

Institutional Investment in China's Infrastructure

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Abstract

Rapid growth in post-reform China has resulted in a high demand for infrastructure and the need for sustained mechanisms of financing. As public finances are already overstretched at the local level, seeking long-term investment financing is imperative. A potential such source is institutional investors, including pension funds, insurance companies, endowments, and sovereign wealth funds. This paper provides an intellectual foundation for understanding institutional investment in China's infrastructure. Integrating issue conceptualization with diagnostic analysis, it focuses on economic infrastructure, including transport, energy, telecommunications, water and sewerage, and other utilities. Specifically, it offers an in-depth analysis of the prospects for these investors in China, as related to the investment environment, divergent investor groups, and opportunities in various sectors. Drawing from experiences elsewhere, it also proposes how China can move forward with developing non-bank financial intermediaries to harness institutional investment.

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Institutional Investment in China's Infrastructure

Introduction

Rapid economic growth in post-reform China has resulted in a very high demand for infrastructure and the need for sustained mechanisms of financing. Similarly, across developing countries, investment in infrastructure is in demand. According to McKinsey Global Institute, just keeping pace with current levels of investment will require an estimated \$57 trillion between now and 2030. That's nearly 60 percent more than the \$36 trillion spent over the past 18 years (MGI 2013).

Overall, in China, bank loans have become the major source of funding for infrastructure projects. State-owned commercial banks and policy banks hold around 80 percent of total infrastructure loan portfolios, and bank financing accounts for more than half of total infrastructure financing. Five major state-owned commercial banks dominate the credit market for large infrastructure projects: the Agricultural Bank, Industrial and Commercial Bank, Bank of Communications, Construction Bank, and Bank of China. Additionally, a policy bank established in 1994, the China Development Bank, provides long-term financing for key projects supported by the state (Walsh et al. 2011).

At the local level, mechanisms for infrastructure financing have broadened beyond traditional fiscal allocation under decentralization. The common sources include borrowing through urban development investment corporations, often backed by future land lease revenues, and local government's own taxes and fee revenues (Wong 2013). These sources, however, are reaching their limits. Often, local governments cope with funding shortfalls through a variety of off-budget mechanisms, particularly through the collection of land lease/transfer fees. In 2010, for instance, receipts from land lease/transfer accounted for an estimated 35 percent of comprehensive fiscal revenues for prefectural-level cities, compared with just 30 percent from tax revenues. But this is a major source of inefficiencies, distorted incentives, and loss of state assets (Wong 2012; Wong and Bird 2004; Wu 2010). Sold land use rights also represent foregone sources of income. Local governments will, therefore, need to explore innovative and sustainable long-term financing solutions.

A path towards more sustainable, long-term financing is through private participation in infrastructure. Increasingly, this is seen as the key to shortfalls in infrastructure financing. A potential source of long-term financing is institutional investors, including pension funds, insurance companies, endowments, and sovereign wealth funds. The higher long-term risk adjusted returns, amongst other benefits, make infrastructure an attractive asset class for institutional investors. But in general, all categories of long-term financing have been affected by the 2008 global financial crisis, including debt flows, bank lending, bonds, and foreign direct investment (World Bank 2013). On the more positive side, a McKinsey report predicts that funds managed by institutional investors will grow significantly, and infrastructure projects have the opportunity to capture more of their capital (MGI 2013).

The purpose of this paper is to provide an intellectual foundation for thinking about institutional investment in infrastructure in China. Integrating issue conceptualization with diagnostic analysis, it focuses on economic infrastructure, including transport, energy, telecommunications, water and sewerage, and other utilities. The first section provides a succinct summary of the current patterns of private participation in China's infrastructure, primarily based on data from an online database maintained by the World Bank and Public Private Infrastructure Advisory Facility (referred to as World Bank PPI Database hereafter). It also places China in a comparative context with other emerging economies (Brazil, Chile, India, Russia, South Africa, and Turkey) to inform a better understanding of the possibilities and limits of private participation. Following that, the paper offers a glimpse of the promise held by institutional investors, for emerging economies in general. The third section provides an in-depth analysis of the prospects for these investors in China, as related to the investment environment, divergent investor groups, and opportunities in various sectors. Drawing from experiences elsewhere, the fourth section proposes how China can move forward with developing non-bank financial intermediaries to harness institutional investment. The paper also is informed by interviews with a select group of fund managers and investment professionals based globally and in China (27 in total).

As a background, infrastructure financing at the local level in China is fundamentally different from that of most other countries. In industrialized countries, borrowing is widely used as a key method because of the capital-intensive nature of much urban infrastructure, especially in terms of up-front costs. Most such borrowing is directly from a functioning capital market and relies on a system of municipal bond rating (in contrast to the dominance of bank lending in China). Excluding borrowing, local taxes are the most important source, counting on average a 40 percent share (Bird 2004; Chan 1998). What follows are grants and subsidies, and other sources including user charges. Although the situation in developing countries varies substantially, local property taxes dominate the revenue structure, and loan financing tends to be a small source.

Local governments in China, in contrast, have neither sufficient tax resources nor sufficient authority to borrow (Wong and Bird 2004). In borrowing to finance infrastructure, local governments face virtually no limit and little accountability. Banks are ill-equipped to provide the discipline expected from capital markets, leading to sub-national debt liabilities totaling 10.7 trillion yuan at the end of 2010 (Wong 2013). It is also unlikely for local governments to count on revenue from asset sales as a major, lasting source of funding to expand infrastructure construction and maintenance. Improving the status of municipal finance, therefore, may require a process of moving public investment off the budget and into the capital market (Wong 2012).

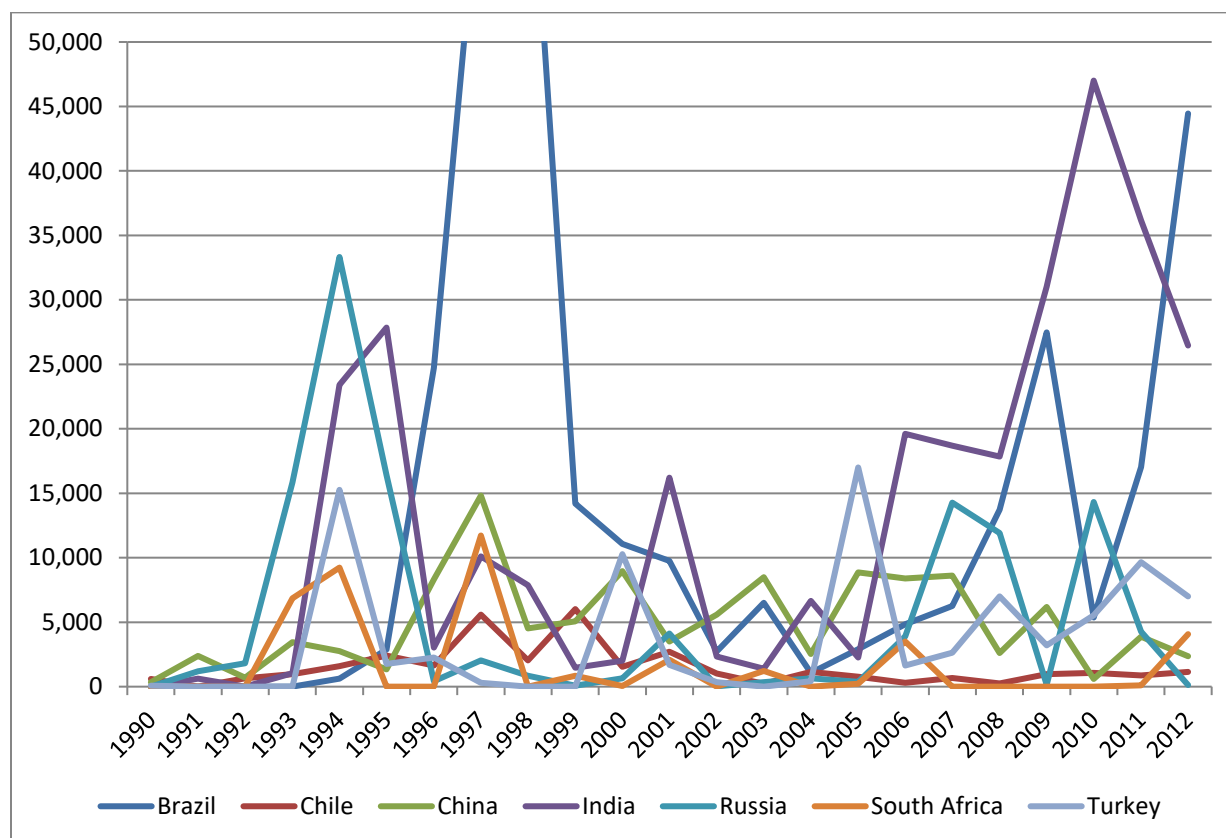
Private Participation in Infrastructure

China, as a relative newcomer, is still in the process of developing a clear vision for the role of private participation in infrastructure (PPI). Private participation may take the form of direct investment, leases, operation contracts, and private public partnership (PPP). In general, it is defined as the private sector providing some form of upfront investment, as either equity or debt, and receiving cash flow over time from the asset (WEF 2014). There are variations of financing vehicles across different areas of infrastructure, and investment levels may respond to global

financial fluctuations. Compared to other emerging economies, such as Brazil, India, and South Africa, China is still at an early stage of developing the institutional sophistication for engaging the private sector (Siemiatycki 2013). Trends in the past two decades show that significant private investment in China's infrastructure is South-South investment (from other developing countries) and domestic in origin (see Table 1).

In China, PPP projects were first introduced in the late 1970s. With increasing demand for more and better infrastructure, the central government began to apply PPP schemes at a larger scale in the 1990s, especially for water, power, and road projects (Cheung and Chan 2011). The State Planning Commission and Ministry of Construction (now known as Ministry of Housing and Urban-Rural Development) have issued a number of policies to guide private investment in public utilities. Since then, China remains in the process of developing a clear vision for the role of PPP in infrastructure delivery and generating a robust and transparent pipeline of viable PPP projects. Research shows that the attempt to transplant PPP policies to China has led to the emergence of two significant transitions: the rise of PPP from 1993 onwards, and its subsequent fall from about 2007 (Mu et al. 2011). The post-2007 decline is partly a by-product of the global recession. Between 1990 and 2012, China had more than 1,020 PPP transactions in infrastructure (transport, energy, water, and sewerage) for a total value of US\$114 billion. However, compared to other emerging economies, investment in PPP projects in China has been smaller—\$398 billion in Brazil and \$303 billion in India during the same period (see Figure 1).

Figure 1: PPI in China and Select Emerging Economies, 1990–2012 (Investment in US\$Million)



Source: World Bank PPI Database.

Table 1: Top 20 Investors in China's Infrastructure (Investment in US\$Million), 1990–2012

Rank	Sponsor	# of Projects	Investment (Project Total)	Share of Total (%)	Base	Sector(s)
1	NWS Holdings Limited	62	5,394.62	4.72	HK	Transport, Energy, Water & Sewerage
2	China Light and Power Ltd.	18	4,402.65	3.85	HK	Energy
3	Hopewell Holdings	7	4,241.56	3.71	HK	Transport
4	Hutchison Whampoa Ltd	17	4,047.52	3.54	HK	Transport
5	AP Moller - Maersk Group	8	3,571.87	3.13	Denmark	Transport

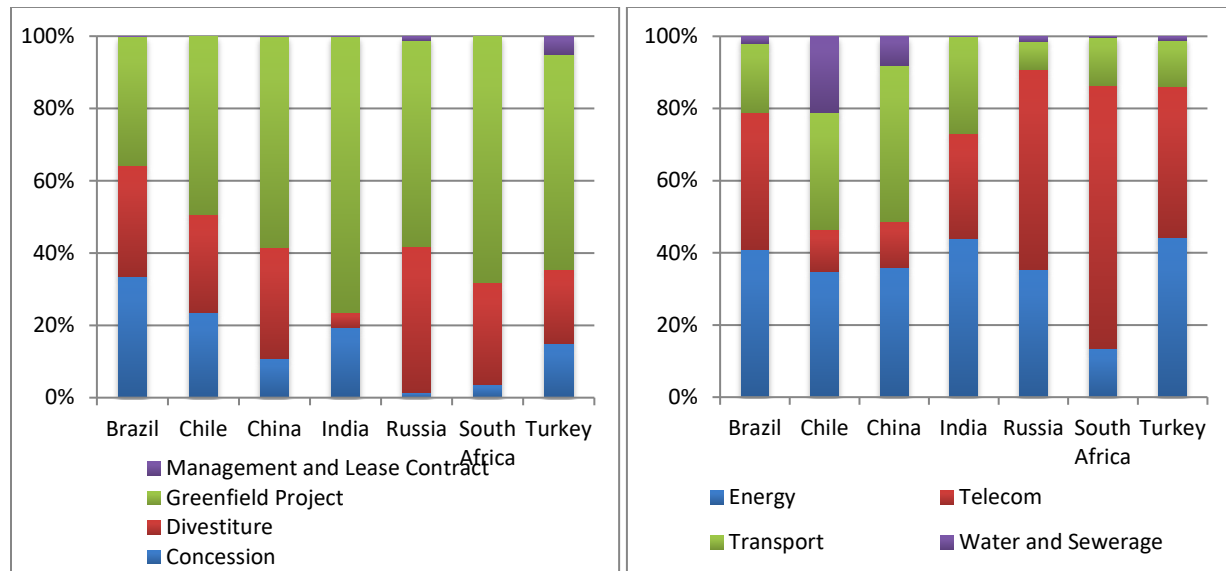
6	MTR Corporation	4	3,481.92	3.05	HK	Transport
7	Cheung Kong Infrastructure Holdings Ltd	24	3,407.96	2.98	HK	Transport, Energy, Water & Sewerage
8	Electricite de France	2	2,800.00	2.45	France	Energy
9	AES Corporation	14	2,397.53	2.10	US	Energy
10	Veolia Environnement	20	2,127.43	1.86	France	Water & Sewerage
11	PSA Corp	7	2,090.72	1.83	Singapore	Transport
12	Suez	22	1,657.06	1.45	France	Water & Sewerage, Energy
13	New World Development Co.	11	1,551.86	1.36	HK	Transport, Water & Sewerage
14	Road King Infrastructure	21	1,422.47	1.24	HK	Transport
15	P&O Ports	5	1,352.20	1.18	UK	Transport
16	Siemens AG	2	1,347.00	1.18	Germany	Energy
17	Hong Kong and China Gas Company	34	1,165.96	1.02	HK	Energy, Water & Sewerage
18	Hamburgischen Electricitaets - Werke	1	1,065.00	0.93	Germany	Energy
19	Dubai Holding	1	1,000.00	0.88	UAE	Transport
20	PSEG Global Inc.	9	995.06	0.87	US	Energy
Sub-total		289	49,520.39	43.34		

Source: World Bank PPI Database.

The distribution of PPI investment by sector in China also is distinct. Between 1990 and 2012, the transport sector received the largest amount of investment (about 43 percent of total), followed by energy (36 percent), whereas telecom and water & sewerage lagged far behind (see Figure 2). The transport sector's dominance is absent from the other emerging economies, with the exception of Chile. By contrast, the telecom sector was the leading sector in Brazil, Russia, South Africa, and Turkey. One commonality among all the countries is the significant share of

investment in the energy sector, except for South Africa where most PPI concentrated in the telecom sector.

Figure 2: PPI Investment by Type and Sector, 1990–2012



Source: World Bank PPI Database.

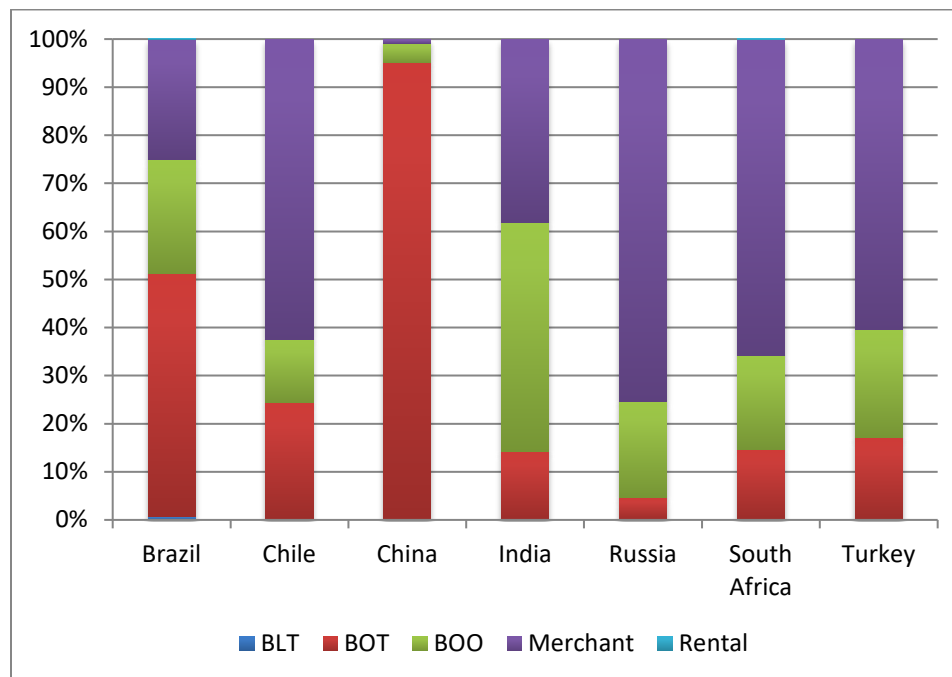
PPI projects in China took a variety of forms, ranging from service and management contracts, concession, greenfield, to divestiture. A more general distinction is between greenfield and brownfield projects: the former refers to new construction or the development of new infrastructure while the latter existing infrastructure assets already operating and frequently with a demand history (WEF 2014). Greenfield projects, in the form of BOT (build-own-transfer), BLT (build-lease-transfer) or BOO (build-own-operate), were the most common in China, though they are often perceived as higher risk by investors. This also was the case in the other emerging economies, with the exception of Brazil (see Figure 2). BOT, in particular, dominated in all infrastructure sectors in China. This preference for BOT was absent from the other emerging economies, except for Brazil (see Figure 3). Some of the more noted PPP projects in China include Line 4 of the Beijing Metro, Shanghai Zhuyuan No. 1 Sewerage Plant, Hangzhou Bay Bridge, Shenzhen Metro Line 4, the sewage treatment projects in Xilang (Guangzhou), and water plants in Beijing (Cheung and Chan 2011).

China's BOT approach with foreign private sector participation falls into the following five types:

- Cooperative joint venture BOT (CJV BOT);
- Equity joint venture BOT (EJV BOT);
- Non-official wholly foreign owned BOT;
- Official BOT (a specific institutional arrangement and legal structure being developed by the central government under a "National Experimental BOT Program"); and

- BOT variant (e.g., transfer-operate-transfer or TOT).

Figure 3. Forms of Greenfield PPI by Investment, 1990–2012



Source: World Bank PPI Database.

In JVs, both sides contribute funds or services (frequently by providing property or land on the Chinese side), and the public sector often is represented by a company directly or indirectly owned by the government (Bellier and Zhou 2003). CJV is generally more flexible. For example, under a CJV, the foreign party may recover its investment before the end of the cooperation period if the contract stipulates that the local partners take ownership of all tangible assets upon completion of the JV period. But after the 2002 ban on guaranteed rates of return, which caused the exit of some multinational firms from the Chinese market (e.g. Thames Water), EJV has become more preferred given that profits and losses are distributed in accordance with each partner's equity shares (Lee 2010). Wholly foreign-owned option recently has become a mainstream investment model, because such projects no longer need to be endorsed by the central government after 2003. Compared to the official BOT, non-official wholly foreign owned BOT is conducted according to local government regulations rather than the "BOT Circular" promulgated by the central government (Chen and Doloi 2008).

There are a number of challenges; some are institutional while others are operational. In most international settings, it is common for infrastructure PPP projects to have 15–20 years of loan repayment period depending on the nature of a project and its future cash flows. But according to the General Rules for Loans in China, the term for self-support loans shall not exceed 10 years and extension for long-term loans shall not be longer than 3 years, unless the state stipulates otherwise. This implies that the loan term can be extended to 13 years, which lags behind the due financing demand required for PPP projects (Choi et al. 2010; Li 2007). While borrowing from both domestic and foreign sources is increasing, commercial banks sometimes are reluctant to

commit because infrastructure investment is large, with longer terms and lower return rates (Wu 2010). In particular, financing risk has always been a major problem for water and wastewater projects. It is very difficult to achieve full cost recovery. In addition, the rise of PPP in China seems to have generated higher transaction costs. The costs of organizing tendering, evaluating and selecting bids have proven quite high (Mu et al. 2011).

Private participation in infrastructure also calls for support by an effective legal and policy framework, which can provide value-for-money for the government, protect the public interest, and provide a conducive environment for the private sector to invest and operate for the long term. As reported in a Deloitte (2006) consulting study, few countries have the highly sophisticated legal frameworks and institutional capacity necessary to carry out PPPs. Developed countries are nearly exclusively those identified as having the most sophisticated legal, policy and institutional frameworks towards PPPs, while developing countries have historically had less developed PPP marketplaces (cited in Siemiatycki 2013). Research shows that many risk factors for PPPs in China are related to or affected by government in one way or another (Chen and Doloi 2008; Cheung and Chan 2011). Among these, the following deficiencies in the legal and policy framework require serious attention: fragmented legal and administrative decisions at central and local levels, lack of institutional capacity and skill set required to support PPPs, lack of appropriate and enforceable dispute resolution systems, and lack of level playing field between state-owned enterprises and independent providers.

Understanding Institutional Investors

Relying on private infrastructure providers and increasingly through project financing, PPPs are not without constraints. Historically, the majority of project financing debt globally has been funded by banks. This is especially the case in emerging markets where bond and securitization markets are less developed. But after the 2008 financial crisis, banks, particularly those in OECD countries, are less able to offer longer-term lending for infrastructure projects. Bond finance in new projects also has come to a halt because of the financial crisis (Della Croce and Yermo 2013; Inderst and Stewart 2014). Consequently, policy-makers have been looking for potential alternative sources of infrastructure financing from the private sector.

Institutional investors have received increased attention, given their combined assets on the order of \$50 trillion. Because of the longer-term nature of their liabilities and their low risk appetite, they are well suited for financing illiquid assets such as infrastructure (OECD 2011, Sharma 2013). Since the great recession of 2008, at least three trends are developing among institutional investors. These include: (1) a more active role in managing the deployment of their capital, up to and including bringing screening and selection processes in-house; (2) opening satellite offices, often far from traditional financial centers like New York or London; and (3) looking to new markets, such as emerging markets and developing economies, as well as new asset classes such as real estate, resources and private equity, for fresh opportunities in an otherwise low-yield environment (Al-Kharusi et al. 2014). These trends are evident across a myriad of institutional investor types, including:

- pension funds;
- insurance companies;
- sovereign wealth funds (i.e. government-owned investment funds);
- investment funds (e.g. mutual funds);
- private equity; and
- endowments.

On the side of institutional investors, the search during the last decade has been towards new sources of long-term, inflation protected returns. Among them are investments in private equity, real estate, commodities, and infrastructure (so-called alternative assets). The increase in socially responsible investing also has raised demand for what are seen as ethical projects including “green infrastructure” such as renewable energy. All of these tend to have lower liquidity and require a longer time horizon than publicly traded stocks and bonds (Della Croce and Yermo 2013, WEF 2014). Specifically, as an alternative asset class, infrastructure offers the following potential benefits:

- Low price elasticity of demand, therefore low correlation with business cycle;
- Monopoly power, hence pricing power and inflation hedge;
- Predictable and substantial cash flow; and
- Attractive risk-adjusted cash yield, available over long periods.

Some of the same characteristics of infrastructure investing, however, can also present potential entry barriers: high upfront cost, lack of liquidity, and long asset life (OECD 2011).

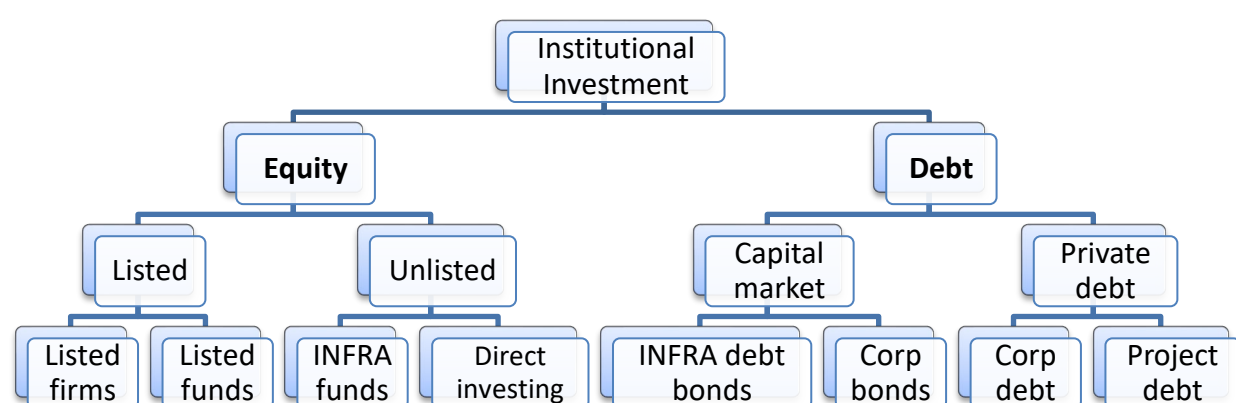
The interest and perspectives of investors are evolving. A survey of global institutional investors indicates decreasing worry about political, economic and currency risks, to the tune of only 23 percent of respondents expressing such concerns (Probitas Partners 2013). This was a decrease of half over the previous year and came with a commensurate increase in the number of investors who were interested in infrastructure. Other top-line findings of the survey also include:

- Most institutional investors prefer core brownfield assets (about 93 percent of surveyed), including bridges, tunnels, toll roads, pipelines, energy transmission and distribution systems, and water and wastewater systems;
- Investors tend to pursue the best funds in the market instead of holding a particular sector focus;
- There is a significant interest in co-investments; and
- While continuing to focus on developed markets, there is a rebound in interest in emerging markets, with an increase in the number of funds targeting Latin America and Asia.

Traditionally, institutional investors have invested in infrastructure through listed firms and fixed income instruments such as bonds (see Figure 4). Given that listed firms tend to move in tandem with broader market trends, during the last two decades unlisted infrastructure has become

attractive to institutional investors, to ensure proper diversification (Della Croce and Yermo 2013). A 2012 Preqin survey of 75 institutional investors confirms that about two-thirds of them prefer unlisted funds, while only about 10 percent choose listed funds. The desire for direct investment and co-investment also runs high, in the range of 32 to 45 percent. In addition, many institutional investors have historically relied on third parties, such as investment management companies, to make investments on their behalf as a means of overcoming risk. However, the global financial crisis and the subsequent demise of the monoline financial guarantee model in infrastructure, combined with a sense that investment managers may have different priorities from institutional investors, has led to a serious rethinking of this intermediary arrangement (Bachher and Monk 2013; Al-Kharusi et al. 2014).

Figure 4: Investment Vehicles



Sources: Based on Inderst and Stewart 2014.

While growing rapidly, institutional investment in infrastructure is still limited. According to Preqin Infrastructure Online, the average institutional investor allocation to infrastructure was 3.5 percent of assets under management in 2011 and 4.3 percent in 2014. For pension funds specifically, investment in infrastructure currently represents only around 1 percent of total assets on average across industrialized countries. Only large pension funds, particularly those in Australia and Canada, have been actively raising asset allocation to infrastructure, to as high as 10–15 percent (Della Croce and Yermo 2013; Inderst and Stewart 2014). Similarly, infrastructure allocations among some sovereign wealth funds are high, on the order of 10 percent. According to a Preqin survey in 2014, about 57 percent of sovereign wealth funds have active investments in infrastructure (though transparency and data availability on these funds are relatively poor). The investment preferences of these funds are: 34 percent for direct investments only, 16 percent for fund investments only, and the rest (50 percent) for both methods of exposure. Eighty-five percent actively investing in infrastructure target the energy sector, while 73 percent invest in transportation assets, 65 percent in utilities, and 53 percent in the telecommunications industry.

Moreover, matching investment demand and institutional investors have been elusive. This is particularly the case in emerging markets, where there is a strong demand for investment in greenfield projects. The vast majority of institutional investors concentrate their investment in

their home markets, i.e. in OECD countries. One set of key barriers has to do with general government support, including the lack of long-term political commitment, regulatory instability, fragmentation of the infrastructure space across multiple levels of government, and the lack of project pipeline. Other barriers include lack of appropriate financing vehicles, limited investment and risk management expertise, and lack of appropriate data and investment benchmarks for illiquid assets (Inderst and Stewart 2014; World Bank 2013).

Another key barrier relates to investor capability. There is evidence that investors can be segmented by size, governance capacity, and method of investment. For instance, insurance companies often need to match their liabilities while pension funds have higher shorter-term obligations and a limited ability to invest longer term. Specifically, defined contribution pension funds often have easy withdrawal or switching options for members, and therefore the need to hold more liquid investments. Smaller, inexperienced investors may be reliant on and influenced by financial intermediaries for their investment decisions in infrastructure. Larger investors with greater in-house governance capacity usually have a clearly defined investment mandate for infrastructure and deploy their capital accordingly (Inderst and Stewart 2014; Sharma 2013).

On the more positive side, domestic institutional investors are a potentially growing source of capital in emerging economies. These countries in general face a substantial opportunity to develop their institutional investor sectors since their financial systems are largely bank-based (OECD 2011; Sharma 2013). The first wave of such investors in infrastructure began in the 1990s in countries such as Korea, Malaysia, and Chile (Inderst and Stewart 2014). Over time, for instance, pension fund experience with domestic infrastructure has become widespread in Latin America, while Asia and other regions have seen limited exposure (see Table 2). While often with good justifications, legal constraints on infrastructure and other investments by domestic pension funds are fairly strict in many developing countries.

Table 2: Pension Funds Investment in Infrastructure in Select Emerging Economies, 2010

Country	Total AUM (US\$Billion)	INFRA Allocation	INFRA Investment Limit	Key INFRA Investment Vehicle
Brazil	340	\$1.0 billion (0.3%)	20% in INFRA (PE) funds	INFRA company/private equity funds
Chile	135	\$2.0 billion (1.5%)	No specific limits for INFRA	INFRA bond
China	168		Only National Social Security Fund can invest in INFRA projects (10% in PE INFRA funds, 20% in trusts used for INFRA investments)	INFRA trusts
India	70	0 (0%)	INFRA investments prohibited	No investments to date
South Africa	160	\$6.4 billion (4%)	5% in unlisted equity	INFRA bonds/ INFRA equity fund

Source: Inderst and Stewart 2014.

Notes: AUM=asset under management, INFRA=infrastructure, PE= private equity.

What rates of return do institutional investors expect from asset allocation in infrastructure? A competitive risk adjusted return is a key motivation for infrastructure investment, aside from social and economic benefits. So far, no robust benchmarks exist for infrastructure. Estimates, as well as interviews with investors, point to a long-term nominal internal rate of return of 10–12 percent (see Table 3). These estimates also vary by sector and duration of investment. Interviews with multiple global investors confirm that they’re looking at high teens to low twenties percentages as the expected return (though this may depend on cost of capital) when it comes to infrastructure investment in China given the country risk.

Table 3: Expected Returns Estimates

Source	Expected Returns
Probitas Partners (2013)	Brownfield funds: 12.5% or lower Opportunistic funds: 15% or higher Debt funds: less than 10%
Mercer Investment Consulting (2005)	9–12%
JP Morgan Asset Management	Average: 10–15% Toll roads: 2–8% PPP: 9–14% Airports: 15–18%
Inderst (2009) survey of European pension funds	9.5%
Dutch fund APG	10%

Looking towards emerging economies, investors carry a fundamental concern of risk, the level of which at some point can be high or difficult to determine. Contributing to this is a variety of factors, including vast differences among projects, even those within the same infrastructure subsector; the chance that host government officials will change contract terms without repercussion; a lack of clarity on future investment opportunities; convoluted permitting processes; and unstable tax policies (WEF 2014). Global investors generally expect higher returns in emerging markets infrastructure than their investments in developed markets (Partners Group 2013). This is the result of adding the premiums associated with perceived risks, particularly as related to regulatory and political risk, business risk, and currency risk (as elaborated in the next section). Together, these risk premiums (around 5 percent) would push the required return from 8 to 9 percent in developed markets to the high teens in emerging markets (or in the range of 12–19 percent).

Prospects for Institutional Investors in China

Investment Environment

While various estimates suggest that up to 10 percent of investment needs in emerging economies could be filled by institutional investors (Inderst and Stewart 2014), the scenario for China may be less certain. According to Preqin investor surveys carried out at the end of 2012 and 2013, about 31 and 28 percent respectively viewed China as presenting the best opportunities. This is markedly lower than their views of Asia as a whole (49 and 36 percent respectively). With bank loans, particularly from the state banks, as the major source of funding for infrastructure projects, capital markets remain under-developed and private participation

crowded out. While common investment vehicles including project finance loans, project and corporate bonds, and equity investment in projects are present, other important mechanisms such as municipal bonds and infrastructure funds (particularly those with foreign equity/debt) remain absent or limited in general (see Figure 5).

Regulatory Risk

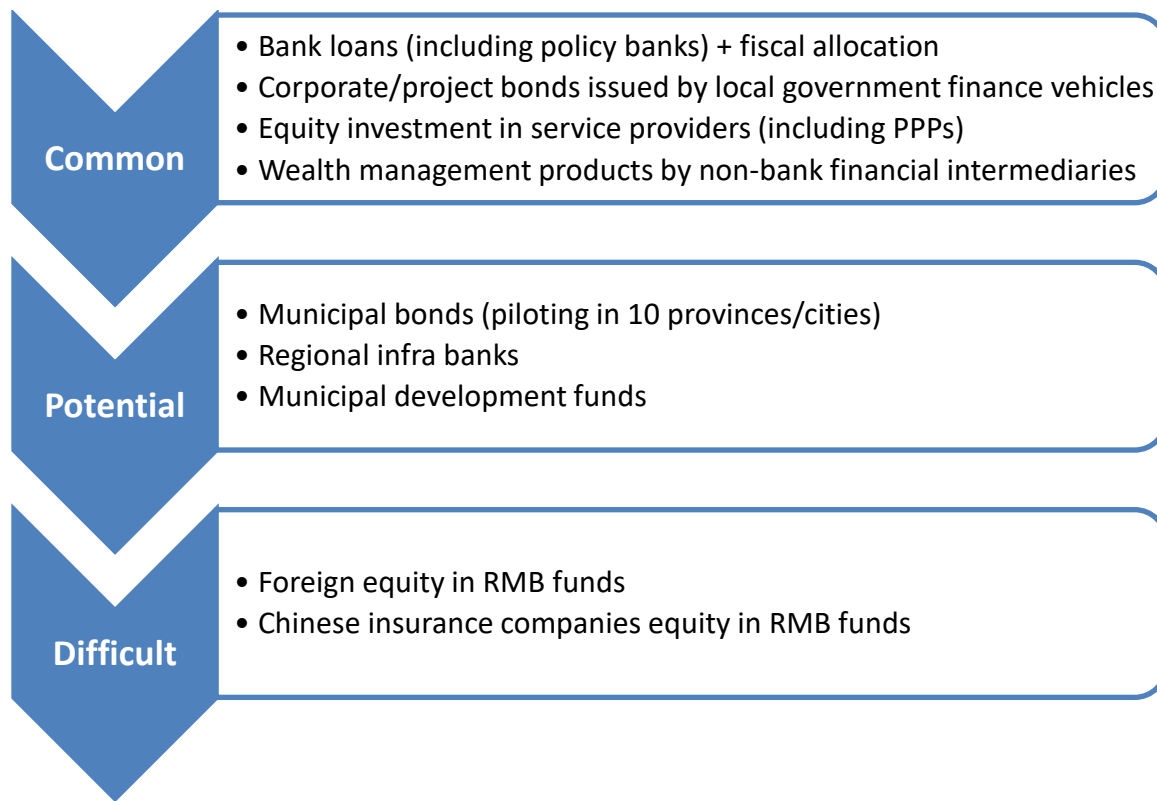
Changing regulations as well as fluctuation in government policies pose a substantial risk. Investors are generally looking for a regulatory framework independent and separate from political influence (WEF 2014). The prevailing sentiment among institutional investors who are less tuned in to China is captured as follows:

“Regulatory environment is a first-order issue: with transparent, published rules, and independent of politics...Chinese infrastructure space is ‘a black box’ due to unpredictable regulations.” (personal interview with a sovereign wealth fund manager)

“China doesn’t see the need to conform to international norms in certain areas because they have their own internal financing and know-how; they don’t need outsiders. Things are ‘flexible’ in China.” (personal interview with a multilateral institution representative)

To a large extent, regulatory risks may be a reflection of the learning curve China experiences as it opens up to private and institutional investment. A telling case in point relates to the policy flip on fixed rates of return. From the 1990s to the early 2000s, many PPP projects were contracted with either flexible rates or fixed investment return rates, determined at the local levels. But the central government’s view crystallized later on that the fixed return clause was against the principal of sharing benefits and jointly bearing risks by Chinese and foreign investors. In order to curb the tendency of using the fixed return clause in contracts of China-foreign co-operations, the State Council specially issued the Notice on Appropriate Handling of Existing Problems in Guarantee of Foreign Investment Fixed Return Projects on 10 September 2002 (State Council General Office’s No. 43 Decree). This policy change led many foreign-invested PPP projects to be renegotiated to replace fixed return with a legitimate proceeds allocation method such as ‘return of investment’ or to be acquired back by local governments (Choi et al. 2010, Li 2007). To many investors, China continues to lack a consistent set of policies and practices at the national level that conform to international norms.

Figure 5: Infrastructure Investment Vehicles in China



Source: Compiled by author.

Currency Risk

In addition to financial and interest rate risks, China's soft currency adds another layer of uncertainty. For global investors, current risk ranks high among perceived risks, particularly if they are looking for hard currency returns. In contrast, domestic investors may disregard current risk completely (Partners Group 2013).

Demand Risk

While greenfield projects are most in need of investment, their demand history is uncertain at best and maybe even nonexistent. Risk can arise from changing projections, lower demand than forecast, poor macroeconomic conditions, and price elasticity (WEF 2014). In addition, to interest private (including institutional) investors in greenfield projects may require closing the financial viability gap between costs and expected revenues (Inderst and Stewart 2014).

General Business Risk

These include potential risk incurred in financing and refinancing, construction and development risks (particularly for greenfield projects), environmental constraints, stakeholder engagement, and operation and maintenance.

Encouraging institutional investors to move into infrastructure would require regulatory changes, particularly those affecting cash flows that the asset operates under. The role of institutional investors in long-term financing is currently constrained by short-termism as well as structural and policy barriers such as a lack of appropriate financing vehicles, limited investment and risk management expertise, transparency viability issues, regulatory (dis)incentives, and a lack of appropriate data and investment benchmarks for illiquid assets. From a longer-term perspective, promoting the development of domestic contractual savings and the capacity of domestic financial systems to intermediate them will foster more, and less volatile, long-term finance (World Bank 2013). Large insurance companies and pension and provident funds would have to be allowed to diversify into bonds issued by private insurance companies. Motivating institutional investors to buy into long-term debt markets also is difficult without some form of credit enhancement (Walsh et al. 2011).

Lessons from Other Emerging Economies

Among a number of emerging economies, steps have been taken to engage capital financing. For instance, in India, an effort to develop the financial sector to catalyze more long-term financing into infrastructure has led in part to measures to develop the corporate bond market and facilitate bank lending into infrastructure. Chile represents one of the best environments in the world for private investment in infrastructure, particularly successful in developing local bond markets to support relatively long-term issuances by infrastructure companies. Its investment environment and risk profile resemble those of OECD countries, according to interviews with multiple global investors. Chile's initial concessions law enabling private sector investments in infrastructure was passed in 1991, with the first project completed in 1995. Between 1995 and 2008, investments totaling nearly US\$11.5 billion across 55 projects were completed (Ministry of Public Works 2009). Our own calculation using World Bank figures for PPI projects through 2013 pegs total investments at nearly US\$40 billion, including greenfield developments and divestments to the private sector.

These investments have been made possible by a strong regulatory framework based on the rule of law. According to its Ministry of Public Works (2009), which oversees concessions, three key principles govern foreign investment in Chile:

- Non-discrimination, meaning that foreign parties will receive equal treatment from the government as local parties;
- Non-discretionary treatment, meaning clear, transparent and objective decision making by administrative bodies; and
- Economic freedom, meaning that nearly all sectors of the economy are open to foreign investors.

In practice, these principles have the effect of creating a stable, predictable environment for investors. There is a fair process uninhibited by bilateral negotiations or backroom deals, with clear expectations that build public confidence regarding services that will be provided. Innovations in the Chilean PPP program also help attract increased interest from foreign investors. These innovations include the adoption of a least present value of revenue auction for toll roads, reducing the risk of major shifts in demand in future years, using a multi-variable

tendering procedure to eliminate unrealistic bids, and implementing exchange rate guarantees in contracts (Gomez-Lobo and Hinojosa 2000; Hill 2011).

Of noteworthy significance is the transparent dispute resolution scheme that is a hallmark of Chile's concessions program. Disputes between concessionaires and the government, or between two companies operating in the same sector, for example between an electricity producer and an electricity transmitter, would be resolved via "expert panels" formed individually per concession. These panels would be typically comprised of three experts, one chosen by the government, one chosen by the concessionaire, and one agreed upon by both parties. A common dispute is tariffs or prices that concessionaires could charge users (or the value of assets upon which a rate of return would be calculated), and each party would submit their proposed tariffs or values to the convened panel, with the panel ultimately being free to come to their own independent conclusions that could often be appealed to the judiciary. Since 2004, disputes in the power sector have been resolved via a standing expert panel whose decisions are binding (Jadresic 2007).

The primary legal mechanism via which capital inflows enter the country is Foreign Investment Statute Decree Law 600, passed in 1974 and restated and ratified in 1993 (Hill 2011). The law permits investors to enter into contracts with the government and allows appeals of judiciary decisions that investors believe to be unfair; at the same time, capital must stay in Chile for at least 12 months, and an additional tax on remittance of income—beyond the corporate income tax—encourages investors to continue to keep funds in Chile (Hill 2011).

On the domestic side, the development of the country's pension system was crucial—the growing pension system of the 1990s created a market for local currency-denominated long-term securities, minimizing the need for bank finance (Walsh et al. 2011). The public pension system was initially privatized in 1981, requiring pensioners to deposit funds into new investment firms known as AFPs, or with insurance companies, although AFPs control the lion's share of pension funds. A critical component of this reform was the conversion of lump-sum payments upon retirement into a stream of annuity payments indexed to inflation. AFPs and insurance companies, with this large new source of long-term capital, have become the primary purchasers of corporate infrastructure bonds, holding more than 90 percent of infrastructure bonds in Chile between them (Walsh et al. 2011).

Investor Prospects

There is a prevailing concern among global investors that public finance of infrastructure tends to crowd out private investment. They believe there is sufficient liquidity within China (e.g. from state banks). Global investors do not see a lot of value in putting funds into infrastructure in China because of so much money already coming from within the country (which also lowers the returns) and because of the aforementioned regulation risk (personal interviews). However, there is a small minority of global investors, particularly those with some knowledge of China, with a more positive perspective. For them, China is a good place to do projects, overall in terms of governance. The quality and willingness of the government to live up to agreements is high relatively to other countries, such as Russia. They consider China an investment-grade country,

growing rapidly and with a desire to make their currency a world currency (personal interview with two global investors).

Table 4: Unlisted Infrastructure Funds in China, as of October 2014

Source country	#	Fund manager
China	8	All-China Federation Industrial Funds Management, China Development Bank Capital, China Guangdong Nuclear Power Fund Management, China Ship Fund Management, Fortman Fund, Nature Elements Capital, RIC Capital Management, Suzhou International Development Venture Capital Holding
U.S.	7	BlackRock, Carlyle Group, Fortress Investment Group, Global Capital Finance LLC, Hudson Clean Energy Partners, Kohlberg Kravis Roberts, StepStone Group
Hong Kong	5	AIF Capital, China Resources Enterprise, CITIC Capital, CLSA Capital Partners, Wanthorpe
U.K.	5	Actis, Ashmore Investment Management, Henderson Equity Partners, SL Capital Partners, Terra Firma Capital Partners
Australia	3	AMP Capital Investors, Lend Lease, Macquarie Infrastructure and Real Assets (MIRA)
Switzerland	3	Adveq Real Assets, Capital Dynamics, Partners Group
Canada	1	InstarAGF Asset Management
France	1	Ardian
Singapore	1	Equis Funds Group
Sweden	1	EQT Funds Management

Source: Based on Preqin Infrastructure Online.

In China, unlisted fund deals remain limited, primarily originating domestically or from only a handful of countries outside of Greater China (see Table 4). Generally, in emerging markets, since the 1990s, dedicated infrastructure funds have become popular. They are primarily in the form of equity-sector funds or specialized private-equity funds. The key investor base of such funds is public pension funds and insurance companies, according to a Preqin survey in 2013

(cited in Inderst and Stewart 2014). Energy, utilities and transport tend to see more fund deals than water and sewerage.

Global Investors

One of the largest global investors is Macquarie, in partnership with China Everbright, with two funds to invest in core infrastructure (see Table 4). One fund is open to global wholesale investors and another is a domestic fund for Chinese currency investors. The intended key focus is on toll roads, airports, renewable energy, water, ports, and rail. Macquarie has had limited success so far, mainly in the toll road sector, including the Hua Nan Expressway. It has already started divesting the Expressway, which continues to benefit from favorable traffic forecast.

A more recent development is the joint venture between Dutch pension fund investor APG and Hong Kong-based China Resources to focus on car park investment. Other investors in the \$265 million venture include Macquarie Capital and Hong Kong-based Wilson Parking¹. Tapping into the steady rise of car ownership in urban China, the venture intends to develop and operate parking facilities.

Sovereign wealth funds also have limited exposure to China (see Table 5). Aside from CIC (China Investment Corporation, China's own sovereign wealth fund tasked with managing foreign exchange reserves), the main players are two Singaporean funds: GIC (Government Investment Corporation) and Temasek Holdings.

Table 5: Sovereign Wealth Funds (SWF) with Deals in China, 2006–2013

SWF Name	Target Name	Sector	Year Announced	Co-Investors
CIC	China Railway Group	Railways	2007	IPO
CIC	SIIC Environment Holdings	Water Treatment	2013	RRJ
CIC	Huaneng Renewables	Renewable Clean Energy	2011	CIC, GE, Standard Chartered, Sinowel Wind Group, Xinjiang Godwin Science & Technology
CIC	GCL-Poly Energy Holdings Limited	Renewable Energy – Solar	2010	GCL-Poly Energy
CIC	China Longyuan Power Group	Renewable Energy Wind	2009	IPO
National Social	CSR Corporation	Railways	2011	NA

¹ <https://www.altassets.net/> 22 February 2013

Security Fund				
GIC	China Railway Construction Corporation Ltd	Railways	2008	Temasek, Yale University, Citic Pacific, Shau-Kee Financial, Bank of China Investment, China Life Group
GIC	CITIC 1616 Holdings Ltd	Telecom	2007	Ashmore Investment Management, Michael Ying, Nina Kung
GIC	Noboa Energy	Renewable Energy	2011	IPO
Temasek Holdings	China Railway Construction Corporation Ltd	Railways	2008	GIC, Yale University, Citic Pacific, Shau-Kee Financial, Bank of China Investment, China Life Group
Temasek Holdings	Huaneng Renewables	Renewable Energy Wind	2011	CIC, GE, Standard Chartered, Sinowel Wind Group, Xinjiang Godwin Science & Technology
Khazanah Nasional Bhd	Beijing Enterprise Water Group	Clean Water Supply	2013	NA
Khazanah Nasional Bhd	JV w. BJ China Sciences General Energy & Enviro	Waste to Energy	2008	BCSGEEE
Oman Investment Fund	China Gas Holdings Ltd	Gas Supply	2007	NA

Source: SovereignNet database.

Given the limited exposure of OECD investors to China, a more promising source is likely to be institutional investors from the Asian region, particularly those with historical linkages with China. For instance, the Malaysia Pension Fund (KWAP) plans to invest in key regional economies including South Korea, Indonesia, Thailand, and China in both hard and local currencies (KWAP Annual Report 2013). Currently, KWAP allocates only 1 percent of its portfolio to infrastructure, but plans to grow that to 3–4 percent after having set up an infrastructure investment division. For Asian investors, they see China as their ‘back yard’ and are more comfortable with the intricacies of the country. Good cultural ties also help mitigate political and policy risks (personal interview with an Asian investor). They are more willing to take on smaller scale or mid-sized projects, and in sectors where the playing field is more level (instead of those with dominance of large state-owned enterprises).

Domestic Investors

In China, a number of new, long-term options have emerged recently, showing a rising role of the private sector and capital financing. There is an increasingly active secondary market for financing infrastructure, as local authorities and domestic construction companies start to look to release capital from their assets. In addition, there is a new type of financing: urban infrastructure facilities investment fund. First initiated by the All-China Federation of Industry and Commerce, the fund handles investments in energy and infrastructure by private companies and investors. The Federation's fund invests in a 16 percent stake in the third phase of the West-East natural gas pipeline. China's state pension fund, the National Social Security Fund, also invests the same amount (Owen 2012). In fact, the National Social Security Fund has invested in funds (beyond infrastructure) as a general partner and is an important player. Table 6 shows a list of active domestic institutional investors.

Table 6: Domestic Institutional Investors in Infrastructure, as of October 2014

Type	#	Firms
Asset/Wealth Management	7	China Asset Management, China Great Wall Asset Management, China Life Asset Management, CNPC Assets Management, Pacific Asset Management, Taiping Asset Management, ZD Holding
Corporate Investor	2	China City Construction Holding Group Company China Communications Construction Company
Government Agency	1	China-Africa Development Fund
Insurance Company	8	Allianz China Life Insurance, China Life Insurance, China Pacific Insurance (Group), China Reinsurance (Group) Corporation, China United Property Insurance, Generali China Life Insurance, New China Life Insurance, Ping An Insurance (Group)
Investment Company	3	China CYTS Tours Holding Company East China Mineral Exploration and Development Bureau People's Insurance Company of China
Private Equity	3	Inventis Investment Holdings (China) China Development Bank Capital Oriza Holdings
Sovereign Wealth Fund	3	China Investment Corporation National Social Security Fund - China State Administration of Foreign Exchange

Source: Based on Preqin Infrastructure Online.

The 2012 China Insurance Regulatory Commission issued a circular to allow insurance companies to invest up to 10 percent of their balance sheets in both real estate and private equity, as well as expected growth in infrastructure investments from other pension and equity funds (KPMG 2012). China Life, Ping An Insurance, China Pacific Insurance all are investing or have plans to invest (e.g. 10 billion yuan in Wenzhou infrastructure construction projects). In 2012, Ping An Insurance's life insurance arm and China Pacific Insurance's property and casualty arm started to pilot small loan guarantee insurance business in Longwan, Lueqing, and Ruian of Wenzhou². Ping An also has invested more than 60 billion yuan of equity in toll roads, wind farms, and railroad, all through PPPs, first two of which are sectors particularly friendly to private participation. For the six wind farms it owns, the rate of return has averaged more than 20 percent (personal interview).

The growth of private equity in China has been fairly impressive. For instance, the number of general partners grew from 10 in 1990 to about 4,500 private capital deal-makers. Most are domestic, but few are eyeing infrastructure at the moment. Beijing is now among the top 10 metropolitan areas for private equity firms managing closed-end funds, based on headquarters (Preqin 2013). Given their better position in identifying viable projects and understanding risks, these investors tend to demand a rate of return in the low teens, as opposed to upper teens for global investors (personal interview with two domestic investors).

Another way to open up private participation is for local governments to issue municipal bonds. In the West, municipal bonds provide funds for capital improvements, and most of the money to repay these bonds comes from property taxes, either in lump sums (term bonds) or in increments (serial bonds). The potential downside is sub-national debts (as in the case of Brazil). In addition, a system of local property taxation and municipal credit rating must be in place, which remain absent in China. Since 2006, there has been a series of discussion within the Chinese leadership regarding municipal bonds, particularly after the global economic recession. The central government has issued local bonds since 2009 on behalf of select local governments and passed back the proceeds under an on-lending arrangement (Ingram et al. 2013; Yang 2012). As of 2014, six provinces and four cities had been given permission to issue their own bonds in a pilot program, including provinces of Guangdong, Jiangsu, Jiangxi, Ningxia, Shandong, and Zhejiang and cities of Beijing, Qingdao, Shanghai, and Shenzhen.

Knowledge Asymmetry

Investing in unlisted, illiquid funds and firms with a long-term horizon requires specialist knowledge (McKinsey 2014). Compounding this need is the cultural-based business practices and less than transparent regulatory environment in China (personal interview with Asian investor). But there is recognition on the side of the Chinese government of the advantages with bringing in outside investment, even if there is plentiful public fund to develop projects. Examples of such advantages include cost control (particularly against overruns) and accelerated project development and innovation.

That said, knowledge asymmetry persists. For global investors, China is still at the margin of their radar screen, if on it at all. Risks abound, particularly the lack of a regulatory environment

² <http://www.chinascopefinancial.com/en/news/post/21670.html>

with transparent, published rules, and independent of politics that may be driven by popular demand. Unfamiliarity with the business culture and local context adds further discomfort. For Chinese local governments, developing infrastructure is often a mechanism to increase land values that will lead to higher transfer/lease revenues. Bundling with other on-site development deals is often the norm, a practice unfamiliar to global investors. Low-cost capital is another rationale for some Chinese local officials to seek global investment (given the unusually low interests rates post-recession), who are unaware of the risk premiums imposed on China by international investors (personal interviews with municipal officials). Often the choice for private finance is made because the municipal purse is not big enough, and public finance ends up doing the job if private finance is not forthcoming (de Jong et al. 2010).

Aside from built-in risk tolerance, reliable local partners can hold the key to more positive outcome in sourcing viable projects and deals. Infrastructure fund managers, particularly those knowledgeable with China, also can bridge the asymmetry. For all of the unlisted funds (see Table 4), there are fund managers stationed in Greater China, with concentration in Beijing, Shanghai and a few other large cities, as well as Hong Kong. For large global institutional investors such as pension funds and insurance companies, these managers help with accessing the Chinese market. They also provide the due diligence and local monitoring that investors lack about an overseas locale (personal interviews with a global investor and Asian investor). However, when it comes to infrastructure funds, no one can honestly say they have a big track record in China, perhaps with the exception of Macquarie and a few others.

Return Profile

Given the scant data availability, tracking project and investment returns in China's infrastructure is challenging. There is only anecdotal evidence. In 2009, the listed highway special project vehicles in China had assets totaling more than US\$24 billion. The median level of return on equity stood at around 9 percent, which is close to the average level of the stock market as a whole. Meanwhile, the median net margin was about 36 percent (for highways), a reasonably high level compared to other industries (Walsh et al. 2011).

Sector Prospects

Market openness varies substantially across different infrastructure sectors in China (see Figure 6). So are rules and regulations. Municipal utilities such as water, wastewater and gas have seen active reform and opening up to private sector participation, while railway at national and local levels remains controlled by the public sector. Other sectors fall in between (Zhang et al. 2014). In general, water, power, and road projects have higher market openness as PPPs have been promoted in these sectors since the 1990s.

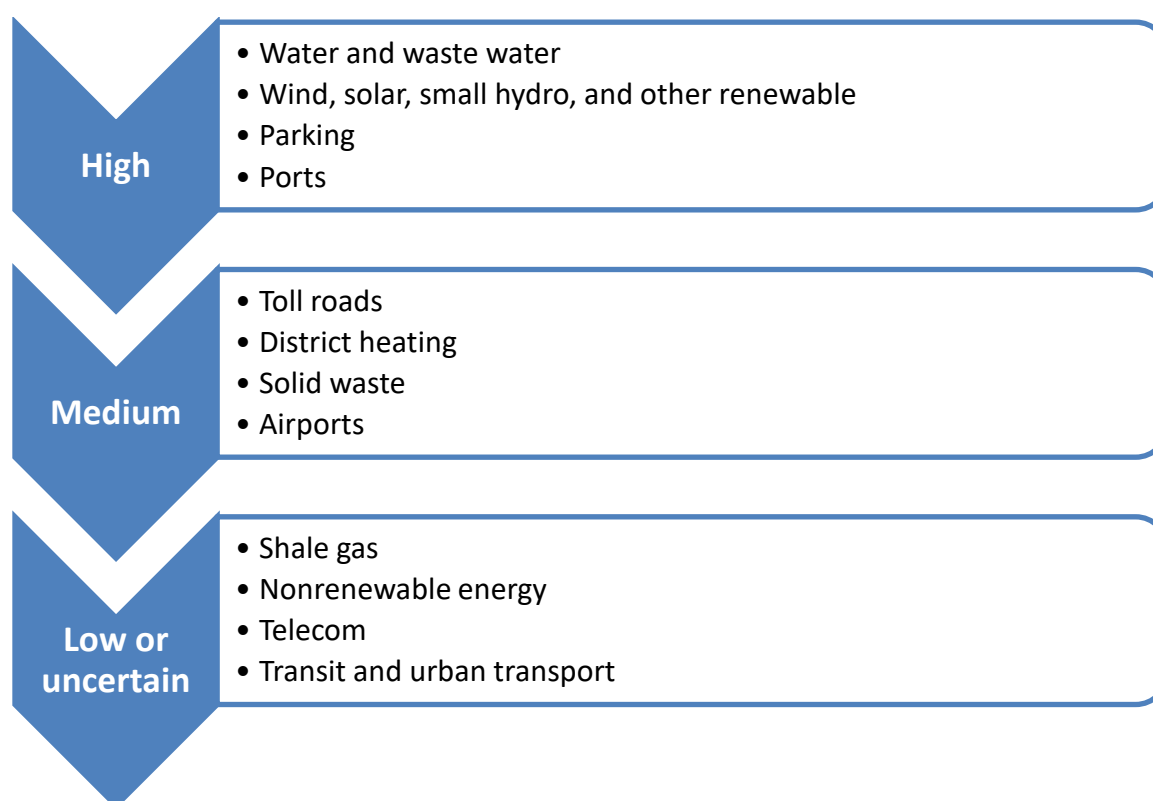
In addition, there is a policy preference for state-owned enterprises in a number of infrastructure sectors still considered strategic, including natural gas, mining, telecom, and airports. With state monopoly, backed by government subsidies, there are significant entry barriers for private investment. There are also restrictions for foreign participation. The Ministry of Commerce publishes a list of sectors/industries with no access by foreign investment. For instance, even a

multilateral development institution was not able to finance a private firm involved in domestic shipping route (personal interview).

Water & Sewerage

Water (including desalination) and wastewater projects look particularly promising for investors. Low sewerage coverage, inadequate treatment facilities, and low water discharge fees all have contributed to contaminated groundwater and polluted surface water that further aggravate urban water shortages in urban China. Most attractive has been water production and distribution services with a number of large multinational providers (e.g. Suez Group, Veolia Environment, see Table 1), and wastewater treatment plants with a maturing set of domestic private providers. Such projects demonstrate solid fundamentals and sound demand. In fact, as of 2012, nine sewerage treatment businesses and 19 water companies nationwide had issued initial public offers or IPOs (Yang 2012). A somewhat hidden need is the upgrading of substandard and deteriorating pipeline networks. Sewerage pipelines, for instance, are financed by local fiscal revenues and not included in water prices paid by households (which have three elements: water resource fee, water supply, and waste water treatment). Hence, there is no cash flow in building pipelines and consequently little appeal to private investors.

Figure 6: Sector Prospects for Infrastructure Investment in China



A large proportion of funds to develop China's water infrastructure has been raised by means of overseas investment, loans, and market financing. Water companies currently participating in the water market are classified into five types: (1) water multinational firms (e.g. Veolia

Environment, Suez Group); (2) foreign specialized operators; (3) Chinese investment developers; (4) privatized local water companies; and (5) domestic operators. Among these, Chinese investment developers may be categorized as quasi-private developers because these organizations are generally state firms either at the central or local level.

The waste water sector has been open to private investment since the 1990s. First, large multinationals were present to build treatment plants through BOT or TOT. But most of them have withdrawn because there were no real significant profits. As such, domestic private firms have proliferated. In fact, competition has intensified, as there are a number of nationwide private firms engaged in waste water treatment. The next step will be merger and acquisition, to consolidate the industry. However, it remains difficult for these firms to raise long-term capital from state banks. So, they need to finance each project individually. A key reason has to do with fluctuation in central policies for banking—hence unwillingness of state banks to lend to private firms for longer terms (personal interview with multilateral institution representative). Given that the market for waste water treatment is already saturated, solid waste management has become more promising as the current practice of land fill is no longer sustainable.

Pipeline problems have become a major bottleneck in waste water collection. A key incident was Beijing's flooding in July 21 (also known as the 721 disaster) of 2012 when the city's drainage system failed to accommodate heavy rains. Some parts of the drainage system did not actually have pumps, due to shoddy construction. This bottleneck problem also affects the operation of waste water treatment plants, because less than planned waste water would actually reach the plants. The new generation of the central government recognized this problem and issued new policy to encourage private capital to finance pipelines as well as a call for surveys of water and sewerage networks and for implementing separation sewerage by 2015. In some ways, sewerage is a more viable sector for investment than highways, given that demand will not fluctuate and will only increase as quality of life increases.

Energy

Renewable energy projects have been growing fast. However, the scale of these projects tends to be smaller than conventional power projects. Most are located in coastal provinces except for wind farms and hydro power projects (Chen 2008). Renewables are interesting to investors because they are part of a larger, and conscious, shift by the Chinese government toward lower-carbon sources of energy. An exception is shale gas, whose prospects in China remain at best unknown (personal interviews with an Asian investor and a domestic investor).

But the renewable energy sector has not delivered its promise, as expected by the large wave of investors in the beginning. The main problem is implementation, particularly of policies made at the national level when it comes to coordination (lack of) between national and local levels. As a result, renewable energy cannot always get on the power grid, causing wasteful investment. In addition, tariff for renewable energy is higher, made up by standard energy charge and a green subsidy. But the disbursement of green subsidy is often prolonged and unpredictable (personal interview with multilateral institution representative).

Nuclear power has been a top priority to achieve energy security more recently. In May 2014, China's Securities Regulatory Commission released a preliminary listing prospectus from state-owned China National Nuclear Power. In the prospectus, China National Nuclear Power was looking to issue up to 3.65 billion shares (representing 25 percent of its enlarged capital base) on the Shanghai Stock Exchange. Funds raised from IPOs would be used to finance nuclear projects in four provinces (Fujian, Zhejiang, Hainan, Jiangsu) and replenish working capital (Business Monitor International 2014).

The attractiveness of the nonrenewable power market in China for foreign investors and developers has not sustained. Since 2002, many foreign Independent power producers have withdrawn from China (Chen 2008). Fossil fuel remains under the control of state-owned enterprises. For purpose of security, pipelines are strictly state owned. There are some signs of opening up, however, and a new entrant has made its appearance to compete with the three large state firms in the natural gas and oil sector (personal interview with a domestic investor).

Telecommunications

For a long time, this sector was dominated by three state firms: China Mobile, China Telecom, and China Unicom. As such, private participation has been miniscule. Recent developments, however, point to change. China Mobile has spun off its tower business, as cell tower ownership is consolidated into one state firm. Thirteen private companies now have become private operators (personal interview with a domestic investor).

Airports and Ports

Airports remain high on the government's agenda. The central government announced that it will build 82 airports and refurbish a further 101 by 2015. This will take the number of airports in China to around 230. The flagship project is Beijing's second airport with capacity of up to 72mn passengers by 2025 (Business Monitor International 2014). But for global investors, airports are a mixed target. A key issue relates to the regulatory environment as the air space is completely controlled by the Ministry of Defense, not by a regulatory body.

In contrast, port operators experience less monopoly and there is more space for private participation. There are also a sizeable number of ports along the coast to offer choices for interested investors. Hong Kong-based Hutchison Whampoa Ltd., for instance, has been one of the largest global investors in China's infrastructure (see Table 1). Between 1990 and 2012, it was involved in 17 different seaport projects, spanning from Xiamen in southeast China to Dalian in the northeast and all the way in between. Firms from Norway, Singapore, Spain, and UK also have been operating in China.

Toll Roads

Highway sector was among the earliest open to private and foreign investment. Gordon Wu was considered a pioneer when he led Hong Kong-based Hopewell in building the highway linking Hong Kong and Guangzhou in the 1990s. Since then, toll road PPPs have proliferated, riding the wave of rising automobile ownership. But investment performance is mixed, due to a mixture of

unreliable demand forecast, drivers avoiding tolls, and political interference in rate setting (personal interviews with two global investors). Investment in the sector also illustrates the complex regulatory environment investors may encounter. A PPP project has to involve different laws and statutes: Road Law (2004), Tendering and Bidding Law (1999), Land Management Law (2004), Contract Law (1999), Regulation on the administration of toll roads (2004) if it is toll road, and Decision on Reforming Investment Scheme (2004) if it involves domestic private investment. There are also other laws and policies to address aspects of environmental protection and construction quality management, which are relevant to a road project (Chen 2010).

Municipal Utilities

In urban gas markets domestic private and foreign firms have acquired significant market shares since the state allowed nonstate investors to participate in 2002. According to a report from the China Gas Association, domestic private companies controlled 29 percent of urban gas supply and foreign firms controlled 14 percent by 2011 (cited in Zhang 2014). In particular, the Hong Kong-based Towngas controlled 93 urban gas supply projects located in 17 provinces.

Role of Non-Bank Financial Intermediaries

Bridging the ‘investability gap’ is critical for harnessing institutional investors. The conditions for launching non-bank intermediaries for financing infrastructure are maturing in China, a mechanism practiced in many other countries. China’s central government has recently (in late 2014) issued a directive to further clear out local government debts generated through financing vehicles. Part of the directive indicates that provincial-level governments can issue municipal bonds and project bonds on behalf of municipalities and counties, and the repayment of the debts must be reflected on municipal budgets. While banks remain the dominating source, policy banks (particularly China Development Bank) have provided a significant volume of infrastructure financing.

More encouragingly, there is forward movement locally (e.g. Guangdong and Shanghai) exploring the feasibility of establishing non-bank financial intermediaries for infrastructure financing, with multiple functions beyond an investment fund. An example would be the Beijing Small Town Development Fund launched in 2012 with initial 80 percent capital from CDB Capital (wholly owned subsidiary of China Development Bank) and 20 percent from Beijing Municipal Government (through its financing vehicle Beijing Capital Group). With agreements with several other potential investors, the fund’s intended financing scope is comprehensive development of small towns in the city’s outskirts, including infrastructure. Shanghai also has a similar platform for small town development financing. Parallel to this, a number of other large state enterprises in the infrastructure sector (e.g. China Railway and China Communications) as well as CITIC Group have been engaged in comprehensive land or new town development, though not through fund mechanisms.

Experiences Elsewhere

Intermediaries have been introduced in different countries and can operate at multiple levels. These range from supra-national facilities to local or regional funds (see Table 7). Of particularly

relevance are the U.S. model of state bond bank, Korea's infrastructure fund, Columbia's municipal development fund (FINDETER), and municipal bank of the Netherlands (BNG). The bond bank will acquire funding on the capital market, then assign funds raised to particular projects. Bond banks are publically established, and many states in the U.S. have a bond bank. Bond banks are often used for relatively smaller projects.

Bond Banks in U.S.

A bond bank in the U.S. is a state-level entity that provides that state's smaller public entities with debt financing at a lower cost than what the small entity could obtain on its own. Bond banks serve municipalities, school districts, fire districts, water and sewer districts, and more. They are able to provide lower-cost financing as long as they have higher credit ratings than the entities that seek to borrow. Some of the states include Maine, Indiana, Idaho, New Hampshire, New York, Vermont, and Alaska. Some municipalities also operate bond banks. For instance, Vermont's Municipal Bond Bank combines all the approved borrowers into a single pooled bond issue, about once a year³. Credit reviews of borrowers are carried out by independent credit agencies. There are at least two benefits. On the one hand, investors may be reluctant to invest in municipal securities of a small town with limited resources, but eager to invest in those issued by a larger entity with significant resources like a bond bank. On the other hand, bond banks also can pool together a number of small offerings to provide investors with a more attractive diversified product.

Table 7: Practices of Government Sponsored Infrastructure Intermediaries

Name	Location	Key Functions
Supra-national level		
Infrastructure Project Preparation Facility	African Development Bank Group	<ul style="list-style-type: none"> • Prepare high quality and viable infrastructure projects • Develop consensus and partnership for project implementation
West Coast Infrastructure Exchange	North America (California, Oregon, Washington, and British Columbia)	<ul style="list-style-type: none"> • Pipeline and standardization • Technical capacity building • Pilot projects
National level		
BNDES (Brazilian Development Bank)	Brazil	<ul style="list-style-type: none"> • Primary lender of long-term capital • Loan guarantees, securities underwriting, bond purchases

³ <http://www.vmbb.org/>

FINDETER (Municipal Development Fund)	Colombia	<ul style="list-style-type: none"> • Technical assistance and project development • Intermediary between commercial banks and municipalities • Administer central government capital grants
Municipal Bank of the Netherlands (BNG)	The Netherlands	<ul style="list-style-type: none"> • Low-cost capital access for municipalities • Manage financial transactions between central and local government units
Regional level		
Restart New South Wales	State of New South Wales, Australia	<ul style="list-style-type: none"> • Capital fund to pool proceeds from asset sales and dividends • Capital recycle to finance new infrastructure
State Bond Bank	U.S.	<ul style="list-style-type: none"> • Lower-cost financing • Pool small projects for bond issuing
Tamilnadu Urban Development Fund	State of Tamil Nadu, India	<ul style="list-style-type: none"> • PPP trust for resource mobilization with minimal guarantees • Improve technical, managerial and financial management in urban local agencies

Infrastructure Funds in Korea

Korea has used the debt and equity funds approach, and other Asian countries are using this model (e.g. Thailand and Indonesia use public investment to help set up infrastructure fund); the government helps set up these intermediaries, and the pension funds can then pool their resources. Korea's initial creation of an infrastructure fund was as an unlisted, public endeavor, largely made up of domestic institutional investors; however, the fund was ultimately listed in 2006, bringing in significant foreign and retail investment. The establishment of multiple private funds in the period of 2005–2008 followed. The benefits of these private funds include not only increasing private investment in infrastructure, but also the building of management and operational capacity on the part of domestic institutional investors (Walsh et al. 2011). A “one-stop” PPI agency also has been created under the Ministry of Budget and Planning that implements and oversees projects, providing a steady pipeline of viable development.

Another key component has been a minimum revenue guarantee (MRG) for both solicited and unsolicited projects. Over time, the MRG has decreased for solicited projects and been abolished for unsolicited projects, but this mechanism was instrumental in providing initial confidence to investors (Cho 2008). Furthermore, the government has provided construction subsidies, credit guarantees, and a partial VAT rebate upon completion of projects, as well as allowing for early

completion bonuses and excess profits as a result of lower-than-expected construction costs (Cho 2008, Walsh et al. 2011). Overall, Korea's experience has generally been highly successful, enabling domestic institutions to become major investors in both debt and equity, with total local investment in PPI projects reaching US\$75 billion across 461 projects as of 2012 (Cho 2008). However, there are problems: fees are high, and interests from multiple stakeholders aren't necessarily aligned (personal interview with a global investor).

FINDETER (Columbia)

FINDETER is a municipal development fund in Colombia, spun off into its own independent agency in the 1980s. FINDETER works actively with municipalities to gauge technical feasibility, determine user cost structure, and develop project budgets. Additionally, it provides operations and maintenance oversight during the construction process. However, commercial banks ultimately make the loans to municipalities. FINDETER acts as an intermediary, assisting municipalities in locating a bank willing to take on the credit risk associated with the loan. But intercept agreements may be created whereby funds that would normally flow to the municipality from intergovernmental tax sharing agreements are deposited into an account that the bank will have first access to in the event of a municipality not making debt payments on time. The federal government is the primary funder of FINDETER, with minimal buy-in from banks via bond issuances. Indeed, commercial banks have seen themselves more and more as competitors with FINDETER, and large cities have found it advantageous to work directly with banks. FINDETER can certainly provide technical expertise that banks often cannot, and it provides development assistance not available through direct loans. But the typical timeframe for FINDETER analyses of more than half a year has led larger cities to increasingly issue their own bonds or to engage in project-specific financing (Peterson 1996).

BNG (The Netherlands)

The Municipal Bank of the Netherlands (BNG) was established a century ago to provide credit to local governments throughout the country. It is currently half owned by the federal government and half owned by municipalities. While the bank historically sourced from savings deposits and government funds, it raises funds exclusively through capital markets. Much of its capital market funds through the early 1990s were raised via institutional investors such as pension funds and insurance companies, though the majority of funding now comes from bonds in the international capital markets. Loans are disbursed upon review of projects from a financial standpoint—BNG does not involve itself in determining the validity of given projects. In addition to providing loans, the Bank's Municipal Fund disburses state grant funds to struggling municipalities and provides loan guarantees when necessary. Municipalities receiving funds in these manners are placed under heightened scrutiny and borrowing limits, and the track record is generally quite positive in terms of loan repayments being made on time (Peterson 1996).

Moving Forward in China

Non-bank financial intermediaries could offer substantial advantages for raising investment from a wide range of institutional investors. Financing model can range from joint-owned funds, government sponsored funds, development institution funds, to commercial funds. Given that

infrastructure finance has revolved around state and development banks in China, government sponsored funds hold particular promise, as in the case of India. Moving to a market-based model in which bond market financing dominates, as in the case of Korea and Chile, may not be feasible in the short or medium term. Chile has demonstrated the long-term nature with its highway network, beginning a process of privatizing construction in the 1990s, auctioning off sections of highways to concessionaires, and contracting out projects on a build-operate-transfer basis. The results have been that Chile now stands as one of the best environments in the world for private investment (Walsh et al. 2011).

Functions of Non-Bank Intermediaries

An Intermediary can be structured as a joint public-private ownership model. The basic idea is for a government entity or development bank to act as a lead investor, perhaps working in partnership with one or two other institutions, and set up a fund with professional management for institutional investors to invest in. Aside from these direct stakeholders, it could engage a multilateral development bank such as the World Bank to provide political risk insurance. This can include currency inconvertibility and transfer restriction, expropriation, terrorism and civil disturbance, and breach of contract (WEF 2014). In essence, the Intermediary would bridge the ‘investability gap’ by assuming the following key functions.

Create an integrated project pipeline: This is a catalogue of individual projects that are expected to launch and have undergone initial due diligence (e.g. conducting feasibility studies). A key bottleneck for infrastructure development is not capital, but a lack of viable pipeline of projects attractive to institutional investors (personal interviews with global investors). First and foremost, creating a viable pipeline of projects is fundamentally the responsibility of governments, and draws investments by demonstrating successful project implementation as well as the likelihood that the development of local expertise will pay off with future opportunities (WEF 2014). Institutional investors are more interested in a comprehensive set of opportunities than ad hoc projects, i.e. repeat opportunities instead of one-off (WEF 2014). Given the multiplicity of local governments in China, this pipeline is likely best developed at the provincial or regional level.

‘Capital recycling’: Institutional investors often prefer brownfield equity investments, while the public sector focus is on financing for greenfield projects. An effective strategy could involve brownfield “capital recycling,” in which the proceeds from the sale or concession of existing brownfield infrastructure are used to fund greenfield projects (WEF 2014).

Technical capacity building: A professional management staff for the Intermediary will function with the mandate to advise local governments on project evaluation, finance, and execution. A key approach would be to advance viable model projects and promote wider adoption.

Risk allocation: This is to ensure that principles for guiding risk allocation are in place. Government guarantees or mitigation instruments will have a direct or contingent cost in the future, so premiums may need to be paid if risk insurance is called for (WEF 2014).

Direct public support measures: These can be in a number of forms, including public guarantee for bonds, fiscal incentives (e.g. tax-exempt bonds market in the U.S.), and credit enhancement. A key pre-requisite for the participation of many institutional investors in infrastructure projects is the achievement of an investment grade credit rating by the borrower in question. Credit enhancements and guarantees can help borrowers obtain higher credit ratings, allowing for the participation of institutional investors (World Bank 2013). They also could mitigate currency risks as well as some regulatory risks. Another guarantee can come in the form of intercept agreements, which allow investors first access to revenue account in the event of a municipality not making repayments on time.

Conclusion

Clearly, there is no lack of capital on the side of investors. These days, being a supplier of capital is no longer sufficient. That may have been the case in the past, but now investors are expected to bring something else. More desirable for local governments and domestic partners in China is the value-added that may come in the form of new technology, management knowhow, or access to a new market overseas. There is also the inevitable learning curve that Chinese local governments have in understanding how to attract institutional investors, particularly global ones, and in acquiring willingness to follow international norms. Educating investors is the other side of the coin, including more systematic demonstration of project viability and track records.

For global investors, lending to project directly is generally not permissible in China (unless through project bonds or equity financing). In occasions this is done, it is not through regulatory approval. As such, this tends to be one-off deals, which are less appealing to investors. On top of this, there are no straight ways to structure debt financing from off-shore to on-shore, under the current capital account control regime (personal interview with global investors). For local governments, having to go through foreign exchange control give them another disincentive to pursue global investors.

In the near future, therefore, mobilizing domestic institutional investors holds much more promise. Particularly of notice would be the large public or quasi-public pension funds, and insurance companies. The private sector will then be more likely to follow, although private investment has increasingly become more short-term. As China looks outward further, Asian investors will hold the key, particularly those with historical linkages with China.

China should pursue the route of financial intermediaries to act as investment platforms, which can bridge the ‘investability gap’ and have the potential of snowball effect to help poorer localities through investment by better-off cities. Another line of projects would be infrastructure items with less cash flow but more social impact, such as water and sewerage pipeline networks. These are long-term investment items that carry relatively low returns. Intermediaries backed by public funds can be a stopgap measure to allow infrastructure financing to further open to private participation and progress towards more market-based mechanisms.

Given the tight control over financial institutions excised by the central government, policy and regulatory innovations may be called for. Three key regulatory agencies oversee licensing: China

Banking Regulatory Commission (over banks and trusts), China Securities Regulatory Commission (over investment banks and funds), and China Insurance Regulatory Commission (over insurance companies). The People's Bank of China oversees bonds. For financial institutions involved in different operations, multiple licenses often are necessary from different agencies. In addition, the commissions have been strict on the number of new licenses issued. The proliferation of private equity funds in China is partially the result of this regime, as such funds carries no licensing requirement. Further complicating the situation is the requirement that a non-bank financial intermediary assume depository functions before it can issue debts or bonds.

References

- Al-Kharusi, Qais. A., Dixon, Adam D., & Monk, Ashby H.B. 2014. *Getting Closer to the Action: Why Pension and Sovereign Funds are Expanding Geographically*. Stanford, CA: Global Projects Center, Stanford University.
- Annez, Patricia. 2006. "Urban Infrastructure Finance From Private Operators: What Have We Learned From Recent Experience?" World Bank Policy Research Working Paper 4045, November.
- Bachher, Jagdeep S. and Ashby H.B. Monk 2013. *Platforms and Vehicles for Institutional Co-Investing*. Social Science Research Network. Retrieved from http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2174696.
- Bellier, M., and Y. M. Zhou. 2003. Private participation in infrastructure in China: Issues and recommendations for the road, water, and power sectors. World Bank Working Paper No. 2. Washington, DC: World Bank.
- Bird, Richard M. 2004. "Getting It Right: Financing Urban Development in China." International Tax Program Paper 0413, Institute for International Business, University of Toronto, November.
- Business Monitor International. 2014. *China Infrastructure Report*. Retrieved from <http://www.businessmonitor.com/china#>.
- Chan, Kam Wing. 1998. "Infrastructure Services and Financing in Chinese Cities." *Pacific Rim Law & Policy Journal* 7, 3: 503–528.
- Chen, Cheng. 2010. "The institutional challenges for PPP in China and the role of PPIAF." Paper prepared for the World Bank Post-doctoral Workshop.
- Chen, Chuan. 2008. "An Analysis of Private Participation in Infrastructure Projects in the Chinese Power Sector." Retrieved on 20 December 2014 from <http://www.grif.umontreal.ca/pages/conferencegrif08/12-Chen%28PPI%29.pdf>.
- Chen, Chuan and Hemanta Doloi. 2008. "BOT application in China: Driving and impeding factors." *International Journal of Project Management* 26, 4 (May): 388-398.
- Cheung, Esther and Albert P.C. Chan. 2011. "Risk Factors of Public-Private Partnership Projects in China: Comparison between the Water, Power, and Transportation Sectors." *Journal of Urban Planning and Development* 137: 409-415.
- Cho, Bong Hwan. 2008. "Private Participation in Infrastructure in Korea." Retrieved on 14 January 2015 from <http://www8.cao.go.jp/pfi/3rdStrategyFinance1.pdf>.
- Choi, Jae-ho, Jinwook Chung and Doo-Jin Lee. 2010. "Risk perception analysis: Participation in China's water PPP market." *International Journal of Project Management* 28, 6 (August): 580-592.
- De Jong, Martin, Rui Mu, Dominic Stead, Yongchi Ma, and Bao Xi. 2010. "Introducing public-private partnerships for metropolitan subways in China: what is the evidence?" *Journal of Transport Geography* 18, 2 (March): 301-313.
- Deau, Thierry and Julien Touati. 2014. "Using PPPs to Fund Critical Greenfield Infrastructure Projects," In Norah Ferry and Bill Javetski (Eds.), *Rethinking Infrastructure: Voices from the Global Infrastructure Initiative*. McKinsey & Company. Retrieved from http://www.mckinsey.com/client_service/Infrastructure/latest_thinking/Rethinking_infrastructure.

- Della Croce, Raffaele and Juan Yermo 2013. "Institutional Investors and Infrastructure Financing", *OECD Working Papers on Finance, Insurance and Private Pensions*, No. 36, OECD Publishing. <http://dx.doi.org/10.1787/5k3wh99xgc33-en>
- Gomez-Lobo, Andres and Sergio Hinojosa. 2000. *Broad Roads in a Thin Country: Infrastructure Concessions in Chile* (Working Paper WPS2279). Washington, DC: The World Bank.
- Inderst, and Fiona Stewart. 2014. *Institutional Investment in Infrastructure in Developing Countries*. Washington, DC: The World Bank.
- Ingram, Gregory, Zhi Liu and Karin Brandt. 2013. "Metropolitan Infrastructure and Capital Finance," in Roy W. Bahl, Johannes F. Linn and Deborah L. Wetzel (eds), *Financing Metropolitan Governments in Developing Countries*. Cambridge, MA: Lincoln Institute of Land Policy, p. 339-366.
- Hill, Andrew. 2011. "Foreign Infrastructure Investment in Chile: The Success of Public-Private Partnerships through Concessions Contracts." *Northwestern Journal of International Law and Business* 32(1), 165-190.
- Jadresic, Alejandro. 2007. *Experts Panels in Regulation of Infrastructure in Chile* (Working Paper No. 2). Washington, DC: Public-Private Infrastructure Advisory Facility, c/o the World Bank.
- KPMG. 2012. *Infrastructure in China: Sustaining Quality Growth* (retrieved on 26 June 2013 from <http://www.kpmg.com/cn>).
- Lee, Seungho. 2010. "Development of Public Private Partnership (PPP) Projects in the Chinese Water Sector." *Water Resource Management* 24: 1925-1945.
- Li, Shoushuang. 2007. *The Legal Environment and Risks for Foreign Investment in China*. Berlin: Springer.
- McKinsey & Company. 2014. Rethinking Infrastructure: Voices from the Global Infrastructure Initiative. Retrieved on 27 May 2014 from http://www.mckinsey.com/~media/mckinsey/dotcom/client_service/infrastructure/pdfs/gii%20compendium/rethinkinginfrastructure_gii.ashx.
- McKinsey Global Institute (MGI). 2013. Infrastructure Productivity: How to Save \$1 Trillion a Year? (retrieved on 26 September 2013 from http://www.mckinsey.com/insights/engineering_construction/infrastructure_productivity).
- Ministry of Public Works, Chile. 2009. *Chile, opportunities in Infrastructure 2009 - 2010*. Retrieved from http://www.mop.cl/Documents/chile_opportunities_in_infrastructure.pdf
- Mu, Rui, Martin de Jong and Joop Koppenjan. 2011. "The rise and fall of Public-Private Partnerships in China: a path-dependent approach." *Journal of Transport Geography* 19, 4 (July): 794-806.
- OECD. 2011. "Pension Funds Investment in Infrastructure: A Survey." Infrastructure Futures Program, Project on Strategic Transport Infrastructure to 2030.
- Owen, Charlotte. 2012. "First private investment in Chinese energy infrastructure plan." *Oil & Gas Technology*, May 31 (retrieved on 4 July 2013 from <http://www.oilandgastechology.net/business-strategy/first-private-investment-chinese-energy-infrastructure-plan>).
- Partners Group. 2013. "Emerging Market Infrastructure: Risk, Returns and Current Opportunities." Research Flash, October.
- Peterson, George (1996). *Using Municipal Development Funds to Build Municipal Credit Markets*. Prepared for Government of India and World Bank. Retrieved from <http://siteresources.worldbank.org/INTMF/Resources/339747-1251914038224/77p.pdf>.

- Preqin. 2014. *Preqin Special Report: Sovereign Wealth Funds*. Retrieved on 10 January 2015 from https://www.preqin.com/docs/reports/Preqin_Special_Report_Sovereign_Wealth_Funds.pdf.
- Preqin. 2013. *Preqin Investor Network Global Alternatives Report*. New York and London: Preqin Ltd.
- Probitas Partners. 2013. *Infrastructure Survey and Trends: Summer 2013*. Retrieved from http://probitaspartners.com/alternative_investments_publications/white-papers-and-surveys.html.
- Sharma, Rajiv. 2013. "The Potential of Private Institutional Investors for the Financing of Transport Infrastructure." International Transport Forum at the OECD, Paris, France, Discussion Paper No. 2013-14.
- Siemiatycki, Matti. 2013. "The Global Production of Transportation Public–Private Partnerships." *International Journal of Urban and Regional Research* 37, 4 (July): 1254-1272.
- Walsh, James P., Chanh Park and Jiangyan Yu. 2011. *Financing Infrastructure in India: Macroeconomic Lessons and Emerging Market Case Studies* (Working Paper WP/11/181). Washington, DC: International Monetary Fund.
- Wong, Christina and Richard Bird. 2004. "China's Fiscal System: A Work in Progress." Paper presented to the Conference on China's Economic Transition, Pittsburgh, November.
- Wong, Christine. 2012. "Some Suggestions for Improving China's Municipal Finance for the 21st Century." Paulson Policy Memorandum, The Paulson Institute.
- Wong, Christine. 2013. "Paying for Urbanization in China: Challenges of Municipal Finance in the Twenty-First Century," in Roy W. Bahl, Johannes F. Linn and Deborah L. Wetzel (eds), *Financing Metropolitan Governments in Developing Countries*. Cambridge, MA: Lincoln Institute of Land Policy, p. 273-308.
- World Bank. 2013. "Long-Term Investment Financing for Growth and Development: Umbrella Paper." Presented to the Meeting of the G20 Ministers of Finance and Central Bank Governors, February, Moscow, Russia.
- World Economic Forum (WEF). 2014. *Infrastructure Investment Policy Blueprint*. Geneva, Switzerland: World Economic Forum.
- Wu, Weiping. 2010. "Urban Infrastructure Financing and Economic Performance in China." *Urban Geography* 31, 5 (July): 648-667.
- Yang, Song. 2012. *Innovations in Public Utility Concessions in Beijing*. Beijing: Intellectual Property Press (zhishi chanquan chubanshe).
- Zhang, Shuibo, Ying Gao, Zhuo Feng, and Weizuo Sun. 2014. "PPP Application in Infrastructure Development in China: Institutional Analysis and Implications." *International Journal of Project Management*. Prepublished online <http://dx.doi.org/10.1016/j.ijproman.2014.06.006>