

Regan, Michael

Working Paper

Infrastructure financing modalities in Asia and the Pacific: Strengths and limitations

ADB Working Paper Series, No. 721

Provided in Cooperation with:

Asian Development Bank Institute (ADBI), Tokyo

Suggested Citation: Regan, Michael (2017) : Infrastructure financing modalities in Asia and the Pacific: Strengths and limitations, ADB Working Paper Series, No. 721

This Version is available at:

<http://hdl.handle.net/10419/163223>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.



<https://creativecommons.org/licenses/by-nc-nd/3.0/igo/>



ADB Working Paper Series

**INFRASTRUCTURE FINANCING MODALITIES
IN ASIA AND THE PACIFIC:
STRENGTHS AND LIMITATIONS**

Michael Regan

No. 721
April 2017

Asian Development Bank Institute

Michael Regan is professor at the Faculty of Society and Design, Bond University, Australia.

The views expressed in this paper are the views of the author and do not necessarily reflect the views or policies of ADBI, ADB, its Board of Directors, or the governments they represent. ADBI does not guarantee the accuracy of the data included in this paper and accepts no responsibility for any consequences of their use. Terminology used may not necessarily be consistent with ADB official terms.

Working papers are subject to formal revision and correction before they are finalized and considered published.

The Working Paper series is a continuation of the formerly named Discussion Paper series; the numbering of the papers continued without interruption or change. ADBI's working papers reflect initial ideas on a topic and are posted online for discussion. ADBI encourages readers to post their comments on the main page for each working paper (given in the citation below). Some working papers may develop into other forms of publication.

ADB recognizes "China" as the People's Republic of China; "Hong Kong" as Hong Kong, China; and "Korea" as the Republic of Korea.

Suggested citation:

Regan, M. 2017. Infrastructure Financing Modalities in Asia and the Pacific Region: Strengths and Limitations. ADBI Working Paper 721. Tokyo: Asian Development Bank Institute. Available: <https://www.adb.org/publications/infrastructure-financing-modalities-asia-and-pacific>

Please contact the authors for information about this paper.

Email: mregan@bond.edu.au

Asian Development Bank Institute
Kasumigaseki Building, 8th Floor
3-2-5 Kasumigaseki, Chiyoda-ku
Tokyo 100-6008, Japan

Tel: +81-3-3593-5500
Fax: +81-3-3593-5571
URL: www.adbi.org
E-mail: info@adbi.org

© 2017 Asian Development Bank Institute

Abstract

Asia and the Pacific is the world's fastest growing regional economy, a position it has held for over a decade. A major challenge for sustained regional growth and development and ensuring greater engagement between national economies is increased investment in economic and social infrastructure. The majority of infrastructure is provided by government as a quasi-public good but governments face difficulties meeting future demand. Private investment provides an important option although investment has mainly taken place in the telecommunications, energy, and transport industries. The objective of this paper is to present a status report about the methods, strengths, and weaknesses of infrastructure financing in Asia and the Pacific at the present time. It adopts a positivist perspective and examines supply and demand conditions today with several recommendations for future policy development in Asia and the Pacific.

Keywords: infrastructure, financing, Asia and the Pacific

JEL Classification: H54

Contents

1.	INTRODUCTION	1
2.	GOVERNMENT PROVISION	2
3.	BANK LOANS AND PROJECT FINANCE	6
4.	BOND FINANCE	10
4.1	Tax-Exempt Bonds	10
4.2	Revenue Bonds	11
4.3	Corporate Bonds.....	11
4.4	Asian Bond Markets.....	12
5.	MULTILATERAL DEVELOPMENT BANKS	13
6.	INTERNATIONAL DEVELOPMENT AND AGENCIES.....	14
7.	PENSION FUNDS	15
8.	SOVEREIGN WEALTH FUNDS	17
9.	INITIAL PUBLIC OFFERING	18
10.	PUBLIC-PRIVATE PARTNERSHIPS.....	19
11.	SECURITIZATION.....	20
12.	CONCLUSION.....	22
	REFERENCES	24

1. INTRODUCTION

Asia and the Pacific region has been the world's fastest growing regional economy for over a decade. Increased investment in economic and social infrastructure poses a major challenge to sustained regional growth and development, as well as to greater engagement between national economies. Adequate and efficient national infrastructure is a fundamental requirement of a well-functioning and high-growth economy. Infrastructure provides the assets and services that facilitate trade and exchange within the economy, increase output capacity, improve productivity, reduce congestion, and lower public and private transaction costs. However, governments globally are struggling to maintain the rate of investment necessary to meet present and future needs, creating an infrastructure gap or future funding requirement estimated at around \$800 billion annually for Asia and the Pacific region (Moore and Kerr 2014). In global industrialized economies, infrastructure investment averages around 3.9% of gross domestic product (GDP). This rate is higher among developed nations in Asia and the Pacific region—10.5% in Malaysia, 6.0% in Australia and Canada, 5.0% in Japan and New Zealand, and 4.0% in the Republic of Korea. In industrializing countries, demand drivers, such as population growth and rapid urbanization, are driving higher levels of investment, particularly in the energy sector (electricity, oil, and gas), roads, ports, rail and urban transport, water, and sanitation services. As for Asia and the Pacific region, infrastructure investment is around 29.0% of GDP in Indonesia, 21.0% in Thailand, 19.0% in Viet Nam, 15.0% in the Philippines, 8.5% in the People's Republic of China, and 4.7% in India (Chong and Poole 2013; McKinsey Global Institute 2013; Seneviratne and Sun 2013). In industrialized economies, the average age of infrastructure capital stock is older than it is in industrializing economies, and depreciation accounts for around half of all new investment, nearly twice the rate in industrializing nations (Mackenzie 2013; Australian Bureau of Statistics 2014).

Governments finance most infrastructure, but future spending is subject to fiscal and public debt constraints that raise concern about the sustainability of present expenditure levels. Future spending may be insufficient to make significant progress toward closing the infrastructure gap estimated at US\$8.5tn for the region between 2010 and 2020 (Bhattacharyay 2012). The region was also affected by the global financial crisis of 2008 and, although the impact was not as severe as first expected, project finance flows downturned in 2009, private bond financing in the region declined rapidly, and project finance supply changed due to the withdrawal of European and North American banks and greater participation from regional lenders. However, challenges remain and the changes introduced by the Basel III reforms have created future impediments for long-term, limited-recourse bank lending for infrastructure projects in the region (Asian Bankers Association 2010).

Infrastructure is a capital-intensive and highly networked asset class that forms a part of complex supply chains. Assets are generally site- and use-specific, involve high sunk costs, and require extensive, advanced planning and long lead times. Since 2003, innovations in design and construction, technology, and efficient management have become highly important to investment economics and are challenging traditional procurement practices. In addition to the supply problem, governments also face the challenge of encouraging significant private investment, and ensuring the delivery and sustainable management of infrastructure. As an asset class, infrastructure has several distinctive characteristics. Infrastructure returns reveal a low correlation with other asset classes and leading economic variables such as interest rates, investment, employment, economic growth, and exchange rate variables (Regan

2004). It also relies on the quality of public institutions and effective policy frameworks in matters such as the enforceability of contracts, and effective regulatory and foreign investment rules.

Governments provide the majority of infrastructure as a public good, with most investment over the past decade occurring in the telecommunications, energy, and transport industries, which also account for around 65% of future investment requirements in Asia and the Pacific region (Asian Development Bank [ADB] and Asian Development Bank Institute 2009). Public–private partnerships (PPPs) account for around 10% of investment and are mainly used for networked economic infrastructure. Infrastructure assets involve high sunk costs, are capital intensive, and form part of complex supply chains. In most cases, investments in telecommunications and energy rely on user-pay tariffs for their revenue and may be regulated internally and/or externally by a government regulatory agency. Investments in road and rail transport, social infrastructure, and water projects derive revenue from government availability payments and/or user-pay regimes. The investment characteristics of this asset class, the maturity of national institutions, and the quality of macroeconomic management significantly impact the way infrastructure is financed in Asia and the Pacific region.

This paper presents a status report examining the current modalities, strengths, and weaknesses of infrastructure financing in Asia and the Pacific region. The paper examines 11 sources of infrastructure finance in Asia and the Pacific region and the finance support mechanisms that underpin investment viability and enhance the credit properties of public projects for private finance. The findings are designed to support the development of future infrastructure policy in Asia and the Pacific region.

Methods of Infrastructure Finance

Global infrastructure finance is experiencing a transition in post-2008 market conditions, with the return of project finance at record levels in 2014, stronger investment intention signals from fund managers and sovereign wealth funds (SWFs), renewed interest in alternative financing options, and the evolution of the PPP procurement models with improved risk-sharing and credit enhancement options. This paper also examines the options for public procurement, which continues to account for around 70% of infrastructure expenditures, as well as the important role that multilateral development banks (MDBs) play in supporting capacity building in transitional countries and providing loans, grants, and noncommercial insurance to improve the bankability of both public and private projects in the region.

2. GOVERNMENT PROVISION

Governments have traditionally provided most infrastructure capital from consolidated revenue, and services are made available to the community as a public good. Since the late 1990s, governments have adopted a variety of methods to help meet the cost of new infrastructure, such as user-pay and asset-betterment charges, thereby creating a new class of quasi-public goods that possess some elements of excludability.¹ While these approaches can provide additional sources of capital, user charges may contribute very little toward the costs of operating urban transport, ports, waste management, and recycling services. In low-income, industrializing countries, an

¹ A quasi-public good refers to a government-provided facility or service that places some limitation on the typical non-rivalry and non-excludability of pure public goods. Although street lighting, public roads, parks, and potable water are pure public goods, tolled roads, public transport fares, and electricity user charges exclude their use by members of society unable to meet the cost.

additional problem is the affordability of user charges and the additional transaction costs imposed on low-margin sectors such as agriculture, fishing, and forestry.

As a general rule, governments provide around 50% of infrastructure, government business enterprises 30%, and private investment around 20% (although significant differences exist between countries) (Chan et al. 2009). Government funding mainly targets health and education, transport, and utility services, reflecting the basic priorities of developing economies experiencing industrial transformation, high urbanization rates, and increasing congestion (PricewaterhouseCoopers and Oxford Economics 2014: 11). In contrast, private investors mostly invest in the energy, resources, and transport sectors, suggesting that private participation in infrastructure has as much to do with the underlying economics of the asset class as with the availability of capital.

In Asia and the Pacific region, governments face many challenges in attempting to meet the demand for new infrastructure and private participation in infrastructure provision, and management is a priority for most governments in the region as well as for multilateral development agencies (Moore and Kerr 2014). The main difficulty is the viability gap that exists between new greenfield infrastructure projects and the need for state-financed subsidies to support a high proportion of private investment. In most countries in Asia and the Pacific region, the demand for new and replacement infrastructure exceeds the financial capacity of most governments, especially in developing countries facing high transaction costs, inadequate port infrastructure, and the need for upgraded transport infrastructure in cities and towns. Governments meet the cost of new infrastructure in several ways.

Reordering Budget Appropriations

General budget appropriations are the most common method used by governments to finance public infrastructure. Governments may reorder appropriations and forward estimates to meet current investment needs (Chong and Poole 2013; Productivity Commission 2014). Public investment is volatile, and mid-cycle mini-budgets, budget review by parliamentary expenditure review committees, concern about fiscal deficits, and changes in government cause frequent funding cutbacks and delays. Vertical fiscal imbalance may also contribute to volatility in jurisdictions in which many projects are initiated or managed by provincial and local government agencies.

Accounting and reporting procedures as well as governance varies between countries, although most governments order public spending according to a 3- or 5-year plan or set of forward estimates. Budget appropriations are mostly funded from general taxation or public borrowings, both of which may attract varying levels of deadweight costs. The strengths of appropriations include greater transparency and accountability for government fiscal management, while a disadvantage thereof is the absence of market discipline in project selection and evaluation (Chan et al. 2009: 228). However, sudden changes in priorities create investment shocks that have been shown to lower capital productivity and efficiency (International Monetary Fund 2015: 17).

By Raising Taxes

Consolidated revenue, which provides the basis for most state appropriations to infrastructure spending, may take the form of (i) an economy-wide increase in direct and indirect taxes, (ii) the raising of a tax or levy confined to a province or local government area, (iii) the dedication of existing taxes to specific investment objectives (such as applying fuel taxes to road construction and maintenance), and (iv) the imposition of a user charge. New taxes to finance infrastructure has several

disadvantages for an economy. First, taxes are costly to collect and administer, and create induced effects, such as tax avoidance behaviors. Taxes also carry significant deadweight costs in economic terms, which may exceed the net proceeds of new taxes (Regan 2009: 27). Second, increasing taxes has been shown to have a negative impact on regional savings and economic growth, may distort economic decision-making, and creates perverse incentives (Chan et al. 2009: 53), although the extent of this depends on the purpose of the tax and whether or not the tax is applied to consumption or income (Helms 1985). Third, the discriminatory taxation of specific communities or users encounters Pareto optimality problems and creates several equity and welfare problems (Regan 2009: 26–27).

Privatization, Initial Public Offerings, and Capital Recycling of Brownfield Assets

In the 1980s, the sale of stock in existing government business enterprises (GBEs), the disposal of assets by trade sale, and the placement of initial public offerings (IPOs) on a securities exchange were common practices in many nations in Asia and the Pacific region. The first cycle of privatizations occurred in industrialized economies and included fully integrated going concerns (brownfield projects) with trading histories that were relatively easy to sell to private investors. In many countries in Asia and the Pacific region, early privatizations included state banks, airports, insurance companies, telecommunications services companies, railways, ports, and energy supply chains including generation, transmission, and distribution assets (Megginson 2005: 14–21). A second cycle of privatizations based on trade sales and a small number of IPOs took place in the 1990s, particularly in industrializing economies in South Asia and East Asia. By 2001, privatizations had raised \$1.5 trillion for governments globally, although readily saleable assets were becoming much harder to find (Megginson 2005: 21–25).

A third cycle of privatization or asset recycling is now taking place whereby governments enter long-term leases or sell mature, income-producing infrastructure to finance the construction of new assets. These assets must be financially viable and may require subsidies or other forms of ongoing support during the early years of operation. Recycled assets include toll roads, airports, electricity generators and transmission companies, defense establishments, ports, and commercial property portfolios. Unlike the enterprise privatizations that preceded it, asset recycling is a sustainable means of raising additional investment capital (Government of Australia 2014).

Public Borrowings and Budget Deficits

Fiscal deficits and public debt in 2008–2012 grew significantly as countries pursued expansionary and liquidity-generating policies in response to the global financial crisis of 2007–2008. The fiscal deficits of countries in Asia and the Pacific region also increased after 2008, with 2014 deficits greater than the average deficit for 2002–2007 (World Bank 2014: 7). The need for fiscal consolidation to rebuild resilience is also pressuring regional governments to lower deficits to longer-term benchmark levels. However, this is difficult for some countries in South Asia and Southeast Asia attempting to balance national development priorities and fiscal sustainability considerations (United Nations Economic and Social Research Commission for Asia and the Pacific 2015: 20). Part of the problem for these countries can be addressed by widening the tax base and fiscal deficit ceilings designed to restore fiscal deficits to long-term levels. Most countries in Asia and the Pacific region other than Australia, India, and Japan possess the fiscal headroom to adopt a development-oriented fiscal position.

Although public debt increased in industrialized economies during 2008–2014, public debt remained stable in East and Southeast Asia at 42% of GDP, slightly higher than average debt levels during 2002–2007 (United Nations Economic and Social Research Commission for Asia and the Pacific 2015: 19). However, most economies in the region have experienced sustained growth in corporate and household debt since 2008, increasing their vulnerability to higher interest rates and presenting a challenge for future monetary policy management.

Public debt is also a major source of investment and may take the form of general-purpose public borrowings, overseas development assistance (ODA) loans, and the sale of conventional, indexed, or tax-advantaged bonds. Many countries in the region offer tax exemptions to resident investors for public bond issues. Public debt attracts deadweight costs, induces credit rationing, and “crowds out” private debt, placing pressure on interest rates and diverting capital away from higher yielding private investment (Regan 2009: 31–32). In 2014, the average public debt of many regional countries exceeded their 2007–2014 external debt average in GDP terms (International Monetary Fund 2014a, 2014b). While the increase in budget deficits and public debt in Asia and the Pacific region is modest compared to that in other regions, it does impact sovereign credit ratings in the long term and represents a limited option for government infrastructure spending in the medium term.

Tax-Exempt Bonds

Tax-exempt bonds are interest-bearing, redeemable securities issued by governments for specific national interest projects or general infrastructure purposes; they form part of governments’ capital budgets for infrastructure spending, and are considered a government liability (Marlowe 2009; Ang, Bhansali, and Xing 2010). In the United States (US), bonds issued by local governments may be accorded federal tax-exempt status. Tax-exempt bonds are described in greater detail in section 3.

Revenue Bonds

Governments in Asia and the Pacific region must look for alternative ways to finance national infrastructure in most sectors, especially new “big ticket” assets such as ports, national highways, energy generation, waste management, airports, and rail transport. In constrained fiscal environments, one option is for governments to issue project-specific revenue bonds. Revenue bonds can be used to finance publicly or privately managed infrastructure with tranches designed to meet investors’ currency, maturity, and interest rate risk appetite. Revenue bonds may be issued on a limited recourse basis, with full or partial government guarantee support, by a government business enterprise, a project special purpose vehicle, or private sponsor. Projects financed with bonds may be listed on local securities exchanges, or bonds may be listed on the home exchanges of the Asian bond market. Depending on the country’s level of compliance with international public accounting standards, bonds that do not require full or partial government redemption may not be included in the country’s public-sector borrowing limits. However, it may be necessary to record bonds supported by government guarantees or other forms of support on the government’s balance sheet for accounting purposes.

Government Business Enterprises

Governments have traditionally used GBEs to finance infrastructure investment in specific sectors, such as energy, transport, and water resources. GBEs are independent legal entities with their own board of directors, and their borrowings are not treated as public debt of the shareholding government. GBEs finance their activities with retained earnings, budget appropriations (usually as equity or payment for community service obligations), and borrowings. These entities may borrow or issue bonds in capital markets and access sovereign credit ratings for debt-raising activities. In many countries in Asia and the Pacific region, GBEs generally spend more on infrastructure than do national and subnational government agencies (Wihardja 2013). GBEs' obligations may be fully or partially guaranteed by the government, and Treasury Departments may borrow or issue bonds on behalf of their GBEs if this incurs a lower cost of funds (Chan et al. 2009: 93–94).

The advantage of the GBE option for governments is the opportunity to generate revenue from user charges, professionally implement projects, and quarantine GBE debt from public-sector borrowing ceilings. GBEs may address market failure and use cross-subsidy services to mitigate specific project risks without state support in the form of guarantees, subsidies, and viability gap funding (VGF). GBEs may also provide better governance, accountability, and transparency than can private firms, and borrowings may be off-balance sheet depending on the governing accounting standards.

GBEs' weaknesses include mixed social and economic objectives, weakened lender discipline, and enterprise vulnerability to government intervention from time to time, either in the appointment of managers, the withdrawal of accumulated earnings as dividends, or the substitution of debt for equity capital. Investments may be selected in response to short-term government priorities rather than on the basis of project viability. GBEs do not possess the private sector's aversion to investing in high-risk, marginal projects that do not demonstrate a sound, risk-adjusted economic rate of return. Studies also suggest that GBEs are generally inefficient due to overstaffing, high levels of debt, low levels of innovation, and a bureaucratic management style. GBEs are not subject to the stimulus of a competitive market environment, and are slow to adopt new and alternative technologies (Megginson 2005). As captive government agencies exposed to expedient government interventions and operating at low levels of efficiency, GBEs may be an unsustainable option for financing long-term infrastructure investment.

The global financial crisis of 2007–2008 demonstrated the hazards of providing GBEs with indemnity against enterprise failure, poor investment, and operational decision-making. There is no incentive for GBE managers to perform financially or operationally at a standard higher than that agreed with government. Long-term studies suggest that GBEs fail to earn a rate of return that exceeds government bond yields, suggesting both enterprise inefficiency and often competing social and economic objectives (Productivity Commission 2008).

3. BANK LOANS AND PROJECT FINANCE

Historically, governments have provided 70%–80% of the capital required to finance global infrastructure investment; however, this position is changing with project finance, corporate, and project bonds presently accounting for a much greater share of investment (Project Finance International 2015). Recent data suggest that private capital now provides up to 40% of infrastructure investment in Asia and the Pacific

region.² The global financial crisis and subsequent Basel III reforms had long-term impacts on global capital markets, such that long-term project finance became less attractive for banks. During 2007–2010, loan terms and leverage levels were reduced, and risk repricing led to higher spreads and more onerous lending terms (Reviglio 2012; Seijas 2013). These changes did little to soften the market appetite for project finance, and the level of lending held up well during 2010–2014 (Australian Trade Commission 2013; Project Finance International 2015). Banks have provided most of the global project finance since the 1960s, and syndicated project finance remains the most common method for financing private infrastructure investment in Asia and the Pacific region. In 2014, global project finance lending stood at \$260 billion, the highest level in 10 years. In the same year, Asia and the Pacific region accounted for \$72 billion (27.7%) of the global market, the largest share among global regional markets but less than the average share of 31.5% over the previous decade (see Table 1). During 2004–2014, most global loans were for power (39.0%), transport (24.0%), oil and gas (21.2%), and property-related projects (5.4%). In Asia and the Pacific region, most lending was for power (34%), transport (23%), oil and gas (15%), and the telecommunications sector (6%) (Figure 1).

Table 1: Project Finance Globally and in Asia and the Pacific Region, 2004–2014
(\$ billion)

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Global	145	166	210	247	250	147	228	214	199	204	260
Asia and the Pacific	36	25	39	45	71	57	99	92	92	64	72
%	24.8	15.0	18.5	18.2	28.4	38.8	43.4	43.0	46.2	31.4	27.7

Source: Author. Data sourced from Project Finance International (2015).

Bank lending for infrastructure generally takes the form of project finance, the features of which include limited recourse security, long tenors, a greater level of lender governance, and higher leverage than conventional corporate finance alternatives. Project finance relies on future cash flow to meet debt servicing requirements, and lenders will generally exercise a higher level of due diligence and governance, make wider use of credit ratings, and apply financial compliance standards for the loan term.³

Bond finance accounts for around 20% of project finance transactions in Asia and the Pacific region, although volumes dropped to 10% during 2008–2012. This decline in the use of bonds is attributed to the rating downgrade of the major default guarantors in 2008–2009 and the repricing of bonds at underlying default risk, which, in many cases, was at S&P's BBB- or lower rating level (Debelle 2008: 78–79).

Several notable characteristics of the project finance market in Asia and the Pacific region since the global financial crisis include the rise in the importance of regional banks and the tendency for a greater share of bank lending to be allocated to home country projects where debt is mainly priced in local currency (Project Finance International 2015). The supply gap created by the withdrawal of the Royal Bank of Scotland, Credit Agricole, the Bank of Ireland, BNP Paribas, and Banco Santander from the market in Asia and the Pacific region was met by growth in regional lending and the acquisition of assets and operations of several European banks, such as

² For example, in Australia, private debt and equity capital accounted for 58% of infrastructure investment in 2013, up from 33% in 1993 (Productivity Commission 2014).

³ These covenants typically include loan-asset value and debt-service coverage ratios, cash-flow distribution priorities and compliance with requirements for sinking funds, debt-service reserve, and cash-flow distribution covenants.

Mitsubishi-UFJ's acquisition of the asset portfolio and later the operations of the Royal Bank of Scotland group in 2012. During 2010–2014, local banks replaced European lenders as the leading arrangers and sources of finance in the region (Table 2).

Table 2: Sources of Project Finance in Asia and the Pacific Region, 2004–2014

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
1	US	UK	US	US	Spain	India	India	India	AUS	US	US
2	UK	Spain	France	UK	US	AUS	Spain	AUS	India	AUS	AUS
3	AUS	Qatar	S Arab	AUS	UK	Spain	AUS	US	US	UK	UK
4	KOR	US	UK	Spain	AUS	US	US	RF	UK	India	India
5	Qatar	Italy	Spain	UAE	India	UK	UK	France	France	KOR	Brazil

AUS = Australia, KOR = Republic of Korea, RF = Russian Federation, S Arab = Saudi Arabia, UAE = United Arab Emirates, UK = United Kingdom, US = United States.

Source: Author. Data sourced from Project Finance International (2004–2015).

Project finance loans are mostly used to finance infrastructure projects for which private firms provide equity capital, management, and operations and maintenance. These include economic infrastructure projects including energy generation, ports and airports, destination freight rail services, and toll roads. In Australia, the Republic of Korea, and Japan, project finance has also been applied to social infrastructure in the form of schools and universities, hospitals, and public buildings. The state bears market risk for social infrastructure, and project revenue is derived from state availability payments.

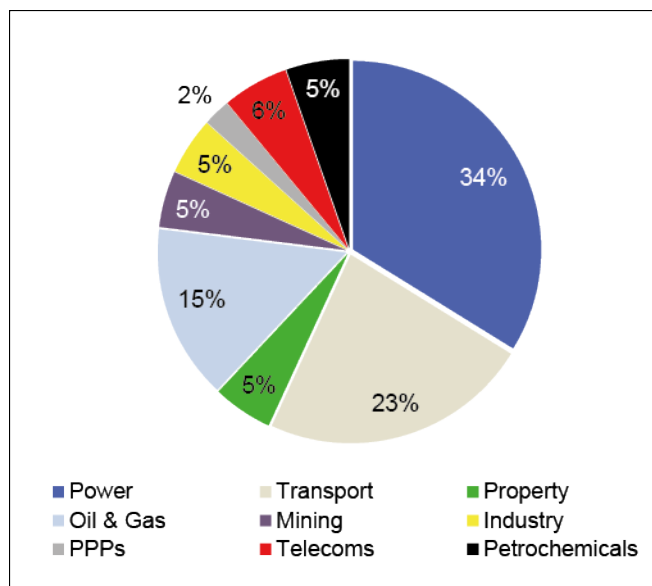
The Strengths of Bank Lending for Infrastructure

A characteristic of project finance is that lenders are more active in asset management and performance by playing an important governance role to ensure borrower compliance with the loan terms, transaction contracts, and financial covenants applying over the life of the loan. Banks also play an important facilitation role providing over-the-counter risk management instruments to hedge borrower exposure to refinancing, currency, and interest rate risks. Multilateral agencies also provide support through grants for early-stage feasibility studies, environmental impact and management strategies, loans, and financial services, including political risk insurance.

Many project finance transactions in Asia and the Pacific region are delivered as PPPs, thus ensuring a high level of rigor in project selection, evaluation, and implementation. A recent survey of PPP policies in the region indicates that 19 economies in Asia and the Pacific region significantly improved the effectiveness of their PPP policies and supporting institutions from 2011 to 2014 (Economist Intelligence Unit 2011, 2014).

An advantage of bank lending as a source of project finance lending is that it is well understood by institutions, central regional governments and their agencies, and borrowers. Debt servicing requirements over the project's economic life are matched to project cash flow and the financial economics of long-term infrastructure investments. Project finance is a major source of infrastructure provision in Asia and the Pacific region; supply increased in the region during 2008–2012 and it appears that finance will remain available for bankable infrastructure projects.

Figure 1: Project Finance in Asia and the Pacific Region, 2004–2014
(by sector)



PPP = public-private partnership, Telecoms = telecommunications.

Source: Author. Data sourced from Project Finance International (2004–2015).

The Weaknesses of Bank Lending for Infrastructure

Following the global financial crises of 2008, Asia Pacific banks have assumed a greater role as providers of loans and project finance to the region. The disadvantage of bank lending is its inflexibility and limited scope for managing change. Loans cannot be retired early or refinanced without penalty, few conversion options exist, and interest rates may be linked to floating rate indicators that, without hedging in place, expose borrowers to interest rate risk over the term of the loan.

A distinctive characteristic of project finance is long-term tenors, which permit a matching of the project’s investment characteristics, the term of the service agreement, and the project’s long-term debt servicing requirements. Short-term finance or a reduction in project finance tenors creates uncertainty and refinancing risk for borrowers, particularly in times of rate volatility.

The Challenges of Bank Lending for Infrastructure

Global capital markets are unpredictable and subject to systematic risk and the influence of global externalities. Many lenders in Asia and the Pacific region favor lending to the domestic market in local currency, suggesting a financing gap for future regional cross-border transactions. Sustainable bank lending for infrastructure in Asia and the Pacific region faces the challenge of transaction flow. Infrastructure investors and lenders argue that a regular flow of bankable transactions permits contractors to create and maintain skilled project teams, enhances collaboration with local consultants and contractors, and lowers bid costs (Prejin 2015a: 4).

4. BOND FINANCE

Bonds are financial instruments issued by a government or corporation obliging the issuer to make periodic interest payments and repay principal on maturity. Bonds are an alternative source of capital to intermediated credit and equity financing (Hack and Close 2013). Bonds take many forms and are widely used by governments, corporations, and project sponsors to raise capital for infrastructure projects. For example, interest payments may be at fixed or floating rates, tranches of a single issue may be issued in different currencies with different tenors, and interest payments may be indexed or guaranteed by the issuer or a third party such as a government or bank.

After the 1997–1998 Asian financial crisis, a corporate bond market was viewed as a possible solution to the capital flow problems that had led to the currency devaluations and economic downturn in Asia at the time. Asian bond markets experienced strong growth in the post-crisis years, due to improvements in the regulatory framework and clearing and settlement facilities. In 2015, corporate bond issues for “Emerging Asia” (excluding Japan) stood at \$8.78 trillion (around 61% of regional GDP), with most issues in local currencies (ADB 2015).

Infrastructure bonds are frequently credit-rated and, leading up to the global financial crisis, default guarantors (monoline insurers) insured a large number of issues and provided S&P’s AAA grade credit guarantees to projects with underlying ratings of BBB- or lower (DeBelle 2008: 78–79). This practice lowered the cost of debt for infrastructure bond issuers, and the rating downgrade that many insurers experienced after 2008 effectively closed the bond market as a financing option. Bonds accounted for around 20% of the project finance arranged in Asia and the Pacific region in 2014, having declined to less than 10% of the market in 2009–2010.

The average tenor of bonds in Asia and the Pacific region is around 6 years, although longer maturities are available in some regional markets, notably the Philippines, Thailand, and Indonesia (ADB 2015). The largest bond markets in the region are the PRC; the Republic of Korea; Hong Kong, China; Malaysia; and Singapore (Hack and Close 2013). The majority of bonds in the region are rated investment grade with low credit risk and low rates of default (Ehlers, Packer, and Remolona 2014).

4.1 Tax-Exempt Bonds

Tax-exempt bonds are government-issued securities that offer investors a full or partial exemption from taxation on interest receipts. Tax-exempt bonds are in high demand from investors paying higher marginal rates of income tax, which limits their attractiveness in low- and middle-income countries and suggests that a capital-guaranteed or indexed bond would be a more attractive option for many investors. Tax-preferred bonds may be issued by central government agencies or, as in the US, by municipal agencies with a national government income tax exemption. Depending on the terms of the issue, bonds may be traded in official markets or informally through intermediaries and secondary markets.

Tax-based incentives present a conundrum for governments.⁴ A deduction from tax liability is an explicit transfer payment from the state to private investors to be offset by the welfare and private benefits of additional public goods.⁵ The security will also be priced lower than other state securities in the market, which may reflect the lower risk of the revenue bonds or simply that buyers recognize the bonds' real post-tax return and adjust prices for the tax benefit. The subsidy effect may be significant, with a 2009 US study showing a reduction in borrowing costs for private corporations by 200 basis points (2%) at a cost to revenue estimated in 2006 at around \$27 billion per year (Ang, Bhansali, and Xing 2010). More recent studies of capped deduction bonds indicate an implicit subsidy of bondholder returns of \$31 billion for 10-year bonds and \$112 billion for 30-year bonds (Scott 2012). Tax-exempt bonds may also create distortions and induce "crowding out" effects in capital markets.

A number of economies in Asia, including the PRC and Malaysia, grant an automatic income tax exemption to resident holders of state-issued bonds. Other countries, subject to international tax treaties and free trade agreements, grant full or partial exemption from transaction taxes, including capital gains and withholding taxes for non-residents.

4.2 Revenue Bonds

Revenue bonds are debt securities issued by governments to meet the cost of greenfield infrastructure, or issued by a project's private sponsors to raise investor capital on either a project-by-project or portfolio basis. The bonds are secured over the value of the assets and the contracts being financed. Issuers may provide enhancements by offering part or all of the issue at a discount or as indexed securities, in which case there is a discount to the yield spread (or interest) paid to retail investors. Issuers of indexed bonds have an advantage because the security is generally priced lower than conventional bond issues in the market (Chan et al. 2009: 84).

4.3 Corporate Bonds

Corporate bonds accounted for 13% of infrastructure finance globally; however, in Asia and the Pacific region it only accounted for 4% of infrastructure bond issues.⁶ This is surprising given the strong growth of the Asian bond market, which accounted for around 61% of regional GDP in November 2015. This may be due to the issuing corporation's liability to redeem bonds in the event of project default. Of the regional infrastructure bonds on issue, around 94% are of investment grade credit standing, compared to 75% for global issues. The credit standing and liquidity of infrastructure bonds are generally more stable than those of corporate bonds (Ehlers, Packer, and Remolona 2014: 72).

⁴ In the US, revenue bonds may be issued by subnational governments and guaranteed by the national government, which also carries the tax revenue reduction. Such arrangements suggest a need for controls on subnational government bond issues to minimize the impact of deadweight costs, as well as any impact on vertical fiscal imbalance.

⁵ Abelson 2003: 404–418; Hillman 2003: 131–138.

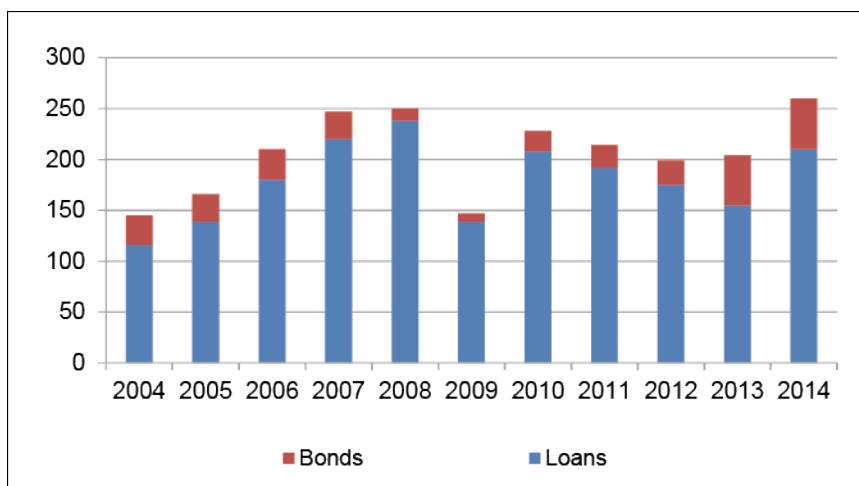
⁶ This can be compared with North America (41%) and Europe (21%) (Ehlers, Packer, and Remolona 2014: 72).

4.4 Asian Bond Markets

Asian bond markets provide an opportunity to bridge the gap between high domestic savings and the shortfall in infrastructure capital in Asia and the Pacific region, although evidence suggests that this has not occurred on a significant scale. In 2013, the Bank for International Settlements and 11 regional central banks created the Asian Bond Fund to invest in local currency bonds across eight Asian markets (the PRC, Indonesia, the Republic of Korea, Malaysia, the Philippines, Singapore, Thailand, and Viet Nam), and to foster capital market liberalization, growth, and the harmonization of member capital markets. In 2005, a second fund with \$2 billion in capital was established to facilitate long-term local currency bond issues and develop supporting services, including derivatives and repurchase agreement trading.

In 2005, the Association of South East Asian Nations+3 and ADB created the Asian Bond Market Initiative to support and integrate regional bond markets for public and private bond issues. In December 2014, bonds on issue stood at \$8.88 trillion across nine regional markets—the PRC (with a 63% market share); Hong Kong, China; Indonesia; the Republic of Korea; Malaysia; the Philippines; Singapore; Thailand; and Viet Nam. Government bonds accounted for 61% of the market, and nongovernment bonds accounted for 39%, an increase from 29% in 2007 (Zen and Regan 2014).

Figure 2: Global Bond and Loan Project Finance, 2004–2014



Source: Project Finance International (2015).

Government bonds accounted for most issues in the PRC, Indonesia, the Philippines, Thailand, and Viet Nam; and corporate bonds accounted for around 40% or more of issues in Hong Kong, China; the Republic of Korea; Malaysia; and Singapore (ADB 2015: 10). The majority of government bonds (33.7%) were issued with tenors of 3 years or less; 19.8% had 3–5 years, 24.6% had 5–10 years, and 21.8% had 10 years. Tenors were longest (10 years or more) in Indonesia and the Philippines, with most other funds favoring tenors of 5 years or less. Corporate bond issues were mostly issued with tenors of 3–10 years and 11% had 10-year tenors (ADB 2015).

The Asian Bond Fund and Asian Bond Market Initiative were important developments for the region providing liquidity, diversification, and risk dispersion opportunities for investors. Although regional regulation has become more integrated, most local currency bonds are held by a small number of domestic institutional investors, which may limit market liquidity.

Strengths of Infrastructure Bonds

As a financial security, bonds are an attractive investment for passive institutional investors, may be credit-rated, and offer investors liquidity and diversification. The security may be issued in a number of configurations, including different tenors, currencies, and security options. Bonds may be fully or partially guaranteed by the issuing institution, a bank, or government, and may be issued with an indexed payment stream, a convertibility option, or discount. Bonds may also be listed on securities exchanges and their performance measured by tracking market indexes. A recent study confirms that infrastructure bonds in the region generally have significantly better credit ratings and lower default risk than do corporate bonds (Ehlers, Packers and Remolona 2014). Bond finance provides a flexible way to finance long-term projects and is well-matched to passive investor requirements for infrastructure finance.

Limitations of Infrastructure Bonds

Infrastructure bonds do not entail the active lender governance of project finance whereby lenders prescribe and then monitor performance criteria over the loan term. Bond investors are generally passive, have little technical understanding of infrastructure, and possess little knowledge of the project's underlying economics. Although the risk of infrastructure bonds is no more complex than that of corporate bonds, the risks are different, consisting primarily of sovereign and political risk (Ehlers, Packer, and Remolona 2014).

Historically, bonds play an important but not a dominant role in project finance. Investor preference for brownfield risk and investment grade credit standing suggests that listed bonds may have a limited role as a future source of infrastructure finance. However, these characteristics do not rule out unlisted bonds playing a greater role in future infrastructure projects. The recent entry of investment funds managed by investment banks specializing in infrastructure is expected to grow the unlisted market in the next decade.

5. MULTILATERAL DEVELOPMENT BANKS

MDBs such as ADB and the World Bank play a critical role in facilitating infrastructure development in Asia and the Pacific region. The World Bank provided \$25.2 billion and ADB provided \$7.5 billion in infrastructure loans in 2011 (Moore and Kerr 2014). The services offered by MDBs include multi-currency loans, grants, equity, guarantees, technical assistance (TA) programs, and cofinancing activities in conjunction with other MDBs, multilateral development agencies, and public and private organizations.⁷ MDBs may lend for longer tenors and at lower rates than do private banks with greater flexibility in designing debt servicing requirements (Asian Development Fund [ADF] 2014). The average credit rating of ADB's loans and other financial exposures is investment grade (ADB 2014).

ADB also provides default indemnities through its Credit Guarantee and Investment Facility to leverage infrastructure projects to lower cost, investment grade credit standing. MDBs provide aid and concessional loans to low-income and developing countries (Chong and Poole 2013), and play an intermediation role by bringing other financing institutions to a transaction and arranging debt syndications and sponsorship, the provision of non-commercial risk insurance (sovereign, political, and currency

⁷ ADB loaned \$7.5 billion to infrastructure in 2012, around 64% of the institution's total lending (ADB 2014; Moore and Kerr 2014).

non-convertibility risk), and the management of donor programs such as the ADF (Moore and Kerr 2014). MDBs also provide training and information to emerging economies through technical publications, national and project case studies, surveys, and reports. ADB sponsors the Economist Intelligence Unit's Asian Infrascop (Economist Intelligence Unit 2011, 2014), and publishes Key Indicators for Asia and the Pacific annually (ADB 2016) and the Asian Bond Monitor quarterly (ADB 2015).

Strengths of Multilateral Development Bank Participation

MDBs are a major facilitator and provider of infrastructure finance in Asia and the Pacific region, and have a sound understanding of the region's economic, political, and social drivers, as well as the capacity to support projects with TA and financial and nonfinancial support services. MDBs play an important role in providing flexible intermediate lending that reduces the gap that often exists between underlying infrastructure project economics and a bankable transaction. MDBs also provide grants, equity, and debt on concessional terms, and may act as an intermediary for projects in low-income Asian countries by introducing co-lenders and third parties to help finance projects.

Limitations of Multilateral Development Bank Participation

MDBs have limited resources to meet the region's infrastructure financing needs, although the World Bank applies around 50% of its lending to infrastructure, and ADB applies around 65% (Moore and Kerr 2014). In March 2015, the Group of Twenty Nations (G20) committed to increase ADB's capitalization by \$100 billion, suggesting a stronger regional role for this institution in coming decades.

6. INTERNATIONAL DEVELOPMENT AND AGENCIES

International development agencies (IDAs) are also an important source of loans, grants, financial services, and TA for infrastructure projects in Asia and the Pacific region. Loans and grants from MDBs and IDAs are often needed to address the viability gap that exists for private investment in many infrastructure projects in developing economies and in several industry sectors.⁸

IDA support for infrastructure may take the form of official development assistance, which was drawn from around 40 national agencies, 31 nongovernment agencies, and 26 international institutions in 2015. ODA generally takes the form of loans, grants, and technical cooperation agreements for training, development planning, the financing of study teams and experts, and the provision of equipment. In 2013, the Japan International Cooperation Agency's global development assistance comprised loan aid (72%), technical cooperation (17%), and grant aid (11%) (Japan International Cooperation Agency 2014). Loan assistance is mostly provided as long-term loans for development at rates lower than those offered by commercial lenders. In Asia and the Pacific region, ADB manages the ADF, which also provides low-interest loans and grants to the region's low-income economies. In 2013, the ADF's assets were \$21.00 billion, of which \$14.00 billion was financed by ADB and \$6.64 billion by cofinancing partners (ADB 2014).

⁸ Industry sectors such as water resources, public transport, roads, and road maintenance generally require that high levels of state subsidy or availability payment regimes be viable for private investors. Viability is improved through low-interest IDA loans and grants, which may lower the level of subsidy support or guarantees provided by national governments (Estache 2010; Wihardja 2013).

IDAs also provide TA to regional countries. Infrastructure is a capital-intensive group of assets requiring long-term planning and operating as part of networked supply chains in non-competitive market conditions. These characteristics assume greater importance when private firms in the form of build–own–transfer and PPP contracts provide investment and finance. Governments face the challenge of ensuring that the agencies commissioning these projects have the technical, financial, and commercial skills necessary to negotiate long-term and incomplete contracts with experienced international investors, operators, and financiers. IDAs provide TA to developing nations at a number of levels: project research, analysis, and studies; advisory services and payment for consultants to assist with project selection, appraisal, governance, and finance; and capacity building in the line agencies of national and subnational governments.

International development assistance may take the form of loans through import–export agencies and credit enhancement through international agencies such as the World Bank’s International Finance Corporation, International Development Association, and Multilateral Investment Guarantee Agency.

7. PENSION FUNDS

Global pension funds are significant global investors with an estimated \$64.0 trillion in assets, of which \$33.8 trillion was held by the top 300 funds in the Organisation for Economic Co-operation and Development (OECD) 2014 Global Pension Asset Study, with funds under management growing at an annualized rate of 7.3% during 2010–2014 (Towers Watson 2014). Sovereign and public funds accounted for 67% of assets under management, private corporate funds 19%, and private independent funds 14%. Around 64% of funds are in countries in Asia and the Pacific region.⁹

Defined-benefit superannuation funds account for over 70% of survey assets in Asia and the Pacific region. This is important because defined-benefit funds permit fund managers to invest in long-term assets without the pressure of quarterly market performance indicators and the need to maintain higher liquidity ratios. Accumulation funds place greater emphasis on the fund manager’s ability to trade securities actively and maintain a competitive yield performance, particularly when regulations permit members to move their accounts freely between funds managers.

Significant differences exist in the asset allocation practices of fund managers. For example, funds in Australia, Chile, and the United Kingdom (UK) typically hold 40% or more of their assets in equities, while the PRC, Denmark, the Netherlands, and the Republic of Korea hold 20% or less of their assets in equity (Mercer 2014) (Table 3). The OECD study found that, on a weighted average basis, equities accounted for 41.2% of assets, bonds 44.9%, and cash and alternatives 13.9%. Pension fund investment in infrastructure takes several forms: direct and indirect equity investment, debt, and through the agency of specialist infrastructure funds. The OECD 2014 Annual Survey of 104 Large Pension Funds estimated an average allocation to infrastructure of around 1% (Inderst 2014; OECD 2014: 51).¹⁰ In contrast to the international norm, the infrastructure allocation of funds under management is around 6% in Australia and 5% in Canada (Inderst and Della Croce 2013). Debt instruments

⁹ US (36%), Japan (13%), Canada (6%), Australia (3%), the Republic of Korea (3%), the PRC (1%), Malaysia (1%), and Singapore (1%) are among the funds controlling 90% of assets under management (Towers Watson 2014).

¹⁰ Prequin (2015a) estimates the average allocation to infrastructure of over 600 global funds to be 3.3% of funds under management. The allocation for all institutional investors is 4.4% (Prequin 2015b).

are believed to be a relatively insignificant medium for global pension fund investment in infrastructure

Strengths of Pension Fund Lending

As a debt security, infrastructure investments are well matched to pension funds' long-dated liability curve and yield preferences. Infrastructure debt offers above-average risk-adjusted returns and portfolio diversification attributed to low-return correlations with equities, direct and indirect real estate, bonds, and leading economic indicators (short- and long-term bond rates, incomes, employment, inflation interest rates, exchange rates, and investment levels) (Peng and Newell 2007). Infrastructure revenue streams are stable, generally indexed, underpinned by long-term service contracts, and possess low price elasticity and the advantage of limited competition.

Table 3: Pension Fund Asset Allocation by Country

Country	%		
	Equities	Fixed Interest	Property and Other
Australia	50	25	25
Canada	35	40	25
Chile	40	45	15
People's Republic of China	20	80	0
Denmark	20	65	15
Hong Kong, China	65	35	0
Japan	30	50	20
Republic of Korea	5	95	0
Netherlands	20	70	10
Switzerland	35	45	20
United Kingdom	40	45	15
United States	45	40	15

Source: Mercer 2014.

Limitations of Pension Fund Lending

Pension funds favor debt and equity participation in unlisted infrastructure, which accounts for 56% of their allocation to this asset class, and fund managers have difficulty identifying robust investment and lending opportunities. Infrastructure lending can also attract high transaction costs, while 33% of institutional investors note liquidity as a concern and 26% note performance (Prequin 2015b).

Pension funds prefer brownfield projects and will not lend for construction. As passive lenders, fund managers are not well equipped to exercise the governance generally required of lenders to this asset class. Pension funds in Canada, Australia, and the US prefer mature projects with stable and predictable revenues. Pension funds are not significant lenders to infrastructure either globally or in Asia and the Pacific region, although data are not readily available for portfolio allocations to infrastructure bonds and other debt securities with the fund's allocation to listed equities.

Pension fund lending to infrastructure is essentially passive and does not import the technical understanding and governance introduced by project financiers. Pension funds and institutional investors experience difficulty with regulatory and political risk associated with these projects, and are expected to be a limited source of future infrastructure finance.

8. SOVEREIGN WEALTH FUNDS

SWFs are special-purpose vehicles created by governments to provide financial security and stability during periods of international economic uncertainty. Clark, Dixon, and Ashby (2013: 4) view SWFs as a policy instrument and explain their rise as opportunities for states to identify investment platforms away from traditional capital markets.

Although they have existed since the late 1950s, SWFs came to global prominence in the wake of the 1997–1998 Asian financial crisis when the number of funds increased from 8 to 21, and they stabilized many nations in Asia and the Pacific region during the 2007–2008 global financial crisis. In April 2015, SWFs controlled \$7.1 trillion of assets in diversified portfolios generally allocated to interest-bearing domestic and foreign securities, equities, real estate, and alternative investments, which generally include infrastructure assets (Table 4). SWFs are now contributing to the reshaping and decentralization of global capital markets and fiscal architecture.

Table 4: Sovereign Wealth Fund Ranking
(\$ billion)

		Assets
Government Pension Fund	Norway	882
UAE-Abu Dhabi Authority	UAE	773
Saudi Arabian Monetary Authority	Saudi Arabia	757
China Investment Corporation	PRC	653
Safe Investment Company	PRC	568
Kuwait Investment Authority	Kuwait	548
Hong Kong Monetary Authority	Hong Kong, China	400
GIC Private Limited	Singapore	320
Qatar Investment Authority	Qatar	256
National Social Security Fund	PRC	236
Temasek Holdings	Singapore	177
Future Fund	Australia	95
Other		1,440
Total		7,105

PRC = People's Republic of China, UAE = United Arab Emirates.

Source: Sovereign Wealth Fund Institute 2015.

Strengths and Limitations of Sovereign Wealth Funds Finance

SWFs possess the capital required for long-term equity and debt investment in infrastructure as an asset class. Infrastructure securities generally display the investment characteristics favored by portfolio investors and, with few liabilities, SWFs possess the necessary flexibility for direct participation in the infrastructure sector. As with pension funds, the attraction of infrastructure for portfolio investors is its strong diversification characteristics, with studies showing a low correlation with other asset classes and stable price–return performance against most leading economic variables (Peng and Newell 2007). It may also be argued that funds are designed to support the national interest and should maintain a high portfolio allocation to domestic infrastructure projects, although any discussion of a portfolio quota for a specific asset class raises the question of conflicting objectives. That is to say, SWFs possess a financial rather than a development purpose requiring high liquidity levels and a return commensurate with a given risk appetite. Minimum allocations to domestic infrastructure will involve political intervention in the SWFs’ decision-making processes, and threatens the independence of fund managers, a matter widely discussed and rejected in 2008²⁰–2009 with regard to mandatory infrastructure investment levels for pension funds (Regan 2009: 47–50).

As portfolio managers, SWF managers, unlike banks, lack the retail apparatus to issue or trade in bonds, annuities, or derivatives, or to exercise the lender’s traditional credit assessment and governance roles. Lender governance is particularly important in infrastructure finance, which requires lenders to design, monitor, and enforce covenants regulating borrowers’ performance under loan agreements. Covenants may cover cash and operational management, observance of debt–security ratios, compliance with sinking fund requirements, and debt service coverage ratios.

These constraints limit the SWFs’ capacity to serve as arm’s-length providers of debt finance for domestic infrastructure projects, as suggested by the relatively low average allocation of 4.5%–4.8% to this asset class (S&P 2014: 4).

9. INITIAL PUBLIC OFFERING

In the 1990s, one method of raising equity capital was the IPO or securitization of privatized former government business enterprises and listing on global securities exchanges. Several recent privately financed infrastructure projects were securitized in a similar manner by issuing stapled securities in multiple entities, one of which will “loan” its share of the offer proceeds to another vehicle in the group. This device was used for four motorways in Australia (Hills Motorway, Eastlink, Clem 7, and Airport Link) from 1997 to 2011, although in all cases total return performance was poor and the vehicles were subsequently delisted and assets sold. Transactions using the IPO option have occurred in countries with mature capital markets, which limits the feasibility of this option in countries with less well-endowed capital markets. While a listed vehicle may issue stapled securities, bonds, and other debt instruments on a securities exchange, in most cases, the IPO option is used to raise equity capital for privately financed infrastructure projects.

Strengths of the Initial Public Offerings Option

IPOs provide an additional source of debt capital. Companies can raise equity and debt as stapled securities or may issue bonds on a securities exchange. Stapled securities provide issuers with the opportunity to offer separate equity and equity securities within a corporate group structure. Listed bonds bring liquidity and the issuer has the option of issuing bonds in a variety of coupon and tenor configurations to reduce most project financing risks.

Limitations of the Initial Public Offerings Option

The market for listed infrastructure projects is limited for single-asset infrastructure projects. Debt finance options include listed bond markets in which infrastructure securities have demonstrated robust credit and performance characteristics. IPOs imply greenfield project risk, and market evidence in Canada and Australia indicates a high failure rate as recent transactions have resulted in significant loss to equity and write-downs for lenders (Regan, Smith, and Love 2015).

Low institutional support is another limitation of the IPO. Portfolio investors will favor pre-commitment or sub-underwriting participation at a discount to the issue price for stapled debt and equity securities, an option not available to smaller portfolio investors and the retail market. Given the dominant position of institutional investors in capital markets throughout the region, the infrastructure IPO market has a limited pool of investors to draw from compared with offerings for other sectors.

10. PUBLIC–PRIVATE PARTNERSHIPS

PPPs came into wide use in the global economy in the early 2000s, although the practice of government concessions for the private delivery and management of public goods has a long history dating back to the Romans. PPPs are long-term contracts for the provision and management of infrastructure services whereby a private firm provides capital, constructs the required assets, and carries most development and operational risks over the contract term. The private firm derives sufficient revenue to provide a reasonable return on investment either through user charges or a government availability payment, and debt is supported from cash flow with restrictions on payment to equity during the project's early stages. There is some ring-fencing of construction risk with a short-term construction loan refinanced on completion. However, market risk projects in which a private party relies entirely on user tariffs are difficult to finance, with recent transactional evidence suggesting that these projects have a high probability of failure (Regan, Smith, and Love 2015).

PPPs are generally highly leveraged with bond issues or project finance. PPP service delivery is regulated under the PPP contract and/or by an independent regulator, and assets pass to the state at the contract's conclusion. For availability payment transactions, lenders to recent projects have required that debt servicing be met from a core service payment, which is not subject to performance abatement. These negotiated terms and "take or pay" contracts effectively substitute sovereign risk for operator performance risk, significantly reducing risk for lenders.

In Asia and the Pacific region, PPPs are an important source of infrastructure finance and are widely used to deliver economic infrastructure including motorways and roads, power stations, ports and airports, rail infrastructure, and urban transport (Zen and Regan 2014). Most PPPs are highly leveraged and may be financed with project finance or bonds. PPPs are delivered against a policy framework suggesting

consistency in the procurement process. PPPs may be supported with credit enhancement, as demonstrated by the Phu My 3 gas-fired energy transaction finalized in 2003, the first PPP in Viet Nam. Phu My was a high-risk, limited-recourse, greenfield project that was mitigated with sovereign and political risk insurance designed for the transaction by ADB and the Multilateral Investment Guarantee Agency (Cooper 2004).

PPPs are not suitable for all infrastructure applications and deliver their best returns when projects offer economies of scale, significant risk transfer including lifecycle cost and operational risk, and the ability to be financed in capital markets. PPPs are not suitable for small, conventional projects given their high transaction cost, and must be affordable for governments if they require an availability payment, capital contributions, subsidies, or guarantee support over the project's life.

Strengths of Public–Private Partnerships

PPPs are delivered under a procurement policy that brings some uniformity to the project selection, bid, and implementation process. Project finance is used in most applications, although bonds account for around 12% of recent transactions (Project Finance International 2015). For lenders, an important aspect of PPPs is alternative dispute resolution mechanisms for the speedy resolution of problems that arise over the life of the contract. PPPs experience lower failure rates than do projects financed with conventional corporate loans. Evidence since the mid-1990s shows that PPPs deliver innovations in design and construction, achieve significant risk transfer away from governments, and deliver better services more sustainably than do traditional procurement methods (Infrastructure Partnerships Australia 2007).

Limitations of Public–Private Partnerships

PPPs deliver the best value-for-money outcomes for the state when projects offer economies of scale and significant risk transfer to private investors, and require innovative design and construction solutions, as well as skilled and incentivized management. However, private participation in infrastructure in East and South Asia peaked in 2010 and investment flows in 2014 had declined to less than half of peak flows (World Bank 2017). PPPs involve long lead times and high transaction costs for all parties, and must be capable of being financed in capital markets. Debt is usually syndicated, and sustainability requires a strong and effective governance framework. PPPs are not suitable for projects under \$50 million and, if financed with tenors of less than 10 years, are vulnerable to refinancing risk. Another disadvantage of PPPs is the implied lack of flexibility with incomplete contracts 20, 30, and 40 years in duration, and governments' capacity to manage planning and change over such long operational periods, in particular.

11. SECURITIZATION

The unitization and/or securitization of revenue streams from mature infrastructure assets are a financing option for government agencies and private investors. The investment characteristics of mature infrastructure assets include limited competition, regulated tariffs, a stable and frequently indexed revenue stream, low variable costs, high leverage for enhanced return to equity, and low demand elasticity. In mixed asset portfolios, infrastructure assets are an option for portfolio diversification (Della Croce and Gatti 2014).

Securitization has been used to finance credit-enhanced bonds issued to finance social and economic infrastructure projects in sectors such as waste management, hospital and school projects, and regulated utilities delivering water, electricity, and gas services (Dexia 2007). In 2012, the Independent Debt Capital Markets Group issued consumer price-indexed notes for a solar power project based in the UK, and transactions in the resources sector have been completed in the Russian Federation, Europe, and Asia and the Pacific region (Project Finance International 2015).

Limitations of the Securitization Option

Securitization was widely used for homogenous revenue streams such as mortgage and credit receivables until 2007, and was an early victim of the financial crises that followed. Securitization is an opportunity for lenders to recycle loans to a wider institutional investor market. However, securitization requires a mature capital market with larger institutions that can package and guarantee security offers, and provide the intermediation and distribution services required. Securitization is not viewed as a medium-term option by leading financial institutions in Asia and the Pacific region where bond markets offer a more liquid and flexible recycling and diversification alternative. Securitization is limited to assets with high credit standing in a stable interest rate environment.

Finance Support Mechanisms

Following the early privatization of brownfield projects in the mid-1990s, infrastructure projects in many sectors declined in credit quality. This is partly because privatizations and more bankable energy, port, transport, and airport projects have been replaced by a group of projects in such sectors as water supply and sanitation, urban transport, roads and road maintenance, and railway services, many of which are in regional areas. Project viability questions are far more common now than they were in the early 2000s. Governments and MDBs have responded with financial support designed to improve the credit profile and bankability of infrastructure projects. Of these support facilities, many of which are discussed above, several warrant further examination: VGF, the European Investment Bank (EIB) mezzanine bond finance program, and the state as a lender of last resort.

Viability Gap Funding

Infrastructure may not be viable for private investors if the revenue stream generated by the project is insufficient to service the level of debt required for the undertaking. This can occur when user-pays principles generate insufficient revenue to meet debt servicing obligations, when output pricing is subject to discretionary state regulation or price caps, or when the level of risk allocated to the private party is unacceptable to lenders. In response, governments worldwide have introduced VGF policies in place of ad hoc project support negotiated on a case-by-case basis.

VGF is state financial assistance for privately financed infrastructure projects to support bankability, and is being adopted either formally or informally in build–own–operate and PPP contracting modalities throughout Asia and the Pacific region. VGF is used to ensure that a project designated for delivery as a privately financed project does not fail due to its marginal viability. VGF effectively internalizes externalities in infrastructure markets (Irwin 2006), and governments use VGF if some form of assistance is warranted to reduce project costs, ensure timely delivery, or provide a basis for sustainable service delivery over long intervals (Regan 2009). VGF may take the form of up-front capital contributions, debt provision, payment of subsidies during the operational stage of the project, and/or guarantees against specific transaction risks.

VGF is embodied in policy, which in many cases creates contribution “caps,” requires the full disbursement of private equity and debt before payment is made, and directs payment to project lenders on the commissioning of the project. VGF assistance is normally accounted for as a budget appropriation in the case of capital contributions, or as a contingent liability in the case of subsidies or guarantees.

European Investment Bank Mezzanine Bond Finance Project

The EIB mezzanine bond finance pilot project was introduced in 2010 to enhance credit for senior bondholders of privately financed and qualifying infrastructure projects. The EIB provides S&P’s AAA-rated subordinated mezzanine bonds or a guarantee to 20% of the senior debt to meet cost overruns during construction or shortfalls in debt servicing capacity during the early operational term of an infrastructure project. The government or a multilateral development agency such as the EIB or the European Central Bank provides the finance or guarantee. The mezzanine bond program reorders project risk and benefits senior lenders by improving their credit risk, lowering the project’s cost of capital, and permitting higher debt–equity ratios (subject to leverage limits) (EIB 2012).

Lender of Last Resort

In the uncertainty that followed the global financial crisis, lenders reduced the level of debt that they were willing to contribute to syndicated project finance loans. This was most evident in large-budget PPP projects in Canada and Australia, and required quick policy responses on the part of the government. The A\$3.5 billion Victorian Desalination Project was offered to the market at the peak of the 2009 crisis, and the Government of Victoria received bids from two consortia that both failed to raise the full debt requirement. In response, the government quickly announced a successful bidder for the final negotiations, and pooled lender commitments for both consortia. The government stood as the lender of last resort, and relied on a pre-commitment to purchase a minimum quantity of water (the plant’s base load) in an effort to reduce the project’s financial risk. The successful bidder was able to raise the full debt requirement from the market without recourse to state loans (EIB 2012).

The “lender of last resort” mechanism, with the state providing senior debt, imparts confidence and provides greater certainty to both bid and capital markets. However, as with the earlier credit guarantee finance programs trialed in Australia and the UK in 2008–2010, state financial participation limits project refinancing and leverage, and increases the equity or mezzanine share of capital, thereby raising the cost of capital for the project (McKenzie 2008).

12. CONCLUSION

Governments provide the majority of infrastructure finance in Asia and the Pacific region, with the assistance of multilateral development agencies. While continuing to plan and provide most infrastructure in the medium term, national government sources alone may not be sufficient to bridge the infrastructure gap created by high economic growth, urbanization, and rapid industrialization in factor-driven economies. Since the early 2000s, private infrastructure finance has assumed a more important role in the form of project finance, bonds, and build–operate–transfer and PPP procurement methods. As well as serving as an additional source of capital, private management of infrastructure also increases efficiency, improves productivity, and eliminates high-risk lifecycle costs for the state. However, private capital does have limitations, including a

preference for projects in the energy, transport, and telecommunications sectors and an aversion to market risk with transport projects. Another limitation is the marginal bankability of many infrastructure transactions, which may be difficult and costly to finance without credit support from the state. In response, multilateral development agencies have increased credit enhancement options, and VGF policies have been introduced, providing a systematic approach to improving the bankability of marginally viable transactions. In the region's mature PPP markets, this model has been modified to eliminate market risk for projects such as toll roads and rail projects, with availability payment options for asset provision stapled to long-term asset and service management contracts. Future innovation and development of the PPP procurement model will be designed to allocate risk equitably and increase the attractiveness and bankability of transactions to private finance.

Pension funds and SWFs are not widely used to finance infrastructure projects, either globally or in Asia and the Pacific region; however, a majority of funds intend to increase equity participation in the medium term. IDAs, the Asian bond market, and specialized infrastructure investment funds are potential sources of future debt, although passive investment is not always optimal for limited-recourse infrastructure projects. Bond finance brings many attributes to infrastructure transactions but, unlike bank loans, lenders do not bring the same level of experience, market knowledge, and governance to the lending transaction.

Bhattacharyay (2011, 2012) outlined the capital market policy objectives for the region, and these require little further explanation. Challenges faced by regional governments include fiscal repair, mechanisms for the recognition and funding of the contingent liabilities of national and subnational governments, the refinement of PPPs, and the integration of policy frameworks with a view to adopt common policy principles to facilitate regional connectivity and simplify cross-border transactions. The Association of South East Asian Nations has made considerable progress in this respect, and the template can be applied more widely to Asia and the Pacific region.

REFERENCES

- Abelson, P. 2003. *Public Economics, Principles and Practice*. Sydney: Applied Economics.
- Ang, A., V. Bhansali, and Y. Xing. 2010. Taxes on Tax-Exempt Bonds. *Journal of Finance* 65(2): 565–601.
- Asian Bankers Association. 2010. *Basel III and its Implications for Asian Banks*. Position paper presented at the 25th Asian Bankers Association General Meeting and Conference. Taipei, China. 1–2 November. www.aba.org.tw/images/upload/files/psages53-75.pfd (accessed 21 August 2016).
- Asian Development Bank (ADB) and Asian Development Bank Institute (ADBI). 2009. *Infrastructure for a Seamless Asia*. Tokyo: ADBI.
- ADB. 2014. *Annual Report*. Manila: ADB.
- . 2015a. *Asian Bank Monitor*. March and November. http://asianbondsonline.adb.org/documents/abm_mar_2015.pdf (accessed 20 March 2016).
- . 2015b. *Key Indicators for Asia and the Pacific*. Manila: ADB.
- Asian Development Fund. 2014. *Statement of the Asian Development Bank's Operations in 2013*. Manila: ADB.
- Australian Trade Commission. 2013. *Australia: World's Biggest Market for Project Finance in 2012*. Data Alert. Canberra: Australian Trade Commission.
- Australian Bureau of Statistics. 2014. *Managed Funds*. Cat. No. 5655.0, December. Canberra: Australian Bureau of Statistics.
- Bhattacharyay, B. N. 2011. *Financing Infrastructure for Connectivity: Policy Implications for Asia*. ADBI Policy Brief 33, July.
- . 2012b. Modes of Asian Financial Integration: Financing Infrastructure. In *Infrastructure for Connectivity*, edited by B. N. Bhattacharyay, M. Kawai, and R. M. Nag. Cheltenham: ADBI-Edward Elgar.
- Chan, C., D. Forwood, H. Roper, and C. Sayers. 2009. *Public Infrastructure Financing—An International Perspective*. Productivity Commission Staff Working Paper, March.
- Chong, S., and E. Poole. 2013. Financing Infrastructure: A Spectrum of Country Approaches. *Reserve Bank of Australia Bulletin* (September Quarter): 65–76.
- Clark, G. L., A. D. Dixon, and H. B. Ashby. 2013. *Sovereign Wealth Funds, Legitimacy, Governance and Global Power*. Princeton, NJ: Princeton University Press.
- Cooper, B. 2004. Project-Financing a Vietnam Power Project. *Journal of Project and Structured Finance* (Spring): 34–38.
- Debelle, G. 2008. Recent Market Developments. *Reserve Bank of Australia Bulletin* (August): 71–79.
- Della Croce, R., and S. Gatti. 2014. Financing Infrastructure—International Trends. *Organisation for Economic Cooperation and Development (OECD) Journal: Financial Market Trends* 2014(1): 123–138.

- Dexia. 2007. *Sale of Dexia Banque Private France to BNP Paribas*. Press Release 19, February. Brussels: Dexia.
- Economist Intelligence Unit. 2011. *Evaluating the Environment for PPPs in the Asia-Pacific, The 2011 Infrascope*. Hong Kong, China.
- . 2014. *Evaluating the Environment for PPPs in the Asia-Pacific, The 2014 Infrascope*. Singapore.
- European Investment Bank (EIB). 2012. *An Outline to Project Bonds Credit Enhancement and the Project Bond Initiative* (December). Luxembourg: EIB. <http://www.eib.org/infocentre/publications/all/an-outline-guide-to-project-bonds-credit-enhancement-and-the-pbi.htm> (accessed 28 January 2017).
- Ehlers, T., F. Packer, and E. Remolona. 2014. *Infrastructure and Corporate Bond Markets in Asia*. Paper presented at the Reserve Bank of Australia conference Financial Flows and Infrastructure Financing. Sydney. 20–21 March. <http://www.rba.gov.au/publications/confs/2014/> (accessed 10 November 2014).
- Estache, A. 2010. Infrastructure Finance in Developing Countries: An Overview. *EIB Papers* 15(2): 60–88.
- Government of Australia. 2014. *The Asset Recycling Initiative, Helping State Unlock their Balance Sheets*. <http://www.budget.gov.au/2014-15/content/glossy/infrastructure/download/Infrastructure.pdf> (accessed 20 October 2016).
- Hack, M., and C. Close. 2013. East Asian Corporate Bond Markets. *Reserve Bank of Australia Bulletin* (September Quarter): 55–63.
- Helms, L. J. 1985. The Effect of State and Local Taxes on Economic Growth: A Time Series-Cross Section Approach. *The Review of Economics and Statistics* 67(4): 574–582.
- Hillman, A. L. 2003. *Public Finance and Public Policy, Responsibilities and Limitations of Government*. London: Cambridge University Press.
- Inderst, G. 2014. Institutional Investment in Infrastructure. *Institutional Investment in Infrastructure* 7(5): 20–23.
- Inderst, G., and R. Della Croce. 2013. Pension Fund Investment in Infrastructure: A Comparison between Australia and Canada. OECD Working Paper in Finance, Insurance, and Private Pensions 32. Paris: OECD Publishing.
- Infrastructure Partnerships Australia. 2007. *Performance of PPPs and Traditional Procurement in Australia*. Sydney: Infrastructure Partnerships Australia.
- International Monetary Fund (IMF). 2014a. *World Economic Outlook, Legacies, Clouds, Uncertainties* (October). Washington, DC: IMF.
- . 2014b. *Regional Economic Outlook: Asia and the Pacific—Sustaining the Momentum: Vigilance and Reforms* (April). Washington, DC: IMF.
- Irwin, T. 2006. *Public Risk in Private Infrastructure*. Paper presented at the high-level seminar Realising the Potential for Profitable Investment in Africa, organized by the IMF Institute and the Joint Africa Institute. Tunis. 28 February–1 March.
- Japan International Cooperation Agency. 2014. *Annual Report*. Tokyo: Japan International Cooperation Agency. <http://www.jica.go.jp/english/publications/reports/annual/2014/index.html> (accessed 12 March 2015).

- Mackenzie, H. 2013. Canada's Infrastructure Gap, Where It Came From and Why It Will Cost So Much to Close. Alternative Federal Budget Technical Paper. Montreal: Canadian Centre for Policy Alternatives.
- Marlowe, J. 2009. *Method of Sale, Price Volatility and Borrowing Costs on New Issue Municipal Bonds*. Research Paper. Seattle, WA: University of Washington.
- McKenzie, R. 2008. Strategies to Improve Value for Money in Financing PPPs. *Public Infrastructure Bulletin* 7(December): 5–16.
- McKinsey Global Institute. 2013. *Infrastructure Productivity: How to Save \$1 Trillion a Year* (January). New York, NY: McKinsey Global Institute.
- Meggison, W. L. 2005. *The Financial Economics of Privatisation*. Oxford and New York, NY: Oxford University Press.
- Mercer. 2014. *Asset Allocation of Pension Funds Around the World*. Melbourne: Melbourne Mercer Global Pension Index.
- Moore, R., and S. Kerr. 2014. On a Highway to Help: Multilateral Development Bank Financing and Support for Infrastructure. *Economic Roundup* 2014(1). Canberra: Australian Government Treasury.
- OECD. 2014. Annual Survey of Large Pension Funds and Public Pension Reserve Funds, Report on Pension Funds' Long-Term Investments. Paris: OECD.
- Peng, H. W., and G. Newell. 2007. *The Significance of Infrastructure in Investment Portfolios*. Paper delivered at the Pacific Rim Real Estate Society conference. Fremantle, Western Australia. 21–24 January. 1–26.
- Prequin. 2015a. *Global Infrastructure Report*. New York, NY: Prequin.
- . 2015b. *Spotlight*. March. <https://www.prequin.com/docs/newsletters/inf/Prequin-Infrastructure-Spotlight-March-2015.pdf> (accessed 28 January 2017).
- PricewaterhouseCoopers and Oxford Economics. 2014. *Capital Project and Infrastructure Spending: Outlook to 2025*. London.
- Productivity Commission. 2008. *Financial Performance of Government Trading Enterprises 2004–05 to 2006–07*. Commission Research Paper. Canberra.
- . 2014. *Public Infrastructure*. Inquiry Report 71(1). Canberra.
- Project Finance International. 2015. *League Tables 2004–2014*. London: Thomson-Reuters. <http://www.ifre.com/?&m=0&src=http://www.ifre.com/hybrid.asp?typeCode=68&pubCode=1&navcode=386> (accessed 10 April 2015).
- Regan, M. 2004. *Infrastructure: A New Asset Class in Australia*. Adelaide: Gilberton Press. <http://espace.library.uq.edu.au/view/UQ:107180> (accessed 16 October 2015).
- . 2009. A Survey of Alternative Financing Mechanisms for Public Private Partnerships. Research Report 110. Infrastructure Association of Queensland and Bond University.
- Regan, M., J. Smith, and P. E. D. Love. 2015. *Financing of Public Private Partnerships: Transactional Evidence from Australian Toll Roads*. Working Paper 226. Gold Coast, Australia: Bond University, Faculty of Society and Design.

- Reviglio, E. 2012. *Global Perspectives for Project Financing*. Proceedings of the Conference Financing Future Infrastructure, EU 2020 and Long Term Financing, Regulatory Aspects, held by the Joint European Commission-EIB/European Public-Private Partnership Expertise Centre Private Sector Forum. Brussels. 6 June.
- Scott, M. A. 2012. The Build America Bonds Program: Savings Opportunities and Efficiency Improvements from Subsidising Taxable Municipal Debt. Working Paper. Palo Alto, CA: Stanford University, Department of Economics.
- Seijas, J. G. 2013. *Global Trends in PPP and Project Finance Markets*. Singapore: Ernst and Young.
- Seneviratne, D., and Y. Sun. 2013. *Infrastructure and Income Distribution in ASEAN-5: What Are the Links?* IMF Working Paper 13/41. Washington, DC: IMF.
- Sovereign Wealth Fund Institute. 2015. Largest Sovereign Wealth Funds by Assets under Management. Singapore: Sovereign Wealth Fund Institute. <http://www.swfinstitute.org/sovereign-wealth-fund-rankings/> (accessed 12 November 2015).
- Towers Watson. 2014. *Pensions & Investments, Towers Watson 3000 Analysis*. Arlington, VA: Towers Watson.
- United Nations Economic and Social Commission for Asia and the Pacific. 2015. *Economic and Social Survey of Asia and the Pacific 2015: Year-End Update*. Bangkok: United Nations Economic and Social Commission for Asia and the Pacific.
- Wihardja, M. M. 2013. Looking at the G20 Initiatives on Infrastructure Investment from a Developing Country's Perspective: Indonesia. Presentation to the Regional Think20 Meeting, Lowy Institute. Sydney. 23 May.
- World Bank. 2014. *Asia and Pacific Economic Outlook. October 2014 Update, Asia and Pacific Department*. Washington, DC: World Bank.
- World Bank, 2017. *Private Participation in Infrastructure Database*. <https://ppi.worldbank.org> (accessed 11 February 2017).
- Zen, F., and M. Regan, eds. 2014. *Financing ASEAN Connectivity*. Jakarta: Economic Research Institute for ASEAN and East Asia.