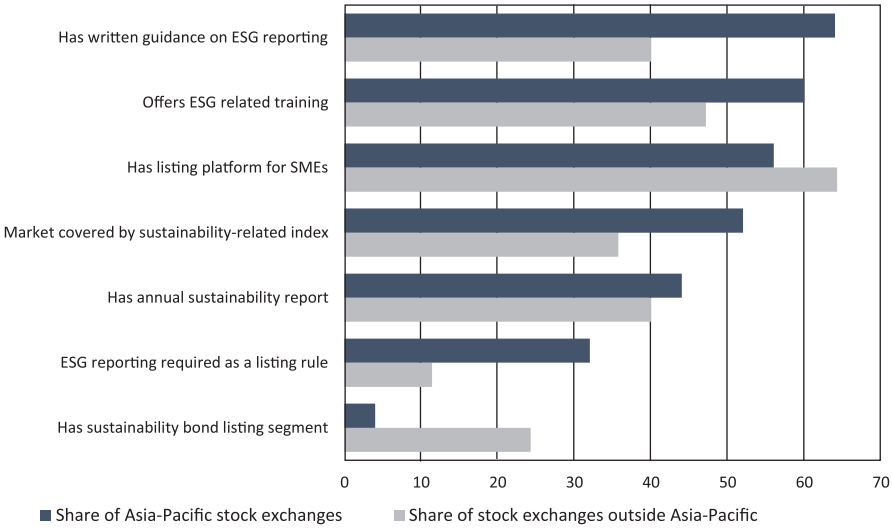
5.4. Sustainable securities markets

Launched in 2009, the Sustainable Stock Exchanges (SSE) Initiative is a United Nations Partnership Programme, comprising the United Nations Conference on Trade and Development (UNCTAD), the United Nations Global Compact, the United Nations Environment, and the Principles for Responsible Investment (PRI). It serves as a global platform that explores how securities exchanges can enhance performance on ESG issues[34]. The SSE initiative currently tracks the sustainability activities carried out by 95 securities exchanges in 70 economies worldwide, including 25 securities markets in 18 Asia and the Pacific (Sustainable Stock Exchanges, 2018). These activities include whether a securities exchange: i) requires ESG reporting as one of the listing requirements for some or all listed companies; ii) reports on social and environmental impact and corporate governance on an annual basis; iii) offers a written guidance on ESG reporting; iv) has offered interactive ESG training over the past year; v) adopts any sustainability-related index (which may include an environmental index, a social index or an index for specific themes, such as low carbon indices); vi) has developed rules and regulations allowing for sustainability bonds to be listed in a separate segment; and vii) offers a listing platform specifically for small and medium-sized enterprises (SMEs).

Overall, securities exchanges in Asia and the Pacific are actively engaged in sustainability activities. Figure 2.14 depicts the share of securities exchanges in Asia and the Pacific, and those outside the region, that carry out sustainability activities tracked by the SSE initiative. Relative to stock markets outside Asia and the Pacific, the region's securities markets are active in requiring ESG reporting as a listing rule, offering ESG training and guidance on ESG reporting, and providing a sustainability-related index. However, the sustainability activity that the region appears to lag behind

[34] While this chapter has primarily focused on the bond part of a capital market, the SSE initiative, which focuses on the equity part of a capital market, still offer valuable insights because a majority of corporate bond issuers are listed companies. Besides, there appears to be no initiative that tracks the sustainability activities carried out by national bond market regulators around the world.

Figure 2.14
Share of securities markets that engage in sustainability activities



Source: ESCAP based on Sustainable Stock Exchanges (2018).

most is in offering a dedicated listing platform for sustainability bonds. Out of 25 securities markets in Asia and the Pacific included in this database, only Indonesia provides such a listing platform, compared to about a quarter of securities markets outside the region.

At a country level, the securities markets in Hong Kong, China, India, Malaysia and Singapore are seen to be more active in promoting sustainability issues than others. Except for providing a separate segment for sustainability bonds, the SME markets in these four economies engage with all six sustainability activities highlighted above. Other relatively active SME markets in this space include Japan, Thailand and Turkey. In contrast, available information shows that there is still potential for the stock markets in Bangladesh and Mongolia to step up their efforts towards sustainable stock markets.

Box 2.3

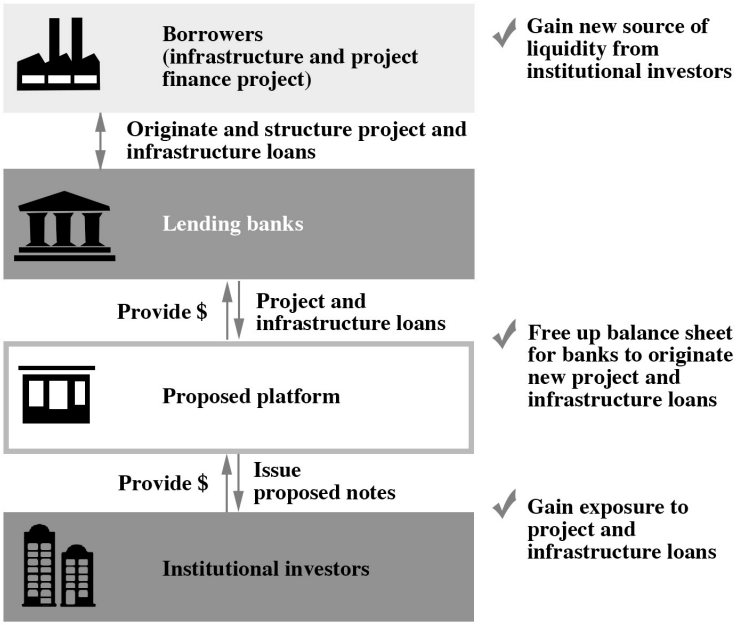
Infrastructure take-out facility: an innovative infrastructure financing programme

Although private capital is beginning to play a key role in the funding of infrastructure projects, the potential of raising capital for infrastructure in the debt markets remains largely untapped in Asia and the Pacific. Among other non-conventional and innovative financial products, securitized project financing solutions are gaining momentum in the region. Infrastructure take-out facility (TOF) is an emerging instrument of such debt securitization.

TOF refers to the sale of contractual debt related to infrastructure assets, by banks, to an off-balance sheet SPV, and issuing tranches of securities bought by a syndicate of institutional investors (figure 2.15). It, therefore, belongs to the collateralized loan obligation (CLO) asset class. To mitigate the risks for institutional investors, the SPV buys back infrastructure loans from various countries in Asia and the Pacific and in a broad range of sub-sectors industries. Through the TOF, banks facing strong capital requirements can free up their balance sheets, and recycle capital to originate new projects and infrastructure loans. However, in Asia and the Pacific thus far, securitization has been mainly used for consumer loans and mortgages, rather than for corporate and infrastructure debt (Macfalane, 2015).

Figure 2.15

Value proposition of an infrastructure take-out facility



Source: Clifford Capital (2018).

The first fully project finance-backed CLO, or TOF, in Asia and the Pacific, was developed by Clifford Capital in Singapore, through the creation of an SPV – Bayfront Infrastructure Capital. There was a strong demand from a variety of institutional investors (the loans of Class A were 2 times oversubscribed). The portfolio of the SPV is backed by 37 projects and infrastructure loans located in 16 countries and eight sub-sectors (Bayfront Infrastructure Capital, 2018). The use of such a ToF model could well enhance infrastructure financing through the capital markets in Asia and the Pacific (G20 Sustainable Finance Study Group, 2018).

6. Concluding remarks

Bonds exhibit significant potential to complement bank loans, which are currently the main source of infrastructure financing in Asia and the Pacific, in helping to underwrite the significant costs of infrastructure development in the region. Even in small developing countries, such as Bhutan, bonds provide an alternative infrastructure financing option, and increase investment opportunities for institutional investors to gain long-term investment exposure in the country. However, there remains a wide range of policy issues that governments, market regulators, issuers, and portfolio investors need to address in order to fully realize such potential. There are at least three main messages that can be drawn from this chapter. Firstly, at present, infrastructure bond financing remains limited in Asia and the Pacific, and can be explained in large part by generally poor sovereign credit risk ratings, which constrain governments' ability to issue 'benchmark' sovereign bonds, and under-developed capital markets in the region.

Second, two broad groups of policy issues should be considered in any concerted bid to increase the role of infrastructure bond financing. The first is the need to provide a conducive and stable enabling economic environment, such as macro-economic stability, supportive financial markets, and an effective legal and regulatory framework. The second is the need to enhance the capacity of the capital markets and their participants in various aspects. This includes widening the investor base, diversifying the range of financial instruments available, increasing market liquidity, improving the credit support mechanism, enhancing the credit rating system, and protecting investor rights. Third, while aiming to create effective capital markets, governments and market participants alike should seek to ensure that these capital markets are in a position to support the 2030 Agenda for Sustainable Development. In addition to their primary economic objective of channelling excess funds to where they can be used to best economic effect, capital markets should also contribute to socio-economic stability, social inclusiveness and environmental sustainability. Examples of this include adopting a prudent approach to capital market

liberalisation, the issuance of 'green bonds', the incorporation of environmental, social and governance factors into bond investment decisions, and promoting sustainable securities exchanges.

Overall, this chapter points to the critical role of governments and market regulators in delivering effective and sustainable capital markets. Sovereign credit risk ratings directly influence ratings for corporations (and projects) seeking to issue bonds, and a well-functioning sovereign bond market provides a critical benchmark for corporate bonds. The development of sustainability-oriented capital markets is also possible through reforms in regulatory requirements and incentives. Clearly, achieving an effective and sustainable capital market is a multi-dimensional and long-term process with numerous moving parts. Countries may therefore wish to initially embark on infrastructure financing strategies that involve less complex projects, and ones that have built-in revenue adequacy mechanisms, such as 'brownfield' projects on well-established toll roads and water supply concessions. In the meantime, for less developed countries, bank loans and external sources of finance, such as official development assistance and global development partnerships, will remain critical for infrastructure financing in Asia and the Pacific.

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Annex 2.1.

The use of green bonds for infrastructure financing in Asia and the Pacific

Since the Paris Agreement entered into force in November 2016, green bonds have been garnering considerable attention. Green bonds tend to have a wide definition as their label has been applied to various debt instruments, including private placement, securitization, covered bonds as well as 'sukuk' paper. The Climate Bonds Initiative (CBI) refers to green bonds that invest at least 95 per cent of proceeds or refinanced funds into climate related activities for environmental and/or climate benefits consistent with the 2-degree global warming target set under the Paris Agreement (CBI, 2018a). Green bonds are typically earmarked for investments in a wide array of sectors[35] but a majority are infrastructure related (CBI, 2018b). Indeed, the overlap between green and infrastructure projects is significant, at over 75 per cent (Lake, 2017).

Over recent years, green bonds have been used in Asia and the Pacific on a large variety of infrastructure projects. The projects included notably the installation of wind turbines, the creation of photovoltaic farms, the construction of mini hydro cascades, the development of geothermal and biomass facilities, the rehabilitation of power and heating plants and transmission/distribution facilities, the modernization of industrial installations, the deployment of waste water treatment plants, the rehabilitation of municipal water infrastructure and investments in existing buildings (insulation, lighting, heating and cooling systems)[36].

The green, or climate-related, bond market has expanded significantly, to reach a total of $ 1.45 trillion globally in 2018. It has also ballooned in ESCAP member states (see figure 2.16) in terms of both volume and number of issuers. In 2018, issuers located in Asia and the Pacific issued a total volume of $ 0.47 trillion of labelled green bonds, next to the European market ($ 0.62 trillion). The amount issued by Asia-Pacific entities also out-paced the volume of green bonds of North American issuers ($ 0.39 trillion). With growing market appetite for green bonds in the region, the range of issuers and investors in the green bond market has expanded significantly. The number of issuers in the region (170 in 2018)

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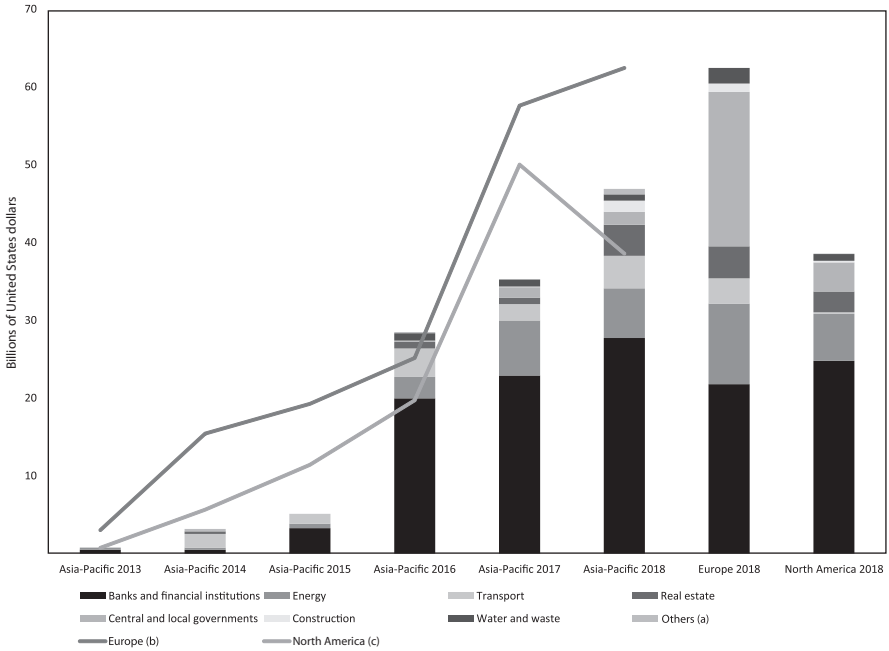
35 Those sectors include information and communications technology (ICT) with projects related to the installation of broadband networks and the implementation of 'Internet of Things' solutions, land use and marine resources, with projects ranging from the creation of wild fisheries to the adoption of environmentally friendly agricultural practices, or industry with projects such as electric rail supply chain.

36 Various sources.

Figure 2.16

Issued green bonds by line of business in Asia and the Pacific, 2013–2018

(Billions of United States dollars)



Source: ESCAP based on CBI (2019), accessed on 5 June 2019.

Notes: In Asia and the Pacific, the following 11 economies have so far issued climate-related bonds according to the CBI database: Australia, China (and the Taiwan Province of China), India, Indonesia, Japan, Republic of Korea, Malaysia, New Zealand, Singapore, and Thailand. CBI is an investor-focused not-for-profit international organization, and its database aims to track all self-labelled green bonds, for which at least 95 per cent of proceeds were used for financing or refinancing green/environmental projects. All the screening criteria are explained in CBI Green Bond Database Methodology. (a) Others encompass companies with cross sectoral line of business. (b) In Europe, the database covers the following countries: Austria, Belgium, Denmark, Finland, France, Germany, Iceland, Ireland, Italy, Lithuania, Luxemburg, Netherlands, Norway, Poland, Scandinavia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom. (c) North America encompasses Canada and the United States.

has been increasing at an exponential rate and now exceeds the number of European issuers (160 in 2018).

The development of the green bond market in Asia and the Pacific has been mainly motivated by governments' growing awareness of the need to steer economic growth and development onto a more environmentally responsible pathway. The region hosts five of ten most vulnerable countries to climate change (i.e. Bangladesh, Nepal, Sri Lanka, Thailand

and Viet Nam), while contributing to over half of the world's total greenhouse gas (GHG) emission (Eckstein, Hutfils and Winges, 2018). The green bond market presents an opportunity to help underwrite the additional financing requirements needed to mitigate and adapt to climate risks for multiple sectors across the countries in the region. Somewhat in contrast to European public institutions, central and local governments in Asia and the Pacific have generally been less involved in sovereign green bond markets, rather like their North American counterparts. Historically, the United States held back from the market system, while its minimal involvement made way for financial institutions and private-owned businesses. In 2018, banks and companies accounted for 90 per cent of the total green bond issuances in the United States.

In the region, most green bonds pass through banks and financial institutions which have been in the past few years the largest issuers and have played the role of middle-person by selecting investment projects, managing risks, and allocating foreign investors' funds to domestic projects. At present, however, there is no consistent reporting framework on the use of the proceeds, and the environmental impact assessment, of green infrastructure projects in the financial and banking communities. This condition limits banks to lend mainly for eco-friendly commercial properties or housing (CBI, 2019). There is clearly a pressing need for financial intermediaries to develop a shared framework in the assessment of the ESG performance of entire green infrastructure projects (UNEP, 2016).

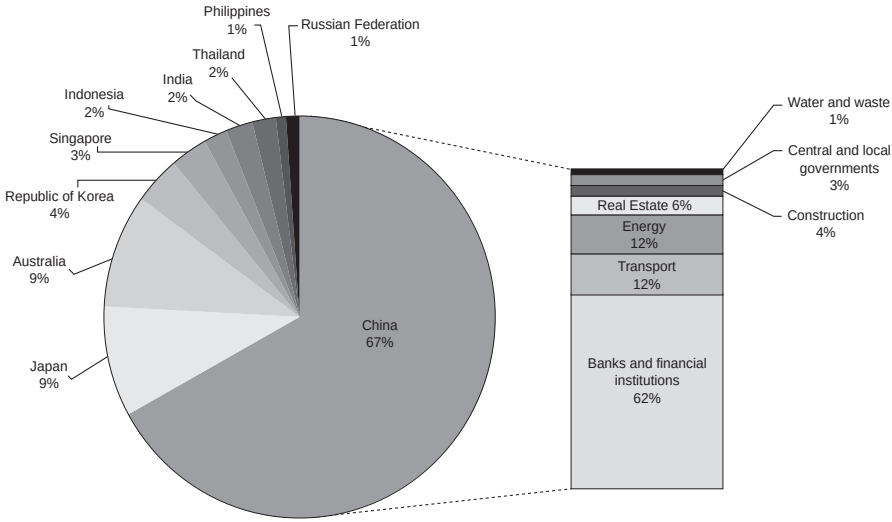
The issuances of non-financial companies have been recently increasing (41 per cent in 2018 versus 30 per cent in 2016). The energy sector's issuances have developed at a robust pace, driven by the upsurge of solar, hydro and nuclear power infrastructure projects. Interestingly enough, transport companies in Asia and the Pacific have started to issue green bonds, and attracting the attention of foreign investors, although the market is still nascent. In addition to this, the participation of construction and water and waste issuers in the market has been increasing steadily. The construction sector accounts for up to 3 per cent of the total issuances. In recent years, a dramatic upswing in real estate sector issuances in Asia and the Pacific has also been observed, entailing the construction of eco-friendly buildings, which include green and smart houses. This recent shift foreshadows the burgeoning of 'smart cities', which is inherently dependent on close collaboration between private sector and public entities, aimed at making conurbations more liveable, workable and sustainable.

Although not involved in the green bond market as early as Japan and Australia, China has recently been leading the Asia-Pacific region's shift toward financing infrastructure through green bonds (see figure 2.17). The

rise of Chinese green bond issuers has created an opportunity for investment both domestically and in neighbouring countries, as the market is still at a nascent stage in the rest of the region. China has encouraged the usage of green finance instruments with public incentives and has developed a green bond market framework broadly compatible with international practices. The government subsidizes up to 12 per cent of the interest rate and allows companies to use these green bonds as collateral (Morris, 2019). China also became the first country to issue official rules on issuing green bonds in the region (Clifford Chance, 2018). The People's Bank of China and National Development and Reform Commission have also published tangible definitions and green bond guidelines, along with a list of green projects that would be eligible for a green label domestically. Moreover, the China Securities Regulatory Commission is working with industry to verify that green bond issuers fulfil their environmental pledges (HKEX, 2018).

Figure 2.17

Origin country of green bond issuers in Asia and the Pacific, 2018-2019
(Percentage of total volume)



Source: ESCAP based on CBI (2019).

While green bond issuance is becoming more common across Asia and the Pacific, developing a shared definition and taxonomy for green bonds is critical to enhance investors' confidence in the credibility, consistency and integrity of the green bond markets. In this sense, the recent launch of the ASEAN-GBS could be a good example to enhance transparency, and act towards the success of green bond standardization in the region. The ASEAN standards focus mainly on the "use of proceeds, the process for the project evaluation and selection, the management of proceeds, and reporting" (ASEAN, 2018, p. 4). This shared taxonomy for green bonds aims to align the documentation, disclosure and arbitration of green bonds through greater collaboration amongst all major market participants, such as regulators, institutional investors (including impact investors), the private sector, international bodies and local think-tanks, philanthropists, non-governmental organisations (NGOs) and foundations, academia and civil society. Such a regional platform would aim at both catalysing and supporting the rapid scale-up of green bonds, by engaging with key institutional players and harnessing the market intelligence of private sector stakeholders. Such regional cooperation could adopt a wider strategic approach that might also include the development of a credit rating system to broaden the investor base and attract foreign investors in particular. The strategy could also include a capacity building component, as government agencies will need training if they are to secure opportunities to develop their own green bond markets.

Chapter 3

Enhancing Private Infrastructure Financing through Externality Effects[37]

1. Introduction

While infrastructure provides necessary public services and is vital for the socio-economic development of a nation, public funds alone are usually insufficient to finance all infrastructure needs. This funding shortfall in developing countries can be considerable, and so private financing has typically been encouraged by governments and multilateral development banks (MDBs) to support infrastructure development (ESCAP, 2019). In Asia and the Pacific, roughly two thirds of infrastructure investments are currently funded by national and sub-national governments, MDBs and bilateral donors, and just one third is funded by the private sector (ADB, 2017). Indeed, the share of private investment in infrastructure in the region has been in decline in recent years, from an annual average of $ 64 billion per year between 2008 and 2012, to $ 50 billion between 2013 and 2017, hitting a low of $ 20.4 billion in 2016; the lowest level since 2005 (ESCAP, 2019). This decline in private investment in infrastructure can be attributed in large part to inadequate institutional frameworks and implementation capacity in the region (Nishizawa, 2018).

Given this trend, there is a need to enhance the private sector's involvement in infrastructure projects, including through public-private partnerships (PPPs), and overcome the hurdles that many infrastructure projects face in attracting private financing. Electricity and water supply are two areas of infrastructure where attracting non-state finance can be particularly challenging, most notably in countries where the tariffs for these public goods are deliberately kept low by governments, for understandable social reasons. However, this then adversely impacts on the (risk-adjusted) rate of

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[37] This chapter was prepared by Naoyuki Yoshino, Dean, Asian Development Bank Institute (ADBI) and Masato Abe, Economic Affairs Officer, Macroeconomic Policy and Financing for Development Division, ESCAP. The authors appreciate the useful comments provided by Hongjoo Hahm, Hamza Ali Malik, Tientip Subhanij, Alberto Isgut, George Abonyi and Zheng Jian who enhanced the quality of the chapter. The authors are also grateful for a number of substantive comments made by participants in the Expert Group Meeting on Infrastructure Financing for Sustainable Development in Asia and the Pacific, which was held at the United Nations Conference Centre in Bangkok, Thailand, on 7 and 8 March 2019. Sharon Amir edited an early version of the manuscript and Nick Freeman conducted the technical editing of the final manuscript. Charlotte Nudelmann, Romain Pradier and Yifan Zhang provided useful research assistance.

return for private sector investors, and thereby makes an infrastructure project a less appealing business prospect, relative to other business opportunities also seeking funding. The reason why this is a source of concern is not that the public purse should be used to help construction companies, financiers and other private sector actors involved in infrastructure projects, but that there is a need to tap those private sector resources, and especially private sector funds, to help underwrite the infrastructure needs of most countries in Asia and the Pacific. Public spending alone will not be sufficient to meet the infrastructure needs of their citizens, so the key challenge – and one of the principle theses of this book – is how to incentivise greater private sector participation in infrastructure financing, construction and operations, by mitigating the risks and increasing the rates of return in such a way that projects proceed without an undue strain being placed on the finite budgetary resources of the state.

As depicted in the first chapter of this book, there are significant inhibiting factors that constrain the private sector in being more actively and significantly involved in financing and co-financing infrastructure development projects in Asia and the Pacific, and indeed globally. Just as these inhibitors are multiple, so too is the range of potential solutions. This chapter focuses on identifying and leveraging the externality effects of infrastructure development as a potential new source of financing, in addition to conventional public funds and user charges. An externality effect is defined as being additional value creation from newly constructed infrastructure projects, over and above the immediate benefits of the projects themselves. It is argued here that externality effects – such as increased tax revenues and land values, through to new commercial and residential activities – can be captured to increase the feasibility of private financing for long-term infrastructure investments.

This chapter proposes that governments explore ways to use projected externality tax revenues, created by newly developed infrastructure, to help underwrite some of the costs incurred. These increased externality tax revenues can then be shared with private investors and operators in infrastructure development. Since positive externality effects could create incremental tax revenues to the area where infrastructure is being developed, infrastructure investors and operators may receive a proportion of tax revenues, in addition to user charges. This allows financiers, constructors and operators of infrastructure projects to receive a higher rate of return on the project, and quicker cost recovery, as long as the infrastructure project succeeds in creating positive externality effects. In the United States, property tax revenues are sometimes used to increase the rate of return for infrastructure investors using 'infrastructure dedicated funds' (Chapman, 2017). However, this proposal does not propose only

capturing property tax revenues, but also considers accessing other tax revenues streams, such as corporate taxes, income tax and sales tax, all of which may increase as a result of the externality effects of newly developed infrastructure. This is congruent with the fact that developing countries in Asia and the Pacific have often been encouraged to provide suitable subsidies to enhance private investors' cash flows in infrastructure development (Sundaram and Chowdhury, 2019a).

This chapter also discusses several related issues, such as voluntary efforts by private investors, financing start-ups and smaller business, and tax collection and evasion. The chapter concludes with some specific policy recommendations. Annex 3.1 also provides an overview of private sector financing for infrastructure and its major modalities and players.

2. Externality effects created by infrastructure investment

One policy option to enhance private sector financing and participation in infrastructure development is to capture and leverage the positive externality effects of newly developed infrastructure. For example, increased tax revenues from newly established businesses and residential areas, as well as employment generated around newly constructed roads and railways, could be partially harnessed to provide incentives (e.g. subsidies, grants or service fees) that would encourage greater private sector financing. Externality effects, also sometimes referred to as spill-over effects, network effects and/or indirect effects, are defined as positive socio-economic benefits that accrue outside the specific target area of the infrastructure activity and its direct service provision, derived by establishing a network of physical assets, functions and stakeholders (Cantos, Gumbau-Albert and Maudos, 2005; Hulten, Bennathan and Srinivasan, 2006; Hurlin, 2006; Nakahigashi and Yoshino, 2016). Externality effects are observed in the environment that surrounds the infrastructure project, and gradually spreads through networks of people, entities, and services to a wider geographical area[38]. Externality effects can also be seen as an extension of 'value capture', derived from the public sector through taxation (e.g. property tax) and the sale of assets (such as land), transport and parking levies, betterment levies[39], and sales of surplus publicly held

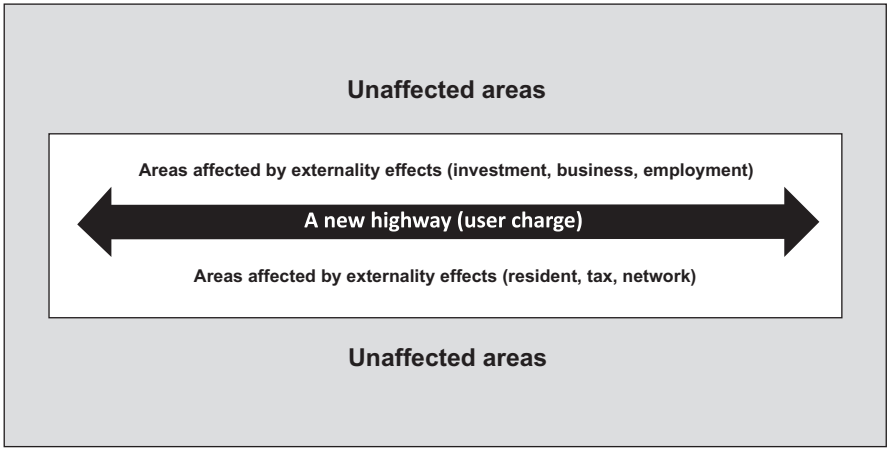
[38] It should be noted that empirical support for the existence of significant externality effects shows mixed results (cf. Cantos, Gumbau-Albert and Maudos, 2005; Holtz-Eakin and Schwartz, 1995).

[39] "A betterment levy captures part of the land-value gain attributable to infrastructure investment by imposing a one-time tax or charge on the land-value gain" (Peterson, 2009, p. 6).

land, or rights of development and use (Chapman, 2017; McIntosh and others, 2017). This is not to suggest that there is always an automatic externality effect emanating from all infrastructure projects, as much depends on the utility of the project itself to drive the positive impact desired. Conversely, a badly designed and/or undesirable infrastructure project will likely have little or no net externality effect.

Figure 3.1 provides a simple visual model of the externality effects of infrastructure investment. Suppose that the middle line is a new highway to be constructed. Then, in the area along the highway 'corridor', new companies may emerge, initiating manufacturing or other commercial activities. Houses and apartments may also be constructed along the new highway, as well as new restaurants, retailers and other services (including public services, such as schools and health centres). As a consequence, the periphery and adjacent areas surrounding the infrastructure enjoy externality effects created by the new highway. This geo-economic development should then increase revenues for the government in this locale, through land and property tax, income taxes and corporate tax, as well as sales tax and others. Typically, these additional tax revenues generated by the newly developed infrastructure project solely go to the local and/or central government, and do not benefit the infrastructure project's investors and operators. These latter players must typically rely only on up-front public grants and subsidies for infrastructure construction, and user charges for their returns on investment. A detailed macro estimation of externality effects is presented in annex 3.2.

Figure 3.1
Externality effect of a highway



Source: ESCAP.

Table 3.1 presents estimates of the direct effect of nation-wide infrastructure investment in Japan on tax revenues, and its externality effects as indirect effects, using macro-economic data, based on a translog production function[40]. The first row of table 3.1 presents the direct effect of infrastructure investment. The externality effects from private capital and labour are shown in the second and third rows. In the 1966-1970 period, for example, the direct effect of infrastructure investment was increased output of 0.638 (see the first row)[41]. But the externality effect of increased output, induced by an increase of private capital, is 0.493 (see the second row), and the externality effect of increased output by increasing employment is 0.814 (see the third row)[42].

Table 3.1

Economic effect of infrastructure investment: the case of Japan

	1956-1960	1961-1965	1966-1970	1971-1975	1976-1980	1981-1985	1986-1990	1991-1995	1996-2000	2001-2005	2006-2010
Direct effect	0.696	0.737	0.638	0.508	0.359	0.275	0.215	0.135	0.135	0.114	0.108
Indirect effect (private capital)	0.452	0.557	0.493	0.389	0.207	0.203	0.174	0.146	0.110	0.091	0.085
Indirect effect (employment)	1.071	0.973	0.814	0.639	0.448	0.350	0.247	0.208	0.154	0.132	0.125
Additional tax revenues	0.305	0.306	0.261	0.206	0.144	0.111	0.084	0.071	0.053	0.045	0.042
Increased rate of return	0.438	0.415	0.410	0.404	0.400	0.402	0.392	0.392	0.390	0.390	0.391

Source: ESCAP based on Yoshino, Nakahigashi and Pontines (2017).

Note: The rate of return increases when half of the incremental tax revenues are used for supporting private infrastructure investors or operators.

Consequently, these increases in output translate into increased tax revenues (whose corporate income tax rate is average around 20 per cent in Japan). The amount of additional tax revenues is shown in the fourth row of table 3.1. If half the anticipated incremental tax revenues had been returned to help co-finance the infrastructure investment, such as through public subsidies to private investors, it is illuminating to see how much their rate of return would have increased. Since the economic impact of infrastructure decreases over time, tax revenues created by infrastructure development also gradually diminish, as shown in the fourth row. The fifth and last row of table 3.1 suggests that this would have increased the rate of

40 The detailed method of estimation can be found in Nakahigashi and Yoshino (2016).

41 This number is calculated using a translog production function (see annex 3.2 for the detailed model). The higher the number is, the larger the impact of infrastructure investment on tax revenues.

42 Ibid.

return by about 43.8 per cent, for the period 1956 to 1960, and in 2006-2010 half of the incremental tax return would have increased the rate of return by 39.1 per cent. If harnessed correctly, these significant increases in the rates of return could have attracted greater private sector investment into infrastructure. However, in practice, all these incremental tax revenue gains were absorbed by the government and not used to finance infrastructure development. Thus far, private investors and operators in infrastructure have had to rely on user changes and other direct revenues in their bid to attain an adequate rate of return.

The positive impact of externality effects, in the form of increases in tax revenues, has been explored in a number of studies. Using micro-economic estimations, Yoshino and Abidhadjaev (2017a) estimated the impact of railways on externality effects in Uzbekistan, while Yoshino and Pontines (2015) investigated the impact of highways in Manila, the Philippines. Yoshino and Abidhadjaev (2017b) also estimated the impact of the Kyushu high-speed railway in Japan. All these studies found that the externality effects of infrastructure investment can raise tax revenues, and that the right kinds of infrastructure development do indeed create significant externality effects in the region.

First, Yoshino and Abidhadjaev (2015) estimated the impact of Uzbekistan's Tashguzar-Baysun-Kumkurgan railway on regional economic output, as measured by: i) the regional domestic product growth rate; ii) the agricultural output growth rate; iii) the industrial output growth rate; and iv) the services valued added growth rate (table 3.2). The data suggests that if 20 per cent of additional tax revenues generated by the railway connection were earmarked to support private sector investors in developing new infrastructure projects, the average rate of return would have increased by 5.2 per cent in (2009-2010). And if 50 per cent of additional tax revenues were similarly earmarked, the rate of return would have increased by a not insignificant 13.0 per cent (2009-2010). And if all the additional tax revenues generated by the rail project were allocated to support private sector investors, the rate of return would have increased by 26.1 per cent (2009-2010). This kind of empirical modelling suggests that a government's infrastructure investment policies should factor in allocating some proportion of additional tax revenues emanating from the anticipated externality effects of projects, to private sector investors, as a means to bolster the forecasted rate of return, and thereby make the project more attractive as a commercial business proposition. Such an arrangement is preferable to a government subsidy that does little to align the design and construction of the project with the economic impacts of its usage. Not only does that externality effect entice greater private sector participation in infrastructure projects, driven by the increased rate of return, but participating firms are motivated to ensure that the project is designed,

constructed and operated in a way that is most economically beneficial to the surrounding local, from which they will directly benefit. The interests of the private sector investor and the government become better aligned in seeking the optimal, long-term impact from a project. Conversely, in the case of a subsidy offered by a government to help get an infrastructure project off the ground, the relationship with the private sector investor and developer is much more short-term and contractual, with the firm's interest in the project probably limited to just getting it done, regardless of its economic utility. The sense of engagement and shared interests is not present, and the kinds of knowledge and insights that the private sector firms have are less likely to be shared[43].

Table 3.2

Increase of GDP by Uzbekistan railways using externality tax revenues to support private sector investors

Period	Using 20 per cent of externality tax revenues	Using 50 per cent of externality tax revenues	Using 100 per cent of externality tax revenues
2009-2010	105.2	113.0	126.1
2009-2011	104.0	110.1	120.2
2009-2012	103.0	107.5	115.1

Source: ESCAP based on Yoshino and Abidhadjaev (2017a).

Table 3.3 shows the case of the Star Highway in Manila (Yoshino and Pontines, 2015). The periods t_{-1} and t_0 indicate periods under construction. At the end of t_0, the highway was completed and started its operation. In the last row, for Batangas City, t_{-2} was a period when construction was not going on, and t_{-1} and t_0 were periods under construction. Tax revenues in Batangas City increased from 490 million Philippine peso (PHP) to PHP 622 million and PHP 652 million in the period from t_{-2} to t_0. During the highway construction, construction workers and related workers came to the area, which increased the GDP of the area. At the end of t_0, the Star Highway was completed, and at t_{+2}, tax revenues diminished compared to the construction period. But after the fourth year, tax revenues increased drastically. At t_{+4}, tax revenues reached PHP 1 208 million; more than twice as much as before construction began. These developments are externality-driven tax increases coming from infrastructure investment in the Star Highway. If the highway had not been constructed, the tax revenues would likely have remained at PHP 490 million (t_{-2}) in Batangas City, excluding

[43] Table 3.2 also presents that the rate of return declines over time. However, this might be due to the short period of data observation after launching the railway in August 2007.

other economic factors. Because of the highway construction and increased economic activities along the highway that followed, Lipa City gained tax revenues of PHP 371 million at the t_{+4} period. If just part of these additional tax revenues from the period t_{-2} to the period t_{+4} (i.e. PHP 134 million to PHP 372 million) in Lipa City were allocated to support private sector investors, they would be more incentivised to invest their funds in infrastructure construction work. The same kind of commercial stipulation could be applied to the construction of other infrastructure projects, such as water and electricity supplies and rail links.

Table 3.3

Changes in tax revenues in three cities along the Star Highway in Manila
(PHP millions)

City	t_{-2}	t_{-1}	t_0	t_{+1}	t_{+2}	t_{+3}	$t_{+4\ forward}$
Lipa City	**134.36**	173.50	249.70	184.47	191.81	257.35	**371.93**
Ibaan City	5.84	7.04	7.97	6.80	5.46	10.05	12.94
Batangas City	490.90	622.65	652.83	637.89	599.49	742.28	1 208.61

Sources: Yoshino and Pontines (2015; 2018).

Within this context, part of the incremental tax revenues could be used to finance project pre-investment (pre-feasibility/project preparation) studies. The private sector is often (and understandably) reluctant to undertake such pre-investment, as it can be costly for major projects, yet it is not yet clear if the project will be viable, and many infrastructure projects are often found to be not financially appropriate for private sector participation. Such pre-investment studies therefore entail a sunk cost, with no guarantee that any business activity will subsequently be forthcoming, and managers of firms have a fiduciary responsibility to their shareholders not to expend costs if the genuine prospects of a return are unclear. Alternatively, part of these incremental tax revenues could be set aside as 'contingency funds' to finance potential demand shortfalls. For example, given the inherent uncertainty and inaccuracy of demand projections on transport projects (e.g. toll roads and mass rapid transit systems), funds can be earmarked for a "minimum ridership guarantee" for such projects. These are funds that may or may not be spent, depending on actual demand, but such guarantees can help trigger an infrastructure project to go ahead that otherwise might have been seen as too risky by private sector investors to bear that risk alone[44].

[44] It should be noted, however, that such funds need to be reflected in the public budgeting process, as they are contingent liabilities.

Yoshino and Abidhadjaev (2017b) confirm the positive impact of a Japanese high-speed rail line on tax revenues in an affected area, and their study supports the notion that the economic impact of an infrastructure investment can induce positive changes in tax revenues after the infrastructure project is in operation. The Kyushu high-speed rail line began construction in 1991, the rail line started operating in 2004, and the entire line was completed in 2011. The study compared the tax revenues of the affected areas along the high-speed rail line with other regions that were not affected by the rail line. The results found a statistically significant and economically growing impact of the high-speed rail line on tax revenues in the affected areas. These findings again strongly suggest that additional tax revenues, created by the externality effects of an infrastructure project, could be used to encourage increased private sector financing in such projects, by using some of that additional tax derived to improve the rate of return on infrastructure projects.

3. Capturing tax revenues to increase the rate of return for private financing

Externality tax effects provide an opportunity for private sector infrastructure investors and operators to earn additional revenues, by allowing players to enhance the rate of return from their investment, and thereby make their infrastructure operations sustainable for the long-term. This is done by addressing a classic externality problem, in which none of the indirect benefits of an activity – in this case, an infrastructure project – accrue to the party that helped create them – private sector infrastructure investors and operators (Dahlman, 1979). Subsidies and other project-specific inducements may, or may not, prompt private sector financiers and constructors to proceed to undertake a project, largely by mitigating some of the risk entailed and/or raising the anticipated rate of return, but it is not a sustainable solution in the long-run, and comes at a direct cost to the public purse. But allowing the same private sector financiers and constructors to share in some of the benefits, the externality effects, of a proposed project is a means by which their involvement can be more fundamentally and sustainably ensured, both as a viable commercial proposition (not one that is artificially sweetened by a subsidy), and one that sees their own interests aligned in ensuring the best possible outcomes from the projects subsequent operations. In least developed and developing countries, in particular, public funds available for subsidies tend to be meagre and hard to secure, if at all, but earmarking a portion of future additional tax revenues (i.e. tax revenues that would otherwise not be forthcoming) is a more viable proposition for policymakers and government budget planners.

The key to harnessing externality effects is to find a means of measuring and internalizing the spill-over from capturing incremental tax revenues that then further support private financing for infrastructure projects. Externality tax revenues can be considered in infrastructure development projects, especially those with a low rate of return, to boost other additional revenues, such as subsidies to operators. If the expected rate of return is increased, private sector investors will be more willing to invest in the construction and other upfront costs of infrastructure. This scheme could prevent shortages of indispensable public services, such as fresh-water and electricity supplies, which are often sold to customers at discounted rates for various socio-economic reasons, thereby making private sector participation extremely difficult, because the rate of return from direct revenues is insufficient to be viable. But a water supply project, which can capture not only user charges but also part of the externality tax revenues derived, could earn sufficient revenues to make its construction and operation a viable commercial prospect. In the developing countries of Asia and the Pacific, governments often regulate infrastructure operators to charge users of public utility services fees and tariffs that are less than the total (and sometimes considerable) costs of constructing, operating and maintaining infrastructure, such as expressways and water supplies (Regan, 2017)[45]. Although governments may be able to provide subsidies to help offset the low rate of return on the private sector's investment in such projects, for instance under the terms of a PPP structure[46], the availability of government funds for such subsidies is typically limited. And it is precisely this dichotomy that often constrains greater private sector participation in infrastructure investment and the provision of public goods and services. It is impossible for policy-makers to 'square the circle'.

Figure 3.2 illustrates the relationships of user charges, increased tax revenues generated by infrastructure investment, and the rate of return on the investment, on a hypothetical infrastructure project. The flat horizontal line at the bottom represents the inflows of user charges, and the dotted line indicates increased tax revenue made by externality effects. The uppermost line denotes the total rate of return on the infrastructure investment, as the summation of user charges *and* incremental tax revenues. An increase in regional GDP stemming from the project will increase tax revenues, as shown by the dotted line. Supposing that some or all of these incremental tax revenues are used for public subsidies to the infrastructure investors or operators, part of the dotted line becomes the investors' total revenues on

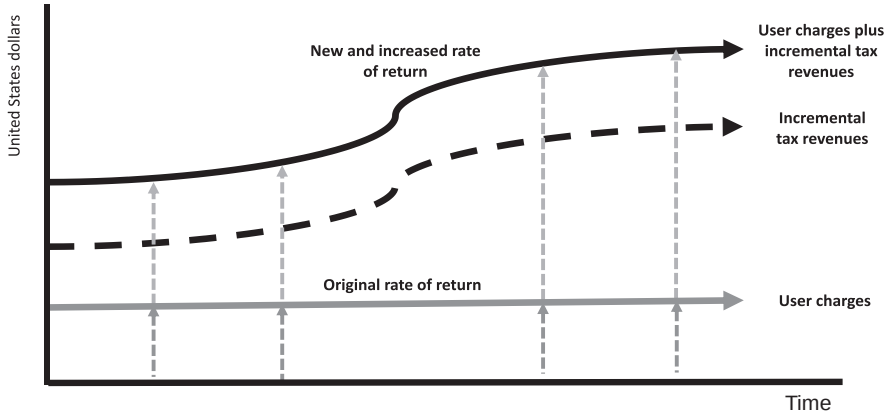
[45] Governments' options to implement incentive regulations, such as price-caps and revenue-caps, may not be feasible in many developing countries in the region, principally due to weak institutional capacities in both the public and private sectors (Harris, 2003).

[46] For example, public subsidies to operators can increase dividends to investors indirectly.

the project[47]. The rate of return rises from the user charges (the flat horizontal line) to somewhere near to the dotted line. If these externality tax revenues, which are created by the new infrastructure project, were fully linked with public subsidies to the infrastructure investors, then the actual rate of return on investment rises significantly to the upper-most line. This can then encourage private investors to participate more in infrastructure investment.

Figure 3.2

User charges, externality tax revenues and the projected rate of return



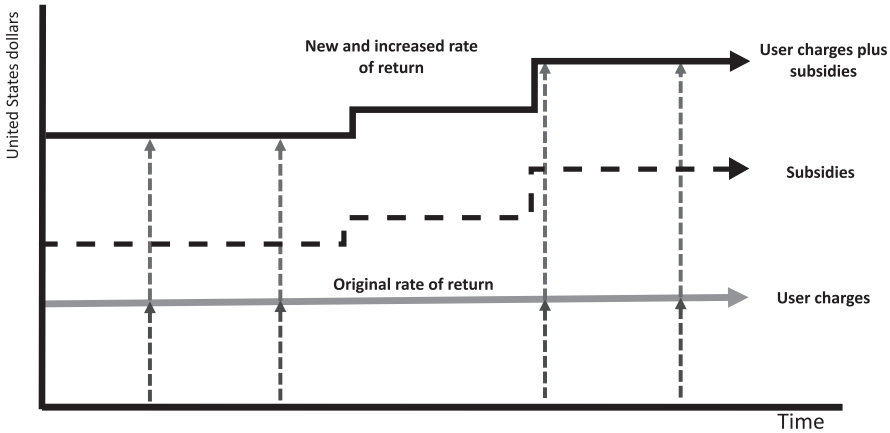
Source: ESCAP.

Supposing that a portion of these incremental tax revenues in the target area of the infrastructure is used for long-term public subsidies to infrastructure investors and operators, part of the dotted line becomes the investors' total revenues from the project. If these externality tax revenues, which are created by the new infrastructure, were 'partly' linked with public subsidies provided to the infrastructure investors, then the actual rate of return on investment rises significantly. In figure 3.3, the rate of return rises from the horizontal flat line (user charges) to the upper-most line (user charges plus subsidies). This can encourage private sector financiers and investors to participate more in the infrastructure project. In addition, the incremental tax revenues may link with the fixed amounts of public subsidies, instead of letting them fluctuate (see the dotted line).

[47] Alternatively, public authorities could provide service fees to infrastructure operators, linked with incremental tax revenues, in accordance with the contract.

Figure 3.3

Linking externality tax revenues with public subsidies to increase the rate of return



Source: ESCAP.

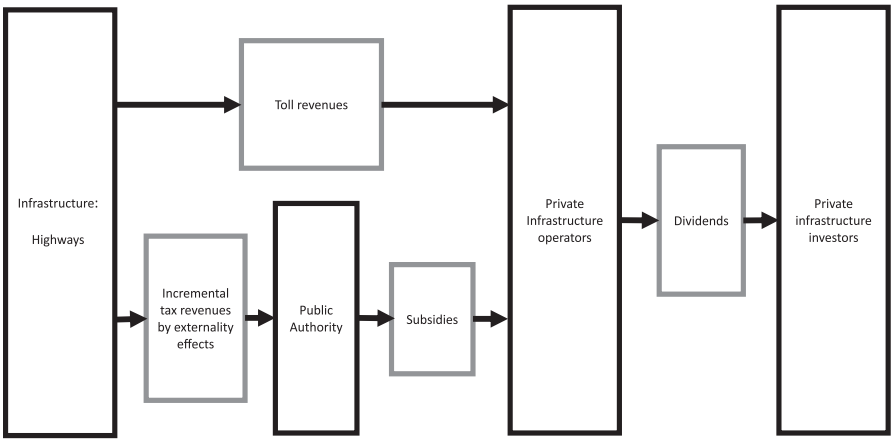
Figure 3.4 proposes a model for the partial injection of externality-derived tax revenues to private infrastructure investors and operators through public subsidies[48]. At the top of the figure, private infrastructure operators receive user charges, in this case, highway tolls. At the bottom are increased tax revenues generated by the externality effects of the infrastructure. Then, part of the externality effects is injected, through subsidies by the government, to private sector infrastructure operators. The operators also pay dividends to private sector investors, if the infrastructure project makes a profit, according to the operator's corporate governance system. In this case, the model envisages the government fully passing on the externality tax revenues, but it may only need to inject a proportion of the increased tax revenues to private operators[49].

When part of this net increase in tax revenue is associated with public subsidies to infrastructure operators, the prospects for the infrastructure project itself, and the sustainable development of the target area, are enhanced. Once the infrastructure firm diversifies its revenue streams with

48 Viability gap funding (VGF) can be used for this purpose. See box 3.1 for details.

49 Another benefit of externality tax revenues is related to funds that are borrowed from overseas. Supposing that the ADB, World Bank or another MDB makes loans to a developing country to help underwrite the costs of infrastructure construction, general tax-payer money is traditionally used to service repay those loans, when they become due. But ear-marking and utilizing externality-driven tax revenues, generated in the affected areas, could make it easier to repay those borrowed foreign funds.

Figure 3.4
Injection of fraction of externality tax revenues as subsidies



Source: ESCAP.

the subsidy emanating from part of the incremental tax gains, infrastructure operators may even opt to lower user charges, and thereby benefit the surrounding society even more. These can also positively affect the local economy and raise the marginal productivity of the capital, resulting in increased tax revenues, even when holding tax rates constant.

However, it is imperative that policy-makers design and implement a robust mechanism to effectively link the incremental tax revenues to the subsidies. If such a mechanism is not implemented in a fair and transparent manner, governments can come under legitimate suspicion and criticism from taxpayers. In particular, the rate of injection of the incremental tax revenues gained must be carefully determined, using a transparent process agreed by all stakeholders. While the government's fiscal spending is strictly regulated, taxpayers may see such tax-linked subsidies to specific infrastructure operators as an irregular deviation from established procedures and regulations. To minimize abuses and to protect the public interest, governments should ensure full transparency and accountability of the subsidy schemes. Public interest agencies, civil society organizations and the media can also help closely monitor such 'de-risking' schemes, and help to make wider society better aware of their costs, and risks (Sundaram and Chowdhury, 2019b). It is similarly important to ensure that the necessary agreements and contracts between the public and private sector are clear and transparent. In some least developed and developing countries in the region, contracts between the government and private sector entities – or between the government and state-owned enterprises –

are sometimes less than clear, and the cost of infrastructure development may be greater than widely believed (World Bank, 2019). If MDBs, such as the Asian Development Bank (ADB) and World Bank, which have institutional reputations to protect, jointly participate in infrastructure projects with the government and the private sector, they too will closely monitor the contractual arrangements, and seek to ensure that the costs of infrastructure investment are kept at acceptable norms.

Box 3.1

Viability gap funding

Infrastructure projects may not all be fully financially viable on their own. Viability gap funding (VGF) is a mechanism that provides government's financial support to subsidize the various costs of infrastructure projects, even partially, when infrastructure projects cannot be fully funded by user fees (Hyun, Nishizawa and Yoshino, 2008; Regan, 2018). VGF can be set up as a special facility of the government to provide such financial support to unviable infrastructure projects (World Bank, 2006). VGF allows to budget future government expenses to fund infrastructure projects, and reduce uncertainty for private investors, as the funds will be committed through the VGF mechanism (Regan, 2018). The VGF modality also allows for a foreseeable fiscal planning and avoids the problem of contingent liabilities that would occur in the case of revenue guarantees. Contingent liabilities that are not recorded in government accounts, which can create problems of fiscal sustainability. Instead, having a dedicated public fund for infrastructure, like VGF, assures the recording of future expenses on 'the books' of the government, thereby making the process more transparent.

4. Other issues relating to externality effects in infrastructure financing

In order to enhance efficiency and increase the rate of return on private investment in infrastructure, using externality effects and/or incremental tax revenues, it is necessary to have the appropriate governance frameworks. Such frameworks typically contain such elements as: i) voluntary efforts by private infrastructure investors and operators; ii) financing smaller and start-up businesses; and iii) proper tax collection to prevent tax evasion. Let us briefly look at each of these in turn.

Voluntary efforts needed for enhancing externality effects

It is important that the public sector provides a conducive regulatory and policy environment that allows private sector infrastructure operators and investors to have sufficient trust, and be able to fully capture the benefits of externality effects, so as maximize the rate of return on their infrastructure investment. However, both private investors and operators need to also be

pro-active in their efforts to increase income and reduce the costs of infrastructure projects, including those relating to establishing new businesses associated with the infrastructure project being developed. Without such efforts by the private sector, even when conducted under an enabling business environment and public investment promotion strategy, the impact of externality efforts is unlikely to meet expectations, and the government's assistance will not be sufficient to enhance the anticipated rate of return. Put another way, the 'additionality' of using the externality effect approach is only going to trigger additional private sector investment in infrastructure if it is not used, or even abused, in a wasteful manner by contractors. In a variation of the moral hazard issue in banking, it is important that private sector actors do not come to think that any subsidies derived from externality-driven tax revenues are a licence to act recklessly or with less regard for costs.

Table 3.4 shows a hypothetical pay-off matrix on the presence, or absence, of efforts made by an infrastructure operator and investor. If neither the operator nor the investor makes any effort, the operator gains 50 units in revenue and the investor receives dividend income r. It is assumed that the operator could increase operating income to 100 units by improving the salary system, such as paying staff bonuses based on the entity's revenues. Furthermore, the investor could raise its dividend income to ar (a>1) with efforts to reduce costs and increase revenues, such as increasing the number of highway turnoffs or the number of users. The lower right cell of the pay-off table represents the revenues when both the operator and the investor make maximum efforts to increase revenues and improve service. In this case, the total income of both the operator and the investor is higher than in the normal case. The income of the operator increases from 50 to 100 units, and the dividend of the investor from r to ar. This illustrates the importance of designing robust corporate governance mechanisms, such as the salary system of the operator to incentivize its staff, and the dividend policy for the investor, to improve revenues (Nakahigashi and Yoshino, 2016). This theory suggests that the voluntary efforts of the operator and investor can significantly enhance the externality effects of the infrastructure project yet further.

To reiterate, it is necessary to improve the efficiency of infrastructure projects using private sector financing, and to introduce proper corporate governance mechanisms, for example, to incentivise the staff of infrastructure operators (e.g. paying staff bonuses tied to increases in profit through externality effects). Dividend payments for private sector investors will also vary based on a project's revenues, including user fees and public subsidies, as well as incurred costs (e.g. of construction and operation), which could be linked to externality effects.

Table 3.4

A pay-off matrix for a private infrastructure operator and a private infrastructure investor

Investor / operator	Normal case		Effort case	
Normal case	50	r	50	αr
	Operator	Investor	Operator	Investor
Effort case	100	r	100	αr
	Operator	Investor	Operator	Investor

Source: ESCAP based on Nakahigashi and Yoshino (2016).

Financing smaller businesses to enhance externality effects

In addition to direct incentives to private infrastructure operators and investors, such as price-cap regulations and revenue-cap regulations, one indirect incentive scheme for infrastructure development is support in co-financing business start-ups and small or medium-sized enterprises (SMEs) that operate around the infrastructure (Abe, Troilo and Batsaikhan, 2015). If infrastructure, such as railways and roads are developed in a new area, entrepreneurs and SME owners will be more interested in starting new businesses, such as hotels, restaurants and retail shops. However, these entrepreneurs and the SME owners often find it difficult to raise capital, and banks often deny loans to start-ups and smaller businesses without any credit history or adequate physical assets to pledge as collateral (Abe and others, 2012). In this case, providing partial debt (or even grant) financing for start-ups and SMEs, for example, through geographically concentrated or sector-dedicated public infrastructure funds, or sub-national development funds and highway trust funds (Inderst and Croce, 2013), could be part of the answer[50]. This would help enhance externality effects, such as increased tax revenues around the area where more businesses are being developed, and may then in turn increase cash flows for the infrastructure operators and the rate of return for investors, if such positive externality effects are properly captured. At the same time, financing for smaller businesses, and the job creation that occurs, will mitigate income inequality and create business opportunities for entrepreneurs and start-ups. A virtuous economic cycle is attained in the locale around the infrastructure project, with improved tax revenues as the 'return', which is then distributed in ways that catalyse and cultivate greater economic activity, and have a greater social impact than would be the case if the tax gains were simply pumped directly in the treasury of the national government.

[50] Those funds can be financed with various sources, such as general funds, user charges, land and property tax, taxes on fuels and tires and so on.

Hometown crowdfunding can also lend capital to start-ups and smaller businesses in the target area of new infrastructure. This financing scheme for developing local businesses began in Japan about 20 years ago and then expanded to Cambodia, Peru, and Viet Nam (Yoshino and Kaji, 2013). Hometown crowd funds collect individuals' smaller contributions in a certain geographical area where new infrastructure is being developed. For example, when new water supply begins, people in the target area contribute a relatively modest amount of money, say $ 50–100 per person, across 200–300 people, to local business entrepreneurs. Hometown crowdfunding can finance not only water supply, but also provide funding to develop new businesses within the water-supplied area, which then creates larger externality effects.

Proper tax collection to prevent tax evasion

This chapter has argued that the use of externality tax revenues can encourage greater private sector financing in infrastructure. But this argument can only be supported if the relevant government collects taxes fairly and effectively, which can be a difficult task, particularly in some least developed and developing countries (Slemrod and Yitzhaki, 2000). For example, tax authorities often face challenges in tracing revenues and profits generated in the informal sector, as SMEs may seek to avoid paying tax, and even large businesses sometimes find ways to hide their true revenues (Abe and others, 2012; OECD, 2015a). In developing countries, there are many challenges related to tax administration, including tax fraud and poor compliance, as well as unregistered business. Modern taxation has gradually shifted away from an emphasis on excise, customs and property taxes, through corporate income and progressive individual income taxes, and towards broad-based consumption taxes, such as value-added tax (VAT) (Slemrod and Yitzhaki, 2000). Autonomous revenue authorities (ARA), which are semi-private agencies, have taken on an increasing number of tasks relating to tax administration, independent of the traditional tax authorities like the finance ministry (Ahlerup, Baskaran and Bigsten, 2015). These developments have been supported by the changing technological landscape of tax administration, including the on-going fintech revolution that can help keep administrative and compliance costs low.

In the developing countries of Asia and the Pacific, however, most governments still face difficulties in implementing and enforcing their tax policies, and thereby maintaining adequate tax revenues (ESCAP, 2018). Trends in globalization, the fintech evolution, intensifying state-level tax competition, and growing mobile assets have cumulatively served to create new opportunities for increased tax avoidance, and potentially constrained effective taxation of corporate and personal incomes (OECD, 2017; Swank,

2016). Critical issues include poor governance and a lack of technology to implement tax policies with reasonable administrative and auditing costs. In this context, capturing incremental tax revenues through new infrastructure projects becomes more challenging for governments, as quantifying the true impact of infrastructure development on tax revenues is made more complex. Moreover, governments are confronted with the challenging task of deciding how to fairly assign additional tax revenues in cases when two or more infrastructure projects are implemented simultaneously, in the same area. Since economic growth and the associated increase of tax revenues are influenced by many factors, such as natural and human resources, the business environment, market access and openness, trade and investment and technology, it can be difficult for government agencies to demarcate the source of additional tax revenues properly and fairly. Indeed, exogenous factors can cause overall economic growth and tax revenues to decline, despite the positive impact derived by one or more infrastructure projects.

One option to help collect taxes more efficiently and effectively is to apply new technologies, such as satellite imagery data collection. Satellites can provide various socio-economic data that then serve as reliable proxy indicators on critical tax collection issues. For example: measuring how many people are visiting shopping malls or restaurants every day, as measured by the number of cars, cycles or motorbikes seen in the car park. Logging how many hours the restaurant is open for business. Counting the number of trucks going to and from a factory or industrial zone. Or counting how much farmland is under cultivation, and with what specific crops. In this way, satellite data can provide tax authorities with indicative figures for a range of business activities. Further, such satellite data can be triangulated with additional geographic data, such as electricity and water usages and transportation and logistics, to help capture externality tax revenues more easily, particularly in those developing countries where governments struggle with other forms of tax-related data.

5. Policy implications and conclusion

As we have seen, incremental tax revenues derived from the externality effects of newly developed infrastructure projects provide a new opportunity for governments to enhance private sector financing for infrastructure development. For this purpose, governments need to develop proper governance and institutional frameworks, while actively engaging with private infrastructure investors and operators. Some key policy implications in this regard are presented here.

First, governments need to design and implement astute and attractive incentive schemes, such as subsidies to private infrastructure investors and operators, that encourage private sector investors and operators to pursue profits, while keeping user charges within reasonable limits. They can also provide additional finance to help catalyse and support start-ups and SMEs around new infrastructure projects. These incentives need to be linked with the growth of tax revenues in the adjacent area to the infrastructure. By so doing, private sector actors can envisage an adequate rate of return on their investment in a particular infrastructure project and are encouraged to allocate greater investment resources in this space. For this purpose, coherent regulatory policies and associated institutional and governance frameworks are necessary if the goal of boosting private sector financing and participation in infrastructure is to be attained.

Secondly, governments should further develop and strengthen financial markets for both debt financing and equity financing. Private investors and operators rely heavily on the financial markets: including commercial and investment banks, insurance funds and pension funds, bond issuance, corporate and project finance specialists, etc. But without well-functioning financial markets and financial institutions in a country, neither the public nor the private sector can fully harness the benefits of using the externality effects to enhance private financing for infrastructure projects. The funding sources still need to be there, to get projects commissioned and underwrite construction costs, before the gains from the externality effect start can be harvested (typically sometime after the project is completed and its externalities have started to take effect). Indeed, capital markets can also play a role in creating financial derivatives – such as futures contracts, default risk hedging instruments, and securitization products – that allow those anticipated externality effect revenues gains to be 'locked in', and made part of an infrastructure project's financial equation.

Thirdly, the opportunity of land 'capture' by private sector infrastructure investors and operators can provide additional incentives to encourage private sector financing in infrastructure. As previously discussed, businesses operating in the adjacent area of the infrastructure project can significantly contribute to externality effects, and thereby increase tax revenues to public authorities. However, the direct involvement of private sector infrastructure investors and operators, in the land and business development around the infrastructure, can promote even more financing for infrastructure development if they can foresee the additional cash flows emanating from newly developed businesses surrounding the infrastructure. There have been some successful examples of such land capture schemes in Japan. However, governments must carefully develop a proper governance structure when offering this opportunity to private sector investors, in a way that is fair and transparent, and thereby avoid

unwelcome accusations of impropriety, whether real or perceived, and to protect public interests[51].

Fourthly, to successfully capture the externality effects of infrastructure, governments must collect incremental taxes effectively and fairly. Without proper taxation administration, and high rates of tax evasion, governments are unlikely to collect the anticipated incremental taxes fairly and adequately. Also, if there is some discrimination in taxation among different groups of society, people may not support the government using incremental tax revenues to support privately-funded infrastructure projects. In this regard, the government may wish to adopt advance technology, such as satellite data, to better capture incremental taxes efficiently and comprehensively.

Fifthly, governments must reduce informality in their economies. With high informality, it is not possible to measure and then capture externality effects effectively, missing many commercial and private activities in the targeted area around newly developed infrastructure, from which additional tax revenues should emanate. Indeed, there may be a need to reform the governance structure over the private sector in a way that encourages small informal businesses to make themselves formal[52]. This is often done by creating a more conducive business enabling environment for formalised businesses, with improved trade and investment opportunities, better property rights, and incentives to support private sector development. Policy-makers can also implement simpler and cheaper enterprise registration schemes, such as 'one-stop-shop' service centres, to increase formality in the wider business community.

Finally, governments in Asia and the Pacific can request technical assistance from international development partners to help build up their institutional capacity to fully capture the externality effects of infrastructure. In addition, they can also facilitate the exchange of experiences and knowledge with neighbouring countries in the region.

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[51] For details on the 'land capture' scheme, read annex 3.1.5 and box 3.3.

[52] Perhaps the most common factor behind high levels of informality in developing countries' business sectors is the desire by small firms to avoid paying taxes by staying 'under the radar'. Therefore, any government scheme that seeks to leverage tax revenues, such as the externality effect, automatically needs to address high levels of non-compliance in tax reporting and payment. It is important to note that many firms seek to avoid paying taxes because the tax regime itself is perceived as being arbitrary and potentially punitive, and so the key reform is improving the system by which taxes are consistently administered and fairly enforced.

This chapter has argued that externality effects could bring new opportunities for governments to enhance private sector financing for infrastructure projects in Asia and the Pacific. A new 'string' to their 'bow', as they aim to achieve the SDGs. New infrastructure is expected to trigger incremental tax revenue increases, principally through associated business and residential development, and increased land values in the periphery and adjacent areas. Governments can then use those incremental tax revenues partly, through properly designed long-term subsidy schemes to private sector infrastructure investors, to guarantee – and even increase – the long-term profitability of infrastructure projects that will improve the livelihoods of their citizenry. To capture this opportunity fully, however, governments must implement adequate governance structures that provide proper incentives to private infrastructure investors and operators, sufficient that it will indeed trigger genuine 'additionality' (i.e. greater private sector participation in infrastructure investment), and ensure transparency and accountability when using externality effects through taxation and other mechanisms.

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Annex 3.1.
An overview of private sector infrastructure financing

Infrastructure development is vital in any economy, providing an adequate standard of essential public services. It also typically requires a substantial investment of capital for construction and operations. Mobilizing the necessary scale of financing can be challenging, particularly in least developed and developing countries where public funds are often the most constrained, yet the needs are most apparent. An inverse correlation often exists between the demand for public services provided by infrastructure, and the supply of capital needed to underwrite the cost of providing these services. It is here that private sector capital can play an important role in helping fill the funding gap, through the design and development of commercially viable business models and robust governance structures.

The principle objective of the vast majority of private sector businesses is to engage in profit-making activities, which they typically do by pursuing the optimal (risk-adjusted) rate of return on their investments. Indeed, in many countries, business executives have a fiduciary duty to generate the best returns for their shareholders. This is typically done by blending capital with other (non-financial) resources and core competencies in a bid to take advantage of the most lucrative business opportunities. That capital may come from retained earnings or their balance sheets, but often includes elements of debt (i.e. borrowed money) also. In this context, infrastructure development projects – which are often large in scope, can be slow to generate a return, typically have a significant debt component, and usually contain considerable project risks – can have limited allure when there is considerable uncertainty regarding the anticipated net rate of return, relative to the perceived risks entailed (Iossa and Maritimort, 2015). This uncertainty then hampers the channelling of private sector financing into many infrastructure projects. This annex presents a succinct view of key issues of private sector financing for infrastructure: i) the principal associated risks; ii) public policies to facilitate private-sector financing; iii) major private-sector financing scheme; iv) private-sector actors; and v) revenues from infrastructure.

3.1.1. Principal risks associated with private sector investment in infrastructure

In addition to the uncertainties around the investment returns on numerous infrastructure projects, other factors that can make infrastructure projects less attractive for private sector investors include: i) the heightened risks associated with large scale investments; ii) inefficient pricing policies for user charges, and other concerns around subsequent revenues; and iii) the

likelihood of cost overruns. Such issues are often exacerbated by weak and/or incoherent government regulations, and a lack of assistance provided to the private sector (Égert, 2009; Henckel and McKibbin, 2017). Efficient and effective management of infrastructure design, construction, and operation is required if private sector investors are to allay their legitimate concerns around infrastructure investment and service delivery[53]. While public-private partnerships (PPPs) have often been promoted to enhance the private sector's involvement in infrastructure development, it has also been recognized that new policy options are needed to facilitate greater private sector financing for infrastructure projects (ESCAP, 2019).

Private sector investors often stress that infrastructure investments are particularly risky and involve high costs, which are difficult to bear without some form of government support (OECD, 2015b). Nevertheless, some infrastructure projects – for example, in the water, power, telecommunications and transport sectors – are profitable and have attracted private financing without public support (Bjornlund, van Rooyen and Stirzaker, 2017; Iordache, Schitea and Iordache, 2017; Pargal, 2003). Table 3.5 summarizes various risks associated with private infrastructure investments. The private sector cannot control those risks alone or fully, which suggests that support from the public sector may sometimes be required.

The development and operation of infrastructure projects are typically characterized by long construction times, require intensive use of fixed assets, and can in some cases rely on quite advanced technology. Infrastructure development also tends to be heavily regulated by governments, in order to ensure that public services are provided equitably, safely and sustainably, at a reasonable cost to users, and without incurring harm to society and the environment. One crucial issue for private sector investors is the high-risk levels associated with the illiquidity and irreversibility of large project-based investments, coupled with difficulties in long-term business forecasting, such as cost predictions and long-term revenue streams. As a result of these elevated levels of risk, the costs associated with infrastructure construction and operation tend to be high, and may exceed the projected revenues expected from user charges (ESCAP, 2018; Quiggin and Wang, 2019).

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[53] One example is the recent verdict over an extensive 60-kilometre elevated rail project, intended to link central Bangkok with Don Muang airport in Thailand. In April 2019, the Supreme Administrative Court of Thailand ruled on the disputed contract and ordered the Thai Ministry of Transport and the State Railway of Thailand to pay baht 12 billion in compensation to a Hong Kong-based developer for wrongful termination of the concession (Thaiger, 2019).

Table 3.5

Typology of risks associated with infrastructure investment

Risk group	Examples
Political, macroeconomic and regulatory risks	Complex regulations with political interventions; unstable and short-time regulations; consumers versus shareholders; regulations for user charges inconsistent incentives; inflation; unfavourable business environment; real estate costs.
Supply-side risks	Cost over-runs for both construction and operation; availability and cost of technology and inputs; high cost, illiquidity and irreversibility of infrastructure assets; difficulty in deciding timing of investment; lower or higher cost of present and future capital; change in economic conditions; large and 'lumpy' investments to attain adequate economies of scale.
Demand-side risks	Negative- or over-demand; high fluctuations in demand; difficulty in revenues and profit forecasting; difficulties in pricing; brown-field versus green-field; loss of customers to competitors or other 'substitutional' services; cash-flow management issues.
Cross-border risks	Exchange rate fluctuations; different legal and regulatory regimes; different cultural and social norms; difficulties with financial transactions; cost of international trade and logistics.
Environmental risks	High cost for mitigation and adaptation; natural disasters; corporate reputation; community and stakeholder relationships.

Source: ESCAP.

Note: This table excludes *force majeure* risks, such as wars, natural disasters and 'acts of God'.

3.1.2. Public policy and private sector investment in infrastructure

In recent decades the public sector in Asia and the Pacific has faced increasing pressure to provide adequate public services to its citizens, while simultaneously facing growing debt levels in financing infrastructure (ESCAP, 2019). Governments have therefore moved to introduce a number of policies and initiatives aimed at enhancing the private sector's involvement in infrastructure development, and thereby help share some of the financial burdens. These can be broadly categorized into: i) public procurement; ii) operational licences and infrastructure leases; iii) concessions for infrastructure; iv) corporatization and privatization of state-owned utilities firms; v) third sector organizations; and vi) public private partnerships. Each has its own unique features, characterized in large part by the modalities used to elicit private sector participation in infrastructure development and operations, and the financing schemes used. They are briefly reviewed here.

Public procurement

Public procurement refers to the public sector's purchase of supplies and services in the market, chiefly from private sector entities. The main objectives of public procurement are to harness market principles of

efficiency and effectiveness, competition, accountability and transparency, ethics, and industry development (Raymond, 2008). In other words, governments participate in the market as an institutional buyer, while also regulating those same markets in various ways, such as through competition laws (McCrudden, 2004). One challenge encountered in public procurement is that the government's purchasing power is often considerable, and sometimes even the single largest purchaser in a market. This asymmetry can then lead to inefficient and ineffective purchasing practices.

On infrastructure projects, private sector entities usually participate as contractors or sub-contractors, typically through formal tender and bidding processes, dictated by specific governance laws and regulations to prevent irregularities. Under such contracts with public authorities, the winning private contractor designs, constructs, operates, maintains, and may even remove the infrastructure project. It provides the necessary materials, supplies, technology, as well as skills and knowledge, but it is the government that bears the overall financial risks of the project, while the private sector contractor's risks are limited to only those conditions laid out in the contract it signs with the government agency that procures their services.

Operational licences and infrastructure leases

The private sector can also be involved in infrastructure operations through operational licences and leases. Upon obtaining an operational licence from the government, a private entity may supervise the management of public utilities (e.g. water or electricity supplies), and collect user fees on behalf of the government. The private sector operator will in turn pay an agreed fee to the public authority. An infrastructure lease can also provide a private entity with the right to operate and maintain infrastructure, which the government has developed while collecting user fees. Under operational licences and infrastructure leases, governments are still responsible for financing infrastructure development, while private sector entities need only finance their own operations, thereby limiting the scale of their risk exposure (Harris, 2003). These practices can be an extension of public procurement, thus requiring concrete rules and transparent regulations to enhance their efficiency and effectiveness.

Concessions for infrastructure

The private sector may also participate in infrastructure development by obtaining concessions from governments. Such a concession allows a private entity to develop and operate an infrastructure project that provides a public service. In this case, a private sector firm typically has the

exclusive right to construct and operate the asset, under the governing laws and regulations, with specific requirements provided by the public authority, and to collect usage fees to maintain the infrastructure for long-term (Harris, 2003). Concessions for infrastructure often require private sector investment across the entire development and operation stages of the infrastructure project, and so the risks become higher on the private sector's side.

Within this format, government agencies have implemented rate-of-return regulations and incentive regulations (e.g. price-cap regulations and revenue-cap regulations) to encourage private sector investment in concessions for infrastructure. Rate of return regulations aim to assure the degree of profits resulting from the private infrastructure investment, while incentive regulations, such as price and revenue caps, encourage private infrastructure concessioners to reduce the costs of development and operations, and maintain usage fees low, while securing adequate profits for private investors. The common objective is to keep fees and tariffs sufficiently low, in keeping with the provision of a public good, while generating adequate cash flows for private sector investors and operators to be sufficiently attracted to undertaking infrastructure concessions (Cambini and Rondi, 2010).

Privatization

In Asia and the Pacific, state-owned enterprise (SOE) reform through privatization has been a popular means to enhance private sector financing for infrastructure development and operations since the 1980s (Turner, O'Donnell and Kwon, 2017). A number of governments aimed at improving the deteriorating performance of SOEs due to growing social demands and intensified competition fuelled by deregulation, liberalization, and globalization in the economic sectors where the public sector has dominated, such as transport, communications, and utilities. (Gakhar and Phukon, 2018). The privatization of SOEs can be done by selling off entire SOEs, such as utilities firms, to be operated as commercial concerns (i.e. full privatization), or by inviting private sector investors to acquire part of an SOE's equity (i.e. partial privatization).

Although it has been widely promoted that the transition of ownership from the government to the private sector can enhance efficiency and sustainability of SOEs, empirical research has shown mixed results (Gakhar and Phukon, 2018). Some researchers found a significant improvement in the post-privatization performance of former SOEs, by avoiding political interferences and focusing on the economic objective of maximizing returns from their investment. However, other researchers disclosed that while privatization may provide room to improve efficiency, it can also convert

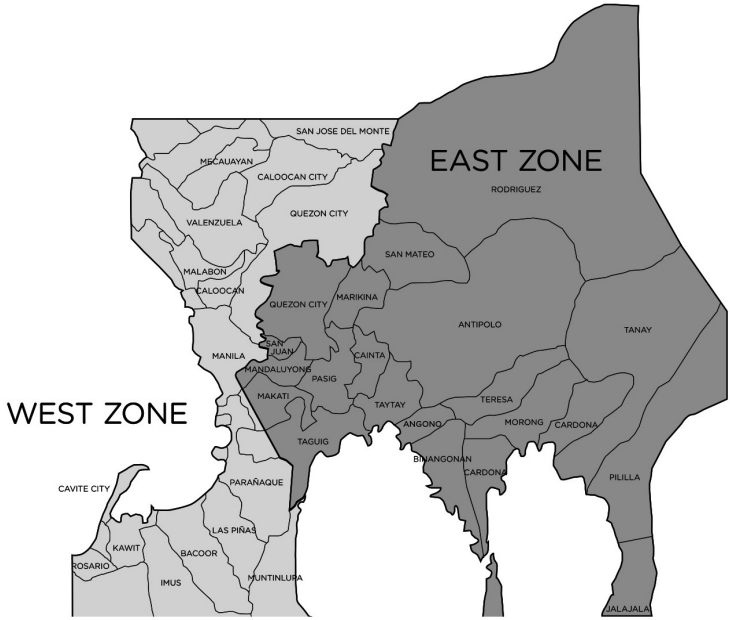
Box 3.2

Concession for inclusive water supply in Manila

In 1997, the government of the Philippines awarded long-term concession contracts to private consortia for water supply and wastewater and sanitation management in the Greater Manila, which were previously handled by the government-owned entity. Under the performance-based concessions that set ambitious performance targets in terms of quality, sewerage and outreach, Manila Water (in the west zone) and Maynilad (in the east zone) were responsible for operating and expanding water-treatment and supply (PPPLRC, 2016). Figure 3.5 presents concessional areas for water supply in Manila.

Figure 3.5

Concessional areas for water supply in the Greater Manila



Source: Rivera (2014).

While they successfully increased their services' coverages, customer base and productivity, the concessionaires significantly reduced water fee for over 1.6 million people of marginalized communities who enjoyed a subsidized price of $ 0.20 per cubic meter (Rivera, 2014; Verougstraete and Enders, 2014). The success of this concession scheme is attributable to: i) utilizing private-sector's knowledge and skills; ii) mobilizing private-sector financing; and iii) providing an adequate legal and regulatory framework. Furthermore, ADB provided its technical assistance to the government by developing medium to long-term investment plans and conducting feasibility studies for the urban water supply (ADB, 2014).

a former SOE into a privately-owned monopoly, which can then be more harmful to society than a public-owned monopoly, particularly if operating within an ecosystem of competition and anti-monopoly regulation. Besides, some others suggest that privatization does not have any significant effect on a firm's performance, as the real problem is not a lack of operational efficiency, but the lack of capacity to set proper pricing and collection of user charges. Given those different views toward the performance of privatized SOEs, governments and their development partners have recently been experimenting with public-private partnerships (PPPs) that can allow increasingly diverse forms and cooperation modalities with private-sector investors (Turner, O'Donnell and Kwon, 2017).

Third sector organizations

The third sector was once popular as an alternative vehicle to mobilize private sector financing for infrastructure development, and tends to have a very loose definition, as it sits in-between the public and private sectors (Anheier and Seibel, 1990), and tends to be non-profit in orientation. Such organizations can take a variety of forms, such as a public-private joint venture, a social enterprise, a business association, a credit union, a voluntary organization or a charity, which operates using a mixture of private sector financing, government funding, philanthropic donations and/or their own commercial activities. However, the use of third sector organizations to deliver public services has often been found financially unsustainable, mainly due to their non-profit nature, with regulatory constraints and a lack of adequate incentives to generate revenues and reduce costs (Enjolras and others, 2018).

Public-private partnerships

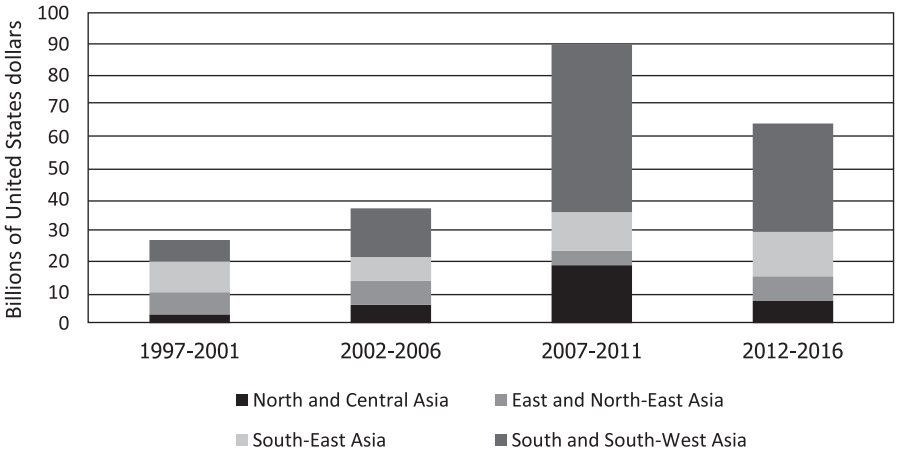
In the past decade, one popular solution to enhance private infrastructure financing has been the use of public-private partnerships (PPPs), such as build-operate-transfer (BOT) and build-own-operate-transfer (BOOT) schemes, and design-build-operate (DBO) arrangements. PPPs had been expected to play an important role in infrastructure development and public service delivery by increasing the role of the private sector. A PPP is broadly defined as a formal agreement whereby a public sector body enters into a long-term contractual arrangement with a private sector entity for the development and/or operation of public infrastructure services (Grimsey and Lewis, 2002). In this context, PPPs may also contain some of the traditional infrastructure development practices outlined above, such as public procurement, operational licences, infrastructure leases and concessions and third sector organizations, which also require a long-term contract. To propagate PPPs, robust legal and regulatory frameworks are needed, as well as a framework that guides the public sector, streamlines

project preparation and implementation, and provides the necessary degree of certainty to private sector investors (ESCAP, 2019). Private sector companies have an understandable dislike for uncertainty, and so having an adequate level of trust in their public sector counterpart on a PPP deal is paramount.

Although PPPs have been promoted among governments and development partners, such as multilateral development banks, their use has not been as great as many had expected, particularly in developing countries (Hodge and Greve, 2018; Leigland, 2018). Figure 3.6 portrays trends of PPPs in Asia and the Pacific over the past two decades. While private financing through PPPs continuously increased, until the five-year period of 2007 to 2011, it then declined in the period from 2012 to 2016. Looking into each sub-region, the growth of PPPs has also been inconsistent.

Figure 3.6

Public-private partnerships in sub-regions of Asia and the Pacific, 1997-2016



Source: ESCAP (2019).

In this regard, the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) has developed a composite index that can be used to assess the extent of a government's readiness to implement PPPs in infrastructure projects. The PPP Enabling Environment Index identifies several key elements to PPP readiness at the national level, spanning: i) institutional arrangements for PPP projects; ii) past experiences with PPPs; iii) macro-economic stability; iv) financial market development; and v) an economy-wide legal and regulatory framework (Sharma and

Sirimaneetham, 2018). In economies with a more conducive enabling environment for PPP environment, private sector financing for infrastructure development is expected to be more viable, with better risk-adjusted rates of return.

3.1.3. Private sector financing schemes for infrastructure

Private sector financing for infrastructure development can be broadly categorized in five areas: i) bank loans; ii) pension funds; iii) insurance funds; iv) bond (fixed income) investment; and v) equity investment (table 3.6). The first four formats essentially entail debt financing, while the final one is a non-debt ownership investment format (OECD, 2015b).

Table 3.6

Private financing, infrastructure assets and nature of project

Private financing	Infrastructure asset	Nature of infrastructure project
Bank loan	Safer asset	Brownfield
Insurance funds	↑	↑
Pension funds		
Bond investment (revenue bond)		
Equity investment	↓	↓
	Riskier asset	Greenfield

Source: ESCAP.

In terms of investment risk, there are different kinds of asset classes in infrastructure. The assets of a 'brownfield' project tend to be perceived as safer. An established railway or highway that has already been in operation, for example, but requires the private sector's involvement in expanding facilities or improving operations, contains relatively modest risk, as revenue flows from these facilities are already known. Conversely, wholly new infrastructure projects, where revenues are less certain, pose a greater commercial risk. Thus, private investors are often less willing to invest in such 'greenfield' infrastructure projects, unless the anticipated returns are sufficient to ameliorate the additional risk. But if private sector investors foresee the rate of return to be large and relatively certain, even risky infrastructure assets can become potentially attractive business propositions. Thus, increasing the rate of return and/or lessening the risk can help to entice private sector capital, such as pension and insurance funds, which tend to be highly risk-averse, both by nature and by regulatory mandate.

Bank loans are usually relatively short-term, ranging from one to five years, and granted directly to infrastructure projects. Without support from public schemes, such as concessional funding or sovereign guarantees, the cost of bank loans is typically more expensive than other forms of debt financing, particularly in developing countries. As a result, private sector investors typically seek additional public support for infrastructure projects, in addition to bank loans[54]. Both insurance funds and pension funds are sometimes able to provide long-term financing for infrastructure development, as the length of insurance contracts is typically more than 10–20 years, and so they ideally wish to invest in longer-term assets that have a similar maturity. Therefore, well-designed infrastructure development projects can be a promising target for long-term investment by both insurance and pension funds.

Both debt and equity financing through capital markets can also provide necessary private sector capital for infrastructure development. One type of bond investment for infrastructure, which shares some similar characteristics to equity financing, is revenue bonds. Revenue bonds can be used to finance a wide range of infrastructure projects, by which debt servicing comes from future revenues generated by the relevant infrastructure project (e.g. Chapman, 2008; Hyun, Nishizawa and Yoshino, 2008). Revenue bonds may be purchased by a mix of different entities, such as central government agencies, local and municipal governments, and various kinds of private sector investors. The entities then share all the risks together, along with the profits, each in proportion to the scale of their investment. This mixed entity approach can help to 'de-risk' the revenue bonds and thereby attract more investors.

One recent development in facilitating private sector financing of infrastructure projects is the emergence of blended finance. Blended finance can be defined as coordinated fund mobilization, in this case for infrastructure development, among domestic and international public and private entities. They may consist of public grants and subsidies, concessional or soft loans, official development assistance (ODA), private sector financing and even philanthropic contributions (Gavas and others, 2011; Leigland, Trémolet and Ikeda, 2016). Blended finance aims to increase the private sector's involvement in infrastructure investment through providing additional financial flows that can reduce borrowing costs compared with a fully commercial investment proposition (Leigland, Trémolet and Ikeda, 2016). As a result, blended finance can reduce the

[54] A number of MDBs also provide guarantees for equity investment in infrastructure projects. For example, the Multilateral Investment Guarantee Agency (MIGA), a World Bank organization, provides guarantees covering long-term equity investments against the risk of breach of contract for infrastructure projects.

financial risks of infrastructure projects, lower entry barriers to new entrants, and 'leverage in' the private sector's resources. However, blended finance in the developing economies of Asia and the Pacific has yet to be widely used at scale (MDBs, 2018).

3.1.4. Private sector actors

The range private sector actors involved in infrastructure projects can be very extensive, spanning a host of institutional financiers, investors, construction companies, to other private sector actors providing operation and maintenance services, as well as professional services like lawyers and consultants. A taxonomy of the various actors in provided in table 3.7.

Table 3.7
Typology of private sector actors

Actors	Descriptions
Commercial banks	Providing the main sources for project financings with flexibility to borrowers. Term loan is the most common type that commercial banks use for project financing.
Investment banks	Providing alternative financing sources for large-scale infrastructure projects through stock and bond markets and as intermediaries with other institutional investors and lenders.
Insurance companies	Providing financial protection to clients in the event of an accident or disaster relating to infrastructure construction and operations. They have the objective of achieving yields that could match or exceed their liabilities. They also invest in infrastructure projects through capital markets, mainly on sovereign debt.
Public pensions funds	Filling the financial gap of infrastructure development through their long-term financial investment, similar to insurance companies.
Sovereign wealth funds	Accommodating investments with lower yields as their strategic objectives in infrastructure projects directly, or indirectly through capital markets.
Infrastructure developers or infrastructure private equities	Investing at an earlier stage of infrastructure projects, where risks are relatively higher (e.g. greenfield projects), typically taking an equity position and targeting a higher return on investment to compensate for the risk, e.g. through initial public offering (IPO) or other sell-out schemes.
Corporate investors	Investing in infrastructure principally for directly operational reasons. Sixty per cent of private sector investment in infrastructure is accounted for by corporate investors, such as transnational corporations (TNCs).
Construction firms	Providing designing, engineering and construction services to develop infrastructure.
Operation and maintenance contractors	Ensuring and enhancing the sustainability of existing infrastructure and assets through providing operation and maintenance services.
Professional services	Providing professional services and advice to infrastructure projects. They include, among others, lawyers, accountants, consultants, engineers and architects.

Source: ESCAP based on EBAC (2016) and Morrison (2016).

3.1.5. Private sector revenue streams from infrastructure projects

Successful and commercially sustainable private sector investment in infrastructure typically requires stable revenue streams over the long-term. While there are multiple ways to generate such revenues, they can broadly be divided into: i) direct revenues, such as public procurement arrangements, public grants, subsidies or public service fees, user charges and third-party financial aids; and ii) indirect revenues, generated through 'land capture' and associated business and residential activities.

Governments often procure private sector services to design, construct, operate, and maintain infrastructure that then provides public services to society (Akintoye and Kumaraswamy, 2016). Public procurement can be done through various modalities, such as construction contracts, management contracts and maintenance service contracts. In such arrangements, private sector contractors receive payments from the government as they deliver specifically defined tasks, goods or services by contracts with the public sector. Grants, subsidies, or public service fees are often used as financial incentives to encourage the private sector's participation in infrastructure projects using capital transfers (te Velde and Warner, 2007). Public sector agencies may provide up-front, direct grants to private sector beneficiaries, often in the form of a one-time capital transfer or a specialized fund. Subsidies or public service fees can also be channelled to the private sector directly (e.g. capital transfers, lower import duties and/or lower interest rate loans), or indirectly by mitigating the investor's degree of risk (e.g. lower capital costs with state guarantees, land concessions and preferred access to public services). Subsidies or public service fees can be provided up-front, or offered for future operations and maintenance of the infrastructure.

User charges (e.g. fares, tariffs and tolls) are the extent to which users fund public services, as provided by infrastructure projects, based on the user-pay-and-benefit principle (Cao and Zhao, 2011). However, in least developed and developing countries in particular, user charges – such as subway fees, highway tolls and water and electricity tariffs – must be at reasonable levels, and often cannot fully cover the cost of infrastructure investment. Water supply and access to electricity in particular are widely viewed as essential public goods, and a government cannot easily increase user charges. The rate of return that private investors can expect from user charges alone is often too low to cover the significant costs of infrastructure development, and therefore it can be difficult to attract private sector participation. As a result, 'capturing' land to indirectly help finance infrastructure projects has gained popularity. Foreseeable land value increases stemming from current and future infrastructure development

can be used to help finance infrastructure projects, and can facilitate private financing with upfront capital investment. Highways, railways, power and water supplies, and the provision of other public goods, provide new business and development opportunities for private sector investors on land that they can acquire, prior to developing that infrastructure. For example, new apartments can be constructed, and new businesses can be established along the lines of infrastructure.

In the case of PPPs for new railway lines in Japan, for example, private investors used land capture to help underwrite the cost of new infrastructure investment. Private railways purchased farmland, constructed their tracks on parts of that farmland, and then developed the remaining farmland into residential areas. They also developed commercial facilities adjacent to the railway stations, constructing department stores and other commercial facilities. These infrastructure-driven development activities benefit the private sector as they help guarantee future revenue streams and encourage greater private sector financing of infrastructure projects. For this reason, government agencies may favour private sector infrastructure investors and award them concessions to develop associated businesses around the infrastructure.

However, governments must be careful to develop proper governance structures when tendering such opportunities to private sector investors and operators, to avoid public accusations of preferential treatment or favouritism, due to a lack of transparency and accountability in the concession procedures. It can also inadvertently make land markets more volatile, and prone to undesirable speculative activities, such as inadvertently creating land asset bubbles that inevitably inflate and then subsequently burst (Peterson, 2009).

Box 3.3

'Land capture' versus 'land value capture'

The private sector's 'land capture' is different from the public sector's 'land value capture' although both of them could be explained as land-related schemes to utilize externality effects. Private sector infrastructure investors or operators could 'capture land', or buy land, adjacent to newly developed infrastructure, and become involved directly in the land and business development, so that they can generate additional cash flows from such new businesses. On the other hand, 'land value capture' refers to "the process of using various fiscal instruments to capture a portion of land value increments to support the financing of public investments and services" (ESCAP, 2018, p. 9). Land values, including property values and rental premiums, are strongly and positively associated with the level of infrastructure investment, such as road construction, mass transit development, and water supply (Peterson, 2009). Governments can increase their revenues using various tax schemes, such as increasing land and property taxes, toll fees and parking levies, and use them to help finance new infrastructure projects directly (McIntosh and others, 2017).

Annex 3.2.
Macro estimations of externality effects

In their macro estimations, Yoshino and Nakahigashi (2004) and Nakahigashi and Yoshino (2016) use a trans-log production function to estimate the direct effect of infrastructure investment and externality effects (i.e. indirect effects) in Japan. The direct effect of infrastructure investment is created by the construction of infrastructure that will then increase the output and productivity of the target area, through establishing its functions and providing public services. The externality effects have two channels. One is that public services, such as water supply and electricity, prompt the construction of new office buildings and/or new housing, which will increase the efficient use of land. New roads also invite businesses and manufacturers along those roads. The second channel is to increase employment in the target area by attracting new businesses, restaurants and residents into the area. New businesses bring additional employment to the area, which will contribute to the increase of consumption and housing development. Consequently, GDP in the area will further increase.

Whether or not infrastructure investment is effective for production activities is verified by estimating the productivity effect of infrastructure. Estimates are made in the following manner using a production function.

$$Y = F(K_P, L, K_G) \tag{1}$$

Where K_P is private capital, L stands for labour and K_G is stock of infrastructure investment. General type of the production function is a trans log production function.

$$\begin{aligned}\ln Y = \alpha_0 + \alpha_1 \ln K_P + \alpha_2 \ln L + \alpha_3 \ln K_G + \beta_1 \frac{1}{2}(\ln K_P)^2 + \beta_2 \ln K_P \ln L + \beta_3 \ln K_P \ln K_G \\ + \beta_4 \frac{1}{2}(\ln L)^2 + \beta_5 \ln L \ln K_G + \beta_6 \frac{1}{2}(\ln K_G)^2\end{aligned} \tag{2}$$

To examine the productivity effect of infrastructure in greater detail, estimates are made by classifying direct effects and externality effects, or indirect effects, according to Yoshino and Nakano (1994). Direct effects refer to incremental increases in production in the marginal productivity of production factor (i.e. private capital and private labour), due to an increase in infrastructure. In this case, externality effects refer to the increased production amount generated by private enterprises that maximises profits, in addition to investing production elements, based on the increase in the marginal productivity of each production element, due to those direct effects. Supposing the production function of equation (2), and that factor

prices and infrastructure are given to the producers of the private sector, the productivity effect of infrastructure is classified into three terms. In equation (3), the first term on the right comes under the direct effect, the second term is the externality effect with regard to the private capital, and the third term represents the externality effect related to the labour input. The effects of the productivity effect of infrastructure are expressed in marginal productivity.

Using the following form of the production function, we derive the direct and indirect effects, or externality effects, thus:

$$Y = F(K_P(K_G), L(K_G), K_G) \tag{3}$$

$$\frac{dY}{dK_G} = \underbrace{\frac{\partial F(K_P, L, K_G)}{\partial K_G}}_{\text{Direct effects}} + \underbrace{\frac{\partial F(K_P, L, K_G)}{\partial K_P}\frac{\partial K_P}{\partial K_G} + \frac{\partial F(K_P, L, K_G)}{\partial L}\frac{\partial L}{\partial K_G}}_{\text{Externality effects}} \tag{4}$$

Incremental tax revenues from externality effects can be written in the equation (5) as follows:

$$dT_{spill} = t \text{ x } dY_{spill} = t \text{ X } \left(\frac{\partial F(K_P,L,K_G)}{\partial K_P}\frac{\partial K_P}{\partial K_G} + \frac{\partial F(K_P,L,K_G)}{\partial L}\frac{\partial L}{\partial K_G}\right) x\ dK_G \tag{5}$$

There are two portions in the externality tax revenues. The first part comes from the contribution of private capital, and the second part is created by the increase in employment.

Incremental tax revenues from the direct effect of infrastructure is written in the equation (6) as:

$$dT_{direct} = t \text{ x } dY_{direct} = t \text{ x } \left(\frac{\partial F(K_P,L,K_G)}{\partial K_G}\right) x\ dK_G \tag{6}$$

Total tax increase created by infrastructure is the summation of equations (5) and (6).

$$dT_{total} = dT_{spill} + dT_{direct} = (5) + (6)$$

The externality tax revenues are the part of the increase of total tax revenues in the area, which is shown in equation (5). dT_{spill} in equation (5) is created by private capital and employment, which should be used to support infrastructure investors and construction companies (for example, through additional public subsidies). dT_{direct} is the incremental tax revenues generated by the government and the private sector through their infrastructure investment.

Chapter 4

Financing Sustainable Cross-Border Infrastructure

1. Introduction

Cross-border infrastructure is broadly defined as infrastructure that facilitates connectivity between two or more countries, and thereby brings benefits to two or more countries involved. It is widely agreed that enhanced connectivity facilitates the movement of goods, services and human resources; enhances economies of scale; promotes trade and investment; creates new business opportunities; and improves regional productivity and competitiveness through expanded regional production networks (ESCAP, 2014). For these reasons, the development of cross-border infrastructure is an important component of the 2030 Agenda for Sustainable Development, as adopted by the General Assembly of the United Nations in September 2015. Of the 17 goals set out in the Sustainable Development Goals (SDGs), the ninth focuses on infrastructure, industry and innovation, and sets a target of developing "quality, reliable, sustainable and resilient infrastructure, including regional and trans-border infrastructure, to support economic development and human well-being, with a focus on affordable and equitable access for all" (United Nations, 2019).

For its part, the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) is committed to supporting regional economic cooperation and integration through four fundamental pillars, one of them being the 'development of seamless connectivity in the region'[55]. The 2013 Bangkok Declaration on Regional Economic Cooperation and Integration (RECI) calls for "seamless connectivity" that can enable "the freer movement of people, goods, energy and information", recognizing that infrastructure gaps "hamper economic growth by limiting economic diversification, movement of goods, people-to-people contacts, access to

[55] The Bangkok Declaration on Regional Economic Cooperation and Integration (RECI) in Asia and the Pacific, adopted at the first Ministerial Conference on Regional Economic Cooperation and Integration in December 2013, set out an agenda consisting of four elements: i) moving towards the formation of an integrated market; ii) development of seamless connectivity in the region; iii) enhancing financial cooperation; and iv) increasing economic cooperation to address shared vulnerabilities and risks. See: (ESCAP, 2017).

energy and the development of global value chains" (ESCAP, 2017, p. viii). To achieve such a vision typically requires investments in both physical, 'hard' infrastructure (i.e. physical assets, such as roads, ports and power stations), and so-called 'soft' infrastructure (such as legal, regulatory, procedural, and other supporting policy frameworks, as well as human and institutional capacities) to link countries and economies[56]. Indeed, the linkages and synergies between 'hard' and 'soft' infrastructure tend to be even more closely entwined in the case of cross-border infrastructure projects.

A number of studies have sought to quantify the potentially significant benefits of developing cross-border infrastructure in Asia and the Pacific (Gilbert and Banik, 2012; Stone, Strutt and Hertel, 2012; Zhai, 2012). However, despite the apparent benefits, developing and financing such initiatives remains a considerable challenge. This is largely because cross-border infrastructure projects have to contend with various transnational factors that make them more complex to implement and underwrite than domestic infrastructure projects. For example, cross-border infrastructure projects often have – or are simply perceived by some to have – a political and/or geo-strategic component, which may then require additional institutional arrangements. Decisions around their design, financing, construction, and operations also need to be coordinated across different sovereign governments and their respective agencies, and bridge any differences in their respective operational modalities. Add to these, any additional challenges stemming from the size and/or technical complexities of the project, and it becomes easy to see why cross-border infrastructure projects are hard to finance and implement.

Attempts have been made to address and overcome such coordination challenges through regional and sub-regional policy frameworks, such as ASEAN's 'Master Plan on Connectivity 2025' (ASEAN Secretariat, 2016). RECI is another example, seeking to address critical constraints in the

[56] The Association of Southeast Asian Nations (ASEAN) views regional connectivity across three complementary dimensions: i) physical connectivity (e.g. telecommunications cables and transport infrastructure); ii) institutional connectivity (e.g. trade facilitation, investment and services liberalization); and iii) people-to-people connectivity (e.g. education and tourism exchanges). See: ASEAN Secretariat (2016).

development of cross-border infrastructure projects[57]. A key determinant of success is having a shared regional vision across countries, so as to bring about region-wide planning and coordination mechanisms, including for financing infrastructure development projects that span borders. This kind of holistic approach is now being pursued on an unprecedented scale with the Belt and Road Initiative (BRI); a multi-modal network that aims to coordinate an ambitious array of infrastructure investment activities across more than 60 countries, most of which are in Asia and the Pacific.

This chapter examines the risks and challenges entailed in financing sustainable cross-border infrastructure, and provides some specific recommendations on how to overcome or mitigate such challenges.

2. Risks and challenges of financing cross-border infrastructure

There are several obstacles that need to be considered when financing cross-border infrastructure, and particularly the factors impeding foreign direct investment (FDI) and private sector investment in infrastructure projects. Although cross-border infrastructure can improve regional or sub-regional connectivity[58], the intrinsic inter-connectedness and inter-dependencies of these complex infrastructure systems inevitably come with additional risks that would not otherwise be found in purely domestic projects of a broadly similar nature (Haimes and Longstaff, 2002; Petit and Verner, 2016). This is something that must be properly acknowledged and addressed, since both equity investors and debt financiers alike are

[57] RECI sees these as mostly relating to a lack of planning and coordination. "First, most cross-border connectivity projects are typically negotiated bilaterally between parties. This results in projects that are fragmented, not well coordinated and, consequently, burdened with high transaction costs. Second, regional infrastructure projects invariably involve asymmetric costs and benefits across countries and groups of people, which entails large externalities and thus need fair compensation. Third, careful planning and coordination are often absent because of a lack of resources, appropriate institutional mechanisms, and/or differences in legal and regulatory regimes. Finally, as most infrastructure networks are domestically centred, with cost-benefit analyses typically assessed from a domestic return-on-investment perspective, the regional public good value associated with the projects is heavily discounted" (ESCAP, 2017, p. ix).

[58] Regional connectivity refers to "the level and effectiveness of regional networks to facilitate flows of goods, services, people and knowledge" (ESCAP, 2014, p. xiii), comprising physical infrastructure and soft infrastructure in four dimensions: i) trade and transport connectivity; ii) information and communication technology (ICT) connectivity; iii) energy connectivity; and iv) people-to-people connectivity.

typically reluctant to take on risks that they cannot adequately measure and find means by which to partially mitigate[59]. Those risks span the following:

- *Large investment requirements*

  Cross-border infrastructure projects tend to be larger in scale when compared with most domestic infrastructure projects, thus requiring greater up-front capital investment. Furthermore, such projects must often compete with other budgetary demands from wholly domestic infrastructure projects, with the latter often given a higher priority by local governments. The large size of cross-border infrastructure projects also implies that only a limited pool of companies and investors have the financial, technical and human resources to undertake and operate them on a long-term basis. This can then limit the competitive pressures when tendering such projects, and thereby lead to poor value for money assessments, among other issues. In addition, private sector investors typically prefer to engage with a single counter-party when negotiating terms and agreements, instead of multiple agencies (as tends to be the case with cross-border infrastructure projects).

- *Lengthy maturation cycles*

  Cross-border infrastructure projects tend to entail longer-term time horizons, particularly when coordination between the relevant agencies of participating countries is sub-optimal, and/or when approval and implementation of a project passes through multiple political cycles in one or more countries. For example, the origins of the Turkmenistan-Afghanistan-Pakistan-India (TAPI) natural gas pipeline project can be traced back to the 1990s, but project construction only started in 2015, after

[59] One useful way to think of this is in terms of the anticipated rate of return. All investments have a rate of return hurdle rate, below which the investment will not proceed, and above which it is potentially possible to proceed. But that hurdle rate itself shifts according to the perceived level of risk involved in making the investment; a project with higher levels of risk demands a higher hurdle rate. Therefore, we can say that the key issue is not simply the rate of return, but the risk adjusted rate of return, of an investment. Not all investment projects entail the same rate of return, and that is due in part to the fact that not all projects entail the same level of risk, as well as such other factors as the cost of capital. Determining the right hurdle rate therefore necessitates being able to establish the level of risk, and if the risks are unknown, or at least unquantifiable, then the hurdle rate cannot be established, and the investor or financier is effectively being asked to take a 'leap into the dark'.

completed protracted negotiations between the relevant governments[60]. Furthermore, some cross-border infrastructure may entail long-term sales contracts with just a few customers (Sawant, 2010), thereby making the project vulnerable to ex-post renegotiation issues. If the interests of private sector investors and host country governments start to diverge after up-front investments have been completed, the latter may unilaterally make ex-post changes in laws and regulations that favour the state (Jandhyala, 2016). Cross-border infrastructure projects, therefore, tend to include appropriate dispute settlement mechanisms, which then add to the overall project costs.

- *Insufficiently clear rationale*

  The socio-economic benefits and commercial viability of domestic infrastructure projects are often better researched than the equivalent justifications provided for cross-border projects. The principal reason for this is that it tends to be easier to define a domestic project's scope and benefits, and thereby quantify its viability. For example, it is easier to determine user demand, revenues, and costs projections for a conventional domestic project, when compared with a project that spans sovereign boundaries. (There is also the potential for 'big ticket' cross-border projects to be viewed in far more than strictly socio-economic terms, with a political, military, diplomatic or strategic dynamic that then dilutes the importance of providing a clear economic rationale before proceeding[61].) Nonetheless, even when the cost-benefit analysis is feasible and relatively more straightforward for a proposed cross-border project, these costs and benefits may not be equally distributed, or at least perceived not to be so, among the countries concerned. This adds another level of complexity, and potential tension, to the terms of the negotiation.

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60 The project's construction and operation are being financed by a special purpose vehicle (SPV) – the TAPI Pipeline Company Limited; a consortium corporate entity, founded in 2014, by Turkmengaz in Turkmenistan, Afghan Gas Enterprise in Afghanistan, Interstate Gas Service in Pakistan, and GAIL in India.

61 The developed and developing world has witnessed numerous large, high profile infrastructure projects that were initiated for more intangible – and sometimes even spurious – reasons, such as political statements, legacy projections, or symbolic totems of a country's aspirations for modernity. In such cases, the economic case for their construction has often been less than clear.

- *Long-term foreign currency denominated liabilities*

  Cross-border infrastructure projects can have differing foreign exchange, inflation (including key commodity prices), credit, and demand risks. Appropriate risk management instruments are therefore needed to manage such risks, such as demand guarantees, exchange rate guarantees, commodity price-linked risk mitigation instruments, inflation-linked guarantees, currency hedging instruments, etc. But each of these comes at a cost, and therefore further add to a project's budget. The precise kinds and degrees of risks – and therefore the right mitigation instruments to be used – tend to differ by sector within the infrastructure 'space'. The costs of getting foreign exchange risk coverage for a less developed country, for example, can be extremely expensive to attain, or virtually impossible to secure. The degree of capital intensity, as well as the long pay-off periods, also mean that cross-border projects tend to have high sunk-costs, sometimes with large direct and contingent liabilities. Guarantees on foreign exchange convertibility and transferability may be required in cases where the project's main debt is denominated in one currency, but the project's revenues are denominated in another currency[62].

- *Political risks*

  As intimated above, commercial arrangements between governments of sovereign states can often be driven more by political and geo-strategic factors than purely economic considerations. Thus, compared with domestic infrastructure projects, the political risks of cross-border infrastructure projects are heightened, thereby adding to the legitimate concerns of private sector actors. Potential political risks include socio-political developments (including conflict or civil disturbances), breach of contract and sovereign default risks, unexpected government interference leading to expropriation, and coordination risks entailed in coordination across multiple government entities. Foreign and domestic private sector investors may opt to decline involvement due to concerns around the degree of default risk (also sometimes referred to as counterparty risk), such as when government agencies or

[62] In the case of the Trans-Anatolian Natural Gas Pipeline Project, national governments provided loan guarantees, and the World Bank provided $ 400 million to the Southern Gas Corridor Closed Joint Stock Company (Azerbaijan), with a 30-year maturity term and 5-year grace term, plus a further $ 400 million to the Boru Hatlari Ile Petrol Tasima Anonim Sirketi (Turkey), with a 24-year maturity term and 5-year grace term. For details, see: World Bank (2016; 2019b).

state-owned commercial entities fail to meet their contractual obligations. Even when a project has a dispute resolution agreement in place, the risks and costs of actually taking a sovereign state to court are considerable, and any ruling can be hard to enforce. Political election cycles and/or leadership changes can also result in the need for ex-post renegotiations of a cross-border project, or even its sudden cancellation. This may be as a result of a change in government that triggers a change in socio-economic priorities, or simply a deterioration in relations with other countries involved in a planned cross-border project. For example, the planned 350 km Kuala Lumpur–Singapore high-speed railway had to be postponed after Malaysia's national election in 2018[63].

- *Differences in regulatory and policy frameworks*

  The level of complexity in most cross-border infrastructure projects is exacerbated by the multiple regulatory systems and policy frameworks that need to be navigated, some of which may even be in contradiction with each other. Participating firms may face regulatory concerns in one or more countries involved, such as adverse and abrupt changes in fiscal regimes, laws and regulations (e.g. on environmental regulation, the setting of tariffs, royalty payments, tax waivers), FDI restrictions and/or incentives, land acquisition related risks, and the cancellation of licenses or approvals. These kinds of inconsistencies and discrepancies also imply that the overall project risk is effectively determined by whichever country has the least favourable business and regulatory environment (Verougstraete, 2018).

- *Institutional capacity and coordination issues*

  Due to their complexity, the development of cross-border infrastructure projects can place a high degree of pressure on the capacities of participating countries' state institutions. There is also the potential risk of delays in project implementation due to the need for both horizontal and vertical institutional coordination when more than one sovereign state is involved. Participating governments may have conflicting views and interests regarding the consortium members selected to build, operate, and maintain the whole infrastructure, or disagree on the procurement procedures to be followed. In such situations,

[63] In September 2018, Singapore and Malaysia formally agreed to postpone the construction of the Kuala Lumpur-Singapore High speed rail (HSR) until end-May 2020, with Malaysia having to pay Singapore compensation for costs incurred in suspending the project. The two governments announced the HSR will be delayed until January 2031, instead of December 2026, as originally planned. Also see: Shukry and Park (2018).

a quasi-independent and trusted third party may be necessary to help facilitate the process, such as a multilateral development bank (MDB).

- *Social and environmental concerns*

  The environmental and social risks of cross-border infrastructure projects can be considerable. For example, cross-border oil or gas pipeline projects, or electricity transmission line projects may traverse over long distances[64]. Cross-border projects cannot be beneficial to the origin and destination countries only, as benefit sharing must include transit countries and their communities[65]. Such projects can also face cultural obstacles, language barriers, differences in labour practices and management approaches, all of which can hamper project progress (Chua, Wang and Tan, 2003). Looking ahead, it is likely that environmental and climate change policies will become more stringent in many countries. If so, investments in infrastructure projects that contribute to pollution and/or climate change (e.g. fossil fuel-based electricity infrastructure) could be exposed to policy changes that then render them as stranded assets.

- *Heterogeneous technical standards*

  Infrastructure projects typically need to be built according to one standard, even when traversing national borders. And yet the national infrastructure of two neighbouring countries may not be built using the same technical standards, such as the gauge of their railway lines. This can also become an issue for a private sector firm seeking a single concession agreement, irrespective of the multiple country contexts. For example, in an inland water transport project, the depth of dredging needs to be agreed by all participating countries, prior to project development, and during subsequent operations the technology used for river navigation, types of permitted craft, customs clearance requirements, border security, etc., all need to be aligned. Variations in design specifications, construction codes and/or material standards can become a critical problem, especially if the project is to be competitively tendered.

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64 For example, the environmental and social risks of a cross-border electricity transmission project connecting Afghanistan, Kyrgyzstan, Pakistan and Tajikistan ('CASA-1000'), was rated as "high" by the World Bank, with substantial social risks identified in Afghanistan. See: World Bank (2014a).

65 In the case of the CASA-1000 project, community support programmes aim to share the project's benefits with those communities living along the way, in a bid to increase local support and decrease social risks.

3. Engaging with stakeholders

There are usually multiple stakeholders involved in cross-border infrastructure projects, including regional and sub-regional institutions, MDBs, sovereign and local governments, the private sector, local communities, and civil society organizations. They all have a critical role to play in supporting cross-border infrastructure development, and therefore should not be overlooked in project planning, as early engagement is of particular importance. Conversely, decisions that are taken by policy-makers and planners without early consultations can result in significant risks that will subsequently imperil a project, or require changes in design that add to the project costs.

3.1. Regional and sub-regional institutions

There is a strong role for regional and sub-regional institutions in developing soft infrastructure to support physical cross-border infrastructure. Cross-border infrastructure projects require not only long-term planning and inter-governmental agreements, but also a high degree of coordination in the implementation phase. Regional and sub-regional institutions or cooperation programmes, such as ASEAN, the Central Asia Regional Economic Cooperation (CAREC), the Greater Mekong Sub-region (GMS) and ESCAP are all important in formulating transnational policy frameworks, ensuring proper regulatory environments, harmonizing technical standards, and building institutional capacity. The inputs of such regional and sub-regional institutions or cooperation programmes are also of utility in supporting governments to engage with stakeholders and in managing emerging conflicts or disputes (Kuroda, 2006), often serving as respected and impartial arbiters. At every stage of project development, effective institutional arrangements can be important for promoting coordination among stakeholders, and ensuring each party's responsibility and accountability (Zhang, 2011).

As previously noted, one major difficulty in the implementation of cross-border infrastructure projects is ineffective coordination among different governments on crucial decisions regarding project design, financing and operations. As such, cross-border infrastructure initiatives can seek to establish common frameworks to facilitate international coordination from the beginning (Massoni and Abe, 2019). It is therefore worth considering the utility of preparation activities conducted at the regional level, rather than at the national level, where the necessary skills maybe scarce. Project preparation at the regional level also helps to build and disseminate best practices, capture learning, and leverages the momentum to implement other successful projects in the region. A regional approach is often better suited to the implementation of cross-border projects, especially when these

involve: i) the management of shared resources (such as river basins bordered by multiple countries); ii) the need to harmonize policies and regulations among multiple countries (such as the interconnection of countries' power systems within a regional power pool); or iii) reconciling the sometimes competing development objectives of different countries.

Adoption of a common policy framework helps strengthen stakeholders' commitment. The case of the Bay of Bengal Gateway (BBG), a submarine communication cable aimed at supporting bandwidth growth between the Middle East, the Indian sub-continent and Southeast Asia, offers some useful insights in this regard[66]. The BBG had a common policy framework and standards, which helped significantly to improve common understanding in the market, and encouraged the establishment of a regional infrastructure based on these standards. A critical issue that emerged in the operational phase of the project, however, was the lack of 'peering agreements' among the participating countries. Peering agreements, a mainstay of the Internet and other large data mobility systems, define how data routing responsibilities across multiple networks will be shared between different network administrators. Without such peering agreements between two carriers from different countries, the data traffic delivered by a cable, such as the BBG, can be delayed as it goes through numerous local nodes before reaching the other operator's network (Houpis and others, 2016). This process not only adds delays to data transmission, but also discourages different parties from accessing newly established cables, choosing instead to remain reliant on existing cables. Such behaviour hinders competition in the network market, lessens the rate of coverage for the broader population, and potentially hinders innovation in the countries concerned.

Cross-border initiatives can also provide benefits for both producers and consumers through economies of scale, generating additional revenues for producers, while consumers gain from lower cost. For example, the Nam Theun 2 (NT2) hydro-electricity project in Lao People's Democratic Republic (Lao PDR) generated $ 1.9 billion in foreign exchange earnings over a period of 25 years, through the sale of electricity to Thailand, and thereby helping the latter to meet its electricity needs, but it also provided an electricity 'off-take' to meet Lao PDR's own, far more modest, power needs[67]. Regional platforms can facilitate dialogue between countries, and thus help in the identification and prioritization of cross-border projects. It can also help establish regional regulatory mechanisms to ease the implementation of cross-border projects, and prepare guidelines for

[66] For further details, see: Bay of Bengal Gateway (2019).

[67] For a profile of the project, see: Nam Theun 2 (2019).

cross-border procurement. In instances where there are multiple buyers and sellers, harmonized policy guidelines and a common standard on contractual agreements should be adopted, in order to protect public benefits and ensure fair treatment over power exchanges. The case of the Southern African Power Pool (SAPP) provides a notable example of efforts to adopt best practices for such a harmonized framework[68].

For some cross-border infrastructure in the transport sector, benefit sharing among the origin, destination and transit countries can become a delicate issue. Differing from state-level projects, cross-border infrastructure projects involve no single jurisdiction to enforce a fair system of costs and benefits. In a bid to ensure the benefits of the transit countries, inter-governmental dialogue is important, and a strong emphasis should be put on environmental and social safeguards. In the case of the GMS Northern Economic Corridor project, for example, as most of the immediate benefits accrued to China and Thailand, these two countries provided Lao PDR concessional resources and took on most of the project investments. The Asian Development Bank (ADB) also regularly monitored implementation of the resettlement and social action plans in Lao PDR, addressing issues such as primary health care, non-formal education, income restoration, land zoning and titling, community rural access roads, community infrastructure, water and sanitation, and road safety awareness.

Box 4.1

Financing cross-border infrastructure through sub-regional cooperation

Under the Master Plan on ASEAN Connectivity 2025 (ASEAN Secretariat, 2016), ASEAN member States, in cooperation with the Government of Australia and the World Bank, selected 19 priority infrastructure projects in the transport, energy, and information and communication technology (ICT) sectors to enhance sub-regional cross-border connectivity (see table 4.1). Those priority projects are expected to complement and strengthen the existing cross-border economic and transport corridors by enhancing connectivity and mobilizing investments along them. Feasibility studies will be undertaken to determine appropriate financing options for each of the projects through an assessment process of the projects' strategic relevance, impact on sub-regional connectivity, environmental, social and governance (ESG) impact, and contracting agencies' implementation capacity. In so doing, ASEAN member States aim to build their capacity to design proper financing modalities for cross-border infrastructure as they frequently face budget constraints and competing demands for financial resources to address infrastructure investment needs. Feasibility studies, including financing options, are scheduled to be launched in November 2019.

[68] See: SADC (2019).

Table 4.1

ASEAN's priority infrastructure projects to enhance cross-border connectivity

Project name	Country	Sector	Type
Jalan Rasau, Kuala-Belait District Upgrading Roadwork from Single Lane to Dual Carriageways	Brunei Darussalam	Road	Brownfield
Siem Reap to Rattanakkiri National Roads Upgrading	Cambodia	Road	Brownfield
Kuala Tanjung International Hub Port and Industrial Estates	Indonesia	Port	Greenfield
Expansion of Passenger Terminal Hang Nadim International Airport (Batam)	Indonesia	Airport	Brownfield
Development of Kijing Port	Indonesia	Port	Greenfield
Upgrading National Road No. 2W on the Asian Highway (AH13)	Lao PDR	Road	Brownfield
Upgrading National Road No. 8 on the Asian Highway (AH15)	Lao PDR	Road	Brownfield
Lao PDR-Viet Nam Power Transmission Line	Lao PDR	Power	Greenfield
Lao PDR-Viet Nam Power Transmission Line (Lao PDR side)	Lao PDR	Power	Greenfield
Lao PDR-Viet Nam Power Transmission Line (Myanmar side)	Myanmar	Power	Greenfield
Nay Pyi Taw-Kyaukphyu Expressway	Myanmar	Road	Greenfield
Muse-Tigyaing-Mandalay Expressway	Myanmar	Road	Greenfield
Yangon-Mandalay Expressway Improvement	Myanmar	Road	Brownfield
Tarlay-Phasho-Kyainglat Road Upgrading	Myanmar	Road	Brownfield
ASEAN Digital Hub	Thailand	ICT	Greenfield
Hat Yai-Sadao Motorway	Thailand	Road	Greenfield
Bangkok-Nong Khai HSR Development for Regional Connectivity	Thailand	Railway	Greenfield
Southern Coastal Corridor Project, Phase 2	Viet Nam	Road	Brownfield
HCMC-Moc Bai Expressway	Viet Nam	Road	Greenfield

Source: ASEAN Secretariat (2019).

Notes: High speed rail (HSR); Ho Chi Minh City (HCMC).

Box 4.2

The Infrastructure Financing and PPP Network of Asia and the Pacific

As part of the United Nations' mandate to support member states meet the challenges of the 2030 Agenda for Sustainable Development, ESCAP is mainstreaming infrastructure financing issues into its work. In this regard, the organization launched in 2018 a regional network on infrastructure financing and public-private partnerships (PPPs), intended to provide a regular platform on which experts can exchange best practices, share their experiences and knowledge products, and provide capacity-building support. The Network's main goal is to support countries' efforts in efficiently attracting private sector participation in public infrastructure projects, especially through PPP arrangements.

With the support of China's Public Private Partnerships Center (CPPPC), the first meeting of the network focused primarily on enhancing the institutional capacity of the existing national PPP units of the region. The event gathered government officials from 23 member countries, infrastructure and capital market specialists and representatives from development partners (ADB and World Bank). In future events, the private sector is also expected to participate and make a strong contribution. These regional events highlight the network's privileged position in facilitating open discussions between stakeholders.

The Infrastructure Financing and PPP Network is also developing web–based knowledge sharing resources to consolidate information on PPP institutions, project pipelines, investment demand and market environment in the region. This online platform is expected to serve as a powerful tool for capacity building and motivate dialogue and cooperation among member states.

3.2. Multilateral development banks

MDBs can support the development of cross-border infrastructure development from multiple aspects. First, they can provide financial instruments and project preparatory technical assistance. For instance, the World Bank Group has two lending arms, the International Bank for Reconstruction and Development (IBRD) and International Development Association (IDA), providing grants and loans for projects in less developed countries to reduce poverty and build shared prosperity. The ADB provides technical assistance in support of cross-border infrastructure projects in Asia and the Pacific region, such as providing project preparation assistance, helping develop public-private partnerships in some cases, and capacity building services. Secondly, MDBs can also provide risk management instruments to attract commercial investments. Guarantees and risk insurance products are important tools to stimulate FDI and private sector investments in infrastructure projects. And they are particularly important for cross-border infrastructure projects, given the high-risk profile of these projects. Thirdly, MDBs can help in addressing the asymmetric distribution of costs and benefits across different countries or

communities, with due diligence on environmental and social plans. This can be particularly important when landlocked and less developed countries are involved in projects. And finally, participating governments have shown a commitment to mitigate long-term environment and social risks as part of their compliance with MDBs' safeguards policies, and other best practice 'conditionalities' attached to the latter's participation.

Box 4.3

Northern Economic Corridor in the GMS: the role of MDBs has been more than direct finance

In the case of the GMS Northern Economic Corridor project, which connects Thailand and China through a road link via Lao PDR, the ADB provided $ 33.4 million in concessional ordinary capital resources lending (ADB, 2014). The cost-sharing among the other parties was that China financed $ 38.9 million, Thailand financed $ 44.4 million and an additional repair cost of $ 11.3 million, and Lao PDR financed $ 3.2 million. The ADB also contributed to project monitoring and coordination, and took special care to secure a relatively fair distribution of costs and revenues across the three countries, and assisted the Lao government in negotiating with the other two countries. As a result, an evaluation of the project suggested that the project had a significant and equitable socio-economic impact on local communities.

Source: ADB (2014).

3.3. Private sector firms and foreign investors

It has already been noted that there are relatively few cases of FDI and private sector participation in cross-border infrastructure projects in Asia and the Pacific. Private sector and foreign commercial investors often have too few incentives to finance cross-border infrastructure, principally due to the additional challenges and risks associated with them. Some countries – such as China, Indonesia, Malaysia, and the Philippines – are also deemed to high degrees of restrictiveness with regard to FDI activity, further disincentivising potential investors[69]. Private sector investors sometimes need to compete with state-owned enterprises (SOEs), MDBs or other sources of development assistance and 'soft funding' (e.g. loans provided at discounted rates of interest and other beneficial terms). In practice, the private sector's involvement in cross-border infrastructure tends to be at the implementation phase, typically as contractors, but it can and should be involved earlier. The private sector can be an immensely useful resource, and provide a range of competencies, skills and experience. It can also sometimes be more adept at forecasting the expected costs, benefits, and returns of individual projects. To attract domestic private sector

[69] See OECD's FDI restrictiveness index (OECD, 2019).

investments or FDI, engagement with the private sector and foreign investors should be institutionalized at an early stage, so that they too can express their valid interests and concerns. The case of ESCAP's Infrastructure Financing and PPP Network illustrates a way to successfully engage member countries, the private sector, and development partners.

3.4. Governments and state-owned enterprises

For cross-border infrastructure projects, the role of national governments and SOEs is often fundamental, as most cross-border projects are financed by the public sector. Governments have a major role in providing clear political support for creditworthy projects, ensuring an enabling investment environment for private domestic and foreign investors, as well as building capacity of contract management and inter-agency coordination.

3.5. Local communities and civil society organizations

As discussed earlier, cross-border infrastructure projects tend to face more complex and challenging social and environmental risks than most domestic projects. Appropriate environmental and social risk management procedures can reduce these risks as well as maximize the benefits to users, as well as the population at large. Since the affected local communities bear much of the cost, even to the extent of losing their traditional livelihoods and land (Kuroda, 2006), civil society organizations can provide a critical channel for their voice to be heard, and for the right compensation arrangements to be made and honoured.

Box 4.4

Environmental and resettlement issues on the Phnom Penh to Ho Chi Minh City highway project

The ADB-funded project's goal was to improve connectivity through the rehabilitation of an existing road connecting Phnom Penh in Cambodia with Ho Chi Minh City in Viet Nam. The environmental impacts of the project were initially estimated to be relatively limited. The civil works contractors, however, did not fully comply with the environmental impact mitigation measures laid out in the contract documents, which then caused more environmental issues than expected. Complaints were filed in Cambodia, claiming that the compensation payments were not enough to restore the economic and social bases of the people affected. These resettlement issues hampered the completion of the whole project. In a bid to resolve the problem, the ADB undertook resettlement audits involving the project-affected people and communities, which were then used to enhance the resettlement arrangements and determine the appropriate compensation to be provided.

Sources: ADB (2007); Zhang (2011).

4. Aiming for sustainable cross-border infrastructure development with the Belt and Road Initiative

Cross-border infrastructure initiatives have considerable potential to overcome the complexities of trans-boundary infrastructure issues. In Asia and the Pacific, the Belt and Road Initiative (BRI) is the largest of such initiatives, both in terms of geographic scope and in the level of ambition. This section outlines how the BRI is seeking to address the challenges and risks of cross-border infrastructure projects, highlighting in particular its efforts to include a sustainability component in the projects it supports, and the links with the 2030 Agenda. The BRI was initially proposed in 2013 by China's President Xi Jinping as a new strategy and framework to support the development of the 'Silk Road Economic Belt' and the '21st Century Maritime Silk Road'. By improving transport, energy and ICT infrastructure connectivity, as well as promoting trade and industrial development, the BRI aims to accelerate the integration of regional markets and people across Asia, Africa and Europe[70]. Geographically, it is expected to connect 65 countries that collectively represent one-third of global economic output, and around two-thirds of the world's population. However, as of March 2019, official data suggested that 125 countries had already signed collaboration agreements (World Bank, 2019a)[71]. The potential of the BRI to stimulate economic and social development in Asia is deemed to be considerable, with landlocked, less developed and developing economies most likely to benefit from a new-found ability to participate in global value chains. But given the numerous risks and challenges faced by cross-border infrastructure projects, can the BRI adequately address them to achieve the envisioned benefits? The BRI's ambitious scope may well be crucial in its ability to overcome these challenges. Key issues include:

- *Large and complex investment needs:* As the BRI covers so many countries and sectors, it can be a venue for coordination to reduce the risks arising from dealing with many countries. The BRI, for example, is the only scheme covering numerous railway projects in Asia, such as between the European Union (EU) and China, and therefore be a vehicle to coordinate between all country stakeholders on cross-border transport;

[70] These objectives are set down in the BRI's five cooperation priorities: i) policy coordination; ii) facilities connectivity; iii) unimpeded trade; iv) financial integration; and v) people-to-people bonds (China, NDRC, 2015).

[71] China announced from the beginning that the BRI was an open arrangement, welcoming any country to participate, regardless of their location.

- *Lengthy maturation cycles:* With MDBs and development finance institutions (DFIs) signing memoranda of understanding (MoUs) to participate in the BRI, projects can gain access to long term financing from such institutions;
- *Long-term foreign currency denominated liabilities:* The MDBs play a critical role in addressing this challenge, and so MDBs' participation in the BRI can help addressing this issue;
- *Political risks:* The BRI can provide a long-term planning framework that member countries (and not just China) can work to shape;
- *Regulatory risks:* A core purpose of the BRI is to align ambitions on infrastructure development between participating countries. By signing on to and taking part in shaping the BRI, countries will be less likely to subsequently carry out policy reversals on infrastructure projects that involve other BRI countries, having already made pledges to each other and aligned their plans;
- *Institutional capacity and coordination issues:* The BRI Forum takes place every two years and has a clear focus on capacity building for participating countries and organizations, as well as on coordinating efforts;
- *Social and environmental risks:* The BRI Green Investment Principles were launched at the BRI Forum in 2019 as voluntary principles for participating organizations to address environmental risks; and
- *Harmonizing technical standards:* Again, the BRI can provide a venue for settling such discrepancies by providing a forum for dialogue and agreement on standards.

Even though the BRI was designed independently from the 2030 Agenda for Sustainable Development, they are clearly inter-connected. One of the stated objectives of the BRI initiative is to contribute to "diversified, independent, balanced and sustainable development" of the partner countries[72]. The BRI's official document, 'Vision and Action', highlights the principles shared with the United Nations Charter: mutual respect for each other's sovereignty and territorial integrity, mutual non-aggression, mutual non-interference in each other's internal affairs, equality and mutual benefit, and peaceful coexistence[73]. These same principles are at the core of the 2030 Agenda. On a more pragmatic level, one can easily identify links between the 17 Sustainable Development Goals (SDGs) promoted by the

[72] For a comprehensive profile of the BRI, see: BRI (2019).

[73] The full document can be found at: China, NDRC (2015).

United Nations, and the five BRI Cooperation Priorities (BRI-CPs) established by the Government of China. Perhaps the most obvious and direct link is between SDGs 7, 8 and 9 ("affordable and clean energy", "decent work and economic growth" and "industry, innovation and infrastructure") and BRI-CPs 2 and 3 ("facilities connectivity" and "unimpeded trade"). Further, in the same year as the adoption of the 2030 Agenda for Sustainable Development, the Addis Ababa Action Agenda (AAAA) was also launched. This occurred during the Third International Conference of Financing for Development in 2015. The AAAA's main objective was to set down the various means of implementation for the SDGs, categorising them into seven action areas. Also aligned to these action areas are the BRI-CPs. For instance, the complexities of financing infrastructure projects with private sector participation are mentioned in action area B (domestic and international private business and finance), along with a call for action for both private and public sectors alike. Similarly, BRI-CP 3 (financial integration) emphasizes the need to encourage commercial equity investment funds and private funds to participate in the construction of the projects supported by the Initiative.

Despite the BRI and the 2030 Agenda being closely aligned in their core values and principles, some issues could arise that, if overlooked, might negatively affect the implementation of the 17 SDGs. In particular, environmental threats are particularly alarming. These include higher pollution and greenhouse gas (GHG) emissions, biodiversity loss, as well as land and ecosystem degradation. The China-Pakistan Economic Corridor, for instance, will pass through an already narrow strip of cultivated land in western Pakistan, which may well adversely impact on existing farmland and orchards[74]. Other concerns, such as social dislocation due to loss of land, voluntary resettlement or marginalization of minority groups, are also present. The China-Central Asia-West Asia Corridor, for example, must contend with tensions around ethnicity[75]. There is therefore a need to protect local cultures and the identities of various communities. Some other corridors, like the New Eurasia Land Bridge Corridor, will run through areas with low population density (such as some regions in Kazakhstan and the Russian Federation)[76]. This tends to suggest that construction projects may need to rely on migrant labour, and attention will need to be paid to ensuring decent working conditions, and avoiding discriminatory behaviour towards migrant workers. With the increased connectivity promised by the BRI, the flow of illicit trade across borders could also potentially increase. Human trafficking, whether for illegal labour or sexual

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[74] For details on the China-Pakistan Economic Corridor, refer to: CPEC (2019).

[75] For an insightful comparison of these two economic corridors, see: Fulton (2016).

[76] See: HKTDC Research (2019).

exploitation is a threat, especially in the China-Indo-China Peninsula Corridor[77]. The level of drug trafficking may also increase in the Bangladesh-China-India-Myanmar Corridor[78]. And as a result of these illicit flows, there are growing and legitimate concerns regarding the spread of HIV/AIDS.

Looking beyond the BRI, a number of other regional and sub-regional infrastructure initiatives also exist. They include:

- *ASEAN*: Adopted in 2016, the key infrastructure plan under the ASEAN framework is the *Masterplan on ASEAN Connectivity 2025* (ASEAN Secretariat, 2016). With a broad coverage of physical, institutional, and people-to-people connectivity, the creation of sustainable infrastructure is a key sub-component. Key initiatives under this component include a pipeline list of projects, a platform to measure infrastructure productivity, and developing sustainable urbanization strategies for ASEAN countries.
- *European Union (EU)*: On the western edge of the BRI, the EU is a key stakeholder, both as a significant market and financier of BRI projects. The EU's core strategy in this regard is the 'Connecting EU and Asia Strategy', launched in September 2018, with a focus on transport, energy, digital, and human dimensions[79]. The EU and Chinese leadership clearly indicated their desire to cooperate in the Joint Statement of the 20th EU-China Summit of July 2018, which included a strong focus on sustainability and climate change. In a bid to jointly promote infrastructure investment and funding, the EU-China connectivity platform was launched by the European Commission in late 2015, leading to initiatives like the Trans-European Transport network and the upcoming China-EU Co-investment Fund (CECIF) (EIF, 2018).
- *United States*: The Department of State's launch of the 'Free and Open Indo-Pacific Strategy', in 2018, includes provisions on sustainable infrastructure, and initiated the Infrastructure Transaction and Assistance Network as an inter-agency body to coordinate efforts to assess projects, direct development finance, and give technical assistance (United States, Department of Defense, 2019). Further, the United States International Development Finance Corporation was established in 2018, with

[77] Ibid.

[78] Ibid.

[79] For further details, see: EEAS (2018).

$ 60 billion in funding, and has the potential to play an important role in supporting Asian and Pacific infrastructure[80].

- *Japan*: As a historically important provider of funds for infrastructure development in Asia and the Pacific, Japanese initiatives continue to play a critical role. Together with the ADB, Japan aims to deliver the 'Partnership for Quality Infrastructure: Investment for Asia's Future' plan, which includes $ 110 billion for infrastructure investment in the 2015-2020 period. Further, there is the Japan-India joint 'Asia Africa Growth Corridor' plan.
- *Ayeyawady-Chao Phraya-Mekong Economic Cooperation Strategy (ACMECS):* ACMECS is a cooperation agreement between Cambodia, Lao PDR, Myanmar, Thailand and Viet Nam. At the 8th meeting in 2018, the countries established an 'ACMECS Master Plan' for 2019-2023, under the vision of 'Building ACMECS CONNECT by 2023'. The plan specifically mentions an ambition to narrow the development gap, contribute to the process of ASEAN community building, and to achievement of the SDGs, as well as the 2015 Paris Agreement on Climate Change[81].
- *Greater Mekong Sub-region (GMS)*: With a similar scope to ACMECS, but adding the Chinese provinces of Yunnan and Guangxi, the GMS was launched in 1992 to enhance economic relations between countries. The GMS' two current strategic documents, the Hanoi Action Plan and the Regional Investment Framework, were approved in March 2018. Many of the projects being pursued by the GMS include cross-border infrastructure components[82].
- *Shanghai Cooperation Organization (SCO)*: Established in 2001, currently with eight members, the SCO has increasingly prioritized cooperation on infrastructure. This was the key outcome of the 2015 meeting where transport infrastructure was identified as the most pressing issue for the region. In terms of coordination with other initiatives, the SCO is well aligned with BRI efforts, given the key role of China in both initiatives[83].

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80 In addition, in 2018, Secretary of State Michael R. Pompeo announced $ 133 million in funding for initiatives relating to Asian digital economy, energy, and infrastructure, and particularly to support the ASEAN Connect initiative, the Asia-Pacific Economic Cooperation (APEC), the Lower Mekong Initiative, and the Indian Ocean Rim Association.

81 For details, see: ACMECS (2019).

82 See: ADB (2019).

83 For details, see: SCO (2019).

- *Eurasian Economic Union (EEU)*: As both a political and economic union, the EEU comprises Armenia, Belarus, Kazakhstan, Kyrgyzstan and Russian Federation, and is centred around a single customs market that was established in 2010. Energy and transport infrastructure is a key priority for the EEU, and the union has focused considerable attention on establishing a common gas market[84].
- *Central Asian Regional Economic Cooperation (CAREC) Programme*: Made up of 11 countries, CAREC was initiated in 2001 to develop regional projects and initiatives for sustainable economic growth and prosperity in the region. By 2018 the initiative had mobilized $ 32.9 billion worth of investments spanning multi-modal transportation networks, increased energy trade and security, facilitated free movement of people and freight, and had laid the groundwork for economic corridor development. The initiative has strong multilateral involvement, officially partnering with the ADB, the European Bank for Reconstruction and Development (EBRD), International Monetary Fund (IMF), Islamic Development Bank (IsDB), United Nations Development Programme (UNDP), and the World Bank. With China as a member, and both CAREC and BRI having a strong connectivity focus, the overlap between the two initiatives is clear, and efforts have been made to support each other[85].

It is clear that some BRI-labeled infrastructure projects overlap significantly with the ambitions of these various other regional initiatives, and project developers and financiers will need to take into account these initiatives as well[86].

5. Three key policy considerations and conclusions

In light of the discussion of cross-border infrastructure financing outlined above, there are three key factors that policy-makers should be mindful of when addressing the issue of cross-border development. They relate to: risk, private sector participation, and regional collaboration. Let us briefly review each of these in turn.

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84 For details, see: EAEU (2019).

85 See: CAREC (2019).

86 A number of additional sector-specific infrastructure initiatives exist in Asia and the Pacific, such as: i) the South Asia Sub-regional Economic Cooperation (SASEC) programme; ii) the Inter-governmental Agreement on the Asian Highway Network; iii) the Inter-governmental Agreement on the Trans-Asian Railway Network; and iv) the Inter-governmental Agreement on Dry Ports.

5.1. Efficient risk allocation

Key risks need to be allocated between private and public sector actors throughout the various stages of a project's development. Efficient allocation of risk reduces uncertainties over the distribution of rights and obligations when things do not work out as planned, and a risk allocation matrix can help to identify the optimal risk mitigation measures to be adopted. A strong correlation exists between proper risk identification and management and successful project outcomes. Even private sector-led projects require effective public sector capacity to oversee, monitor, regulate, co-fund, and undertake other obligations, with a contract management authority often established in the case of large infrastructure projects.

In the case of the NT2 hydropower project in Lao PDR, the project's risk allocation was shared by the Lao government, private sector participants and two multilateral guarantees from IDA and the Multilateral Investment Guarantee Agency (MIGA), broadly following the risk allocation format of the traditional build-own-operate-transfer (BOOT) model. The project was implemented by a special purpose vehicle (SPV) – Nam Theun 2 Power Company (NTPC) – formed by the Électricité de France (EDF) (with a 40 per cent stake), the Lao Holding State Enterprise (LHSE) (25 per cent), and the Electricity Generating Public Company of Thailand (EGCO) (35 per cent). The structure of the project allowed risks to be allocated to various parties that were responsible for specific project activities. For example, as head contractor, EDF had full responsibility for overall project management and delivery of the completed project. EDF sub-contracted the construction work through five principal sub-contracts (three for civil works and two for electro-mechanical packages), thereby passing some of the construction risks on to these sub-contractors. Revenue risk was covered by the Thai utility, Electricity Generating Authority of Thailand (EGAT), in the form of a 'take or pay' Power Purchase Agreement with NTPC. Table 4.2, below, provides a breakdown of the risk allocations.

Macro-economic risks can occur unexpectedly, and can influence multiple countries simultaneously, and so the adoption of appropriate mitigation measures through effective and systematic coordination is necessary. Evidence from NT2 project illustrates how hedging mechanisms can also be adopted to help mitigate foreign currency risk, using a tariff profile that was structured into two tiers (local and United States dollar indexed), so as to match the project financing.

Regional projects can also involve more local financing from local development banks and domestic capital markets. In this way, there is limited need for a derivative product or indexation to mitigate currency

Table 4.2

Key risk allocations of the NT2 project in Lao PDR

		Allocation of key risks			
Phase	Risks/ obligation	Project sponsors and private participants	Lao PDR	IDA partial risk guarantee	MIGA guarantee
Pre-construction	Project design	●			
	Pre-construction works	●			
	Financing	●			
Construction	Cost overruns	●			
	Construction delays	●			
Operations	Operation and maintenance	●			
	Tariffs	●			
	Transmission	●			
	Hydrological	●			
Concession terms	Thai baht devaluation	●			
	Lao PDR political force *majeure*[87]	●	●	●	●
	Changes in Lao PDR Laws		●	●	●
	Natural force *majeure*[88]	●	●	●	●
	Lao PDR expropriation		●	●	●
	Thailand political force *majeure*	●			●
	Thailand expropriation	●			●
	Thailand/ Lao PDR transfer restrictions and inconvertibility		●		●

Source: World Bank (2005).

[87] Political force *majeure* includes: political violence, war, national and regional strikes, coups d'etat, etc.

[88] Natural force *majeure* includes: 'acts of God', earthquakes, fires, typhoons, etc.

and cross-border risks[89]. However, as the examples show, there is limited long-term financing available in local markets at such scale. Countries with incumbent legal tenders as United States dollars – Timor-Leste, Marshall Islands, Micronesia (Federal States of), and Palau – are exposed to risks of currency mis-matches if they introduce their own domestic currencies during the long concession periods. In this instance, Timor-Leste's Tibar Bay Port gives a precedent. The project's concession agreement established that in case of a change of currency, and if the concessionaire is required by the Government of Timor-Leste to start operations in the domestic currency, an automatic monthly tariff adjustment mechanism would apply, to reflect the exchange rate fluctuations and eliminate the foreign exchange risk[90].

Box 4.5

Using hedging instruments to mitigate 'forex risk'

As noted earlier, an important financial risk factor for infrastructure projects – and indeed, other investment activities in pursuit of the SDGs – is that of foreign exchange risk. So-called 'hard currency' tends to dominate financing flows into developed and developing countries, including funding assistance for infrastructure projects. But these countries often have quite volatile exchange rates, which makes predicting the volume of local currency needed to service hard currency debt tricky. Worse still, any significant depreciation in the value of the local currency, relative to hard currencies, can spell significant financial distress for the recipient country. A similar risk is evident in hard currency financing of individual infrastructure projects. For example, a loan to help underwrite an investment in an infrastructure project is denominated in one currency, such as United States dollars, but the anticipated revenue stream from the project's subsequent operations will be denominated in a different, local currency (or even multiple local currencies in the case of cross-border projects). As the exchange rate for those currencies will inevitably change over time, this risk is typically passed on to the lead developer of the project, often a sovereign government, and/or passed on to the users of the project through higher fees. For infrastructure projects that are seeking to bring essential public services to poor communities, the risk that these same communities will have to pay considerably higher fees for those services, solely because of foreign exchange rate fluctuations, is not an acceptable risk. Indeed, it is a serious flaw in the conventional model of hard currency financing of development projects that can actually result in more harm than good.

Until now, the most common way of mitigating this risk has been the issuance of guarantees that seek to protect the recipient from any adverse shift in exchange rates. But these can be costly to arrange, and may also pose some degree of moral hazard for the lender. Another way of mitigating this risk is to use cross-currency hedging instruments that entail agreements between relevant parties to exchange currencies at pre-agreed times and

89 Further details can be found at: World Bank Blogs (2017).

90 Further details can be found at: World Bank (2017).

rates. These instruments were initially developed to assist micro-finance institutions to tap larger pools of funding ('liquidity') from outside the local market by allowing them to borrow hard currency funds from overseas, but with hedging cover to protect them from 'forex risk' (i.e. that repaying the principle and the interest on the loan would not increase in local currency terms as a result of a local currency depreciation). But they have now been extended to other development fields, including infrastructure.

There are two common forms of such hedging instruments: forward contracts, and cross-currency swaps. In forward contracts, an agreement is reached to buy or sell an agreed amount of a currency as a specific price and date in the future. The exchange rate is 'locked in', even though the trade will not occur until a pre-agreed point in the future. Cross-currency swaps essentially bundle forward contracts together, and are agreements to exchange multiple fixed amounts (e.g. the principal on a loan, plus interest payments) in two different currencies. This allows for a stream of payments denominated in one currency to be exchanged for a stream of cash flows denominated in another currency, at an agreed rate. Cross-currency swaps are either in the form of 'deliverable contracts', where all cash flows are in a local currency, or 'non-deliverable', whereby cash flows are 'settled' in a 'hard currency', such as United States dollars, despite actually being denominated in a local currency. Either way, such instruments remove much of the 'forex risk' entailed in the infrastructure financing, making for a more attractive business proposition for private sector actors, and a much less uncertain prospect for planners and policy-makers.

Such hedging instruments have been used on a wide range of infrastructure investment projects, ranging from green energy and off-grid solar distribution, to clean water supplies, and transport services. They have also been used to support the issuance of local currency bonds, issued offshore to tap overseas investors' appetite for exposure to these countries, including in the currencies of Armenia, Azerbaijan, Kyrgyzstan, Myanmar, Pakistan, Papua New Guinea, Sri Lanka, Tajikistan, and Uzbekistan, among others[91]. The funding raised by these bonds can then be used for a range of public spending needs, including infrastructure investment. One company that offers such a service is The Currency Exchange Fund, or TCX, with products spanning over 70 local currencies, many of which are in Asia and the Pacific. This wide spread of countries and currencies provides a degree of diversification that can allow TCX to absorb much of the risk associated with currency fluctuations and volatility. An impact assessment, conducted in 2017, into the first ten years of TCX's operations found that 15 per cent of its hedging work had been in Asia (excluding Central Asia and the Pacific), that less developed countries accounted for 15 per cent of the hedging portfolio, and a further 15 per cent was in low income countries, and that infrastructure projects accounted for just 7 per cent of all hedging finance provided, compared with 64 per cent for micro-finance and 17 per cent for SME finance[92]. In the specific context of infrastructure, TCX argues that

[91] For more on TCX and currency hedging in developing and less developed countries, see ODI (2018).

[92] See Carnegie Consult (2018).

> "... for the required long-term financing structures needed for most infrastructure projects, local currency [and not hard currency] is, over time, generally the most cost-effective solution"[93].

5.2. Promoting private sector participation

Thus far, there has been relatively modest private sector participation in cross-border infrastructure projects. In Asia and the Pacific, only a few cross-border infrastructure projects have been able to attract private sector interest after a full international competitive process. They include the NT2 Hydropower project in Lao PDR, the Tibar Bay Port project in Timor-Leste, and the CASA-1000 project across several Central Asian countries. Key common success factors include: i) proper strategic planning of the overall regional framework; ii) strong project preparation; iii) a robust understanding of the risks and mitigation measures needed; and iv) budget efficiency. All three projects also had strong financial involvement and risk mitigation arrangements with MDBs, and the involvement of SOEs, which helped mitigate counterparty risk. As noted earlier, cross-border infrastructure projects often carry additional political or geo-strategic significance, and as a result tend to be driven by governments. But even here, the involvement of the private sector as co-financiers and/or investors is often desirable. The modalities for private sector participation in infrastructure projects have largely tended to comprise of: i) special purpose vehicles (SPVs); and ii) joint ventures (JVs).

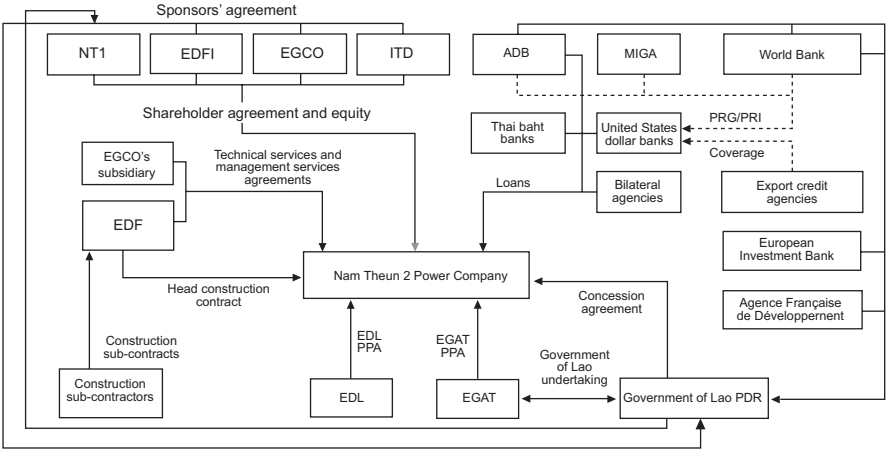
Special purpose vehicles

A special purpose vehicle (SPV) is usually set up by investors exclusively for a specific project. It is an entity that constructs and operates the project, and has no other business interests. Individual investors all work through

[93] See TCX (2019). The article goes on to argue: "One key driver of the persistence of hard currency infrastructure funding in developing markets, is the hard currency off-take agreement model, where exchange rate risk is borne by the off-taker, e.g. the national power utility. Project developers, investors, lenders and even host governments have become so accustomed to this model, that it is now hard to depart from. The [United States dollar] off-take agreement conundrum, i.e. that energy supply in the poorest countries is financed with hard currency, associated often with great economic, social and political cost, can be tackled in different ways. One is to move towards local-currency off-take agreements and hence to local-currency project finance, which will stimulate local debt and capital markets to the extent available and otherwise take the [foreign exchange] risk outside the country and onto the books of foreign lenders and/or their hedge providers. To avoid industry disruption, however, this would have to be phased in gradually, allowing stakeholders to adapt, and debt and hedge markets to adjust and scale up. An example of this gradual approach is seen in Nepal, where projects below a certain [megawatt] threshold are given a rupee off-take contract. Another way is to hedge a utility's currency mismatch resulting from [United States dollars] off-take agreements".

the SPV, and it serves as the main vehicle for the project, operating with its own balance sheet. In the case of NT2 in Lao PDR, 'NTPC' was the SPV responsible for designing, constructing and operating the project, for a concession period of 25 years, after which it will be transferred to the Lao government for continued operation and maintenance (figure 4.1).

Figure 4.1
Nam Thuen 2's contractual and financial structure

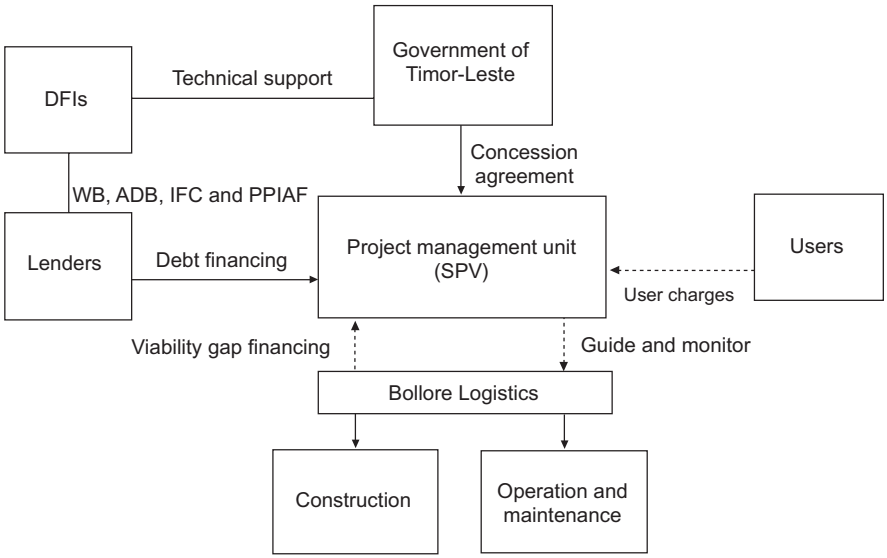


Source: MIGA (2006).

Notes: Asian Development Bank (ADB); Électricité de France (EDF); Électricité de France International (EDFI); Électricité du Laos (EDL); Electricity Generating Authority of Thailand (EGAT); Electricity Generating Public Company of Thailand (EGCO); Italian-Thai Development Public Company Limited (ITD); Multilateral Investment Guarantee Agency (MIGA); Nam Theun 1 (NT1); partial risk guarantee (PRG); political risk insurance (PRI); power purchase agreement (PPA).

The Tibar Bay Port project was also implemented by an SPV – in this case referred to as the project management unit (PMU) – that oversees all aspects of the project. The concession was awarded to a private sector operator, Bolloré Logistics, through a competitive bidding process, resulting in a 30-year build-own-operate-transfer (BOOT) contract, with the possibility of a further extension of 10 years. The PMU is mandated to ensure necessary preparation, effective execution, and constant monitoring of the project from the government side. Bolloré Logistics, under the guidance of the PMU, is responsible for the design, financing, construction and operation of the facility, consistent with the government's masterplan (figure 4.2).

Figure 4.2
Tibar Bay Port's contractual and financial structure



Source: Bisbey (2019).

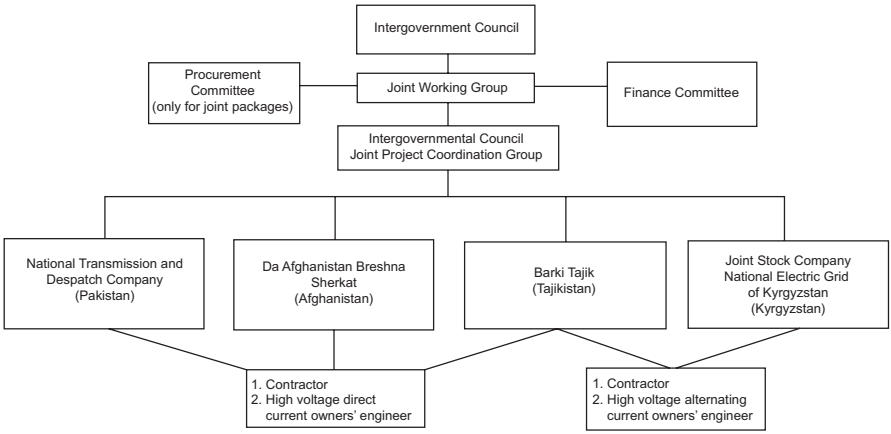
Notes: Asian Development Bank (ADB); development finance institution (DFI); International Finance Corporation (IFC); Public-Private Infrastructure Advisory Facility (PPIAF); special purpose vehicle (SPV); World Bank (WB).

Joint ventures

A joint venture is a formal business arrangement where different parties come together for a specific task. Taking CASA-1000 as an example, a contractual joint venture was established, with four countries each responsible for their own sections of the transmission line. Four power purchase agreements (PPAs) were signed between Kyrgyzstan and Pakistan, between Kyrgyzstan and Afghanistan, between Tajikistan and Pakistan, and between Tajikistan and Afghanistan[94]. Under the contractual joint venture, the four participating countries are each responsible for their own sections of the transmission line, and each government manages its own independent loan financing arrangements with the development finance institutions. Private sector participation is fairly limited, principally taking the form of a Swiss firm, ABB, responsible for the construction of the two converter stations.

[94] Each PPA starts with an initial term of 15 years, and specifies the electricity quantities and prices for each five-year period. After the initial 15 years, each PPA can continue for a further five-year period, or be terminated.

Figure 4.3
CASA-1000's contractual and financial structure



Source: World Bank (2014b).

It is often the case that an SPV or joint venture will retain the services of private sector companies as sub-contractors, such as operating logistics centres, overseeing supplies of necessary and specialized inputs, maintenance, and/or management of day-to-day operations.

5.3. Enhancing regional and sub-regional cooperation

There is clearly a need for a strategic and coordinated regional approach to the development of cross-border infrastructure projects in Asia and the Pacific. This, in turn, requires regional frameworks and agreements that can serve as platforms for improved connectivity and development planning, such as those envisaged along various economic corridors in the region. Regional interventions that can also support the development and adoption of common technical standards and operational rules in member states could do much to bring about more seamless connectivity. The kind of multi-sectoral expertise and capacities that need to be strengthened would also benefit from shared regional learning, including the instruments and modalities by which to infrastructure financing can be improved. The use of blended finance and greater private sector involvement in cross-border infrastructure projects would undoubtedly benefit from enhanced regional and sub-regional interventions that can aid the efficient allocation of resources, and improve the commercial prospects of large-scale projects. But perhaps one of the most important areas where enhanced regional and sub-regional collaboration could play a role in cross-border infrastructure, and its financing, is around issues of sustainability and inclusivity. There is

clearly a need for advances to be made in applying greater social and environmental standards and practices to infrastructure development, and mainstreaming issues such as the impact of climate change and fragile ecosystems into all major infrastructure planning. Cross-border infrastructure activity that can help address challenges of poverty and economic development in large parts of Asia and the Pacific is undoubtedly a field where organizations such as ESCAP can play a critical role, and in a number of valuable ways. The pursuit of the 2030 Agenda and attainment of the SDGs requires bold steps in areas such as environmental and social sustainability, and to bring poor and less empowered communities – some of which straddle sovereign borders – into a more inclusive approach to cross-border infrastructure development, spanning employment, health, land rights, human rights, and potential dislocation. The experience of regional bodies, such as ESCAP and others, have much to contribute in this field, and to ensure that efforts to achieve the SDGs are always a core component of cross-border infrastructure projects of whatever kind.

In conclusion, this chapter has examined the particular challenges entailed in enacting cross-border infrastructure in the region. Such projects are developed and operated under multiple sovereign jurisdictions and state agencies, and the process of putting together and financing viable and sustainable infrastructure projects is inevitably more complex. To successfully increase the financing of cross-border infrastructure, particularly from the private sector, governments in Asia and the Pacific will need to improve the institutional capacities of the relevant state agencies, further develop their legal and regulatory frameworks, and strive to deliver more conducive business enabling environments. By so doing, they will lessen the real and perceived risks of cross-border infrastructure projects for all stakeholders, including state agencies, private sector investors and financiers, infrastructure constructors and operators, among others. A regional approach to project selection, preparation, and implementation can also help to guard against unwelcome risks and inefficiencies. Close coordination and regional cooperation are needed at multiple layers, including through various sub-regional, regional and international fora. The BRI is widely regarded as the most ambitious attempt at such an approach to date. For its part, ESCAP has worked to provide regional platforms, especially the Infrastructure Financing and PPP Network of Asia and the Pacific as discussed in this chapter, and facilitate dialogue between countries in Asia and the Pacific region, and thus help in the identification and prioritization of cross-border infrastructure projects. Establishing regional regulatory mechanisms that could serve to ease the implementation of cross-border infrastructure projects, and prepare guidelines for cross-border transactions and procurements, would also have merit.

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Chapter 5

Infrastructure Financing Challenges of Landlocked Developing Countries and Small Island Developing States in Asia and the Pacific

1. Introduction

The land-locked developing countries (LLDCs) and small island developing States (SIDS) of Asia and the Pacific are two groups of economies that span a diverse range of geographical and climatic conditions, as well as differing economic profiles, infrastructural frameworks and financing capacities. There are 12 LLDCs in Asia: Afghanistan, Armenia, Azerbaijan, Bhutan, Kazakhstan, Kyrgyzstan, the Lao People's Democratic Republic (Lao PDR), Mongolia, Nepal, Tajikistan, Turkmenistan, and Uzbekistan. More than half are transition economies[95]. Similarly, there are 14 SIDS in Asia and the Pacific: Fiji, Kiribati, Maldives, Marshall Islands, the Federated States of Micronesia (Micronesia (FS)), Nauru, Palau, Papua New Guinea, Samoa, Solomon Islands, Timor-Leste, Tonga, Tuvalu, and Vanuatu.

The geographical circumstances of the Asian LLDCs generally put them at a disadvantage in comparison to the coastal countries. Their infrastructural constraints limit access to regional and global markets, negatively impacting their export competitiveness and hindering economic growth. To access foreign markets, Asian LLDCs must go through multiple cross-border facilities and checkpoints, including customs, subjecting them to various weaknesses in regulatory and corridor management systems that can cause border crossing delays and transportation safety issues. All these infrastructure deficiencies can increase transport cost, adding 30-60 per cent to the cost of production (UNCTAD, 2015). LLDCs are therefore typically dependent not only on neighbouring countries' transit infrastructure, cross-border policies and administrative practices but also bilateral political relations. While some LLDCs have better access to international markets indirectly through maritime services, others, such as those of Central Asia,

[95] They are Armenia, Azerbaijan, Kazakhstan, Kyrgyzstan, Mongolia, Tajikistan, Turkmenistan, and Uzbekistan.

depend more on land access to reach their major trading partners. As a result, most discussions on the economic difficulties of LLDCs tends to be dominated by the assumption that the remedy for their situation lies in the development of adequate transportation infrastructure that would facilitate access to the major markets in the world (UNCTAD, 2014).

As a consequence of their small populations and distances between small atolls, the challenges for most SIDS in Asia and the Pacific to provide public services are mainly related to the lack of economies of scale, extreme isolation and remote sources of inputs. Furthermore, many residential areas are located in low-lying coastal areas imperiled by climate change and rising sea levels[96]. Cyclones, flooding, earthquakes and tsunamis are all-natural disasters that have repeatedly impacted on the SIDS. Consequently, for infrastructural frameworks to be sustainable, they must take such natural disasters into account, be of an appropriate scale, and support the main economic sectors. However, weak government planning capacity in SIDS often results in the absence of comprehensive development plans needed to address the state of poor infrastructure. In addition, the operating and maintenance costs of infrastructure in SIDS tend to be considerable, notably on a per capita basis, given both the challenging geographies and the relatively modest and sparsely located consumer base.

The scale of funding that the LLDCs need to close their current infrastructure gap is, on average, about 10.5 per cent of their respective GDP (Branchoux, Fang and Tateno, 2018). The reliance on infrastructure – and the need for financing – is extensive, from roads and bridges to power generation and transmission lines, airports, water supply and sanitation, access to internet and other telecommunications networks; the list goes on. Investment in efficient infrastructure is an essential prerequisite for future prosperity. A similarly wide gap in infrastructure financing is apparent for the SIDS, at approximately 6.5 per cent of GDP (Branchoux, Fang and Tateno, 2018). On average, household access to electricity in the SIDS of Asia and the Pacific is only around 30 per cent, with a high urban-rural coverage disparity, and the cost to build roads can reach four times as much as other locations in Asia and the Pacific (PRIF, 2016). There is a lack of modern seaports, as well as low quality and unsafe airports. Disparities in

[96] Nine of the world's 20 most vulnerable countries to climate change are SIDS in the Pacific, along with four of the region's LLDCs. The 'Vulnerable Twenty' (V20) consist of: Afghanistan, Bangladesh, Barbados, Bhutan, Burkina Faso, Cambodia, Colombia, Comoros, Costa Rica, Democratic Republic of the Congo, Dominican Republic, Ethiopia, Fiji, The Gambia, Ghana, Grenada, Guatemala, Haiti, Honduras, Kenya, Kiribati, Lebanon, Madagascar, Malawi, Maldives, Marshall Islands, Mongolia, Morocco, Nepal, Niger, Palau, Palestine, Papua New Guinea, Philippines, Rwanda, Saint Lucia, Samoa, Senegal, South Sudan, Sri Lanka, Sudan, Tanzania, Timor-Leste, Tunisia, Tuvalu, Vanuatu, Viet Nam and Yemen.

access to clean water and sanitation services are also considerable between urban and rural areas.

In this context, increasing targeted investments and accelerating infrastructure development have become a pressing policy issue in the LLDCs and SIDS of Asia and the Pacific. At a time of greater regional economic integration, strengthening infrastructure investment is necessary to ensure ongoing regional development. In both LLDCs and SIDS, providing adequate infrastructure means fulfilling basic human needs, providing connectivity (both domestic and regional) and improving economic resilience. The ongoing expansion of cross-border trade, people-to-people exchange and capital flows among neighbouring countries increasingly demands greater infrastructure capacity.

A common denominator for LLDCs and SIDS is the challenge of infrastructure financing. Both groups of countries tend to have relatively under-developed domestic financial systems and narrow capital markets, limited public funds, modest private sector, and limited capacity to mobilize financing for infrastructure projects. This chapter aims to provide readers with insights into the challenges and opportunities of infrastructure financing in LLDCs and SIDS with their unique geographic characteristics. It is hoped that the policy-oriented recommendations provided here will be of benefit to all stakeholders seeking to improve the quality and extent of infrastructure provision in Asia and the Pacific.

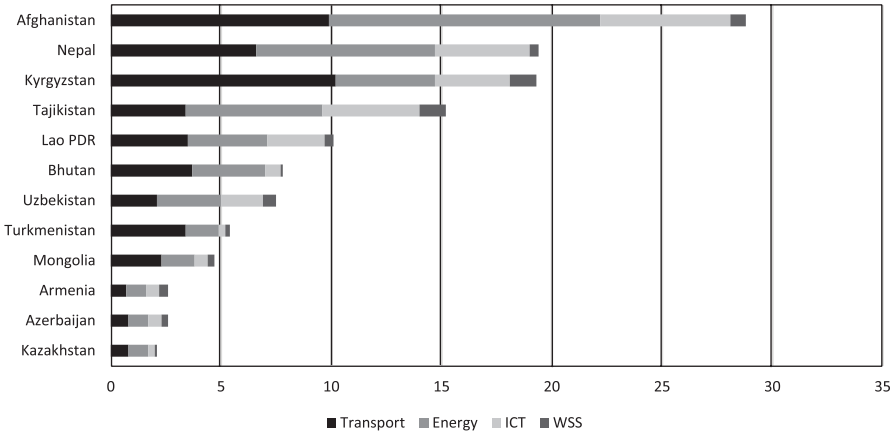
2. Infrastructure development and financing challenges

The United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) has estimated that in countries with special needs (CSNs) in Asia and the Pacific – which includes least developed countries (LDCs), LLDCs and SIDS – on average, 65 per cent of infrastructure projects are funded from government budgets. Of the remaining 35 per cent: i) 15 per cent are financed by the private sector, including foreign direct investment (FDI) and public-private partnership (PPP) arrangements; ii) 10 per cent are financed by loans and credits from multilateral development banks (MDBs); and iii) the remaining 10 per cent are financed by the official development assistance (ODA) (ESCAP, 2017). In contrast, in developed countries, on average only 30 per cent of infrastructure projects are publicly funded, with the majority being financed through other means (World Bank, 2015). This would suggest that policy-makers in many LLDCs and SIDS have yet to find ways to leverage private and other non-public sources of funding to meet their infrastructure financing needs and explain in part why they are typically struggling to adequately fund their infrastructure requirements.

2.1. Asia's LLDCs

There are constraints in Asia's LLDCs on both public and private resources, as well as foreign investment across countries, which make it challenging for them to finance their infrastructure needs. The funds required to develop integral infrastructure project, i.e. water, sanitation, transport, energy and information, in Asian LLDCs are expected about 10.5 per cent of their GDP. (Branchoux, Fang and Tateno, 2018). Among the region's LLDCs, Afghanistan has the highest needs in infrastructure financing (up to 29 per cent of GDP), followed by Nepal and Kyrgyzstan with up to 19 per cent of GDP (figure 5.1). The largest investments are required in the transport and energy sectors, followed by ICT and WSS (Branchoux, Fang and Tateno, 2018).

Figure 5.1
Infrastructure financing needs in Asian LLDCs, 2018–2030
(Percentage of GDP)

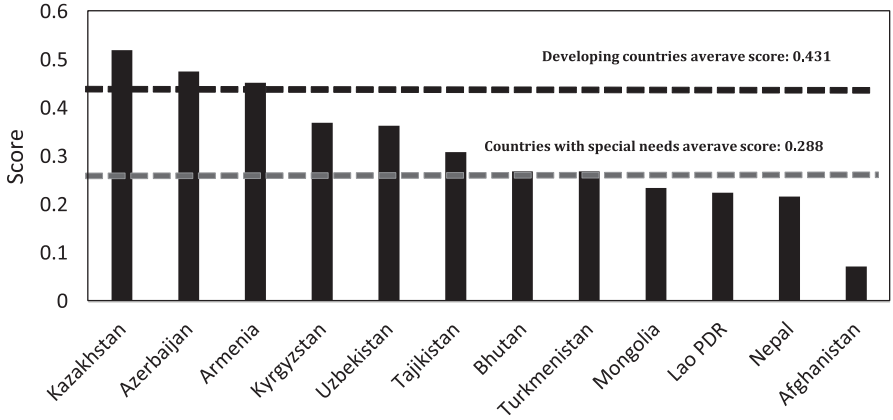


Source: ESCAP, based on Branchoux, Fang and Tateno (2018, table 4 in Appendix F).

In addition, for those LLDCs that were formerly part of the Union of Soviet Socialist Republics (USSR), their economic reliance on a limited number of economic sectors (such as natural resources) and the volatility in global commodities prices add to the challenges of long-term financing of major infrastructure projects. This has been further exacerbated in recent years by the economic ramifications of international economic sanctions imposed on the Russian Federation, with which they maintain close economic ties. The cumulative result has been severe pressure on public and private funds,

thereby limiting financing options for infrastructure investments in most of the former Soviet LLDCs in Asia. As a result, deficiencies of physical infrastructure are major obstacles for Asian LLDCs, amplified by their geographical constraints. ESCAP's Access to Physical Infrastructure Index, which assesses Asian LLDCs' access to physical infrastructure in the transport, energy, ICT and WSS sectors, confirms insufficient access to all types of infrastructure in Asian LLDCs (figure 5.2). While Kazakhstan, Azerbaijan and Armenia are positioned well above the average score of developing countries in Asia and the Pacific, Afghanistan, Nepal, Lao PDR and Mongolia are around or less than the average of CSNs. Kyrgyzstan, Uzbekistan, Tajikistan, Bhutan and Turkmenistan are more or less between the average scores of developing countries and CSNs.

Figure 5.2
Asian LLDCs access to physical infrastructure index, 2015



Source: Based on ESCAP (2017).

The funding for infrastructure investment in Asian LLDCs mostly comes from the public sector, and particularly from fiscal budgets. The way public resources are mobilized tends to vary across countries. In resource-rich LLDCs, for example, the share generated from non-tax revenues, such as licenses, royalties and rents levied on the extraction of natural resources is higher than tax revenues, while a large part of public expenditure is, usually, financed from tax revenues in other LLDCs (table 5.1). In terms of financing instruments, due to the dominance of the public sector, concessional public financing has dominated infrastructure finance in some LLDCs, while non-concessional private finance participation remains low.

Table 5.1

Fiscal revenues, grants and expenditures in Asia's LLDCs, 2017

(Percentage of GDP)

Country	Revenues	Revenues, excluding grants	Grants	Tax revenue	Current expen-ditures	Capital expen-ditures	Net lending (+) / net borrowing (-)
Afghanistan	54.0	10.1	43.9	7.6	36.9	18.4	-1.3
Armenia	23.7	23.1	0.7	20.9	25.1	3.4	-4.7
Azerbaijan	34.2	34.2	0.0	15.6	24.8	12.1	-2.7
Bhutan	26.6	19.0	7.5	13.8	18.9	8.5	-0.8
Kazakhstan	14.1	13.7	0.4	9.8	15.5	1.0	-2.4
Kyrgyzstan	32.4	30.1	2.3	16.8	27.2	6.2	-1.0
Lao PDR	20.3	15.8	4.5	13.5	14.9	9.2	-3.7
Mongolia	23.4	22.6	0.9	11.8	24.0	4.1	-4.7
Nepal	21.1	19.3	1.8	16.7	15.9	4.2	1.1
Uzbekistan	25.3	25.3	0.0	17.5	19.4	2.5	3.4

Source: ESCAP based on World Bank (2019b).

Capital expenditures (mostly on infrastructure) in Asian LLDCs tend to be much lower than current expenditures despite considerable infrastructure financing needs. In recent years, Afghanistan and Azerbaijan have recorded the highest shares of capital expenditure, while Kazakhstan has the lowest (see table 5.1 again). The main source of public resources in non-resource-rich LLDCs is tax revenues, which tend to be low due to the largely informal nature of their economies coupled with the low capacity and inefficiencies of the tax administration systems. In addition, tax avoidance and evasion, particularly by domestic individuals and companies, are also an issue. In this context, the presence of fiscal and current account balance deficits, or "twin deficits", presents a crucial challenge, constraining infrastructure financing capacity and turns LLDCs into net borrowers (table 5.2). The "twin deficits" of the LLDCs will continue to be financed by a combination of external borrowings, FDI and remittance inflows, mostly from China and the Russian Federation (IMF, 2017d; 2017e; 2017f; 2017g; 2017i).

As a result, harnessing public debt as a potential source of infrastructure financing may not be a viable answer for some Asian LLDCs, especially for those with the "twin deficits". At the same time, infrastructure development without incurring debt may simply not be possible for these countries: unlike private entities that can raise funding through either debt or equity, governments cannot issue equity. For many Asian LLDCs, funding through public debt financing may therefore be the only choice, however undesirable that may be.

Table 5.2

Fiscal and current account balances to GDP in Asian LLDCs, 2017

(Percentage to GDP)

Country	Fiscal balance	Current account balance
Afghanistan	-0.7	-20.0
Armenia	-5.6	-2.9
Azerbaijan	-1.4	5.6
Bhutan	-2.1	-24.4
Kazakhstan	-2.8	-3.2
Kyrgyzstan	-5.9	-6.5
Lao PDR	-0.4	-7.0
Mongolia	-5.3	-10.4
Nepal	-0.5	-0.4
Tajikistan	-3.8	0.0
Turkmenistan	..	..
Uzbekistan	..	2.8

Source: ESCAP based on World Bank (2019b).

One common denominator across Asia-Pacific LLDCs is the heavy reliance on ODA funding to underwrite the costs of infrastructure development. The majority of ODA available to Asian LLDCs is concessional debt, with long-term maturity, low interest rates, and often includes a grant element. Concessional debt accounts for the highest proportion of Nepal's total external debt (at 85 per cent), as well as Afghanistan (75 per cent) and Lao PDR (42 per cent) (World Bank, 2016). Indeed, ODA is the most important single source of international financing for low-income LLDCs, accounting for more than 70 per cent, while the ODA for lower-middle LLDCs is between 35 per cent and 65 per cent of total non-national funding (UNCTAD, 2014). During 2012-2017, the largest share of ODA was provided to Afghanistan – the country with the highest infrastructure financing needs. The second largest ODA recipient among Asia's LLDCs was Nepal.

Box 5.1

Multilateral and bilateral financing for the cross-border dry ports of Nepal

Nepal, an LLDC in South Asia, is surrounded by two large countries, India and China. The country has promoted foreign trade and investment through the development of dry ports that aim to connect the Nepalese markets with India particularly through the Kolkata Port. The dry ports are inland terminals, often developed adjacent to customs, providing logistics services for the handling, temporary storage and trans-shipment of containers that move through any mode of transport such as roads, railways, inland waterways or airports (ESCAP, 2015). Dry ports can reduce border crossing and transit lead-time and facilitate a deeper integration of hinterland areas with international trade.

For the development of its dry ports, Nepal has received financial and technical assistance from MDBs and neighbouring countries, not only to help bridge project funding gaps, but also to learn from their experience of managing, constructing and operating the infrastructure assets. For example, Nepal has benefited from the World Bank's assistance in the construction of the three dry ports at the Nepal-India border, i.e. Birgunj, Biratnagar and Bhairahawa, during the 2000s (World Bank, 2013). The World Bank helped mainly in reducing transport costs associated with Nepal's imports and export through the supervision of the construction of inland container depots and in streamlining trade and transit procedures through the installation of the Automated Systems for Customs Data (ASYCUDA) and Advanced Cargo Information System (ACIS) and hands-on trainings for trade facilitation. In 2010, the Asian Development Bank (ADB) financed Nepal's fourth dry port in Kakarbhitta through a national road project in Nepal and a cross-country corridor project between Bangladesh and India (India, Ministry of Road Transport and Highways, 2018).

Those four dry ports in operation have facilitated the integration of Nepal into regional and global markets as they channel almost 70 per cent of Nepal's total imports and 60 per cent of its total exports (see table 5.3 for more details). The rest of the import and export flows are concentrated

Table 5.3

Imports and exports through dry ports on the Nepal-India border, 2017-2018

Dry ports	Imports (thousands of Nepalese Rupees)	Imports share (Percentage)	Exports (thousands of Nepalese Rupees)	Exports share (Percentage)
Birgunj	421 939 564	33.9	14 063 766	17.3
Bhairahawa	224 037 171	18.0	3 510 935	4.3
Biratnagar	152 944 627	12.3	24 558 279	30.2
Kakarbhitta (Mechi customs office)	37 580 934	3.0	6 730 357	8.3
Rasuwagadhi[(a)] (Rasuwa)	22 648 766	1.8	1 166 232	1.4

Source: Nepal, Department of Customs (2019).

Note: [(a)] Under construction.

either in the Tribhuvan International Airport based in Kathmandu (30 per cent of the total exports and 12 per cent of total imports) or in other special economic zones (SEZs) and industrial districts[97].

As a result of the dry ports' initial success, the Government of Nepal has planned to develop additional dry ports, which will benefit from the support of neighbouring countries. On the Nepal-China border, China has provided financial assistance for the reconstruction of the Tatopani dry-port, which was closed for four years due to the devastating earthquake of 2015 (Himalayan Times, 2019). On a similar note, as part of the Belt and Road Initiative (BRI), Chinese development assistance is expected to reach 124 million yuan for the construction of an inland container depot in Rasuwagadhi (Kathmandu Post, 2019). In addition, the feasibilities of the following dry ports are under study: Yari, Nechung, Rasuwagadhi, Kimathanka, Olangchungola, Nepalgunj, and Mahendranagar. In parallel, SEZs are planned to be developed adjacent to those new dry ports, granting investors various incentives ranging from 100 per cent income tax exemption for the first five years (50 per cent for next five years), 40 per cent tax exemption for infrastructure, zero-value-added tax (VAT) facilities, customs duty concessions to the prohibition of labour strikes and protests as per the 2015 Special Economic Zone Act.

Although successful in attracting imports and exports thanks to multilateral financing support, the dry ports have failed to generate the desired revenues (Kathmandu Post, 2014). The government is therefore setting up the Port Authority of Nepal to control and regulate the dry ports in the country, separate from the direct operations of the dry ports (Rising Nepal, 2019).

A sovereign wealth fund (SWF) is a state-owned or controlled fund aiming at stabilizing a country's economy against volatility in revenues and emergency events such as natural disasters and economic crises and supporting economic development of a nation at large (Sovereign Wealth Fund Institute, 2019b). Among Asia's LLDCs, Azerbaijan, Bhutan, Kazakhstan, Mongolia, Turkmenistan and Uzbekistan have at least an SWF typically funded by the revenues earned from their natural resources (Sovereign Wealth Fund Institute, 2019a). Some SWFs in Asian LLDCs are particularly large in terms of the size of capital (see table 5.4).

While most SWFs exist to ensure economic stability and resilience to economic and financial shocks, such as in the cases of Bhutan, Kazakhstan, Mongolia and Turkmenistan, the SWFs of Azerbaijan and Uzbekistan have strategically invested in infrastructure and social assets, (IMF, 2018i; Peaslee, 2019; World Economic Forum, 2019; Yangdon, 2019; Yurou, 2018; Zhussupova, 2018). For example, the Azerbaijan's State Oil Fund (SOFAZ),

[97] Among the special economic zones, Dhanusa Janakpur, Nepalgunj and Siraha accounted for, respectively, 0.11, 3.62 and 0.01 per cent of the total imports of Nepal in 2017-2018. Among the industrial districts, Kailali accounted for 1.41 per cent of the country's total imports in the same year.

Table 5.4
SWFs in Asia's LLDCs, 2018
(Millions of United States dollars)

Country	SWFs	Size of capital
Azerbaijan	State Oil Fund of Azerbaijan (SOFAZ)	38 987.7
Bhutan	Bhutan Economic Stabilization Fund	1.5
Kazakhstan	Samruk-Kazyna	71 344.3
	National Fund of the Republic of Kazakhstan (NFRK)	57 628.0
	National Investment Corporation of National Bank of Kazakhstan	109.6
Mongolia	Mongolia Fiscal Stability Fund	..
	Future Heritage Fund[(a)]	217.3
Turkmenistan	Turkmenistan Stabilization Fund	..
Uzbekistan	Fund for Reconstruction and Development of Uzbekistan	20 000.0

Source: Sovereign Wealth Fund Institute (2019b).

Notes: [(a)] Mongolia's Future Heritage Fund started with an initial investment of $ 217.3 million in 2019 and expects to receive an additional fund of $ 392.9 million annually (Yurou, 2018).

Box 5.2
The National Fund of Kazakhstan: a potential funding source for priority infrastructure projects

The National Fund of the Republic of Kazakhstan (NFRK) is an SWF that favours economic stability over investment. NFRK manages Kazakhstan's oil, gas and natural resource revenues to: i) minimize the impact of volatile oil prices on public finances; ii) support targeted capital spending; and iii) generate provisions for future generations. In short, the NFRK is currently used as a stabilization and savings fund.

The current NFRK concept in 2016 sets an annual guaranteed transfer to the government budget of up to $ 10 billion, principally for budget support and targeted capital spending. The guaranteed transfer, denominated in the local currency, is expected to decline to $ 6 billion by 2020, and is intended to reduce oil revenue dependence and hedge against adverse exchange rate changes in the future.

NFRK could serve as a crucial and sustainable tool in the mobilization of extra funding resources, given its long-term assets, and is ideally placed to invest in priority infrastructure projects in Kazakhstan. At present, however, such an allocation of resources in infrastructure assets is not permitted, and acquisition of domestic securities – including those of infrastructure projects – by NFRK is prohibited (IMF, 2017g). The current reserves of the NFRK are estimated to be nearly $ 58 billion, as of 2018, or 45 per cent of GDP, which suggests a large opportunity for sustainable infrastructure financing through SWFs in Kazakhstan (IMF, 2017g).

supported by oil and gas revenues, has actively invested in the infrastructure sector, also covering health care, education and real estate (Antidze, 2018; Azernews, 2018). A number of SWFs in Asian LLDCs, however, are still not ready to use their funds for infrastructure development.

Although infrastructure projects in Asian LLDCs are relatively unattractive for private investors, FDI still plays a significant role in greenfield infrastructure in Asian LLDCs (table 5.5). Lao PDR, Nepal and Bhutan are good examples in hydropower generation (ESCAP, 2017). Kazakhstan has also attracted greenfield FDI in energy, transport, telecommunications and other infrastructure, while Tajikistan has received major investment in the energy sector, including hydroelectric plants (Banco Santander, 2019b; fDi Intelligence, 2018). Armenia also attracted greenfield FDI in the energy and telecommunications sectors (Banco Santander, 2019a).

Table 5.5

Greenfield FDI in infrastructure in Asian LLDCs, 2011–2015

Host country	Amount received (millions of United States dollars)	Share to GDP
Kazakhstan	2 475	0.2
Tajikistan	1 137	2.9
Lao PDR	1 012	1.9
Armenia	535	1.0
Nepal	429	0.4
Uzbekistan	428	0.2
Afghanistan	321	0.3
Azerbaijan	321	0.1
Bhutan	272	2.9
Kyrgyzstan	80	0.2
Mongolia	61	0.1

Source: ESCAP based on UNTCAD (2003).

Due to their geographical and demographic conditions, however, many LLDCs in Asia have typically experienced uncompetitive risk-adjusted rates of return on infrastructure financing with high costs of construction and operations. The restrictions imposed on FDI in Asian LLDCs also provide additional challenges for private infrastructure financing. Foreign investors are faced with legislative measures as foreign equity limits, screening and approval procedures, restriction on key foreign personnel, and other operational measures (OECD, 2015). A lack of transparency and

Box 5.3

Astana International Financial Centre

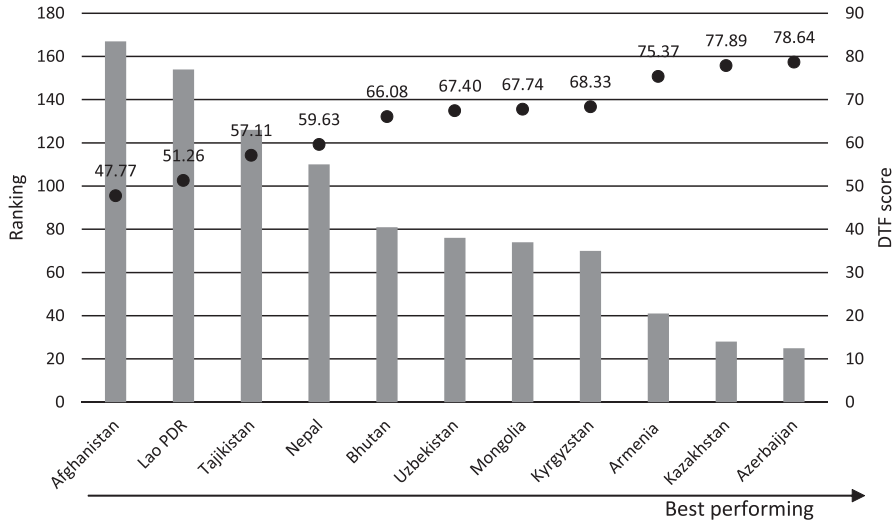
The Astana International Financial Centre (AIFC) of Kazakhstan, which was launched in 2018, aims to increase private investors' confidence, to attract financial resources for sub-regional development and to promote FDI flows through creating a competitive, efficient and transparent financial hub in Central Asia. For this purpose, AIFC, equipped with modern ICT facilities, provides both local and foreign investors favourable tax treatment, simplified labour and visa regimes, facilitation to infrastructure investments, and a separate legal framework based on the United Kingdom common law—detaching from the judicial system of Kazakhstan. The AIFC focuses primarily on: i) capital market development in cooperation with the Shanghai Stock Exchange and Nasdaq; ii) asset management; iii) Islamic finance; iv) 'fintech' start-ups; v) private banking for high net-worth individuals; and vi) green finance (AIFC, 2019).

predictability of the procurement regime can be additional challenges for foreign investors in Asian LLDCs.

The business environments in Asian LLDCs vary significantly on a country-to-country basis. According to the World Bank (2019a), Afghanistan and Lao PDR share the worst positions among Asian LLDCs, ranked 167th and 154th out of 190 economies respectively, and their business environments are very much unfavourable to private investors in infrastructure projects.

Figure 5.3

Doing business rankings for Asian LLDCs, 2019



Source: ESCAP based on World Bank (2019c).

Note: Distance to frontier (DTF).

On the other hand, Azerbaijan, Kazakhstan and Armenia, natural resources rich countries, are at the top of the list of Asian LLDCs, ranked at 25th, 28th, and 41th respectively (figure 5.3). Those three LLDCs have increased the liberalization of their economic policies and enhanced investment appeal in their infrastructure sector through enforcing favourable laws and regulations to foreign investors (World Bank, 2019a).

In most Asian LLDCs, public-private partnerships (PPPs) have recently gained popularity to facilitate private sector financing in the public sector-led infrastructure investment (ESCAP, 2019). The largest share of private investments through PPP modalities in Asian LLDCs has been in the ICT sector, followed by energy, due in part to their lower development risks and construction costs, as well as offering greater financial return prospects than other kinds of infrastructure investments, such as water (PPP Knowledge Lab, 2019). In this case, investment in the transport sector has been much needed among Asian LLDCs to enhance their connections with regional markets. The viability of PPPs also tends to vary across countries as much as sub-sectors. Lao PDR widely uses PPPs in the hydropower sector and has become a leader among Asian LLDCs, having implemented more PPP projects than any other Asian LLDCs (see table 5.6). However, constraints in adopting PPPs still exist: weak public guidelines on modalities and legalities, lack of appraisal and evaluation criteria, unclear public objectives, approval process and administrative procedures, poor business plans, and so on.

Table 5.6
PPP projects in Asian LLDCs, 1990–2019

Host countries	Completed projects	Total investment (millions of United States dollars)
Afghanistan	2	211
Armenia	10	612
Azerbaijan	4	375
Bhutan	2	218
Kazakhstan	8	885
Kyrgyzstan	2	..
Lao PDR	31	17 896
Mongolia	3	368
Nepal	2	2 500
Tajikistan	3	956
Uzbekistan	2	320

Source: PPP Knowledge Lab (2019).

The Global Infrastructure Facility (GIF), which became operational in 2015, is a good example of PPP programmes among governments, multilateral development banks, and private sector investors and financiers. GIF was designed to provide a new way of PPPs on the preparation, structuring and implementation of institutionally complex infrastructure projects, and it can provide extra funding source for infrastructure projects in Asian LLDCs (Global Infrastructure Facility, 2019).

Box 5.4

Bhutan: pension fund investment in a power plant

Domestic pension funds are another potential source of financing diversification and can fit well with infrastructure finance, given the long-term nature of both. There have been some attempts to tap pension funds for infrastructure, such as in the case of Bhutan, which was able to harness its pension fund to invest in a hydropower project.

Bhutan's Hydro Power Corporation Limited was incorporated in May 2008 as the vehicle for development of the run-of-the-river 126 MW Dagachhu Hydroelectric Project in south-western Bhutan. The project is a PPP venture, with the Druk Green (the national operator of hydropower stations) as the majority equity partner with a 59 per cent stake, the Tata Power Company of India (the holder of the power purchase contract) with 26 per cent and the National Pension and Provident Fund (NPPF) of Bhutan with the remaining 15 per cent stake. The project is designed for an estimated mean annual generation of 515 GWh and in a 90 per cent dependable year to generate 360 GWh.

The project was also funded with a 60:40 debt equity ratio, with ADB providing a concessional loan of $ 51 million for the civil works; the Raiffeisen Bank International AG (RBI) of Austria providing a commercial loan of €41 million for the electro-mechanical works; and NPPF providing a loan of $ 9 million. ADB also provided a loan of $ 39 million to the Government of Bhutan to meet the financing gap of the project. The cost of the project on completion was $ 200 million, and it started producing electricity in 2015.

Source: Druk Green Power Corporation Limited (2019).

Box 5.5

Kyrgyzstan: multilateral climate finance for low-carbon infrastructure

Climate finance is a potential source for financing diversification in LLDCs and can fit well to support a low-carbon and climate-resilient infrastructure. Kyrgyzstan has attempted to tap climate-related development finance for infrastructure and adopted comprehensive national and sectoral strategies and programmes that enhance climate finance in such sectors as energy, transport, water, agriculture and emergency relief (Kyrgyzstan, Government, 2017). The country is one of the most vulnerable states to climate change in Central Asia due to the high occurrence of climate-related disasters, its dependency on climate-sensitive economic sectors and its ageing infrastructure. The country's average

annual temperature is projected to increase from 3.5°C to 8.8°C by 2100 (WHO, 2013).

The Kyrgyz authorities established the Climate Finance Centre (CFC) to coordinate climate finance issues with various stakeholders. The CFC designs and implements investment projects for low-carbon, climate-resilient infrastructure in priority sectors (CFCKR, 2019). It is also responsible for attracting financial resources from international climate funds, MDBs, international organizations and bilateral donors (table 5.7).

Table 5.7

Bilateral and multilateral climate funds used by Kyrgyzstan

Typology of funders	Funds/donors
Dedicated global climate funds	Green Climate Fund (GCF)
	Global Environmental Facility (GEF)
	Adaptation Fund (AF)
	Investment Facility for Central Asia (IFCA)
	Climate Investment Funds (CIF)
	Pilot Program for Climate Resilience (PPCR)
MDBs	Asian Development Bank (ADB)*
	European Bank for Reconstruction and Development (EBRD)*
	World Bank*
	International Finance Corporation (IFC)*
Bilateral and multilateral donors	Department for International Development (DFID), United Kingdom
	Food and Agriculture Organization (FAO)*
	Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) *
	United Nations Development Programme (UNDP)*
	World Food Programme (WFP)*

Sources: Kyrgyzstan, Office of the Prime Minister (2019); Kyrgyzstan, Ministry of Finance (2019); Kyrgyzstan, Ministry of Economy (2019); Kyrgyzstan, Ministry of Transport and Roads (2019).

Note: MDBs and donors marked with an asterisk (*) are Green Climate Fund (GCF) accredited entities.

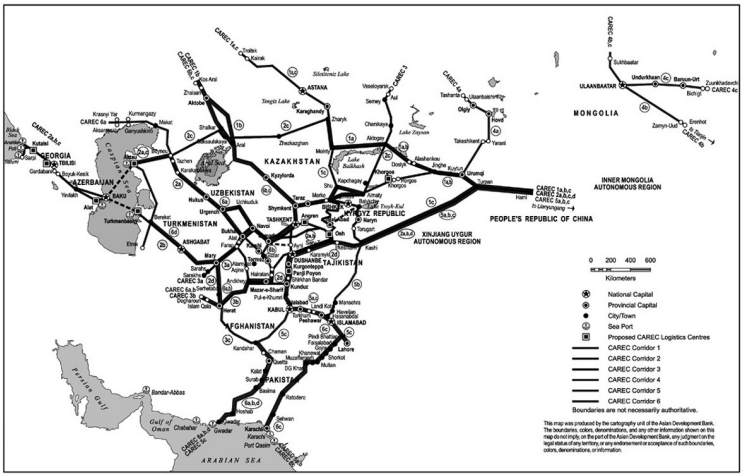
Box 5.6

Regional cooperation in financing cross-border corridors in Central Asia

The Central Asia Regional Economic Cooperation (CAREC) programme is a sub-regional economic cooperation which aims at enhancing connectivity amongst key economic hubs of LLDCs in Central Asia and their neighbouring countries through infrastructure development. CAREC comprises 11 member states and is supported by serval multilateral institutions, such as ADB and World Bank[98]. CAREC's long-term strategic framework emphasizes developing infrastructure within international development agenda, such as the Sustainable Development Goals or SDGs (ADB, 2017b). As figure 5.4 shows, this economic cooperation intends to develop six major economic and transport corridors amongst the countries in the sub-region.

Figure 5.4

Six Central Asia Regional Economic Cooperation (CAREC) corridors



Source: CAREC Program (2017).

The CAREC corridors require a large investment of $ 76.8 billion per year for developing related infrastructure assets, except those of China, which are equivalent to 7.8 per cent of GDP of the CAREC member countries (ADB, 2017a). In order to meet this huge funding requirement, some financing strategies could be proposed as follows:

First, CAREC programme must engage more with the private sector. CAREC countries can work to improve the regulatory and investment environment and enhance policy coordination among the member states to

[98] CAREC member states include eight LLDCs in Central Asia and North-East Asia, namely Afghanistan, Azerbaijan, Kazakhstan, Kyrgyzstan, Mongolia, Tajikistan, Turkmenistan and Uzbekistan, and three of their neighbouring countries, i.e. China, Georgia and Pakistan.

better attract private investors to its infrastructure projects. Although the share of PPP remains limited in infrastructure investment compared to public funding, some countries in Central Asia have provided guidelines for PPP projects. For instance, Kazakhstan, Kyrgyzstan and Tajikistan have fully developed PPP laws, entailing the creation of a common legal framework that better regulates PPP projects in the future.

Second, the BRI could provide additional financial resources for infrastructure projects alongside the CAREC corridors, while member states should also be cautious about debt management. As Central Asian countries are located at the crossroads of the Silk Roads, this strategic location could help member countries raise necessary financial resources for the development of the CAREC corridors. In the past decade, for instance, Kazakhstan has received over $ 14 billion worth of Chinese investment in the transport sector (Cohen and Grant, 2019).

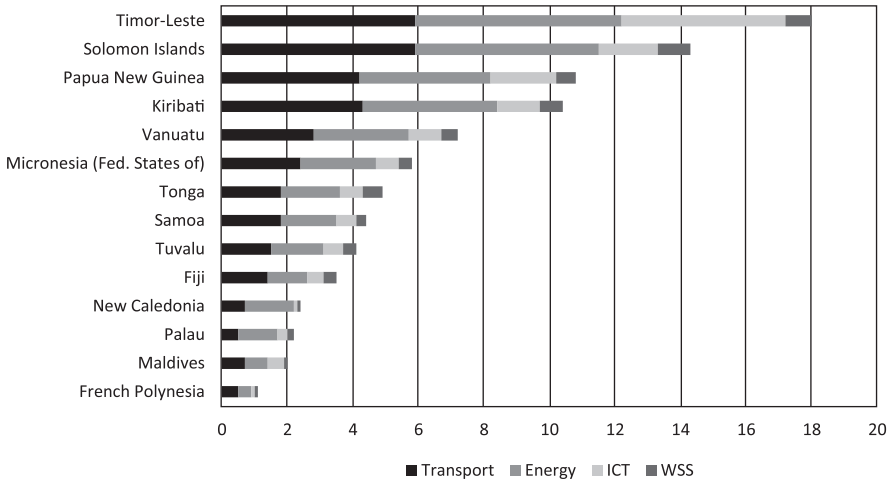
Finally, international organizations still play an important role. For example, apart from providing concessional debt instruments directly to CAREC member states and their infrastructure projects, ADB can offer expertise, guidance and professional tools to help CAREC countries tailor policies in every aspect of infrastructure projects. The infrastructure project's bankability can be improved with the assistance from international organizations, easing the wide financial gap in long-term.

2.2. Asia and the Pacific's SIDS

Public funds alone cannot close the infrastructure financing gap in the least developed and developing islands of Asia and the Pacific, particularly as demand for public services is projected to increase. During the period from 2018 to 2030, Asia-Pacific SIDS will need to spend about 6.5 per cent of their GDP on average to meet their infrastructural needs on transport, energy, ICT and WSS (Branchoux, Fang and Tateno, 2018). Timor-Leste and Solomon Islands top the list of Asia-Pacific SIDS, requiring 17.9 per cent and 14.2 per cent of their GDP respectively, followed by Papua New Guinea (10.8 per cent) and Kiribati (10.5 per cent). See figure 5.5 for a comparison among Asia-Pacific's SIDS. On the whole, Asia-Pacific SIDS need to mobilize funds from a wide range of resources, and not just public funds.

Attracting private investment in infrastructure project in SIDS poses numerous challenges, from physical remoteness to the small scale of these economies to natural disaster threats. Those issues are further complicated by poor institutional capacity and performance of the public sector overseeing the provision of infrastructure services (as a public good). These challenges adversely affect the state of infrastructure development in a number of ways, including (but not limited to): i) the high cost of building infrastructure projects, due to the lack of economies of scale, remote locations, a shortage of adequately skilled planners and workers, and the need for imported inputs and capital; ii) higher risks of investment as a result of natural disaster threats, climate change and environmental

Figure 5.5
Infrastructure financing needs in Asia-Pacific SIDS, 2018–2030
(Percentage of GDP)



Source: ESCAP, based on Branchoux, Fang and Tateno (2018, table 4 in Appendix F).

degradation; iii) the limited ability of public sector agencies to attract private investors, through such measures that can reduce business risks and offer enticing investment opportunities; and iv) their small markets and poor connections with larger economies. Table 5.8 suggests that, in general, Asia and the Pacific's SIDS run large trade deficits (except for Papua New Guinea) and attract low FDI inflows (except for Fiji and Palau) mainly due to distance to foreign markets, the lack of economies of scale, and relatively poor business environment[99]. Limited opportunities for remunerative employment have prompted many citizens to migrate, further reducing both the market for infrastructure services, and the provision of skilled labour to build and operate infrastructure projects.

Transparency and accountability are crucial to attract potential private investors, particularly when it comes to large-scale infrastructure projects that rely in part on the integrity of the national budget and public funds. In small economies like Asia-Pacific SIDS, a single large infrastructure project can have a marked impact on the macro-economic profile of the entire

[99] The latest data for total investment is not available for numerous Asia-Pacific SIDS, and there are differences in how FDI statistics are compiled and released by different institutions, making comparisons problematic. There is clearly a need for these governments to improve their database management and publicly disseminate reliable, regular and timely key data.

Table 5.8

Selected key economic indicators of SIDS, 2017

Country	Trade balance (percentage of imports)	Total investment	FDI	Remittances received	Gross debt	Ease of doing business ranking
		(percentage of GDP)				
Fiji	-60.5	21.5	5.9	5.4	48.9	101
Kiribati	-88.3	..	0.7	9.9	26.3	158
Maldives	-86.5	20.0	10.6	0.1	63.9	136
Marshall Islands	-67.9	..	0.1	14.4	25.5	150
Micronesia (Fed. States of)	-38.5	..	0.3	7.1	24.5	160
Nauru	-46.5	..	0	..	61.5	..
Palau	-95.5	28.4	12.2	0.8	..	133
Papua New Guinea	130.3	..	-0.9	0.0	36.9	108
Samoa	-87.5	..	1.1	16.4	49.1	90
Solomon Islands	-12.5	17.3	2.8	1.2	9.4	115
Timor Leste	-97.9	26.0	0.2	3.0	3.8	178
Tonga	-83.9	..	-1.3	37.1	..	91
Tuvalu	-99.8	..	0.8	10.8	37.0	..
Vanuatu	-90.1	27.1	2.9	2.3	48.4	94

Sources: World Bank (2019b), accessed on 18 April 2019; IMF (2017a; 2017c; 2017h; 2018a; 2018c; 2018d; 2018e; 2018f; 2018g; 2019a; 2019b; 2019c).

country. And as with Asian LLDCs, the business climate rankings for Asia-Pacific SIDS tend to convey an unfavourable environment for private investment.

The majority of Asia-Pacific SIDS are at high risk of debt distress (see table 5.8 again). And yet their infrastructure financing relies principally on public funds, with considerable support from bilateral and multilateral international development partners. Various governance indicators, spanning issues like government effectiveness and transparency, the quality of the regulatory framework, the rule of law and its enforcement, and controls on corruption, all reflect relatively weak systems that only add to the perceived risks of investing funds[100]. Based on data from relevant International Monetary Fund (IMF) Article IV Consultations, table 5.9

[100] Nonetheless, there is limited data on infrastructure spending in these countries, and the mechanisms used to determine financing schemes are often not clearly defined, due in large part to weak planning capacity. Discussions here are made based on World Bank (2019d), accessed on 17 February 2019.

Table 5.9
Selected public finance indicators in Asia-Pacific SIDS
(Percentage of GDP)

Country	State budget	Official aid (ODA+OOF+private)	Special revenues
Fiji (2017 estimate)	32.4	3.1	15.0 (tourism)
Kiribati (2016)	115.0	28.2	66.0 (fishing license)
Marshall Islands (2016 estimate)	58.4	29.5	8.3 (compact fund) 6.3 (fishing license)
Micronesia (Fed. States of) (2016)	61.2	237.4	19.6 (fishing license)
Maldives (2017)	30.1	14.1	
Nauru (2016 preliminary)	91.6	97.7	27.4 (remittances) 12.9 (tourism)
Palau (2016/2017)	34.9	11.4	39.9 (tourism)
Papua New Guinea (2017 estimate)	20.3	2.0	
Samoa (2015/2016)	36.5	12.3	
Solomon Islands (2018 estimate)	46.9	15.7	
Timor-Leste (2016 estimate)	64.5	7.5	19.6 (petroleum)
Tonga (2017 estimate)	44.9	21.5	
Tuvalu (2017 estimate)	126.0	69.5	50.0 (fishing license)
Vanuatu (2016)	36.9	16.4	25.5 (tourism)

Sources: IMF (2019a; 2019b; 2019c; 2018a; 2018b; 2018c; 2018d; 2018e; 2018f; 2018g; 2017b; 2017c; 2017h); and OECD (2019), accessed on 17 February 2019.

Note: Other official flows (OOF).

provides some key data on the fiscal situation of SIDS in Asia and the Pacific. The majority of Asia-Pacific SIDS economies have relatively large state budgets – in terms of their proportion to total GDP – and high ODA inflows. Conversely, the scale of their private sectors tends to be relatively modest.

The economies of many Asia-Pacific SIDS rely on public revenues from tourism and fishing licenses. However, both sectors face a number of challenges. Firstly, the islands have limited environmental capacity to support large flows of people, thereby ruling out the option of scaling up mass tourism. Travel costs to reach the islands also tend to be expensive, further limiting this potential market. Secondly, many islands still have inadequate infrastructure and amenities to support the needs of the tourism sector, such as clean water, electricity, and navigable roads. Only a few countries, such as Fiji and Vanuatu, are able to provide upscale hotels and resorts. There is also limited participation from local small and medium-sized enterprises (SMEs), mainly due to capacity constraints and

inadequate access to finance. Thirdly, the threat of natural disasters further hampers tourism development, as most SIDS are located in the Pacific Ring of Fire, suffering frequent hurricanes and facing rising sea levels because of climate change.

Box 5.7

Maldives' financing strategies for tourism infrastructure

As an SIDS, the Maldives shares common aspects with the Pacific island states, such as small size, seclusion from bigger markets, and vulnerability to natural disasters and climate change. This archipelago has the lowest average elevation in the world (1.8 metres), and the rising of sea water is thus a concrete and immediate threat (Portland State University, 2015). The lack of connectivity between each island forces local dwellers to use ferries to travel from one island to another, and this greatly reduces access to basic services (Bramlett, 2017; World Bank, 2019b). Tourism is a major sector in the Maldives, and its revenues can greatly contribute to infrastructure development. These islands are victims of their own success however, and it is a significant challenge to accommodate the massive arrival of tourists (1.3 million in 2016) given inadequate tourism infrastructure (Ely and Ercan, 2017). Table 5.10 provides a socio-economic overview of the Maldives.

Table 5.10

An overview of the Maldives, 2017

GDP PPP (billions of United States dollars)	Population	Surface (square kilometre)	Average elevation (metres)	ODA (percentage of GDP)	FDI	Debt
6 887	496 402	300	1.8	0.6	7.2	63.9

Sources: IMF (2017a; 2017c); OECD (2017); Portland State University (2015); World Bank (2017a; 2017b).

Note: Purchasing power parity (PPP).

The development of artificial islands, with the notable example of Hulhumalé, helps counter the rise of sea level and provides additional land to a growing population (Mitchell, 2017). Bridges are also built between islands to increase connectivity and to provide faster travelling methods than ferries (Mitchell, 2017). The International Finance Corporation (IFC) has also invested in telecom and hotel operators, and the Valana International Airport has been under renovation with a budget of $ 800 million to welcome seven million international passengers annually (Ely and Ercan, 2017; World Bank, 2019c).

There are several ways to facilitate infrastructure financing in the Maldives. While the Maldives must also rely on tax revenues particularly from tourism for public financing, concessional loans, ODA and FDI are additional sources of infrastructure financing. In 2017, the Maldives' inward loans and grants, mostly from MDBs such as ADB, the World Bank's International Development Association and the Islamic Development Bank

(IsDB), amounted to 0.6 per cent of its GDP PPP (OECD, 2003), and its FDI represented 7.2 per cent (World Bank, 2017a). In the case of the China-Maldives Friendship Bridge built in 2018, China provided $ 100 million in free-aid and $ 170 million in loan as part of the BRI (Bramlett, 2017). In addition, as a Muslim country, the Maldives could apply 'sukuks' (Islamic bonds) and other instruments to reduce the costs of infrastructure financing and improve public services. Islamic financing can be another alternative source of infrastructure financing in Central Asia's LLDCs and beyond since its main principles, such as risk sharing and profit sharing, are quite appropriate for infrastructure financing (Amirat and Sabreena, 2018; Kulkarni, 2018).

The fisheries sector in Asia-Pacific SIDS also faces significant challenges. In addition to diminishing fish stocks, the fisheries sector is also adversely impacted by climate change, pollution and natural disasters that could be devastating. This situation is further exacerbated by inadequate funding to invest in infrastructure development. In the Marshall Islands, for example, there are no telephone networks or proper piped water that reach the outer islands (ESCAP, 2017). In Samoa, less than 15 per cent of roads are paved (ESCAP, 2017). High electricity costs and energy vulnerability across multiple SIDS pose major bottlenecks for the fishing sector (ADB, 2018). In Kiribati, the commercial sales of small-scale fisheries have hit a roadblock because of a lack of efficient transport to regional markets (ADB, 2016). Poor infrastructure clearly hinders the business environment and the opportunity to develop relevant economies of scale and expand trade which impact prospects for economic development (IMF, 2016).

In a bid to manage and coordinate development financing flows into the infrastructure sector in the Pacific's SIDS, the Pacific Regional Infrastructure Facility (PRIF) was established in 2008. The institution acts as a multi-donor partnership to oversee infrastructure development and is supported by the World Bank, the ADB, the Japan International Cooperation Agency (JICA), the European Union, and the governments of Australia and New Zealand. PRIF supports five key economic infrastructure sectors: i) energy; ii) telecommunications; iii) transport (including roads and bridges, maritime transport, and aviation); iv) solid waste management; and v) water supply and sanitation. Of the total development assistance provided between 2009 and 2016, 82 per cent were grants and 18 per cent were loans (PRIF, 2016). Papua New Guinea was the top recipient, getting a significantly larger amount of funding assistance compared to other countries (see table 5.11).

Table 5.11

Top five development partners to, and recipients of, the PRIF, 2009–2016

(Millions of United States dollars)

Top 5 donors		Top 5 recipients	
Country	Amount	Country	Amount
Australia	798.7	Papua New Guinea	646.1
New Zealand	192.0	Oceania, regional	239.2
Japan	180.8	Solomon Islands	189.2
World Bank Group	143.5	Fiji	177.3
China	113.9	Vanuatu	153.6

Source: PRIF (2016).

Box 5.8

Fund allocation and international cooperation for infrastructure development in Fiji

As an upper-middle income country with a population of 918 000 spread over 330 islands, Fiji has a PPP per capita of $ 8 702 and recorded GDP growth of 3.8 per cent in 2017. Major sources of revenue come from indirect taxes (62.9 per cent) and direct taxes (26.2 per cent). Fiji has been running a deficit budget that is common among the Asia-Pacific SIDS. In fiscal year 2017-2018, it targeted a 4.5 per cent (of GDP) net deficit, equivalent to 16.0 per cent of the country's total budget. The total infrastructure expenditure was about 9.0 per cent of GDP. Fiji allocates about 21.0 per cent of its budget to infrastructure services, as depicted in table 5.12.

Table 5.12

Budget allocation for infrastructure in Fiji, 2016-2017 to 2018-2019

(Millions of United States dollars)

Infrastructure services	Actual expenditure 2016-2017		Estimate 2017-2018		Estimate 2018-2019	
	Operating	Capital	Operating	Capital	Operating	Capital
Ministry of infrastructure and transport	24 956	14 479	29 013	32 515	33 911	41 996
Water authority of Fiji	40 175	91 851	42 101	94 558	48 315	115 839
Ministry of waterways and environment	2 300	4 538	3 774	9 355	6 142	24 580
Fiji roads authority	7 792	120 672	12 583	211 865	13 925	250 712
Total - infrastructure	75 223	231 541	87 471	348 293	102 293	433 126
Total budget	1 438 329		2 047 710		2 185 757	

Table 5.12 (continued)

Infrastructure services	Actual expenditure 2016-2017		Estimate 2017-2018		Estimate 2018-2019	
	Operating	Capital	Operating	Capital	Operating	Capital
Percentage of total budget	21.3		21.3		24.5	

Source: Fiji, Parliament (2018).

Note: Conversion: F$ 1 = $ 0.47 (Reserve Bank of Fiji, 2019, accessed on 18 January 2019).

Fiji suffered severe damage when tropical cyclone Winston hit in February 2016, causing losses of $ 1.36 billion, equivalent to 31 per cent of GDP. The government responded by focusing much of the 2017–2019 budgets on programmes intended to aid recovery and rehabilitation, resulting in a higher than normal percentage of infrastructure spending. In 2017, Fiji became the first emerging market to issue a sovereign green bond, valued at F$ 100 million, or approximately $ 47 million, to finance climate change mitigation and adaptation. Technical aspects of the issuance were assisted by the World Bank and IFC, and financially supported by the Australian government. In the first tranche, the country received F$ 87.71 from domestic insurance companies, commercial banks and the Fiji National Provident Fund. Fiji expects to use the fund to finance several infrastructure projects, including achieving a target of 100 per cent renewable energy by 2030.

Of the 14 Asia-Pacific SIDS, only Kiribati, Papua New Guinea, Timor-Leste and Tuvalu have sovereign wealth funds. While those sovereign wealth funds have played a limited role mainly to provide relatively short-term financing to supplement their governments' fiscal budgets, they could be a very useful endowment to attract external funds for cooperation, especially in infrastructure financing (IMF, 2019a). However, establishing new sovereign funds is not an easy undertaking, considering the economies' size and activities while lacking capacity to mobilize domestic revenue with diminishing revenues from natural resources in many Asia-Pacific SIDS.

Even though private sector participation in infrastructure is not limited to PPPs, the absence of a PPP regulatory framework shows that the level of private involvement is typically limited to traditional public procurement modalities. All Asia-Pacific SIDS are at the early stages of PPP policy; some countries have PPP units but others do not. Only Papua New Guinea and Fiji have PPP Acts, while others tend to handle PPPs through a Public Procurement Law or PPP Guidelines as in the case of Samoa (UNDP, 2017)[101]. In the specific case of Fiji, it passed a PPP Act in 2006, but there has

[101] Publicly available data on private sector participation in infrastructure development in Asia-Pacific SIDS is insufficient. The mechanisms that allow and support private sector participation are also unclear and non-transparent.

been little subsequent progress on the issuance of implementing regulations for the Act. The country's PPP Act also does not make any reference to the use of funding support from the government. Instead, it declares that the control of a PPP company must remain under majority Fijian interests, through a minimum of 51 per cent of voting rights, or the right to appoint more than 50 per cent of the board of directors, or a Fiji ("golden") share, including a right of veto (Fiji, House of Representatives, 2006). These kinds of stipulations for foreign investment in PPPs, without being compensated in some way by adequate guarantees or other financial support, do little to create a conducive environment for PPP promotion. In Papua New Guinea, a PPP Act was passed in 2014 but was not followed by the promulgation of necessary implementing regulations, nor the establishment of PPP institutions[102]. In Asia-Pacific SIDS without specific PPP laws and regulations, private sector participation is typically governed under public procurement laws that often fail to capture the benefits of the PPP modality.

Box 5.9

Developing a Pacific capital market for infrastructure financing: some lessons learned from the Caribbean

Although Pacific SIDS[103] largely depend on state revenues, public borrowing, foreign aid, and FDI to finance their infrastructural development, those insular economies have struggled to attract both internal and external capital due to both small-sized markets and projects (Hurley, 2015). Lacking adequate financial and banking regulations and policies, coupled with weak governance structure, has further hampered their access to necessary funds.

A potential solution to attract capital for needed infrastructure is to develop a Pacific-wide capital market that could enhance the economies of scale through sub-regional cooperation and capacity building of the financial and banking sector in the Pacific. A joint capital market in the Pacific could help improve standards and policies as well as develop a proper surveillance system in the financial and banking sector. This could also ease the movement of capital from an island to another.

The Pacific Islands Forum (PIF) should be the best framework to lead the development of such a sub-regional capital market. PIF is an organization of 16 Pacific SIDS, as well as Australia and New Zealand, to promote sub-regional socio-economic integration. This Forum has focused on the free movement of people and goods through trade and investment liberalization but does not focus on capital and banking as one of its priorities (PIF, 2019).

Within this context, Caribbean SIDS could provide a useful example for the Pacific to develop a sub-region-wide capital market. The member states of the Organisation of Eastern Caribbean States (OECS), a supranational organization among select Caribbean SIDS, share a common currency and

[102] The PPP Act 2014 has been in operation since January 2018, but a PPP centre, as mandated by the PPP Act, has yet to be established.

[103] All the Asia-Pacific SIDS, except the Maldives and Timor-Leste.

a central bank, having removed restrictions to the movement of capital (OECS Secretariat, 2010). OECS established the Regional Governments Securities Market (RGSM) in 2002, which is a sub-regional capital market for trading public debt instruments among OECS member states and operates fully on an electronic platform administered by the Regional Debt Coordinating Committee. This committee sets norms, such as the maturities for treasury bills and sovereign bonds and the calendar for auctions, and provides a licence to intermediaries or brokers (ECCB, 2019; Venner, 2016). The purchase of bonds and securities is tax-free for OECS residents. Since the creation of the RGSM, the number of auctions had increased from a couple of securities issued in 2002 to nearly 50 securities in 2014 (Venner, 2016).

Pacific SIDS and Caribbean SIDS share some similarities and differences. Their small and insular geography limits the economies of scale and provides smaller markets to potential investors and lenders. Both sub-regions face the serious risks of natural disasters (such as hurricanes, earthquakes and tsunamis), environmental degradation, and rising sea level. On the other hand, Pacific SIDS are spread over a large surface of approximately 38 million km^2, while the Caribbean SIDS form a continuous archipelago. Because of large American and European investments, Caribbean SIDS have more advanced and efficient financial and banking systems than Pacific SIDS do. While the PIF member states have mainly promoted trade and investment liberalization, the OECS member states already harmonized their monetary regulations and policies through adopting one single currency and one single central bank. Table 5.13 provides the concise comparison between PIF and OECS.

Table 5.13
Comparison of PIF and OECS, 2018

	Participating countries	Population	GDP (PPP) (Billions of United States dollars)	GDP (PPP per capita) (United States dollars)	Average debt-to-GDP ratio (Percentage)
PIF	Australia, Cook Islands, Fiji, French Polynesia, Kiribati, Marshall Islands, Micronesia (FS), Nauru, New Caledonia, New Zealand, Niue, Palau, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu, Vanuatu	40 871 619	1 600	40 321	33.1[b]
OECS	Full members[a]: Antigua and Barbuda, Dominica, Grenada, Montserrat, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines (Associate members: Anguilla, British Virgin Islands, Guadeloupe, Martinique)	633 934	6.7	10 569	74.7[c]

Sources: Country Economics (2018); IMF (2018h); United Nations (2018).

Table 5.13 (continued)

Participating countries	Population	GDP (PPP) (Billions of United States dollars)	GDP (PPP per capita) (United States dollars)	Average debt-to-GDP ratio (Percentage)

Notes: Purchasing power parity (PPP);

[a] The data in this table only account full members;

[b] no data for the Cook Islands, French Polynesia, New Caledonia, Niue, Palau, and Tonga; and

[c] no data for Montserrat.

Less developed financial and banking systems and lack of integration of the monetary regulations and policies can make it much harder for the Pacific SIDS to develop a joint capital market. They could however apply some experiences of Caribbean SIDS. First, Pacific SIDS must accelerate sub-regional integration through the PIF framework although their initial actions may still focus on the free movement of goods and people. Second, Pacific SIDS should enhance the capacity of their financial and banking sector and improve their productivity and governance. Third, they should adopt ICT applications to digitize their financial and banking systems to counter the geographical distance and make it easier to connect to each other's capital markets. Fourth, Pacific SIDS should set common norms regarding bond issuances, selecting capable intermediaries and implementing tax-free bond purchasing for locals, all of which could greatly facilitate the transfer of capital among Pacific SIDS. Fifth, implementing international financial and banking standards such as Basel II and III could foster a virtuous domino effect as better standards and surveillance can foster international trust in Pacific SIDS' financial and banking systems. Finally, the South Pacific Stock Exchange (SPX) of Fiji, arguably the most developed capital market in the Pacific, may play a central role to develop a sub-regional capital market through extending their services and sharing their knowledge with other Pacific markets to attract financiers and investors throughout and outside the Pacific. In conclusion, these options could have the overarching effect of attracting more capital needed for crucial infrastructural projects in Pacific SIDS through both providing a larger capital market and better financial and banking systems to potential investors and lenders.

3. Opportunities and policy recommendations

Through structural reforms and improvements in governance standards, policy-makers in Asia and the Pacific's LLDCs and SIDS should mobilize domestic and external funding resources more effectively and efficiently for infrastructure. This includes – but is certainly not confined to – improved tax administration, creating more conducive investment climates through legal, regulatory and other measures, and building private sector confidence to invest in infrastructure. It also entails ensuring that domestic and foreign capital is efficiently channelled into productive infrastructure investments.

3.1. LLDCs in Asia

Mobilizing domestic public finance is clearly a key factor in infrastructure financing for Asia's LLDCs, while private financing is increasingly important. Given the large financing gap in infrastructure, all financing sources – whether they are public or private, domestic or international – need to be harnessed. The respective roles and weightings of the various potential financing sources will differ across Asia's LLDCs and infrastructure sub-sectors. But there are four areas of recommendations provided here.

Tax reform

Improved tax administration, through the implementation of tax reforms, will allow Asia's LLDCs to expand their fiscal capabilities in providing infrastructure services. The ability to collect taxes is crucial in financing critical infrastructure projects. Many Asian LLDCs, especially those that are not rich in natural resources, should strengthen their capacity for tax collection, as tax mobilization rates still remain low, despite some significant reforms efforts in the past. A simpler tax system with a limited number of rates is critical in fostering higher levels of taxpayer compliance. This also makes tax administration and enforcement less challenging in countries that typically lack a well-functioning judicial system. Curbing exemptions can also reduce the tax system's complexity and distortions, while boosting revenue by broadening the tax base. In this context, the VAT has proved to be an efficient and strong revenue booster: countries that impose this sales tax modality tend to raise more revenues than those that do not (Keen and Lockwood, 2010).

In addition, Asia's LLDCs should consider comprehensive tax administration reforms that modernize their tax procedures and institutions. A broad spectrum of legal, technical, and administrative measures might potentially include: i) establishment of independent taxpayer offices; ii) use of ICT applications to improve compliance and fight corruption (e.g. one-stop Internet tax portal, e-filing, e-tax-return application, and e-customs); iii) establishment and modernization of basic rules and processes for registration, filing, and management of payment obligations; iv) enhanced audit and verification programmer; and v) use of infrastructure related taxes and levies for infrastructure maintenance and operations (ADBI, 2018; IMF, 2017b, 2018). However, increased tax mobilization does not automatically translate into adequate volumes of financing for a country's infrastructure needs. Nor does it mean that the money earmarked for infrastructure spending will be used in an efficient or optimal manner. Thus, reforms aimed at reducing inefficiencies in public spending on infrastructure can also help better utilize available tax revenues.

Attracting FDI

Asia's LLDCs may wish to consider implementing carefully tailored incentive policies aimed at attracting more FDI for infrastructure investment. Those incentives can be broadly divided into two categories: fiscal and financial incentives (OECD, 2015). Fiscal FDI incentives include the following**:**

- Reduced direct taxes through, for example, reduced corporate income tax rates, tax holidays and tax-privileges in specific geographic zones, such as SEZs;
- Incentives for capital formation, such as special investment allowances, investment tax credits and reinvested profits; and
- Other tax reductions, such as lower sales taxes and VAT reductions.

Financial FDI incentives are usually negotiated between public authorities and large foreign investors, and can comprise (but are not limited to):

- Reduction or elimination of tariffs and other cross-border barriers with trade partners and neighbouring countries;
- Infrastructure subsidies by providing physical infrastructure (e.g. roads and railways) or communication to meet the needs of foreign investors;
- Job training subsidies to ease a shortage of qualified labour resources, including trainings through public education programmes;
- Credits to investors through providing soft loans, interest subsidies or loan guarantees to foreign enterprises; and
- Concessional access to real estate through selling or leasing lands or buildings to foreign investors at below market values.

But there are also risks arising from the use of incentives to try and stimulate greater foreign investment inflows. Any incentive given comes at an opportunity cost to the state, in terms of the revenues foregone (for fiscal incentives) or the expenditures given (for financial incentives); precisely the opposite of the goal of tax reform. Being confident that an incentive does genuinely trigger additional FDI activity, and is not a 'gift' to a firm that had plans to invest anyway, is not always easy. And in the case of financial incentives in particular, least developed and developing countries rarely have the public funds available to, somewhat controversially, give money to private sector actors as a form of 'legal bribe' to do something that is deemed desirable for the country, and that they would otherwise hesitate to

do. This can only be justified if the impact resulting from the investment or business activity triggered by the incentive has a value greater than the incentive itself.

In the specific case of FDI in the infrastructure sector, and as intimated in chapter 1 of this volume, it is an imperative to have effective PPP units, procurement entities and privatization authorities all need to have adequate institutional capacity (such as well-trained staff), and have well defined responsibilities and coordination mechanisms in place, including for managing any cross-border infrastructure projects, such as regional road or rail networks. Governments may also wish to consider the provision of appropriate guarantees, so as to lessen the perceived risks for foreign investors. Such guarantees give comfort to financiers and investors that legally binding agreements and payment contracts, such as those pertaining to a power purchase agreement or a PPP deal, will be respected by the government, and any monies paid. It is important to recognise here that such a guarantee does entail a government taking on all the risk of an infrastructure project, but only that part which relates to its own actions, such as failing to honour a contract or a payment due. All the other, considerable risks of potential project failure remain with the developers; the government guarantee just lessens one part of the aggregate risks surrounding a project, and which the government can control for.

Strengthening public-private partnerships

In Asia's LLDCs, the PPP modality has been widely touted as a potentially impactful platform for governments in developing countries to leverage private sector financing for infrastructure projects that then provide public services and goods. Private sector financing through PPPs can broadly include: i) equity financing through the project's developer(s); or ii) project finance or debt financing through private lenders, which can be either commercial banks or non-bank institutional financiers; or a combination of both. Public financing to PPPs typically comprises: i) governments underwriting part of a project's upfront capital costs through grants or viability gap funding[104]; ii) governments providing subsidies to share recurrent operational and maintenance costs; iii) state-owned enterprises (SOEs) investing some of their equity; and/or iv) state-owned development banks extending concessional loans. MDBs and bilateral financial institutions also provide various forms of concessional loans, grants and guarantees, as well as financial and technical support to PPP based infrastructure projects. But to be successful, PPPs need an adequate legal

[104] As discussed in chapter 3, viability gap funding (VGF) can provide government's financial support to inviable infrastructure projects (World Bank, 2006).

and regulatory framework within which to operate, which explains in part why this particular modality for private-public co-investment in large-scale infrastructure projects has probably not been as vigorous as many had previously hoped. And as noted earlier, a key prerequisite for any sustained progress involves enhancing the capacity of government officials in planning, executing, supervising and evaluating sustainable, resilient, inclusive, and well-prioritized infrastructure programmes, and creating robust infrastructure frameworks. In this context, Asia's LLDCs can use two existing tools to assess their readiness to implement PPPs and to determine which is the optimal path down which to proceed:

- ESCAP's PPP Readiness Self-Assessment[105] is a tool for self-diagnosis of a country's readiness to implement PPPs. This assessment tool helps to diagnose the main challenges in attracting private investment for infrastructure development and identify the key issues that governments need to address in order to involve the private sector more actively in infrastructure financing. This tool can also help in preparing detailed action plans; and
- The Public-Private Infrastructure Advisory Facility (PPIAF) Country PPP Readiness Diagnostic[106] can be also used to provide strategic and specific understanding of whether a country or a specific sector within a country, is ready to undertake PPPs, and if not, what is the most effective and efficient operational way to proceed. This tool aids in the strategic choice of public investment vis-à-vis PPPs, and the optimal type of PPPs.

International cooperation

It is important for Asian LLDCs to avail themselves of technical assistance from development finance institutions and MDBs to enhance their institutional and technical capacity for planning, maintaining and managing infrastructure, and thereby optimize the limited financing available. In particular, responsible agencies in Asia's LLDCs need to be aware of how to promote and prepare commercially viable (or 'bankable') infrastructure projects. International development agencies and MDBs can further help to support the sharing of useful experiences and successful practices in infrastructure financing amongst Asia's LLDCs, and even in other comparable parts of the world. In collaborating with international development partners, Asian LLDCs can also increase the financial viability of infrastructure projects through various financing and risk management

[105] ESCAP (2005).

[106] World Bank (2016).

instruments (including viability gap funds), and by reducing operational inefficiencies and ensuring enhanced transparency and sound practices. By plugging into the non-inconsiderable expertise, capacity and funding resources that resides within the international development community, Asia's LLDCs can get the kind of support they need to roll out the kind of infrastructural platform that will then allow them to plug into the regional networks that are becoming an increasingly important factor in any country's macro-economic fortunes.

Further, Asia's LLDCs are encouraged to work with neighbouring countries in addressing the following issues:

- Achieving a consensus on policy recommendations at a regional level, and where possible, harmonizing regulatory frameworks in infrastructure finance and PPPs;
- Strengthening existing multilateral mechanisms to promote: greater knowledge transfer for infrastructure financing and project preparation and implementation; and open dialogues among public authorities, financial institutions, private investors, project companies and other stakeholders; and
- Mainstreaming potential climate change impacts in all planning activity and financial instruments, such as green bonds, so as to ensure the environmental sustainability of all infrastructure projects that are pursued.

3.2. SIDS in Asia and the Pacific

Financing infrastructure in Asia-Pacific SIDS is constrained not only by limited funds from both the public and private sectors, but also from weak public financial management. In 2014, 81 per cent of total public spending in the SIDS was allocated to recurrent expenditures, leaving only 19 per cent dedicated to capital investment for new public goods. A significant proportion of these recurrent expenditures were used to pay personnel costs (UNDP, 2017). This leaves a narrow fiscal space, contested by numerous state programmes, including infrastructure, for funds to underwrite capital spending projects.

Higher costs to build and maintain infrastructure projects in Asia-Pacific SIDS, compared to non-island countries, is caused by the need to import almost all materials and capital goods, while many projects are small scale, with a faster rate of deterioration due to intrusive climate conditions. As island economies, however, such countries need to be relatively self-dependent across a range of infrastructure services while they are poorly positioned to plug into neighbouring or regional frameworks. The

importance of infrastructure is fundamental, and Asia-Pacific SIDS should maximize their efforts to mobilize domestic revenues and attract external funding sources to finance their infrastructure needs. They need to improve their macro-economic performance, including through enhancing good governance measures, revisiting tax policies and economic policy. Good governance practices influence directly private sector confidence, support public-private partnerships, and cut transaction costs, thereby enhancing efficiency.

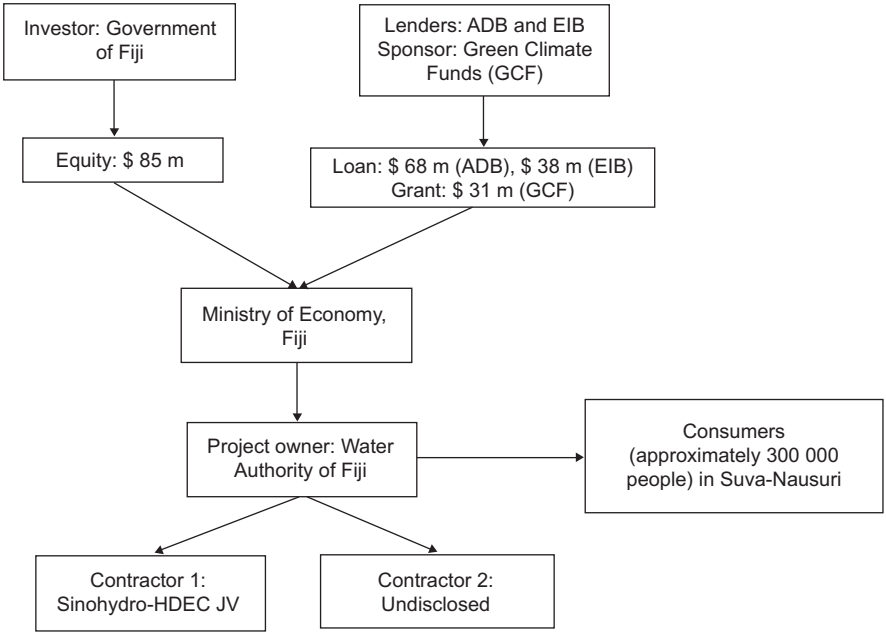
Given the common constraints of small economies and their modest future potential, relative geographic isolation, and the climate change-related threats faced by Asia-Pacific SIDS, infrastructure development strategies need to mitigate such factors, all of which tend to lower the (risk adjusted) rates of return and increase the risks of investment. With low fiscal capacity and high costs of building and maintenance, governments will inevitably face difficulties in attracting private sector financing. The main challenges here are: i) difficulties in identifying and designing infrastructure projects with adequate cost-recovery and economies of scale, given that the market for infrastructure services is thin and users' purchasing power tends to be low, while the costs of capital, maintenance, and replacement are high; and ii) climate change and natural disaster related risks pose threats to the sustainability of projects, leading to higher costs from internalized risks, and the need for greater returns to offset the perceived risks.

The infrastructure market in Asia-Pacific SIDS typically consists of a handful of players, all interacting with one another. They are: i) the owner(s) of the infrastructure projects (typically the government); ii) the consumers of infrastructure services, which range from institutions to individual users; iii) developers and contractors; iv) financial sponsors and lenders; and v) advisors and consultants. Additionally, there are also entities who connect the players, such as the capital market, law firms and negotiators. All players are governed by a set of regulatory frameworks, but the role of the public sector is vital, since it is the highest authority which sets the rules and often leads the process. It is also important to ensure that there is no conflict of interest on the government side as both regulator and potential owner of infrastructure assets, because this can deter potential investors from participating in suspicious project bidding. Figure 5.6 presents an example from Fiji on players and their relationships in a WSS project.

Given the relatively thin domestic private sector and underdeveloped capital markets, it is hard to envisage a significant contribution from locally-sourced financing in most of Asia-Pacific SIDS. Consequently, foreign participation is often crucial in underwriting the costs of new infrastructure projects. Nonetheless, an improved regulatory system for

Figure 5.6

Fiji urban WSS and wastewater management investment programme in the Rewa river



Sources: Green Climate Fund (2015); Karna (2018).

Note: EIB is the European Investment Bank.

domestic finance can also benefit local players and help foster the market, while existing funds – such as pension funds and/or insurance funds – can gradually become more important players in developing the market for infrastructure financing.

As mentioned in a previous section, establishing a sovereign wealth fund is one way to leverage the country's reserve position, support financial stability, and gain investment returns. It can also serve as endowment to attract external fund and to show the capability of the government to manage the fund. Establishing a sovereign wealth fund is a difficult undertaking, however. The majority of Asia-Pacific SIDS are not in the position of having excess revenue, therefore finding the sources of fund is very challenging. Furthermore, given the country's lack of experience in managing large funds and the required institutional framework, it will struggle to engage international partners. Before planning to set up a new sovereign wealth fund, the government may do better to strengthen

domestic capacity to mobilize domestic revenue and improve spending policy. Higher revenue means higher opportunity to save, while bigger impact of a solid spending policy will reduce inefficiency and pave the path to attract more international support.

Apart from utilizing existing ODA schemes, there are also opportunities for Asia-Pacific SIDS to both source foreign funds and help counter climate change-related effects at the same time. Schemes to help finance climate change adaptation have been supported by various development partners; both international organizations (such as the United Nations, the World Bank, ADB and the International Fund for Agricultural Development (IFAD), among others), and bilateral funds (such as from Australia, Japan, the United States, several member states of the European Union, etc.). These funding opportunities span a broad range of areas, covering direct environmental management, socio-economic development, hard and soft infrastructure related to climate-change adaptation, and insurance for natural disasters.

Taking into account the significant impact of natural disasters and climate change on infrastructure provision, and the extent to which they are now mainstreamed into most major infrastructure project plans (including their financing), it is worth looking briefly at this issue. A recent report on climate and disaster resilience financing in SIDS (OECD and World Bank, 2016) highlighted several issues:

- Building climate change and natural disaster resilience at the individual, institutional, and private sector levels is essential to achieve development in the Asia-Pacific SIDS, but available financing for this purpose tends to be limited and difficult to access;
- Market-based financing mechanisms are not as equally and easily accessible to all Asia-Pacific SIDS. Hence, dependency on concessional finance from the international development community continues as it remains a key source of financing;
- Geographic and income patterns mask the disproportionate weight of a few countries, and a few large and isolated commitments, amongst Asia-Pacific SIDS. The smallest nations tend to receive the highest per capita annual financing allocations, largely because of the high fixed administrative costs involved; and
- Resilience funding tends to follow large-scale disasters, but predictable, long-term financing is still scarce. Larger disasters are prone to receive larger funding streams compared with smaller, more recurrent ones.

Therefore, apart from existing patterns and mechanisms in disaster resilience assistance, it is critical to focus on strengthening public sector capacity to help Asia-Pacific SIDS and their infrastructure systems to become better prepared in the long-term. This in turn demands serious efforts in establishing an adequately robust support system, notably in: i) the legal and institutional system; and ii) public sector capacity to manage disaster risks. Disaster risk management requires long-term planning and management, spanning pre-event mitigation, event response, and post-event recovery. Managing disaster risks covers technical capacity to plan and prepare, as well as management capacity to lead field response, prepare contingency plans, and evaluate the results. A firm commitment by a government to having solid disaster risk management will help convince international development partners to support such efforts. For example, in November 2017, Fiji became the first emerging economy to issue a sovereign green bond, with a total amount of F$ 100 million. The World Bank and IFC provided technical assistance to the government of Fiji in the process of issuing the bond, which received a positive response from the financial markets (the first tranche of F$ 40 million was over-subscribed). The funds raised will be used to support climate adaptation and resilience projects.

Another possible way to increase the opportunities for SIDS is forming regional cooperation modalities to raise and manage climate-change funds. Sustainable trust funds or insurance funds require a certain scale of size. Individual country in SIDS is too small to raise and manage efficiently a trust fund or insurance fund, especially when the risks are very high. As such, regional funds may provide the necessary economies of scale. In principle, it is similar to regional bonds in some countries, which municipalities issue bonds not individually but through a regional development bank. The region already has the Pacific Catastrophe Risk Insurance Company (PCRIC), established in 2016, as one of the outputs from the Pacific Catastrophe Risk Assessment and Financing Initiative (PCRAFI). This initiative is supported by the World Bank and ADB, with financial support from Japan, the Global Facility for Disaster Reduction and Recovery (GFDRR) and the ACP-EU Natural Disaster Risk Reduction Programme. The members of PCRIC currently consist of five countries – the Cook Islands, Marshall Islands, Samoa, Tonga, and Vanuatu – but could be scaled up and improved. Establishing a regional trust fund sourced from climate change funds and other development partners would be another alternative to explore. Greater pooling of such a fund would be expected to bring about economies of scale, cutting administrative and transaction costs, and at the same time reduce the level of risk through greater geographical diversification. The Pacific region could also look to strengthen its bonds through regional actions to address the impact of climate change.

4. Concluding remarks

While the Asia-Pacific LLDCs and SIDS face some common challenges and solutions in infrastructure financing and hence, other issues are specific to each group. Some of the problems faced by Asian LLDCs, for example, are intrinsic to being landlocked states, sometimes with mountainous and unfavourable topography, while SIDS in Asia and the Pacific must contend with their physical remoteness and being more vulnerable to the impact of natural disasters and climate change such as rising sea levels. Where the challenges differ, so do the possible solutions. On the whole, however, both groups share many common challenges: sub-optimal economic governance, challenging investment climates, administrative obstacles, a lack of economies of scale, relatively high transport and logistics costs, infrastructure deficiencies, and challenging geographical and climate conditions. Combined, these factors make the enabling environment for infrastructure financing less than ideal for both the LLDCs and the SIDS in Asia and the Pacific.

For these countries, the technical capability of public sector agencies to establish a solid and realistic infrastructure development road map, and to identify and embed a pipeline of robust projects to offer investors and sponsors, is crucial. Host country government agencies also need to schedule project development in a timely fashion, and to be willing to drive the process forward, from the planning stage through to the implementation stage. There is also the need for a conducive and predictable business environment, keeping regulatory burdens and compliance costs (and risks) within acceptable norms, improving transparency, and building the capacity of public officials. Tax systems need to be fair, relatively simple and efficient, so as to provide reliable revenue sources and support the government's infrastructure development agenda. Tax policy formulation, administration and enforcement, transparency and accountability, as well as the stability of the system as a whole are all important aspects in evaluating the investment attractiveness of emerging economies. That, in turn, is important if policy-makers wish to attract private sector capital to co-fund infrastructure development.

But the private sector alone will not be able to underwrite the cost of providing adequate infrastructure services in these countries. These are typically public goods for which the host country's government is ultimately expected to provide its citizenry. Governments, therefore, need to have sufficient fiscal space to invest in capital assets and support infrastructure development, with the provision of infrastructure services as a public good. There are several ways to generate additional fiscal space, including: i) broadening the growth base, by improving debt management, enhancing growth drivers (e.g. through knowledge,

technology, innovation), and attracting more FDI; ii) improving revenue performance from both conventional and non-conventional sources; iii) improving expenditure management (e.g. reducing transaction costs, reconfiguring SOEs, enhancing treasury management, efficiency gains in public institutions, creating a development bank or funding institution that is separate from the state budget); and iv) integrating relevant programmes into a more comprehensive and holistic framework, from which synergies and efficiency gains can be derived.

Asian LLDCs are advised to consider all the relevant sources of potential infrastructure financing, as well as explore new sources of funding, both domestically and internationally. Having a wider spectrum of financial instruments can help the LLDCs to make infrastructure investment more attractive for a broader group of financiers, as well as diversify the risks. Despite being landlocked, the former USSR LLDCs are relatively more advanced in overall development – including infrastructure – as well as often being more attractive for foreign investment. The overall business environments in Kazakhstan and Azerbaijan, for example, are among the thirty best in the world, according to the World Bank's Doing Business 2019 Report. Since problems arising from being landlocked are mediated mostly through transport, LLDCs would be well advised to pay special attention to this sector. Secondly, some LLDCs may wish to explore development strategies emphasizing sectors that are not dependent on physical transport. The ICT revolution in the 21st century has made this task much easier.

Some of the SIDS' common characteristics are their remoteness, the threats posed by climate change, their modest economic sizes and structures, widely dispersed and small populations, and limited institutional and governance capacity. Disaster-prone regions pose severe challenges that can significantly and adversely impact a country's economic development path. It can also deter long-term capital investment in infrastructure projects due to sustainability concerns. Many island states in the Asia-Pacific region are low-lying atolls, increasingly threatened by rising sea level. Rising sea-water level can also contaminate limited fresh water reserves and make human habitation difficult. Internalizing such disaster risks into what is already a thin market inevitably raises the costs of investment and decreases the expected future incomes. This lowering of anticipated risk adjusted rates of return is one of the main reasons for low private sector investment in infrastructure projects in the SIDS. Asia-Pacific SIDS can seek to mitigate these constraints, however, through a number of actions, such as increasing resilience, reforming the legal system, improving public sector performance, strengthening regional cooperation, integrating infrastructure development with disaster management framework, and deepening fiscal capacity. The key areas for improvement are: public sector capacity

(especially related to fiscal policy), trade and investment, good governance, and database management. Good public sector performance will improve budgetary policy, particularly in mobilizing resources and spending efficiency. Further actions require creative and innovative ideas to attract more investments. Policy-makers may also need to review their zoning plans to reduce connectivity costs, public service unit costs, and potential loss caused by natural disasters.

Overall, both the LLDCs and SIDS of Asia and the Pacific have yet to fully harness the opportunities derived from global infrastructure financing options, and therefore have substantial space to mobilize additional resources to meet their critical infrastructure needs. Greater focus on, and targeting of, the various kinds of support emanating from the international development community will likely reap significant rewards.

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Conclusions

In this modern and interconnected world, the bulk of things that are made require electricity to make them, and then require modes of transport to get them to their end destination. The transactions and trading involved also require robust communications. It is the case that infrastructure is the platform on which any economy depends. It is also the vehicle by which a society provides public goods and services to its communities, whether it be health care, education, or safe water. Whatever social, cultural, political, and economic profile a country may have, the need for quality infrastructure is the perennial common denominator. Thus, for policy-makers, there is no way of escaping from the challenge of planning, funding, developing, and implementing infrastructure projects. But that challenge is considerable, particularly for many less developed and developing countries, including those in Asia and the Pacific. Growing and legitimate concerns around environmental degradation and the adverse impact of climate change are providing additional headwinds for economic planners, as an emphasis on sustainability is mainstreamed into the policy-making processes of all countries. Not only did the job become more pressing, but it also became more complex. For countries with limited institutional capacity in those government agencies mandated to oversee infrastructure planning and operation, the task is a daunting one, and the resources that the private sector – both foreign and domestic – can bring are potentially key in determining success or failure. But the worldviews, priorities and incentives of the public and private sectors are quite different, and much of the challenge lies in finding ways to align them in a way that is mutually satisfactory, delivers the desired impact, and can be made sustainable over time. And this is particularly true around the issue of financing infrastructure.

This book has sought to identify and discuss crucial and emerging issues in financing for sustainable infrastructure development, and highlight various important topics in the infrastructure financing 'space'. They include: the roles and constraints of both public and private sectors; the potential of leveraging capital market for infrastructure financing; capturing externality effects to attract private sector investors and financiers; key issues regarding cross-border infrastructure development; and unique challenges and opportunities of land-locked developing countries (LLDCs) and small island developing states (SIDS) in financing infrastructure. This book advocates for a holistic approach to be adopted on infrastructure financing, where both public and private sectors, as well as key stakeholders such as the United Nations, have significant roles to play in accelerating the pace of infrastructure investment towards the sustainable development agenda.

Such a holistic approach to infrastructure financing necessitates the creation of a robust governance structure and conducive enabling environment that then delivers a more efficient and effective allocation of public funds, and creates a more solid basis for mobilizing private sector capital, from both domestic and international actors. For that purpose, governments need to consider how best to: i) allocate their own resources to support the Sustainable Development Goals (SDGs); ii) leverage the development finance architecture and related regional cooperation platforms to finance infrastructure; and iii) incentivize and harness private sector financing sources for sustainable development.

The holistic approach should also help strengthen national and sub-national capacities to develop and implement 'bankable' and potentially transformational projects, and to then manage, monitor and report on project implementation. Policy-makers need to focus on making policy, and having done so, have the institutional frameworks in place that can allow them to delegate responsibility down to 'in-house' experts and consultants to implement that policy. On large and cross-border infrastructure projects, in particular, there has often been an understandable, but sub-optimal, tendency for senior government leaders and elected officials to inject themselves into project-specific negotiations. This often then leads to protracted delays in project negotiation, which investors and financiers often interpret as being an additional political risk factor. It also means that the whole process has to be repeated again with each project; a hugely inefficient way of going about things. Far better for policy-makers is to establish the major terms and conditions by which infrastructure projects will be negotiated, including issues around pricing and the potential for guarantees, and then leave it to the assigned agencies to structure the individual deals. If such a systems approach necessitates first developing the institutional capacity of those agencies, then so be it. The United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) and other regional bodies profiled in this book stand ready to assist in this regard, through the provision of information sharing and learning networks, technical assistance, and other supportive interventions.

Each journey begins with a first step, however faltering or hesitant, and this book underlines the need to think of financing for sustainable infrastructure development as being a process, and not a destination that is easily or instantly arrived at. A country's infrastructure development 'to do' list is typically a long one, begging the question of where to start and how to prioritise. The answer is likely to be different for each country's, or region's, particular circumstances. For example, for a country that has yet to develop a strong track record in infrastructure financing deals, it might be important to cherry-pick a handful of relatively small, but eminently do-able, infrastructure projects and achieve some 'quick wins'. And by

working with, and arguably investing some degree of trust in, leading private sector players and service providers in the relevant infrastructure field, policy-makers can convey a message to the market that their intentions to develop quality infrastructure interventions are serious. By leveraging the institutional reputations of some of the major international players in a respective field, a country can demonstrate that investing in its infrastructure need not necessarily be a high-risk proposition.

While this book hopefully provides numerous 'takeaways' for policy-makers and other stakeholders, we would concede that it also has some inevitable limitations. Firstly, the vast geographical scope of this study arises as an obstacle to the formulation of pertinent and applied policy recommendations. Asia and the Pacific is not only one of the largest, but also most heterogeneous regions of the world, with countries displaying diverse stages of development and socio-economic needs. And this is particularly true for infrastructure financing issues. Whereas Pacific small island states, for instance, are legitimately concerned with the provision of developing *relatively basic* infrastructure, and developing well-functioning banking sectors; in other sub-regions, like East and North-East Asia, countries' priorities typically lie more with the provision of *quality* infrastructure that mainstreams the SDGs, and finding ways to attract and harness capital via innovative financial instruments. This disparity in needs makes the process of policy support and advocacy more challenging, as general frameworks of action may not always prove useful at the country level.

Secondly, up-to-date and robust data on infrastructure investment is often in short supply. Public authorities often do not disclose the size of investment in infrastructure in their national accounts, and the participation of the private sector is also not easily quantifiable. Moreover, costing and estimation methodologies vary immensely across databases, which complicates cross-country comparisons, both statically and over time. Relevant data for least developed and landlocked developing countries, as well as small island developing states, is particularly limited, making any assessment of their needs that much harder to conduct.

Thirdly, there are some important topics that could not be covered extensively in this book, but that are also deserving of attention and should be further explored in the future. These include, among others: i) the optimal governance structure and tax mechanisms to help finance infrastructure projects; ii) banking and financial sector development, including debt rating mechanisms, the development of infrastructure bonds, such as infrastructure Islamic or green bonds, and other advanced financing instruments and FinTech solutions; and iii) the role and promotion of foreign direct investment (FDI) in infrastructure

development, which entails a very different approach than that used for other fields of foreign investment, such as manufacturing or resource extraction.

Those missing elements, among others, suggest some fertile areas for future research work, policy advocacy, and capacity building. Some suggestions for future policy-oriented research in this regard are summarized as follows:

Firstly, financial schemes for infrastructure development should seek to focus more on financial inclusion and expanding their coverage. For example, working with small and medium-sized enterprises (SMEs), and on commercial and residential activities surrounding infrastructure networks or corridors. An inclusive approach such as this can help identify and enhance externality effects, and create more value along with infrastructure development activities, which could then be captured to attract greater private sector financing in infrastructure. Governments should not be shy about embracing commercial structures that can not only stimulate greater private sector participation, but also achieve their own socio-economic goals. When a private sector investor completes an infrastructure project, the relevant government is, in effect, a net beneficiary of that investment, and should be willing to explore ways in which the risks and rewards of its enactment are shared equitably.

Second, a robust environmental, social, and governance (ESG) framework in infrastructure financing work is a necessity. This framework is particularly useful in providing guidance to institutional investors and financiers on stock and bond issuance considerations, and investment portfolio management that can be aligned with the objectives of the SDGs. The Infrastructure Financing and Public-Private Partnership (PPP) Network of Asia and the Pacific, which ESCAP established earlier, can also help integrate ESG into the network's activities, and encourage the private sector to get further involved in ESG investing, such as through improved governance around specific projects, and ensuring that social and environmental factors are considered in a thorough and meaningful manner, and not just as a 'box-ticking exercise'. The size of the impact investing market is growing exponentially, and it, therefore, makes a great deal of sense to see how governments can try to capture a greater proportion of these funds for infrastructure development. As the impact investing sector grows, it will increasingly be looking for larger projects to co-fund and help underwrite and willing to invest in countries that are deemed to be more challenging to operate in. The industry trends are favourable, if they can be harnessed.

Third, the development of equity and bond markets – including equity and bond indices – is critical in widening infrastructure financing options for countries in Asia and the Pacific. The capital markets can be a useful tool to encourage infrastructure and related business to embrace greener and more sustainable practices, with portfolio investors serving as a lever. These financial markets can serve as a conduit, channelling financial resources from the private sector to sustainable infrastructure projects, since institutional investors do not typically have the capacity or the desire to invest directly in individual infrastructure projects. But bonds and other instruments provide a means to 'package' those projects into a form of derivative investment that institutional investors can then use to gain exposure to the infrastructure sector, and even to the economies of so-called 'frontier markets' where the range of suitable asset classes are often scarce. New financial instruments, such as green bonds, directly link financing to sustainable development. It should also be noted that for small economies with a low level of financial sector development, and a modest domestic investor base primarily made up of retail investors, participating in regional financial markets may provide a better alternative for infrastructure financing, rather than trying to do it alone. Far better to place infrastructure-related financial products close to the region's larger pools of capital, if the aim is to tap this resource for funds.

Fourth, additional research on deepening the banking sector for infrastructure investment could be conducted. As countries are at different stages in their financial development, it would not be sensible or practicable to expect a country with a low level of financial development to pursue the same reforms as one of its regional peers enjoying a higher level of financial sophistication. In this case, banking sector development would be more realistic, and thus a higher priority, than the development of the capital markets for some countries in Asia and the Pacific. As discussed earlier, a key challenge is reconciling the maturity mismatch that exists in bank financing of infrastructure projects, and findings ways to address this constraint that would then allow banks to perform their primary macro-economic role, as financial intermediators.

Fifth, there is a need to explore further the potential of using blended finance and other innovations to incentivize the private sector to invest more in sustainable infrastructure. It may be possible for some governments to use more innovative ways to combine various financing resources (e.g. commercial and concessional loans, public subsidies and grants, MDBs' loans, capturing positive externality) through establishing infrastructure dedicated funds or special purpose vehicles (SPVs) so as to enhance the effectiveness and efficiency of infrastructure financing.

Sixth, the potential of new financial technologies, commonly referred to as FinTech, should be recognised and better understood, notwithstanding the rapid pace of change in the sector. Several countries have already started adopting blockchain technology in the management processes of their infrastructure projects, and it can prove especially useful in the procurement and implementation phases of some projects, facilitating bidding, procuring or bond issuance. Another good illustration of the ways in which FinTech is revolutionising the planning of sustainable infrastructure projects in the transport sector is the emergence of ride-sharing services. They have the potential to decrease the demand for personal car ownership, and hence promote a shift in the priorities of policy-makers away from conventional roads and parking lots, and towards bicycle lanes and public transport alternatives, such as a shift back towards using tram lines in urban areas, and thereby harnessing reusable energy sources.

Finally, other potential areas for capacity building activities might include: i) effective planning of infrastructure for the SDGs; ii) proper implementation methods for infrastructure projects and improved institutional settings; iii) harnessing external benefits from infrastructure development as a new source of funding for projects; and iv) improving local taxation to support the mobilization of new sources of funding. In this context, special attention needs to be paid to institutional capacity building of government agencies, and to improve the planning and delivery of infrastructure for the SDGs through strengthened governance. Clearly, the challenge is conceiving how virtually all least developed and numerous developing countries in Asia and the Pacific could actually enact such reforms, as they already wrestle with a range of organizational and political-economy factors that make 'joined-up government' seem like a distant goal, whether at the national and the sub-national levels. Indeed, this may well be one of the biggest challenges that the developing countries of Asia and the Pacific face.

Infrastructure development will play a critical role in meeting the 2030 Agenda for Sustainable Development in Asia and the Pacific. The pursuit of sustainable infrastructure in the region should be at the core of the region's development agenda. But significant challenges and risks around the financing of infrastructure projects – many of which are large, complex and sometimes span sovereign borders – often mean that hesitations and bottlenecks occur. And these are collectively serving to imperil the chances that Asia and the Pacific will meet the Sustainable Development Goals (SDGs). So, how can countries overcome these challenges?

This book takes stock of the infrastructure financing landscape in Asia and the Pacific, and proposes new strategic approaches and emphases to infrastructure financing, based on three complementary pillars. First, the SDGs should serve as the over-arching principles that set good practices in all stages of infrastructure development, from initial planning and conceptualization, through to implementation and operation. Secondly, governments need to provide a conducive enabling environment for infrastructure financing and development, including developing new financial instruments and markets, and ensuring effective planning and implementation of infrastructure investments. Thirdly, the private sector needs to be more meaningfully engaged in infrastructure development, as a valuable partner in achieving economic, social and environmental sustainability.

A strategic shift in mindset is advocated here. Adopting a more holistic approach to infrastructure financing will help to accelerate infrastructure development in Asia and the Pacific, and thereby help drive regional progress towards attaining the 2030 Agenda for Sustainable Development in Asia and the Pacific.

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