

Financing Sustainable Infrastructure Investment in ASEAN+3

Naoyuki Yoshino, Saloni Lakhia, and Josef T. Yap

5.1 Introduction

Infrastructure development is a key component of inclusive economic growth. Better access to physical infrastructure has increased firm-level competitiveness, reduced poverty, and improved welfare. The primary mechanism for these outcomes is enhanced economic productivity. Infrastructure encourages efficiency by lowering distribution costs and making goods and services more affordable (ADB 2017). Meanwhile, by allowing access to better health and educational services and fostering greater social and economic mobility, infrastructure bestows benefits equitably across income classes.

To maintain the beneficial contribution of infrastructure to economic development, plans and programs that articulate its role and design can be guided by the UN Sustainable Development Goals (SDGs) and the Principles for Promoting Quality Infrastructure Investment espoused by the Group of 20 (G20). A common link between these two sets of tenets is the objective of incorporating environmental considerations. This is one of the components of sustainability considered in this chapter. The other is closing a financing gap that threatens the implementation of these plans and programs.

Financing Gaps Constrain Infrastructure Investment

While developing Asia has made great strides in the last 5 decades in building infrastructure, major shortfalls remain. The Asian Development Bank (ADB 2017) estimated that over 400 million Asians still lack electricity; roughly 300 million have no access to safe drinking water and 1.5 billion people lack basic sanitation. In 2017, the Asian Development Bank (ADB) estimated that total investment needs for 2016-2030 for its 45 developing member countries would be \$22.6 trillion (in 2015 prices). The amount covers transport, power, telecommunications, and water supply and sanitation. However, if the costs of climate mitigation and adaptation are included, the amount rises to \$26.2 trillion. This is equivalent to 5.1% of projected gross domestic product (GDP) during that period.

Using data for 25 of these developing Asian countries, which cover 96% of the region's population and include seven Southeast Asian economies, an annual infrastructure gap was calculated for 2016-2020 (Table 5.1). This provided a benchmark for analysis, with the gap expected to extend beyond 2020. Including climate-related needs led to a gap of about \$459 billion annually or 2.4% of projected GDP. Without the People's Republic of China (PRC), the gap in the climate-adjusted scenario as a share of remaining economies' GDP was 5%.

Table 5.1: Estimated Infrastructure Investments and Gaps, 25 Developing Asian Economies, 2016-2020

	Estimated Current	Base	Baseline Estimates			Climate-Adjusted Estimates		
Economy Coverage	Investment (2015)	Annual need	Gap	Gap (% of GDP)	Annual need	Gap	Gap (% of GDP)	
Total (25)	881	1,211	330	1.7	1,340	459	2.4	
Total without PRC (24)	195	457	262	4.3	503	308	5.0	
Central Asia (3)	6	11	5	2.3	12	7	3.1	
South Asia (8)	134	294	160	4.7	329	195	5.7	
Southeast Asia (7)	55	147	92	3.8	157	102	4.1	
Pacific (5)	1	2	1	6.2	2	2	6.9	
Indonesia	23	70	47	4.7	74	51	5.1	
PRC	686	753	68	0.5	837	151	1.2	

(\$ billion in 2015 prices)

GDP = gross domestic product, PRC = People's Republic of China.

Note: The numbers in parentheses refer to the number of selected economies. The gap as a percent of GDP is based on the annual average of projected GDP from 2016 to 2020. The 25 economies covered here are listed in Appendix 3.1 of ADB (2017, 95).

Source: ADB (2017).

Sustainable Infrastructure Investment

This chapter examines the role of the public and private sector in providing resources for infrastructure investment. A key issue is to align the process and outcome with the concept of sustainability, resulting in sustainable

infrastructure investment. Sustainability is defined along three dimensions: macroeconomic stability, environmental soundness, and encouraging and maintaining private sector participation.

Mobilizing public sector resources for infrastructure projects should not lead to unsustainable debt levels. Meanwhile, climate mitigation measures—primarily focused on the reduction of greenhouse gas emissions—and climate adaptation measures should be incorporated in investment plans in line with the SDGs and the Principles for Promoting Quality Infrastructure Investment.¹ Given relatively limited public sector resources, particularly to support environment-friendly infrastructure, the private sector has to be incentivized to broaden and deepen its participation in infrastructure finance.

Figure 5.1 summarizes the mechanisms through which public and private sectors can finance infrastructure. Sources of public infrastructure finance include national and subnational governments, development financial institutions—which include multilateral development banks, national development banks, and other financial institutions (for example, the China Development Bank in the PRC—and official development assistance.



These are referred to as green investment or green projects. Apart from climate change mitigation and climate change adaptation, economic activities related to environmental sustainability are the use and protection of water and marine resources; the transition to a circular economy; pollution prevention and control; and the protection and restoration of biodiversity and ecosystems.

Section 5.2 describes the role of public finance and the importance of debt sustainability. Developing Asia has relied heavily on the public sector for financing infrastructure investment. In 2017, this was estimated at 92% (ADB 2017). However, public funds are not sufficient to cover the estimated gap for 2016–2030. Demand for public resources created by the coronavirus disease (COVID-19) pandemic has exacerbated this shortfall, making the need for private sector financing more critical.

Private sector infrastructure finance primarily relies on user fees—the revenue stream that supports financing through either public or private equity or debt, e.g., borrowing from commercial banks or by issuing bonds. User fees are relatively low in developing economies. As a result, the risk-return profile of infrastructure projects has diverted from those that are normally undertaken by the private sector. Figure 5.2 shows that the return from user fees, i.e., the benchmark yield, is usually lower than the expected or desired return of private investors. This has led to the relative scarcity of bankable infrastructure projects, which has impeded the participation of the private sector. Section 5.3 tackles this issue and proposes measures to encourage private finance can be combined to deliver infrastructure services—such as public–private partnership (PPP) infrastructure projects.



Two crosscutting issues that run between public and private finance are: (i) the need to raise resources for the infrastructure components related to climate mitigation and adaptation, so-called green finance; and (ii) the impact of COVID-19 on the availability of resources and the attractiveness of green projects. Sections 5.4 and 5.5 deal with these issues separately. The three components of sustainability in this chapter are, therefore, interwoven in several ways. One, exploring how to incentivize the private sector to support green infrastructure projects. Two, evaluating the government response to the added burden from climate-adjusted infrastructure requirements and relief and recovery measures necessitated by the pandemic. And three, how economic recovery measures can dovetail with green projects.

Figure 5.3 presents the key challenges confronting most economies in green projects and how the pandemic has magnified problems. Related to the ability to mobilize savings, government recovery strategies to address the pandemic must plan to better leverage resources for attracting capital from nonpublic sources including PPPs; institutions (pension funds, commercial banks, etc.); and the capital markets, together grouped as private, institutional, and commercial sources (ADB 2020a).



The penultimate section examines how regional cooperation can support sustainable infrastructure investment. Progress in previous efforts is reported, particularly the development of local currency bonds. These are juxtaposed against more recent measures that focus on green finance. The last section concludes.

5.2 Role of Public Finance

As noted, the public sector has played a dominant role in the provision of infrastructure investment.² In 2017, this was estimated at 92% of total infrastructure investment. Data in Tables 5.2 and 5.3 indicate this trend has continued in recent years for the ASEAN+3 economies,³ at least in the ratio to GDP. Table 5.2 is obtained from ADB (2017) and shows the average of both public and private infrastructure investment for 2010–2014. Data on private sector infrastructure investment could not be replicated for later years. Data for general government gross fixed capital formation for 2005 to 2019 were obtained (Table 5.3). The bulk of this expenditure category is public infrastructure investment, and it can be gleaned from Tables 5.2 and 5.3 that, as a ratio to GDP, public infrastructure investment has remained fairly steady in East Asia.

The heavy reliance on the public sector in this context stems from the public goods nature of the bulk of infrastructure investment. Many projects yield low private rates of return but high social rates of return. This section examines the role of public finance, with particular attention on fiscal space and debt sustainability.

Table 5.2: Public and Private Infrastructure Investment in Asia, 2010–2014 (% of GDP)

	Private	Public
25 ADB Developing Member Countries	0.4	5.1
East Asia	app. 0	6.3
South Asia	1.8	3.0
Central and West Asia	0.3	2.6
Pacific	0.3	2.5
Southeast Asia	0.5	2.1
People's Republic of China	app. 0	6.3
Indonesia	0.3	2.3

ADB = Asian Development Bank, GDP = gross domestic product. Note: The numbers are based on 25 selected countries listed in Appendix 3.1 of ADB (2017). Source: ADB (2017).

² The main reference for discussion in this section is ADB (2017, pp. 55–59).

³ Association of Southeast Asian Nations plus the People's Republic of China, Japan, and the Republic of Korea

Economy	2005	2010	2015	2019
Brunei Darussalam	3.4	5.9	5.4	1.7
Cambodia	3.6	8.2	3.7	3.4
People's Republic of China	18.6	17.7	15.3	17.3
Hong Kong, China	4.3	4.7	6.2	5.8
Indonesia	2.9	2.4	3.3	3.4
Japan	5.9	5.2	5.0	5.0
Korea, Rep. of	5.8	5.2	4.3	4.8
Lao PDR	4.3	6.4	6.0	
Philippines	1.5	2.2	2.2	3.7
Singapore	4.2	4.5	5.1	4.7
Thailand	5.8	5.1	5.2	5.0
Viet Nam	3.8	5.6	5.4	5.8

Table 5.3: General Government Gross Fixed Capital Formation in ASEAN+3

(% of GDP)

GDP = gross domestic product, PRC = People's Republic of China, Lao PDR = Lao People's Democratic Republic.

Note: The variables refer to the general government investment (gross fixed capital formation) in billions of constant 2011 international dollars and GDP in billions of constant 2011 international dollars. Source: International Monetary Fund Investment and Capital Stock Dataset May 2021 Update (accessed July 2021).

Three Considerations for Fiscal Space

Even prior to the pandemic, a fiscal gap in available resources for physical infrastructure investment was forecast (ADB 2017). Public finance reforms in 24 of the 25 economies referred to in Table 5.1 were determined to narrow the gap, but only approximately 40% of the shortfall for 2016–2020 could be covered. Figure 5.4 indicates that debt service in the Asia and the Pacific is relatively high, even further constraining public sector ability to provide adequate infrastructure services.

Fiscal sustainability is the primary concern in public sector finance here. To assess fiscal space for infrastructure investment, three areas can be explored. First, policy makers need to determine to what extent tax efforts can be raised through higher rates or reforms aimed at greater administrative efficiency in tax collection. Second, opportunities exist whereby public spending can be reoriented toward infrastructure investment and away from inefficient items such as poorly targeted subsidies. Third, policy makers can assess the extent to which government can borrow while maintaining sustainable public debt. This is normally done by analyzing the economy's growth prospects—which represents the capacity to pay—and prevailing interest rates.



Public transfers of tax revenues—whether current or future—are the main source of public sector infrastructure financing. Table 5.4 shows general government revenue as a percentage of GDP for ASEAN+3 countries. Other sources are user charges for publicly provided infrastructure services, tools such as land value capture, and international transfers which usually come in the form of official development assistance. Future tax revenues are important in the context of debt sustainability.

Most economies in the region can sustainably increase revenues through changes in tax policy, improving tax administration, or a combination of the two. At the time the 2017 ADB report was written, in most economies, specific policies had already been identified and their impact on revenues quantified. Overall, IMF estimates at that time suggested that 22 of the 25 developing Asian economies analyzed could sustainably increase revenues via policy reform. In the case of ASEAN+3 economies, the performance of general government revenue has improved between 2005 and 2020, or at least remained steady (Table 5.4). The performance is comparable with other emerging market middle-income economies, except those in Europe.

Reorienting other budget expenditures toward public investment can also increase resources for infrastructure investment. Energy subsidies are one major source. Studies show subsidies are often poorly targeted, with most benefits accruing to the wealthiest households. They also lead to energy overconsumption, which harms the environment. Reforms of unprofitable state-owned enterprises are another area for consideration. IMF estimates at that time suggested at least 14 developing Asian economies could reorient expenditures toward public investment.

Economies	2005	2010	2015	2020
Cambodia	11.9	17.1	19.6	22.5
PRC	16.9	24.7	28.8	25.6
Hong Kong, China	17.2	20.7	18.6	19.7
Indonesia	17.9	15.6	14.9	12.4
Japan	29.1	28.7	33.6	34.1
Korea, Rep. of	19.7	20.1	20.3	22.8
Lao PDR	12.8	20.9	20.2	12.1
Malaysia	21.7	22.3	22.2	20.4
Myanmar	9.9	9.2	21.4	16.0
Philippines	17.1	16.1	18.5	19.6
Singapore	14.9	15.9	17.3	17.7
Thailand	21.8	20.9	22.3	20.6
Viet Nam	19.7	21.5	19.2	16.2
Emerging Market and Middle-Inco	me Economie	s Groups		
G20	25.2	27.0	27.4	25.3
Asia	17.9	22.5	26.2	23.6
Europe	36.2	34.1	33.4	34.3
Latin America	27.6	29.9	26.4	25.8
MENA and Pakistan	35.7	31.7	27.1	23.8

Table 5.4: General Government Revenue in ASEAN+3 (% of GDP)

G20 = Group of Twenty, Lao PDR = Lao People's Democratic Republic, MENA = Middle East and North Africa , PRC = People's Republic of China.

Note: Brunei Darussalam is not included in the data set. The emerging market and middle-income economies groupings are based on the definitions of the source.

Source: International Monetary Fund Fiscal Monitor Database (accessed July 2021).

Assessing Debt Sustainability

Meanwhile, any discussion of fiscal space must deal with public borrowing capacity and debt sustainability. High debt makes public finance and the broader economy vulnerable to growth and interest rate shocks. Debt servicing costs would consume a large share of government expenditures, restricting other priority spending. High public debt can also hurt the private sector, as the prospect of tax hikes or cutbacks in government spending to service debt can dampen investor sentiment and economic activity. Increased government borrowing can crowd out private investment.

Debt sustainability analysis helps assess how much spending can increase while keeping debt levels manageable. For a given set of macroeconomic assumptions, one can compute the primary balance—fiscal balance excluding interest payments—that will stabilize or raise public debt. Stabilizing public debt may not make sense in all cases—where those with low debt burdens could allow an increase to provide more room for priority spending. Normally, for economies with public debt greater than 50% the target is to stabilize public debt at current levels. On the other hand, low-debt economies—with public debt below 50% of GDP—can raise public debt toward the 50% of GDP threshold over a decade.

The fundamental point for developing Asia is that—considering revenue and expenditure measures along with debt sustainability—regional economies have fiscal space to increase infrastructure investment. Looking at individual countries, some have more than others.

This analysis has focused on the quantifiable aspects of fiscal space for infrastructure investment, but several other important (but less quantifiable) factors also shape policy makers' public infrastructure investment decisions. First, governments often have other pressing priorities, such as health and education expenditures, which compete for the available fiscal space of governments. Second, contingent liabilitiesemanating from the financial sector or disaster risk, for example-are often difficult to quantify and can reduce available fiscal space. Third, governments can squeeze more out of each investment dollar by improving the efficiency of the public investment process. Fourth, maturity dates of current public debt have to be accounted for. Bunching up of maturities may affect the feasibility of some infrastructure projects. Finally, there is much scope for governments in the region to increase infrastructure-related revenues. These include user fees that governments can charge for infrastructure services, which are more common for some types of infrastructure such as piped water, energy, and highways, but where prices are often set below cost recovery. Additional revenue can also arise from the increased economic activity generated by infrastructure projects, in some cases mitigating the burden of debt servicing.

Another infrastructure-related revenue stream—one underutilized by many countries as a means of financing infrastructure—is land value capture, a method by which the increase in property or land value due to public infrastructure improvements is captured through land-related taxes or other means to pay for the improvements. Essentially, it enables increases in private real estate value generated by public investments to flow to the public sector. Value capture works best for specific types of projects. In general, it produces the highest return in areas undergoing rapid urban growth. Development drives up land prices, creating an ideal opportunity to raise significant revenues. While value capture can be applied to a wide range of sectors, it is most appropriate for three project types: (i) new land development; (ii) major capital projects, particularly in transportation; and (iii) infrastructure that supports basic services such as water supply, wastewater treatment, and drainage. The benefits arising from these projects contribute directly to raising the value of the surrounding land, making value capture ideal.

5.3 Expanding Involvement of the Private Sector

Because of the anticipated shortfall in financial resources in 2016–2030 and the current strain on public finance, the role of the private sector has to be expanded. Table 5.5 shows that the access of the private sector in ASEAN+3 countries to credit resources has improved between 2015 and 2020. Mechanisms have to be designed to channel these funds to infrastructure investment.

The discussion of private sector financing in this section focuses on: (i) the progress of local bond markets—particularly those denominated in local currency—and how regional financial cooperation could continue its constructive role; (ii) specific tools to attract more private sector investment: (a) floating-interest-rate infrastructure bonds anchored on spillover tax revenues of the underlying project; (b) land trust methods, which can help overcome some right-of-way issues; and (iii) the regulatory and institutional framework for private sector participation, with a focus on PPPs.

The Nature of Private Finance

Since public finance reforms could cover only approximately 40% of the infrastructure finance shortfall for 2016–2020, it is deemed critical to expand the role of private sector finance. The latter can be broadly divided

into project and corporate finance. Project finance—otherwise known as limited recourse financing—utilizes a special purpose vehicle to raise funds for acquiring or constructing an infrastructure asset. Once operational, the cash flows generated by the project special purpose vehicle are used to pay its costs. In corporate finance, projects are undertaken by companies themselves and funded through their own balance sheets. While corporate finance is more flexible and less complicated than project finance, companies can only take on as much debt as their equity allows. Moreover, large projects may cause excessive balance sheet exposure. Thus, corporate finance is commonly used in relatively smaller infrastructure projects.

	Dom Priv	estic Cre vate Sect Banks	edit to or by	Equ Cap	iity Marl italizati	ket onª	Lo Cor	cal Curre porate B	ncy onds
Economy	2015	2019	2020	2015	2019	2020	2015	2019	2020
Brunei Darussalam	41.1	34.9	38.8						
Cambodia	74.2	114.2		1.0	2.6	9.5			
PRC	152.6	165.4	182.4	77.1	60.1	78.5	24.0	30.6	35.7
Hong Kong, China	208.8	237.5	258.5	1,029.2	1,341.7	1,767.6	28.7	38.1	45.4
Indonesia	33.1	32.5	33.2	42.3	45.9	45.2	2.2	2.8	2.8
Japan	102.0	109.6		109.6	120.1	128.8	14.7	15.3	16.6
Korea, Rep. of	132.1	151.7	165.5	87.1	89.1	122.2	72.3	78.6	84.6
Lao PDR				10.3	5.9				
Malaysia	123.1	120.8	134.1	139.7	109.2	123.9	43.1	50.0	56.0
Myanmar	17.7	26.3	28.7		0.6	0.6			
Philippines	39.9	48.0	51.9	80.2	71.5	73.0	5.8	7.7	9.0
Singapore	122.4	120.0	132.7	213.7	183.6	183.8	33.1	32.3	37.0
Thailand	115.9	111.2	125.0	91.4	100.3	104.0	18.3	22.4	23.5
Viet Nam	111.9	137.9		31.0	57.5	68.2	1.2	1.7	4.5

Table 5.5: Sources of Private Sector Credit in ASEAN+3

(% of GDP)

PRC = People's Republic of China, Lao PDR = Lao People's Democratic Republic.

^a The exchanges are: Cambodia Securities Exchange (Cambodia), Shanghai and Shenzhen Stock Exchanges (PRC), Hong Kong Exchanges and Clearing (Hong Kong, China), Indonesia Stock Exchange (Indonesia), Japan Exchange Group (Japan), Korea Exchange (Republic of Korea), Lao Securities Exchange (Lao PDR), Bursa Malaysia (Malaysia), Yangon Stock Exchange (Myanmar), Philippine Stock Exchange (Philippines), Singapore Exchange (Singapore), The Stock Exchange of Thailand (Thailand), and Ho Chi Minh and Hanoi Stock Exchanges (Viet Nam).

Source: Authors based on CEIC, domestic sources, and World Federation of Exchanges Statistics Portal; AsianBondsOnline; and World Bank, *World Development Indicators* (accessed July 2021).

Large infrastructure projects historically receive relatively little private financing for two main reasons. First, the risk-reward profile of many infrastructure projects is not financially attractive, either in absolute terms or in comparison to alternative investment choices. If these investment transactions were to occur, a financial viability gap would result, or other investment choices would simply be more attractive.

Second, even where infrastructure projects might be financially attractive, capital markets and information gaps may prevent private capital from coming in. For example, capital market gaps in green projects are often the result of the "newness" of the technology or the process, and thus generate unfounded perceptions of excessive risk. Factors preventing private financing flows are generally related to either high perceptions of risk or high project or capital costs (for a given level of returns), or a combination of the two.

The importance of these constraints can be gleaned from the amount of investible funds available from the private sector. Of the estimated \$50 trillion private capital managed globally by pension funds, sovereign wealth funds, insurance companies, and other institutional investors, only 0.8% has been allocated to infrastructure in recent years (ADB 2017, citing The Economist 2014). Moreover, savings are high in Asia and the Pacific. To channel available resources into infrastructure finance, an overall regulatory, legal, institutional, and financing framework that provides an effective risk allocation and risk transfer mechanism is needed to generate a pipeline of bankable projects—one that expands financial sources and instruments.

Credit Enhancement Mechanisms

Meanwhile, institutional investors, such as pension funds and insurance companies, are looking to diversify their portfolios, and are typically mandated to invest in low-risk assets. Infrastructure assets offer a viable investment alternative given their long-term, predictable income streams; low sensitivity to business cycles; and low correlation in rates of return to other asset classes. However, most infrastructure bonds in developing countries—even those for completed projects—have ratings below those required by institutional investors. Thus, credit enhancement mechanisms can help boost ratings, protecting senior creditors by absorbing the "first loss" in the case of default—through credit guarantees where a third party acts as the guarantor in exchange for a fee. These can either be privately provided by banks or specialized institutions, or publicly by governments, official agencies, and multilateral development banks.

A lack of credible credit ratings also constrains investment, particularly for project bonds, fueled by insufficient data to determine default probabilities. Credit enhancement instruments require rating agencies to provide a standalone rating to bonds and advise on the extent of the credit enhancement (guarantee cover) required to raise the rating to the desired level. Investors will only invest in the credit-enhanced bonds if the rating agency guidance is credible.

Stronger rating agencies will also support liquidity in instruments such as "green bonds"—corporate, project, and sub-sovereign bonds for clean energy assets—and in enabling securitization of asset-backed securities (whereby bonds are backed by a pool of infrastructure loans and sold to investors through capital markets). In this way, credible credit ratings can inject much-needed liquidity into infrastructure bonds, especially in markets where investors cannot yet assess the bankability of infrastructure projects. The role of credit guarantees and credit enhancement instruments is discussed further in section 5.4. The moral hazard dimension of credit guarantees will have to be covered by the guarantors and this may lead to unfair outcomes.

The role of the public sector in credit enhancement mechanisms must be tempered by the possibility of moral hazard. While attracting private finance by guaranteeing a rate of return, it may result in an unsustainable public sector debt level. Optimal allocation of risk is crucial, and this can be achieved by instruments described in subsequent subsections.

Long-Term Finance and Bond Markets

The Asian Bond Markets Initiative (ABMI) was established in December 2002 to develop efficient and liquid local currency bond markets to better channel Asia's vast savings to more productive long-term investments (Park et al. 2017). In turn, broader and deeper bond markets could mitigate currency and maturity mismatches. Table 5.6 looks at local currency (LCY) bond market progress in Asia. Data show that the share of emerging market economies (EME) bonds denominated in local currency increased from 75% in 2001 to 87% in 2011. The value of local currency bonds was \$7,070 in 2011, which was 87% of \$8,119 billion.

	Total	2011		20	2006		2001	
Economy	\$ billion	\$ billion	% of GDP	% of total	% of GDP	% of total	% of GDP	% of total
Advanced economies	74,371	67,912	164	91	134	91	107	93
Euro area advanced economies	22,106	20,147	157	91	133	91	94	89
Other advanced economies	22,857	19,134	140	84	104	81	84	87
United States	29,409	28,630	191	97	158	96	131	98
Emerging market economies	8,119	7,070	32	87	31	83	26	75
Europe	699	500	24	72	30	77	25	76
Latin America	1,406	1,053	22	75	20	70	19	54
Asia	5,667	5,260	41	93	39	90	33	88
PRC	2,956	2,938	40	99	27	98	18	95
Hong Kong, China	116	45	18	39	19	53	15	54
Indonesia	113	84	10	74	15	87	27	96
Korea, Rep. of	1,265	1,117	100	88	94	91	85	91
Malaysia	260	233	81	90	59	79	57	77
Pakistan	34	32	15	94	15	90	22	96
Philippines	101	63	28	62	26	50	21	48
Singapore	130	90	37	69	40	60	35	69
Thailand	175	170	49	97	37	89	28	80
Other emerging market economies	347	255	11	74	11	69	10	50
Russian Federation	156	91	5	59	3	41	2	13
South Africa	191	164	40	86	39	90	32	87

Table 5.6: Development of Local Currency Bond Markets, 2001–2011

GDP = gross domestic product, PRC = People's Republic of China. Source: Burger, Warnock, and Warnock (2015).

The data represent both government and corporate bonds. Table 5.6 is not readily updated and more recent performance is presented. For example, Silva et al. (2020) show even more substantial progress for local currency bonds between 2011 and 2018 for Asia and Pacific economies (Figure 5.5). However, there has been hardly any progress if the PRC is excluded. Meanwhile, ADB (2019) provides a useful update on the progress of ABMI. According to the Asian Economic Integration Report, since the ABMI was established in 2002, local currency bond markets in ASEAN+3 economies have grown steadily, and today are comparable in size to the United States (US) Treasury and euro-denominated bonds issued by residents in the euro area. In May 2019, ADB published Good Practices for Developing a Local Currency Bond Market: Lessons from the ASEAN+3 Asian Bond Markets Initiative. Though every market has its own unique features—there is no "one-size-fitsall" approach—sharing experiences and lessons learned from the ABMI can help foster the process of local currency bond market development across developing Asia. The ASEAN+3 Multi-Currency Bond Issuance Framework is an ABMI policy initiative designed to help facilitate intraregional transactions by standardizing bond and note issuance, along with investment processes. This can help facilitate the process of recycling savings within the region more pragmatically and efficiently. The ASEAN+3 Multi-Currency Bond Issuance Framework helps intraregional bond and note issuance and investment by creating common market practices; utilizing a common document for submission—the single submission form (SSF); and highlighting transparent issuance procedures documented in implementation guidelines for participating markets.



Floating-Interest-Rate Infrastructure Bonds

One issue that usually constrains private sector participation in large infrastructure projects is the relatively low fees that can be charged to users. There is a conflict of interest between the actual beneficiaries of the infrastructure project and the investors (Figure 5.6). A trade-off exists between the level of user fees and the attractiveness of the project to private investors.



Floating-interest-rate infrastructure bonds are an innovative method to attract private finance in infrastructure projects by offering a higher rate of return. They are designed to capture part of spillover tax revenues created by infrastructure projects and can help reduce the trade-off between attracting private investors and affordable user charges (Box 5.1).⁴

Unlike the usual government bond, which provides a fixed interest rate, the proposed floating- interest-rate infrastructure bond provides a return on investment that depends on spillover tax revenues. When user charges and the return from spillover tax revenues are below the interest rate of the fixed-rate government bond, the interest rate will equal the fixed rate of the government bond. In other words, the latter acts as a floor. As the spillover effect of infrastructure investment increases, the rate of return from the

⁴ For instance, in the case of water supply, government injects extra funds into water supply companies, which are taken from property tax revenues assuming that water supply increases property values. Another example is private railways which develop station areas for shopping malls to get spillover profits to compensate for low revenues from user charges. In Hong Kong, China, subway companies can obtain the land in a station area which they can develop for shopping malls, apartments, etc., to receive spillover revenues in addition to user charges.

investment will become greater than the fixed rate of the government bond so infrastructure bond holders start receiving interest earnings higher than the floor rate. The spillover tax revenues in the latter stage can compensate losses in the first period.

Notably, the overall package includes paying interest equivalent to the fixed rate of the government bond during the construction period. This feature addresses a concern among private investors that the return to investment is zero during the construction period.

In Figure 5.7, the period from T_0 to T_1 is the project construction period. For simplicity, return on investment is zero in this diagram. The operation of the infrastructure starts at time T_1 . User charges and spillover effect from infrastructure are not so large from the start of the operation until Point T_3 , after which user charges and 50% of spillover tax return become higher than the government bond's interest rate.⁵ Between T_0 and T_3 , where not enough revenues are created by the infrastructure, the interest rate of the infrastructure bond is the same as the government bond.

From Point T_3 , 50% of spillover tax revenues, in addition to user charges, become higher than the interest rate of the government bond. After this point, the floating-rate bond will start paying a higher rate of interest than the government bond. The rate of return on the floating-rate bond is the upward-moving red line in Figure 5.7. Revenue for the issuer of floating-interest-rate infrastructure bond is generated from two sources: infrastructure user charges and part of spillover tax revenues.

The issuer of the floating-interest-rate infrastructure bond could cap the interest paid to bond holders. If the spillover effect is very large, the cap on the floating interest rate will be high. However, the issuer must set the cap in advance, prior to bond issuances. Otherwise, private investors would be very skeptical of the cap level of the floating-rate bond.

Alternatively, the cap can be set such that it is conditional on the amount of spillover effects. In this scenario, the contract between government and private investors must stipulate the conditions clearly at the beginning of the project. This allows private investors to compute their expected future return even before the start of the project.

⁵ The choice of 50% is for illustrative purposes.

Extra revenues above the cap can be kept by the issuer as reserves to fund regular infrastructure maintenance and repairs and as a contingency for any future damage due to natural disasters. Maintenance and repairs are needed for infrastructure facilities especially after natural disasters, and such costs are usually covered by public funds (Yoshino, Azhgaliyeva, and Mishra 2020).



Spillover tax revenues result from greater economic activity spurred by the infrastructure project and services. New businesses come to the region and new residential areas are constructed. The result is increased revenues from income tax, sales tax, and corporate business tax. Access to finance for new businesses is necessary for the spillover effect to materialize. When bank loans are not accessible or not affordable, hometown crowdfunding is one of the ways to finance small businesses and start-ups, which will increase economic activities in the region along the new infrastructure facilities (Yoshino 2013).

Box 5.1: Calculating the Spillover Tax Revenue

Spillover effects can be ascertained through the following procedures, presented diagrammatically in the first figure:

- Compute the national average growth rate of tax revenues in each tax category, such as corporate tax, personal income tax, property tax, and sales tax.
- Compute the growth rate of all tax revenues along the newly constructed infrastructure projects such as roads, highways, railways, and water supply.
- Take the difference in tax revenues between the affected region and non-affected region, and define the difference as the spillover effects.



Diagram of Spillover Tax Revenues

Source: Yoshino, Abidhadjaev, and Nakahigashi (2019).

Without investment in infrastructure, the government would not obtain the increased tax revenues. Part of the tax revenues could be distributed to private investors who financed the infrastructure, without decreasing existing tax revenues of local and central governments. In countries such as the Philippines, the central government finances much of the infrastructure development. However, local governments collect most of the spillover tax revenues. An agreement to share the spillover taxes must be forged between the national and local governments.

If local governments agree to share the spillover tax revenues with the central government, the latter can invest the proceeds to help mitigate poverty in rural regions. These projects would generate additional tax revenues from spillovers creating a virtuous cycle.

continued on next page

Box 5.1 (continued)

Following an econometric model (Equation 1), the difference in difference method is used to compare the differential impact of infrastructure investment in two different regions. One is the region which gained significantly from a transport infrastructure project. Another is the region located sufficiently far away so as not to be affected by the project. The difference between these two regions in either tax revenue or gross domestic product (GDP) can be obtained. Since monetary policy and fiscal policies affect all the countries, various economic variables will be used as explanatory variables to explain the fluctuations of tax revenue and GDP. Then add the dummy variable which represents specific infrastructure investment. Periods before the construction, during the construction, and during operation are compared to examine the impact of transport infrastructure investment (Yoshino and Abidhadjaev 2017a, 2017b).

Equation 1: $\Delta Y_{i,t} = \alpha_i + \phi_t + X'_{it} \beta + \delta(D_{gt\{2010,2009\}}) + \varepsilon_{it}$

 ΔY_{it} is the change in tax revenue or GDP of region i; X denotes time-varying covariates (vector of observed control variables); D is the dummy variable indicating whether the observation is in the affected group after the provision of the infrastructure services; g indexes groups of regions, affected and not affected; α_i is the sum of the autonomous and time-invariant unobserved region-specific rates of growth; ϕ_t is the year-specific growth effect; and ε_{it} is the error term, assumed to be independent over time.

There are ways to identify the impact of each infrastructure investment on spillover tax revenues. In staggered infrastructure projects, the use of annual dummy variables can identify spillover effects for each type of infrastructure project. Essentially, in this scenario, an increase in tax revenues resulting from one project can be isolated from an increase in tax revenues resulting from other projects. This allows the identification of different economic impacts in the region.

In simultaneous infrastructure projects, it is difficult to measure the impact of each infrastructure project on tax revenues created separately. There are many kinds of spillover effects derived from different kinds of infrastructure investments. The impact of an infrastructure project on the spillover tax revenues may not be easily distinguishable from the impact of the other infrastructure investments.

Box5.1 (continued)

Example 1: The Philippine Star Toll Highway

The table shows the case of the Star Highway in Manila (Yoshino and Pontines 2018). The periods *t*-1 and *t* indicate periods under construction. At the end of *t*, the highway had been completed and started operation. For Batangas City (last row), tax revenues increased from around P490 million before construction (*t*-2) to over P622 million and P652 million after construction had started (*t*-1 and *t*).

During the construction period, workers and related activities came to the area, which increased regional GDP. The Star Highway was completed at the end of *t*. Then at *t*-2, tax revenues diminished compared with the construction period until after the fourth year when tax revenues increased significantly. At t+4, tax revenues went up to as high as P1,209 billion, about twice the amount before the construction. These are the spillover tax increases emanating from infrastructure investment.

The relevant numbers are the increases in tax revenues. Thus, if the highway had not been constructed, incremental tax revenues would have likely remained at P490 billion as at *t*-2. Because of the highway construction and increased economic activities, Batangas City received tax revenues of P1,209 billion by *t*+4. If part of the incremental tax revenues (P1,209 billion-P490 billion) were to be returned to private investors, they would be more willing to invest their money to construct the highway.

Calculated Increase in Business Tax Revenues for the Beneficiary Group Relative to Non-Beneficiary Group (P billion)

Region	t-2			t+1	t+2	t+3	t+4
Lipa City	134.36	173.5	249.7	184.47	191.81	257.35	371.93
lbaan City	5.84	7.04	7.97	6.8	5.46	10.05	12.94
Batangas City	490.9	622.65	652.83	637.83	599.49	742.28	1,209.61

Source: Yoshino and Pontines (2015).

continued on next page

Box5.1 (continued)

Example 2: Kyushu Railway Company (JR Kyushu)

The high-speed railway of Kyushu Railway Company (JR Kyushu) in Japan is one of case studies (Yoshino and Abidhadjaev, 2017b), where tax revenues are compared in three periods: (i) the construction period, (ii) the operational period without good connectivity, and (iii) the operational period with good connectivity to large cities such as Osaka and Tokyo. Total tax revenues, as well as revenues from personal income tax, corporate tax, and other taxes (including property tax) were compared (second figure). When construction started, speculators who anticipated a significant rise of property values started buying land along the high-speed railway. This caused property tax revenues to go up significantly (denoted in the figure as "other tax"). The project involved hiring many workers and construction companies in the region, which increased revenue from both personal and corporate taxes. During the operational period when there was no connectivity with large cities such as Osaka and Tokyo, revenues from personal income tax and corporate tax went down compared to the construction period. However, during the phase 2 of the operation, the improved connectivity between Osaka and Tokyo brought businesses and passengers into the region, which created a huge increase in corporate and individual income taxes. Interestingly, property tax revenues kept on rising because of the expected increase in property values, as is shown in "other tax" revenues



Changes in Tax Revenues Resulting from the High-Speed Railway in Japan (¥ million)

Note: The first bar is the period of construction, the second bar is the period after operation without connection to large cities, and the third bar is the period after the high-speed railway is connected to large cities such as Osaka and Tokyo. Source: Yoshino and Abidhadjaev (2017b).

Land Trust Issue

Land acquisition for infrastructure investment continues to be a major barrier in many Asian countries. There is usually strong resistance among landowners to give up their land for development projects. This chapter proposes a land trust method as a solution to this barrier. Land trust allows the owners to retain their ownership of the land while it is leased for a stipulated period, for instance, 99 years for infrastructure projects in some cases in Hong Kong, China. In Japan, trust business can only be carried out by entities licensed under the Trust Business Act and financial institutions licensed under the Act for Financial Institutions' Trust Business.

As Yoshino and Lakhia (2020) explain, the process is to consolidate assets owned by individuals, assign them to the trust bank, thereby allowing more optimal use of the assets (Figure 5.8). It has a similar function to a trust for financial assets. Consolidating financial assets to operate more effectively is like consolidating land owned by various individuals who are not able to maximize the utility of their assets by themselves or do not have the know-how to do so. Assigning the land or financial assets to the trust bank can increase their utility.



For instance, Figure 5.9 shows that landowners, while retaining ownership, transfer the usage right to manage the land to the land trust, which further leases it to a railway company. The landowners will receive part of the profit as dividends. The proposed framework increases their profit by leasing land for infrastructure and development projects.



Giving usage rights to infrastructure companies and city planning is one of the most efficient ways to develop infrastructure facilities. Infrastructure developers benefit as there is a significant reduction in land acquisition costs. With this method, they need to only pay for the rehabilitation costs of landowners and return an annual rent for the predetermined period to landowners. Meanwhile, the resulting spillover tax revenues from the infrastructure project can also help finance rental payments to landowners. The land trust method also reduces the time needed to negotiate with landowners. Instead of individual negotiations, the developer can deal with several landowners simultaneously. This process minimizes the problem of holdouts who may frustrate the entire transaction in the hope of getting a better deal. If the land were owned by a community instead of individuals, the community can receive rent every year from infrastructure operators.

Under this method, land acquisition is handled in a much more diplomatic and coordinated manner. Governance issues related to possible corruption are easily avoided because of the transparency involved. The landowners are readily relocated to a new place with some positive net earnings from the land. As a result, the benefits from a tax spillover can take place without waiting so many years for negotiation. Construction time is also reduced because there is less uncertainty about land acquisition.

However, transparency is not automatic. In regions where land grabbing is prevalent, particularly where land pooling or land readjustment is practiced, establishing laws that legalize a land trust system in the region is required. This will enable a clear, transparent, and corrupt-free land transaction mechanism in the region. The proposed trust bank will function as an arbiter between infrastructure operators, infrastructure investors, and landowners.

Disclosure of land prices openly to the public is also important in making land trusts transparent. A key reason for corruption and prevalence of land mafias is connected to the amorphous nature of land prices. The lack of regulation and transparency has enabled a thriving network of violators. This has also created mistrust between landowners and government. The land trust, complemented by transparency of land prices, seeks to challenge the role of the land mafia and aims to put an end to their prevalence. Land prices of the entire nation should be regularly disclosed to the public. In Japan, the Ministry of Land, Infrastructure, Transport and Tourism publishes all land purchase transactions, with the data accessible online.

To enable a more transparent and efficient method in the ASEAN+3 region, national licensing is also proposed for land evaluators. For instance, the Japanese government provides a certificate of national license to evaluators of land, obtained after passing national examinations on assessing land prices. In addition, the Japanese government established a Real Estate Transaction Price Search website where one can get the price of land by selecting the region. It shows the transacted price of land in each area without identifying the name of the owner.

Public-Private Partnerships

One mechanism to effectively channel private capital and funds toward a broader development agenda is to reinvent the relationship between the public and private sectors with the goal of sharing resources more efficiently.⁶ The public-private partnership (PPP) mechanism has evolved, especially over the past 3 decades, to address development issues more effectively. Benefits from PPP-based delivery arise from its unique structural and functional features: a life-cycle perspective on infrastructure provision and pricing, a focus on service delivery, and a sharing of risks between the public and private sectors. Instead of providing exclusively public assets and related services, governments have increasingly relied on the market for the direct provision of public goods and services. If appropriately deployed and managed, PPP facilitates the provision of adequate and efficient infrastructure services for users, profitable investment opportunities for the private sector, and a development mechanism that expands the capacity of the state.

Lee et al. (2019a) cite the four major channels through which PPPs can boost economic growth. The first and obvious channel is improving access to infrastructure services, particularly to a desired level of quality. The second channel highlights the benefits of building technical and institutional capacity, transparency, and good governance from partnerships with the private sector. The third channel emphasizes better allocation of public resources. The fourth channel is the potential of PPPs to attract private savings in long-term investments, such as pension and sovereign wealth funds.

Their empirical evidence supports the relevance of these channels. In particular, the infrastructure–growth link becomes stronger, especially when partnership arrangements emphasize the quality of infrastructure services, better maintenance, and delivering projects on time and within budget. Public sectors therefore need to strengthen their institutional capacity to carry out PPPs, and the legal and regulatory frameworks for PPP processes. And transparency and good governance must be another requirement in the practice of PPPs.

The role of the private sector in the provision of infrastructure services, therefore, should not be limited to closing the financing gap. To tap its comparative advantages, the private sector should help improve operational efficiency, participate in granting incentivized finance, and share innovation capacity. The primary goal is to deploy all the resources and expertise of the private sector in the provision of infrastructure services. The success of PPP depends on the optimal allocation of risk. Project finance for infrastructure extends beyond construction and well into the useful life of the asset. It depends entirely on cash flow generated by the project through user charges or revenues paid by the government. By allocating risk to the party best able to manage it, project finance aligns private profit incentives with the public interest. This makes project finance the preferred financing and governance structure for successful PPPs.

Although innovative methods for attracting private investment in infrastructure have been advocated in the literature for many years (Rillo and Zulfigar 2018, Rowley 2020), one of the main difficulties that PPPs face is the scarcity of bankable projects due to the low rate of return from infrastructure projects that mainly depend on user charges. In some cases, the response has been for the pendulum to swing to the other extreme where the public sector is forced to agree to an inordinately high rate of return for the private investor because of lack of other options. The floating-interest-rate infrastructure bond can partially address this concern. Meanwhile, Susantono, Park, and Tian (2020) note that the barriers to attracting private investments in infrastructure include the complexity of PPPs, corruption in developing countries, and low rates of return. In addition, Lee et al. (2019b) summarize factors affecting PPP projects outcomes including (i) a project factor, (ii) macroeconomic conditions, and (iii) political/institutional indicators. The relatively long gestation period of some infrastructure projects makes them vulnerable to political cycles.

The main sources of project finance are equity and debt. The choice of financing method depends on project requirements and risks, the amount of capital available for direct investment as equity, and the quality of the financing consortium. Debt is the largest component of PPP financing, commonly more in the form of bank loans than bonds. Bonds are more desirable, though, as they allow for long-term financing. More financing can become available for infrastructure PPPs if bond issues allow access to abundant institutional savings, but this requires that project risks be appropriately mitigated.

The infrastructure financing gap is essentially a risk gap. The large infrastructure gap in Asia coexists with a substantial pool of long-term savings that can be mobilized if offered the appropriate balance of risk and return. Credit enhancement mechanisms can mitigate certain risks from PPPs to make them more attractive to a wider range of capital providers. These instruments include partial credit or revenue guarantees, off-take guarantees, subordinated debt, pooling and tranching, and infrastructure debt or equity funds. Multilateral development banks can do much more to promote credit enhancement products, unlock potential in private capital markets around the world, and bridge the risk gap.

5.4 Crosscutting Issue: Green Finance

As mentioned earlier, this chapter analyzes two cross-cutting issues that run between public and private finance. The first is the need to raise resources for the infrastructure components related to climate mitigation and adaptation, so-called green finance. Estimates presented in Table 5.1 showed that if the costs of climate mitigation and adaptation are included the amount needed for infrastructure rises from \$22.6 trillion to \$26.2 trillion for 2016–2030. Environmental soundness, therefore, has implications for fiscal sustainability and the required amount of private finance.

This section focuses on mobilizing private finance for so-called green infrastructure. The two main reasons why large infrastructure projects receive relatively little private financing—unattractive risk-reward profile and information gaps—are more critical for green projects. Consequently, finance remains disconnected from sustainable development for three core reasons:⁷

- Policies and prices in the real economy do not ensure that environmental and social costs are fully accounted.
- Fiscal resources are insufficient to close the viability gap.
- Rules governing the financial system do not ensure that financial decision-making takes account of social and environmental sources of risk and opportunity.

A framework recommended by United Nations Environment Programme (UNEP) (2015, 2016) provides a useful structure to systematically address these issues.

Financing Green and Greening Finance

In line with Goal 7 of the Sustainable Development Goals, the world is committed to achieving net-zero carbon emissions by 2050. Net zero means that, on balance, no more carbon is deposited into the atmosphere than is taken out. To demonstrate their commitment, many countries submitted their intended nationally determined contribution to the United Nations Framework Convention on Climate Change. The intended nationally determined contribution is a declaration by a country of its planned reduction in greenhouse gas emissions over a period. A country's intended nationally determined contribution is converted to a nationally determined contribution when it formally joins the Paris Agreement by submitting an instrument of ratification, acceptance, approval, or accession.

As of May 2021, all ADB developing member countries have declared their nationally determined contributions, and achieving these targets requires an unprecedented shift in investment away from greenhouse gases, fossil fuels, and natural-resource-intensive industries toward more resourceefficient technologies and business models. The financial sector will have to play a central role in this green transformation.

A World Bank (2020) report on mobilizing finance for nature details two channels through which private finance can be generated: (i) by monetizing cash flows from the provision of ecosystem services (financing green); and (ii) by driving better management of biodiversity risks (greening finance). The real and financial sectors are looking for investment opportunities arising from the conservation, restoration, and sustainable use of nature— "to *finance* green". Investors are also trying to avoid or limit biodiversity risk associated with investments— seeking "to green finance" Investment in this category aims to direct financial flows away from projects with negative impacts on biodiversity and ecosystem services to projects that mitigate negative impacts or pursue positive environmental impacts as a co-benefit. In general, investment and lending decisions are taken based on environmental screening and risk assessment to meet sustainability standards, as well as insurance services that cover environmental and climate risk.

The concepts of "financing green" and "greening finance" are also relevant for infrastructure projects directly related to the reduction of greenhouse gas emissions. The two combine as "green finance" which can be defined as comprising "all forms of investment or lending that consider environmental effect and enhance environmental sustainability" (Volz 2018). Or else, green financing deals with "how to enhance the ability of the financial system to mobilize private capital for green investment" (UNEP 2016).

Framework for Green Finance

Tables 5.7 and 5.8 present five approaches to align the financial system to sustainable development based on a framework developed by UNEP (2015). Definitions of each approach are shown below along with recent examples from Asia (ADB 2020). Box 5.2 contains examples in earlier years.

Enhancing market practice. In many countries, measures are directed to improve the efficiency and accountability of financial institutions and markets. In the ASEAN region, the issuance of green bonds and provision of green loans had almost doubled in 2019 from the previous year, reaching \$8.1 billion (ADB 2020).

Harnessing the public balance sheet. Some countries are using the public balance sheet to improve risk-adjusted returns to investors in key areas. The ASEAN Catalytic Green Finance Facility is a green infrastructure financing facility under the ASEAN Infrastructure Fund, with funding commitments from several global development partners including the ADB. This innovative initiative was launched in 2019 to accelerate the development of green infrastructure projects across Southeast Asia in support of ASEAN members' climate change and environmental sustainability goals. The ASEAN Catalytic Green Finance Facility uses a de-risking approach in its fund—around \$1.4 billion funding commitments from the ASEAN Infrastructure Fund as well as ADB and other development partners—to bridge the funding gap and create bankable green infrastructure projects that can catalyze private capital, technologies, and management efficiencies (ADB 2020).

Directing finance through policy (by reforming legal and market

structures). In some countries, policies, requirements, and prohibitions are being used to direct where investment will be allocated. In the Philippines, the Department of Energy in October 2020, declared a moratorium on new applications for greenfield coal power plants. Such a policy should be accompanied by the authorization of "transition bonds". These are different from green bonds, which are designed for green industries alone, i.e., industries in those sectors defined in green taxonomies that are already on the road to reducing greenhouse gases. Transition bonds are a new asset class targeted at "brown" industries with high greenhouse gas emissions, which have a clear and explicit goal of becoming less brown or greener. In the context of the Philippines, the transition bonds can ease the financial burden on energy firms that will be hurt by this policy.

Encouraging cultural transformation in financial decision-making.

Many countries are seeking to align financial behavior with sustainability through improved capabilities, culture, internal incentives, and societal engagement. Indonesia's Sustainable Finance Roadmap focuses on the sustainability skills of professionals. The Republic of Korea is aiming for net-zero emissions by 2050 and an end to coal financing (ADB 2020a).

The plan includes large-scale investments in renewable energy, the introduction of a carbon tax, the phase-out of domestic and overseas coal financing by public institutions, and the creation of the Regional Energy Transition Centre to support workers' transition to green jobs.

Upgrading governance architecture (Table 5.8). Internalizing sustainable development into financial decision-making can be consistent with the existing mandates of financial regulators and central banks. Globally aligned green frameworks with sector taxonomies and eligibility principles will be key to avoiding projects, companies, or countries seen as greenwashing or purpose-washing (ADB 2020a). For instance, the ASEAN Green Bond Standards, the ASEAN Social Bond Standards, and the ASEAN Sustainability Bond Standards were developed to align with the Green and Social Bond Principles and Sustainability Bond Guidelines of the International Capital Market Association.

Various tools designed to achieve the alignment toward more green finance under each approach are also listed in Tables 5.7 and 5.8. The tools are classified under various themes. To understand how these tools can effectively promote green finance, the inventory conducted by Volz (2018) for Asian countries will be useful. A succinct version is shown in Box 5.2.

Meanwhile, the main actors expected to implement these tools are the banking sector, bond issuers, equity investors, institutional investors, and the insurance sector. Proponents of measures listed in Box 5.2 come from at least one of the five groups. For a more concrete example, Box 5.3 discusses the tools available for bond issuers or what is called the debt capital market. Elucidation of both "financing green"—or green bonds per se—and "greening finance"—referred to as greening bond markets—are part of Box 5.3. Credit enhancement mechanisms described in section 5.3 are referred to in this discussion.

Implementing the various approaches in the framework has limitations. For instance, using the central bank balance sheet to incentivize green lending or even invest directly is frowned upon in orthodox central-banking circles. Likewise, directed credit allocation is associated with industrial policy and its soundness is a subject of extensive debate. Hence, the actual tools applied must be calibrated to the quality of governance in the country.

Policy	Theme	Tool
Enhancing market practice	Financial responsibility	Fiduciary duty Fiduciary capability incentives
	Prudential regulation	Risk management Stress tests Capital requirements
	Disclosure and reporting by financial institutions	Policy Performance Accounting
	Disclosure and reporting by nonfinancial corporations	Standards and requirements Accounting frameworks
	Financial market criteria	Equity analysis Credit ratings Green assets indexes
Harnessing the public balance sheet	Fiscal incentives	Targeted fiscal incentives Review fiscal incentives
	Public financial institutions	Sustainability mandates Establishing new green institutions Blended finance instruments
	Central banks	Refinancing operations Asset purchase programs
	Public procurement	Procurement criteria
Reforming legal and market structures	Legal liability	Lender and other liabilities
	Capital requirements	Adjust capital requirements
	Directed investment and lending	Priority sector lending prohibitions
	Directed service provision	Directed provision Mandatory purchase requirements
Encouraging cultural transformation in financial decision- making	Financial capacity building	Consumer education Professional education Regulator capacity building
	Financial behavior	Remuneration regulation Codes of conduct Nonfinancial guidance
	Market Structure	Value-based financial institutions Market diversity Right-sizing financial institutions

Table 5.7: UNEP Framework and Tools for Mobilizing Private Finance for Green Projects

UNEP = United National Environment Programme. Source: UNEP (2015). Efforts to enhance an economy's financial system to make it more aware and responsive to green concerns must be accompanied by cognizance of barriers in the real economy. Gaps in the enforcement of environmental regulation and the non-pricing of negative production and consumption externalities such as carbon emissions clearly reduce the demand for green investment. This is the same as the first reason for the disconnect between finance and sustainable development and stems from market failure (UNEP 2015). Price distortions from fossil-fuel subsidies constitute a particularly important challenge for most Asian economies. Addressing such real economy barriers through binding environmental regulation, emissions-trading schemes, or other policies that help to internalize negative externalities, is critical to mobilizing green investment.

Addressing shortcomings in the financial system itself remains the major challenge. Several proposals were put forth, including raising awareness among regulators and market participations in the financial sector on environmental and climate risks; developing capacities for environmental risk analysis and management; enhancing transparency through environmental, social, and governance (ESG) disclosure requirements, among others (Volz 2018).⁸

Approach	Explanation
Principles	Adopt principles for a sustainable financial system to guide policy making
Policy and Legal Frameworks	Consider impacts on sustainability when developing and reviewing financial regulations
	Incorporate sustainability into financial sector development plans
	Ensure that opportunities for financial system reform are included into sustainability policies
	Introduce long-term strategies and roadmaps, supported by coordination mechanisms
	Strengthen the legal and judicial system to aid enforcement
Regulatory Mandates	Explore the impact of sustainability factors for existing mandates of central banks and financial regulators and adjust where necessary
Performance Measurement	Develop a performance framework to assess and guide progress in developing sustainable financial systems

Table 5.8: Tools Specific to Upgrading Governance Architecture

Note: This table is separated from Table 5.7 because the actions to upgrade the governance architecture provide support across the toolbox. Source: UNEP (2015).

⁸ See Volz (2018).

Box 5.2: Applying the UNEP Framework to Selected ASEAN+3 Economies

The inventory of Volz (2018) on examples of tools to align finance to green investments from Asia, following the United Nations Environment Programme (UNEP) Framework in Tables 5.7 and 5.8 in the main text, is shown below:

Enhancing Market Practice: Disclosure, Analysis, Risk Management

Sustainability disclosure: The Shanghai Stock Exchange introduced Guidelines on Listed Companies' Environmental Information Disclosure already in 2008. In 2010, the Singapore Stock Exchange released the Guide to Sustainability Reporting for Listed Companies. The Philippines Securities Exchange Commission requests an Annual Corporate Governance Report from listed firms since 2013. In Viet Nam, the State Securities Commission introduced a Sustainability Reporting Handbook for Vietnamese Companies in 2013.

Integrating environmental risks into financial regulation: The State Bank of Viet Nam issued the Directive on Promoting Green Credit Growth and Environmental Social Risks Management in Credit Granting Activities, requiring financial institutions to take environmental factors into account in their lending decisions.

Industry guidelines for sustainable market practice: The Association of Banks in Singapore (ABS) released ABS Guidelines on Responsible Financing in October 2015.

Upgrading Governance Architecture: Internalizing Sustainable Development into Financial Decision-Making of Financial Regulators and Central Banks

Inclusion of environmental risk to secure financial and monetary stability: Bank Indonesia is considering including environmental and climate risk into its macroprudential framework. In the People's Republic of China (PRC), the People's Bank of China (PBOC) is considering including the green credit performance of banks in the central banks' assessment of macroprudential risk.

Multi-stakeholder dialogue between financial authorities and the financial industry: In 2015, the PBOC established the Green Finance Committee to develop green

Box 5.2 (continued)

finance practices, environmental stress testing for the banking sector, and guidelines on greening the PRC's overseas investment.

Encouraging Cultural Transformation: Capacity Building, Behavior, Market Structure

Action to enhance the current skill set of financial professionals and regulators: Indonesia's Sustainable Finance Roadmap seeks to develop the sustainability skills of professionals. In Viet Nam, the central bank has also voiced its intent to organize training workshops for bank personnel.

Market development: With the new Green Financial Bond Directive, the PBOC has taken a first step to develop a new market segment for sustainable investment in the Chinese capital market.

Harnessing the Public Balance Sheets: Fiscal Incentives, Public Financial Institutions, and Central Banks

Fiscal incentives for investors: Thailand introduced a feed-in premium program in 2010 which has helped to more than double its installed clean-energy capacity.

Green credit and bond guarantees: Development banks such as the Asian Development Bank have offered risk-sharing facilities in various Asian countries where partial credit guarantees were provided to partner banks sharing the payment risk of underlying borrowers, for example for energy efficiency projects.

Public pension funds: In Japan, the Government Pension Investment Fund and the Pension Fund Association for Local Government Officials endorsed the Principles for Responsible Institutional Investors along with 160 other institutions within 6 months of its launch in February 2014 by Japan's Financial Services Agency. In 2017, Government Pension Investment Fund adopted an environmental, social, and governance (ESG) investment strategy. In 2014, the Korean National Assembly requested from the National Pension Service, the world's fourth largest pension fund, to enhance its ESG standards.

Source: Volz (2018).

Box 5.3: Role of Debt Capital Market in Green Finance

The bond market focuses on longer-term debt instruments issued by governments and corporations. It also allows lenders to convert illiquid assets into tradable asset-backed securities. Bonds are the largest single asset class in the financial system, currently valued at about \$100 trillion. As capital requirements for bank debt tighten, bond markets are an increasingly important means of raising long-term debt, particularly for assets with relatively predictable risks and returns. In this case, there are two interlinked public policy priorities (table).

Priority	Proposal Package: Key Tools
Green bonds	Product standards—green bond standards and verification
	Targeted fiscal incentives
	Credit enhancement (aggregation, securitization, and covered bonds)
	Greening asset purchase programs, strategic investment from public entities such as sovereign wealth funds
	Variations in capital requirements
Greening bond markets	Credit ratings
	Compacts and roadmaps

Applying the UNEP Framework to the Bond Market

UNEP = United Nations Environment Programme. Source: UNEP (2015).

The market for green bonds has grown rapidly, from \$3.4 billion in 2012 to \$156 billion in 2017 (Azhgaliyeva, Kapoor, and Liu 2020). However, the overall market for green bonds still has considerable potential to grow. The growth of the market can be partly explained by the comparable risk-adjusted financial returns of green bonds with non-green bonds, and the broad eligible issuer base. Any bond-issuing entity can issue a labeled green bond, because the requirements of using the label pertain to the use of proceeds being earmarked to qualifying green projects, not to whether the issuing entity is green. The label and earmarking make it easier for investors to identify green investments.

continued on next page

Box 5.3 (continued)

Investor demand for labeled green bonds is strong, evidenced by higher rates of oversubscription than non-green bonds. However, barriers to scaling up the market include the development of credible and ultimately verifiable standards.

Global cooperation is critical for international comparability and consistency. Ultimately, green bonds may need specific securities regulation to protect consumers, but initially, experimentation and development of standards is critical. Beyond such targeted measures is a broader need and potential to encourage a greening of bond markets, specifically to integrate environmental, social and governance factors into routine credit ratings. A first step would be greater transparency by credit rating agencies as to how such factors come into their analysis, which would allow for a more debate and method development process.

In the context of Southeast Asia (Azhgaliyeva, Kapoor, and Liu 2020), two distinct challenges that have been found for issuers include limited credit absorption capacity and costs of meeting green bond requirements. Challenges for investors include a limited investment pipeline; lack of data and analytical ability; and a lack of green bond indexes, listings, and ratings.

Measures to address these challenges are discussed in sections 5.4 and 5.6 of this chapter. The ASEAN Catalytic Green Finance Facility is an example of a mechanism to widen the investment pipeline. Meanwhile, part of section 5.6 proposes how the framework for supporting conventional local currency bonds can be extended to green local currency bonds. Country-specific measures are presented in Azhgaliyeva, Kapoor, and Liu (2020). The issuance of green bonds in Indonesia, Malaysia, and Singapore is driven by the support from the government. However, the nature of the support differs across these countries. In Indonesia, the government issues 99% of all green bonds. In contrast, the issuance of green bonds in Malaysia and Singapore is led by the private sector, but incentivized by government policies supporting green bond issuance, such as green bond grant schemes and tax incentives.

A related issue is the lack of accurate and unified environmental credit rating of investment. Currently, each rating agency provides different ratings to the same company since they have different criteria for environmental aspects.

Box 5.3 (continued)

The allocation of investors for green investment depends on which rating agency they follow. In order to avoid any distortions in portfolio allocation, a unified credit rating should be provided by an international organization (Yoshino and Yuyama 2021).

Source: Authors.

International and Regional Financial Cooperation

International cooperation can support national action. The increasing internationalization of national financial systems makes international cooperation a critical support in embedding sustainable development into financial decision-making. Fortunately, many venues for such cooperation and initiatives are already under way. International organizations and formal intergovernmental and interagency platforms are increasingly looking to this field of inquiry and action, such as the G20 and the Financial Stability Board, the IMF, the World Bank, regional multilateral development banks, and regional financial cooperation efforts.

The opportunities identified by UNEP (2015) for international cooperation fall into two main groups. One is specific to particular asset pools and financial market actors, and the other on opportunities to enhance the underlying financial system architecture.⁹ These will be analyzed in the context of Asian regional financial cooperation in section 5.6.

5.5 Crosscutting Issue: COVID-19 Pandemic

Economic Impact of the Pandemic

The COVID-19 pandemic affected the flexibility and effectiveness of fiscal policy. In some countries, resources had to be realigned possibly reducing allocations in some areas such as physical infrastructure. However, the more prevalent experience in developing Asia is of rising public debt ratios resulting from slower economic growth and government spending measures to stem the impact of the pandemic. The drop in fiscal revenue, coupled with unplanned spending and countercyclical policies because

⁹ See UNEP (2015) on areas on international cooperation across specific asset pools and actors, and on governing architecture.

of the pandemic, are expected to cause primary deficits to widen sharply. Based on Asian Development Outlook Supplement—December 2020 (ADB 2020b) growth projections for 2020 and 2021, the average public gross debt ratio among ADB's developing members is projected at 50.9% of GDP by 2021, a significant increase from 42.5% of GDP in 2019 (Sawada and Sumulong 2021). Figure 5.10 shows the public debt ratios for 44 of developing members with available data using ADB's debt projection model (Ferrarini et al. forthcoming).

The region's past record of strong growth and a generally prudent fiscal stance kept public debt sufficiently low for most regional economies, now giving them the necessary fiscal space to run larger deficits in the short term. But policy space is not unlimited, so resuming growth and normalizing fiscal balances is critical to preserving debt sustainability. Even where pre-COVID-19 debt ratios are low enough to allow for some increase in debt ratios, maintaining debt sustainability inevitably requires that, soon enough, countries resume robust growth and rein in deficits from their crisis response. Otherwise, ballooning debt in gross terms would occur, and sustainability could possibly end up impaired in some parts of the region. Without growth resuming in earnest, countries are bound to face a policy dilemma from having to support their economies against the backdrop of shrinking policy space and rising debt ratios.



This section explores possible responses to the economic impacts of the pandemic and how adverse effects on the environment can be mitigated at the same time. It would be useful for policy makers to apply the standard assessment that was needed to address the fiscal gap defined in section 5.1. First, policy makers need to determine to what extent tax revenues can be raised through higher tax rates or reforms aimed at greater administrative efficiency. And second, public spending can be reoriented toward infrastructure investment and away from inefficient items such as poorly targeted subsidies.

Green Fiscal Recovery Measures

Many governments responded appropriately to the pandemic by approaching the problem initially as a public health crisis. Measures to mitigate the adverse effects of the pandemic were analogous to disaster relief. These fiscal rescue measures were intended to offset income losses and address immediate human welfare concerns during lockdown periods. Broader aspects included protection of balance sheets of businesses, minimizing bankruptcies, and maintaining employment levels to the largest extent possible.

When the spread of the virus was controlled, governments shifted to stimulus packages or fiscal recovery measures. In the context of the energy sector, these recovery packages could be "brown," reinforcing the links between economic growth and fossil fuels or "green," decoupling emissions from economic activity, or "neutral." A silver lining during the pandemic was the sharp decline in greenhouse gas emissions. Globally, emissions likely fell by 8% or 2.6 gigatons of carbon dioxide in 2020 (IEA 2020a). This is more in absolute terms than in any other year on record.

The challenge is to encourage governments to sustain this momentum by adopting "green" fiscal recovery measures. It should be noted that the pandemic occurred at a time when renewable energy costs were declining, oil prices were persistently low, debt in the fossil fuel sector was rising, and investor concerns about the impact of fossil fuels on carbon emissions and environmental regulations were already lowering capital investment in the fossil fuel industry, while making renewable energy one of the fastestgrowing industries (Khanna 2020). The pandemic, however, slowed down the momentum shift. As the International Energy Agency (IEA 2020b) succinctly described it: "The crisis has curbed investments in the energy sector and threatened to slow the expansion of clean energy technologies." A distinct opportunity therefore exists to harness this earlier momentum and build on the desire of segments of society to "build back better" after experiencing a cleaner environment during lockdowns. This renewed thrust can be channeled to the recovery efforts with a parallel objective of expanding the use of renewable energy and low-carbon infrastructure. A lesson from the global financial crisis is that green recovery measures often have advantages over traditional fiscal stimulus. For instance, renewable energy generates more jobs in the short term when employment opportunities are scarce in the middle of a recession. In the long term, renewable energy conveniently requires less labor for operation and maintenance. This frees up labor as the economy returns to capacity. In addition, a recent global survey of economic experts indicates that some fiscal recovery measures rank favorably because of their relatively high multiplier effects but can be classified as green at the same time (Hepburn et al. 2020). These include building efficiency retrofits, natural capital investment, and clean research and development, among others. The extent to which these measures have been implemented largely depends on the priorities of policy makers.

Debt Service Suspension Initiative

While fiscal rescue and recovery measures mitigated the adverse impact of the pandemic, they contributed to the increase in public debt. Data show that public debt in emerging markets has surged to levels not seen in 50 years, and many developing countries have increasingly taken on debt on non-concessional terms—from private lenders and non-Paris Club members.¹⁰

To prevent the ballooning public debt from eroding the fiscal base of developing economies, the World Bank and the IMF urged G20 countries to establish the Debt Service Suspension Initiative. In all, 73 countries have become eligible for a temporary suspension of debt-service payments owed to their official bilateral creditors. Meanwhile, the G20 has also called on private creditors to participate in the initiative on comparable terms. The suspension period, originally set to end on 31 December 2020, has been extended through December 2021.

The World Bank and the IMF are supporting implementation of the Debt Service Suspension Initiative by monitoring spending, enhancing public debt transparency, and ensuring prudent borrowing. Initiative borrowers

¹⁰ Refer to World Bank (2021b) for details.

commit to use freed-up resources to increase social, health, or economic spending in response to the crisis. This includes spending on infrastructure projects and therefore the initiative contributes to sustainable infrastructure investment.

Role of Environmental, Social, and Governance Bonds

The COVID-19 pandemic provides an opportunity to implement integrated responses that straddle economic, social, and environmental dimensions.¹¹ One option is to accelerate the mobilization of ESG bonds, or social bonds for short. Under the International Capital Market Association framework, there are three types of ESG bond instruments: (i) green bonds, which raise capital for projects with environmental benefits; (ii) social bonds, which raise funds for projects with social benefits; and (iii) sustainability bonds, which raise funds for projects with both green and social benefits. Many of the rating agencies include the governance component of ESG in their evaluation score (Yoshino and Yuyama 2021).

Global social bond issuance saw tremendous growth in 2020, as pandemic and economic lockdowns greatly increased market supply and demand for financing response and recovery efforts. Following year-on-year growth of 28% in 2018 and 44% in 2019, the issuance of global social bonds surged to \$149.4 billion equivalent in 2020, an eightfold increase from 2019. Social bond issuance in Asia has consistently lagged European issuance, but recent growth in the region has been impressive (Figure 5.11). The equivalent performance for ASEAN+3 economies is shown in Figure 5.12.

In 2017, Asian social bond issuance comprised 12% of total global (excluding supranational) issuance; its share grew to 23% of the global total in 2020. From 2017 to 2020, the Asian social bond market grew 22.3 times, compared with growth of 9.8 times for Europe and 14.3 times for the world excluding Asia. Nonetheless, the Asian social bond market is still barely more than a third of the size of the European market in terms of its global issuance share, and the need for even faster growth is urgent.

It is generally agreed that the greatest obstacles to growth in the social bond space are the lack of clarity about measuring and assessing impact, as well as a supply-side shortage. More precisely, there has not yet been a coalescing around standardization in the measurement of impact, which is extremely difficult to do because social bond projects and assets are by

¹¹ The main reference for this subsection is ADB (2021).

their very nature much more diverse than green bond projects and assets. While the International Capital Market Association framework is a step forward, it falls well short of a standardized set of metrics that would enable comparison of impact performance across instruments.





The data include local and foreign currency issuance.

Source: Authors, based on AsianBondsOnline Database (accessed May 2021).

Without this clarity, the risk of "social washing," or overstating the social value of a bond, is very real, and investors are keenly aware of this risk. Indeed, even before the emergence of COVID-19 bonds, many market participants worried about "rainbow bonds" in which all manner of labels might go hand in hand with greenwashing or social washing. The need for higher issuance volume and diversity (i.e., more corporate issuers) is another significant obstacle to market growth.

This is a bit of a vicious cycle. Mainstream investors (i.e., those without a strong preference for ESG-linked investing) do not really understand the purpose and value of social bonds. This limits investor demand to niche status, which has then discouraged more widespread issuance and market development, thereby making it harder to explain what social bonds are for.

But COVID-19 brings an opportunity to turn this into a virtuous cycle, as attention is high and focused, and the need for financing is immense. However, different criteria used by different rating agencies for ESGs may bring distortions in the optimal investment portfolio unless a unified set of criteria is established (e.g., Yoshino, Taghizadeh-Hesary, and Otsuka 2021). These criteria should take into consideration unique circumstances brought about by the pandemic.

Issuing an ESG bond, which requires an ESG bond framework and secondparty opinion, also typically requires the issuer to obtain an ESG evaluation by the second party, which takes time and preparation. This gives issuers a good reason to pre-commit to ESG so as to be ready when the crisis comes. Firms that did the ESG work ahead of time have come to market faster.

Of course, with every challenge comes an opportunity, and there is certainly a broad opportunity for market participants to develop this "holy grail": a widely accepted, standardized set of metrics to assess social impact. Various bodies—from the Sustainability Accounting Standards Board to European authorities—are pursuing a system of standardized reporting to include social impact. However, debate is continuing in the market about the right mix of regulatory oversight versus marketprinciples-based oversight.

The main takeaway from this discussion is that the factors relevant in aligning the financial system with sustainability goals are also relevant for the ESG bond market.

5.6 Regional Financial Cooperation in Support of Sustainable Infrastructure Investment

Regional financial cooperation has an important role in promoting sustainable infrastructure investment. In this chapter, several areas have been identified.

First, regional financial cooperation is needed to continue the progress of the ABMI, particularly in relation to the issuance of more local currency bonds. In particular, the framework for supporting conventional local currency bonds can be extended to green local currency bonds (ADB 2018). In this area, policy makers identified several regional policy priorities. These include the following:

- (i) Develop a regional technical assistance facility for green bond issuance
- (ii) Provide specific coverage of green bonds on AsianBondsOnline
- (iii) Consider requesting the International Capital Market Association to present annual updates on the Green Bond Principles and green bond market development globally to members of the ASEAN+3 Bond Market Forum
- (iv) Consider encouraging the Credit Guarantee and Investment Facility to allocate a portion of the guarantee operations to involve green bonds
- (v) Continue working with market participants to address barriers to cross-border bond issuance and investment under the ASEAN+3 Bond Market Forum
- (vi) Encourage regional and global public entities to issue local currency green bonds
- (vii) Encourage regional and global public funds to commit to investing in local currency green bonds

Second, regional cooperation can support the establishment of a regional floating-interest-rate bond if the spillover of tax revenues of an infrastructure project involves several countries. An example is water transport infrastructure in the Mekong Region which covers many countries. Floating-interest-rate bonds can be sold to various investors in the Asian region to support the project. The expected rate of return will be higher by securing 50% of the estimated spillover taxes. Third, multilateral development banks can narrow the risk gap of PPPs through credit enhancement which usually takes the form of sovereign risk mitigation. Involvement of multilateral development banks and other multilateral agencies can also be given as technical assistance, program lending, and specific advice.

Fourth, regional support on the framework for green bonds can be extended to ESG bonds. This includes the following actions: (i) regional cooperation to vet and adopt standards at the regional level, e.g., Social Bond Principles; (ii) develop a robust ESG bond market in the region, including establishing an ESG index; and (iii) regional cooperation in standardization of the measurement of impact of proceeds from ESG bonds.

Fifth, develop a common platform to ensure convergence of standards and to drive essential cross-border cooperation so that global bond and equity markets can most effectively raise capital to serve sustainable development.

Sixth, regional cooperation can help promote green finance measures. For example, scaling up the ASEAN Catalytic Green Finance Facility to the level of ASEAN+3, requires the involvement of the ASEAN+3 finance ministers' and the central bank governors' process. Continued involvement of multilateral development banks in green financing initiatives also requires financial cooperation at the regional level.

Seventh, the G20 Principles for Quality Infrastructure Investment should be taken into account. These are:

- (i) Maximizing the positive impact of infrastructure to achieve sustainable growth and development
- (ii) Raising economic efficiency in view of life-cycle costs implying that not only initial investment cost should be considered but also repairs and maintenance needed at a later stage
- (iii) Integrating environmental considerations in infrastructure investments
- (iv) Building resilience against natural disasters and other risks
- (v) Integrating social considerations in infrastructure investment
- (vi) Strengthening infrastructure governance

5.7 Conclusion

The infrastructure financing gap in the ASEAN+3 region is substantial. The public sector has shouldered a substantial portion of the financing burden. However, its resources are hardly adequate. COVID-19 has made the circumstances more challenging for governments as revenues drop and pandemic containment expenditures rise, increasing debt and tightening fiscal space for infrastructure investment. The circumstances call for a more vigorous drive to involve the private sector in infrastructure undertakings. Beyond the sheer size of the funding needed, the sustainability of the financing mechanisms is equally important.

PPPs are a viable option but developing Asia has more cancelled PPP projects than any other region globally. Studies show that project-related factors, macroeconomic conditions, and institutional quality tend to affect private sector investors' participation. One of the specific binding constraints is the low rate of return of infrastructure investment especially if the environmental, sociopolitical, and economic uncertainties are considered. Reliance on user fees alone is not a viable strategy in many cases.

Against this backdrop, this chapter has proposed the utilization of floating-interest-rate infrastructure bonds that carry a conditionality to share spillover tax revenues between the government and investors. This mechanism is geared toward augmenting the income stream from user fees, thus increasing the investor rate of return. The government partially compensates for the losses at initial stages of operation by paying interest at the prevailing rate of government bonds. The spillover tax revenues in the subsequent stages can then serve as a source for greater compensation.

Meanwhile, the analysis has made other proposals to operationalize the spillover taxation in various contexts. The success of the mechanism will depend on data transparency and accountability of the parties involved. To this end, governments can work on infrastructure projects with multilateral institutions. This will help curb corruption and strengthen the integrity of the entire process particularly in projects that involve multiple countries. In addition, regional organs and regional cooperation initiatives are critical in deepening long-term capital markets further without compromising the appropriate oversight frameworks.

The environmental impact of the infrastructure projects cannot be overlooked in the process of engaging the private sector. There are ample merits to bolster efforts to emphasize compliance of financing instruments with the ESG standards. A proposal to have a greenness-adjusted global taxation on carbon dioxide and other pollutants has been made in a bid to further promote green infrastructure.

More importantly, there is scope for ASEAN+3 economies to strengthen regional financial cooperation in infrastructure investment and in promoting green finance.

References

- Asian Development Bank (ADB). 2017. *Meeting Asia's Infrastructure Needs*. Manila. https://www.adb.org/publications/asia-infrastructure-needs.
 - __. 2018. Promoting Green Local Currency Bonds for Infrastructure Development in ASEAN+3. Manila. http://dx.doi.org/10.22617/ TCS189249-2.
 - _____. 2019. Asian Economic Integration Report 2019/2020: Demographic Change, Productivity, and the role of Technology. Manila.
 - _____. 2020a. Green Finance Strategies for Post-COVID-19 Economic Recovery in Southeast Asia: Greening Recoveries for People and Planet. Manila. http://dx.doi.org/10.22617/TCS200267-2.
 - _____. 2020b. Asian Development Outlook (ADO) 2020 Supplement: Paths Diverge in Recovery from the Pandemic. Manila. http://dx.doi.org/10.22617/FLS200389-3.
 - _____. 2021. Primer on Social Bonds and Recent Developments in Asia. Manila. http://dx.doi.org/10.22617/SPR210045-2.

_____. AsianBondsOnline Database. https://asianbondsonline.adb.org/ (accessed July 2021).

- Azhgaliyeva, D., A. Kapoor, and Y. Liu. 2020. Green Bonds for Financing Renewable Energy and Energy Efficiency in Southeast Asia:
 A Review of Policies. ADBI Working Paper. No. 1073. Tokyo: Asian Development Bank Institute. https://www.adb.org/publications/greenbonds-financing-renewable-energy-efficiency-southeast-asia.
- Burger, J.D., F.E. Warnock, and V.C. Warnock. 2015. Bond Market Development in Developing Asia. ADB Economics Working Papers. No. 448. Manila: Asian Development Bank. https://www.adb.org/ sites/default/files/publication/173190/ewp-448.pdf.
- Deep, A., J. Kim, and M. Lee. 2019. Overview. In Realizing the Potential of Public-Private Partnerships to Advance Asia's Infrastructure Development. Manila. http://dx.doi.org/10.22617/TCS189648-2.
- Ferrarini, B., J.J. Pradelli, P. Mariano, and S. Dagli. (Forthcoming). Asia Sovereign Debt Monitor. Manila.
- Hepburn, C., B. O'Callaghan, N. Stern, J. Stiglitz, and D. Zenghelis. 2020. Will COVID-19 Fiscal Recovery Packages Accelerate or Retard Progress on Climate Change? Oxford Review of Economic Policy. 36. Issue Supplement 1. 2020. pp. S359–S381. https://doi.org/10.1093/ oxrep/graa015.

- International Energy Agency (IEA). 2020a. Global Energy Review 2020: The Impacts of the COVID-19 crisis on Global Energy Demand and CO₂ Emissions. Paris.
- _____. 2020b. The Impact of the COVID-19 Crisis on Clean Energy Progress. Paris.
- International Monetary Fund (IMF). Fiscal Monitor Database. https://data.imf.org/?sk=4BE0C9CB-272A-4667-8892-34B582B21BA6 (accessed July 2021).

__. Investment and Capital Stock Dataset. May 2021 Update. https://infrastructuregovern.imf.org/content/dam/PIMA/Knowledge-Hub/dataset/IMFInvestmentandCapitalStockDataset2021.xlsx (accessed July 2021).

____. World Economic Outlook Database, April 2021. https://www.imf.org/en/Publications/WEO/weo-database/2021/ April (accessed July 2021).

- Khanna, M. 2020. COVID-19: A Cloud with a Silver Lining for Renewable Energy? *Applied Economic Perspectives and Policy*. 43 (1). pp. 73–85. https://doi.org/10.1002/aepp.13102.
- Lee, M., R. Gaspar, E. Alano, and X. Han. 2019a. The Empirical Evidence and Channels for Effective Public-Private Partnerships. In *Realizing the Potential of Public-Private Partnerships to Advance Asia's Infrastructure Development*, edited by A. Deep, J. Kim, and M. Lee. Manila: Asian Development Bank. http://dx.doi.org/10.22617/TCS189648-2.
- Lee, M., P. G. Quising, M. L. Villaruel, and X. Han. 2019b. Assessing Risk in Public–Private Partnerships. In *Realizing the Potential of Public– Private Partnerships to Advance Asia's Infrastructure Development*, edited by A. Deep, J. Kim, and M. Lee. Manila: Asian Development Bank. http://dx.doi.org/10.22617/TCS189648–2.
- Park,C. Y., J. Villafuerte, J. Lee, and P. Rosenkranz. 2017. 20 Years after the Asian Financial Crisis: Lessons Learned and Future Challenges. ADB Briefs. No. 85. Manila: Asian Development Bank. http://dx.doi.org/10.22617/BRF179036-2.
- Rillo, A. D. and A. Zulfiqar. 2018. Toward an Innovative Approach of Financing Infrastructure in Asia. (2) 1. pp. 87–96. https://systems. enpress-publisher.com/index.php/jipd/article/view/141.
- Rowley A. H. 2020. Foundations of The Future: The Global Battle for Infrastructure. Singapore: World Scientific. https://doi.org/10.1142/11765.

Sawada, Y. and L. R. Sumulong. 2021. Macroeconomic Impact of COVID-19 in Developing Asia. *ADBI Working Paper*. No. 1251. Tokyo: Asian Development Bank Institute. https://www.adb.org/publications/ macroeconomic-impact-covid-19-developing-asia.

Silva, A. C., B. O'Reilly Gurhy, A.F. Carvajal, C. E. Paladines, T. Jonasson, C. Cohen, Y. N. Mooi, K. Chung, and M. G. Papaioannou. 2020.
Staff Note for the G20 International Financial Architecture Working Group (IFAWG): Recent Developments on Local Currency Bond Markets In Emerging Economies. Washington, DC: International Monetary Fund and the World Bank Group. https://documents.worldbank.org/en/publication/documentsreports/documentdetail/129961580334830825/staff-note-forthe-g20-international-financial-architecture-working-groupifawg-recent-developments-on-local-currency-bond-markets-inemerging-economies.

- Susantono B., D. Park, and S. Tian. 2020. Introduction. In *Infrastructure Finance in Asia*, edited by B. Susantono, D. Park, and S. Tian. pp. i-xviii. Singapore: World Scientific. https://doi.org/10.1142/11688.
- United Nations Environment Programme (UNEP). 2015. The Financial System We Need: Aligning the Financial System with Sustainable Development. UNEP Inquiry. Geneva. http://unepinquiry.org/wpcontent/uploads/2015/11/The_Financial_System_We_Need_ EN.pdf.

____. 2016. Green Finance for Developing Countries: Needs Concerns and Innovations. UNEP Inquiry. Geneva. http://unepinquiry.org/ wp-content/uploads/2016/08/Green_Finance_for_Developing_ Countries.pdf.

- Volz, U. 2018. Fostering Green Finance for Sustainable Development in Asia. ADBI Working Paper. No. 814. Tokyo: Asian Development Bank Institute. https://www.adb.org/publications/fostering-green-financesustainable-development-asia.
- World Bank. 2020. *Mobilizing Private Finance for Nature*. Washington, DC. https://pubdocs.worldbank.org/en/916781601304630850/Financefor-Nature-28-Sep-web-version.pdf.

___. 2021a. East Asia and Pacific Economic Update: Uneven Recovery. Washington, DC. https://openknowledge.worldbank.org/bitstream/ handle/10986/35272/9781464817021.pdf. _. 2021b. Debt Service Suspension and COVID-19. Factsheet. Washington DC. https://www.worldbank.org/en/news/ factsheet/2020/05/11/debt-relief-and-covid-19-coronavirus.

_. World Development Indicators. https://databank.worldbank.org/ source/world-development-indicators (accessed July 2021).

World Federation of Exchanges. *Statistics Portal*. https://www.worldexchanges.org/our-work/statistics (accessed July 2021).

- Yoshino, N. 2013. The Background of Hometown Investment Trust Funds. In Hometown Investment Trust Funds: A Stable Way to Supply Risk Capital, edited by N. Yoshino and S. Kaji. pp. 1–13. Tokyo: Springer. https://doi.org/10.1007/978-4-431-54309-1.
- Yoshino, N. and S. Lakhia. 2020. Land Trust Method and the Evaluation of the Effect of Infrastructure Investment. ASCI Journal of Management, Special Issue, 49 (2). pp. 133–146. https://asci.org.in/wp-content/ uploads/2021/06/AJoM-49-2-Sep-2020.pdf
- Yoshino, N. and U. Abidhadjaev. 2017a. An Impact Evaluation of Investment in Infrastructure: The Case of a Railway Connection in Uzbekistan. *Journal of Asian Economics*. 49. pp. 1–11. https://doi.org/10.1016/j.asieco.2017.02.001.

__. 2017b. Impact of Infrastructure on Tax Revenue: Case Study of High-speed Train in Japan. *Journal of Infrastructure, Policy and Development*. 1 (2). pp. 129–148. https://doi.org/10.24294/jipd. v1i2.69.

- Yoshino, N., U. Abidhadjaev, and M. Nakahigashi. 2019. Inducing Private Finance to Water Supply and Inland Water Transport Using Spillover Tax Revenues. *ADBI Working Papers*. No. 996. Tokyo: Asian Development Bank Institute. https://www.adb.org/sites/default/files/ publication/524011/adbi-wp996.pdf.
- Yoshino N., D. Azhgaliyeva, and R. Mishra. 2020. Financing Infrastructure Using Floating-interest Rate Infrastructure Bond. *Journal of Infrastructure, Policy and Development*. 4 (2). pp. 306–315. https://doi.org/10.24294/jipd.v4i2.1236.
- Yoshino, N. and V. Pontines V. 2015. The 'Highway Effect' on Public Finance: Case of the STAR Highway in the Philippines. *ADBI Working Paper*. No. 549. Tokyo: Asian Development Bank Institute. https://www. adb.org/sites/default/files/publication/175868/adbi-wp549.pdf.

Yoshino, N., F. Taghizadeh-Hesary, and M. Otsuka. 2021. COVID-19 and Optimal Portfolio Selection for Investment in Sustainable Development Goals. *Finance Research Letters*. 38 (3). https://doi.org/10.1016/j.frl.2020.101695.

Yoshino, N. and T. Yuyama. 2021. ESG/Green Investment and Allocation of Portfolio Assets. *Studies of Applied Economics*. 39 (3). https://doi.org/10.25115/eea.v39i3.4628