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Infrastructure Investment
in New Markets: Challenges
and Opportunities for
Pension Funds

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Abstract/Résumé

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Abstract: This report reviews the existing evidence on pension fund investment in infrastructure in “new” markets, covering a number of non-OECD countries, such as Brazil, China, India, Indonesia and South Africa, as well as some OECD countries like Chile and Mexico. In the African, Asian, and Latin American countries surveyed, domestic pension funds invest more than USD 15 bn in infrastructure projects, around 1.3% of the total assets managed (USD 1.1 trillion as of December 2010). Foreign pension funds, given their large size, could be a potentially major source of funding, but most have only recently started investing in infrastructure projects and have focused their attention in mature markets. The report concludes with a series of policy recommendations to facilitate infrastructure investments in new markets.

JEL codes: G15, G18, G23, G28, J26

Keywords: pension funds, infrastructure investment, emerging markets

INVESTISSEMENT DANS LES INFRASTRUCTURES SUR LES NOUVEAUX MARCHÉS : DÉFIS ET OPPORTUNITÉS POUR LES FONDS DE PENSION

Résumé : Ce rapport passe en revue les éléments d’information disponibles sur l’investissement des fonds de pension dans les infrastructures sur les « nouveaux » marchés, qui englobent un certain nombre de pays non membres de l’OCDE, comme l’Afrique du Sud, le Brésil, la Chine, l’Inde et l’Indonésie, ainsi que certains pays membres comme le Chili et le Mexique. Dans les pays d’Afrique, d’Asie et d’Amérique latine examinés, les fonds de pension nationaux investissent plus de 15 milliards USD dans les projets d’infrastructure, soit environ 1.3 % du total des actifs sous gestion (1.1 billion USD en date de décembre 2010). Compte tenu de leur taille, les fonds de pension étrangers pourraient être une source de financement potentiellement importante, mais la plupart d’entre eux n’investissent que depuis peu dans des projets d’infrastructure et concentrent leur attention sur les marchés matures. En conclusion, le rapport formule un ensemble de recommandations d’action en vue de faciliter les investissements dans les infrastructures sur les nouveaux marchés.

Codes JEL : G15, G18, G23, G28, J26

Mots-clés : fonds de pension, investissement dans les infrastructures, marchés émergents

INFRASTRUCTURE INVESTMENT IN NEW MARKETS: CHALLENGES AND OPPORTUNITIES FOR PENSION FUNDS

By Fiona Stewart and Juan Yermo*

1. Introduction

This report reviews the existing evidence on pension fund investment in infrastructure in “new” markets, covering a number of non-OECD countries, such as Brazil, China, India, Indonesia and South Africa, as well as some OECD countries like Chile and Mexico. The report complements existing OECD reports on the topic that have focused on the more mature infrastructure markets of Australia, Europe, and North America.¹ The report examines the role of both domestic and foreign pension funds in infrastructure investment and provides a set of policy recommendations to facilitate such investments.

Infrastructure² plays an important part in economic development. As outlined by the OECD (OECD 2008), infrastructure projects – such as transport, electricity, water and other systems - are not an end in themselves, but a means for ensuring the delivery of goods and services that promote prosperity and growth and contribute to quality of life, including the social well-being, health and safety of citizens, and the quality of their environment. Like other investment, infrastructure expansion typically adds to the productive capacity in an economy – with the impact stronger at lower levels of provision (OECD 2009).

As shown in Figure 1, infrastructure can be further divided into economic and social sectors. Using a broad definition economic infrastructure typically includes transport (e.g. ports, airports, roads, bridges, tunnels, parking); utilities (e.g. energy distribution networks, storage, power generation, water, sewage, waste); communication (e.g. transmission, cable networks, towers, satellites); and renewable energy. Social infrastructure includes: schools and other education facilities; healthcare facilities, senior homes; and defence and judicial buildings, prisons, stadiums. In addition to the physical characteristics there are other elements that further define the infrastructure investment opportunity such as the contractual approach, the phase of asset development (Greenfield vs. Brownfield) and stage of development of the market.

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¹ See for instance Della Croce (2011).

² See WEF (2010).

Figure 1. Classification of infrastructure

Economic Infrastructure			Social Infrastructure
Transport	Energy & Utility	Communication	
•Toll Roads	•Gas Distribution Storage	•Cable networks	•Healthcare
•Ports	•Electricity Distribution Generation	•Satellite systems	•Education
•Airports	•Water Treatment Distribution		•Social Housing
•Rail	•Renewables		•Waste treatment

Source: (OECD 2011c)

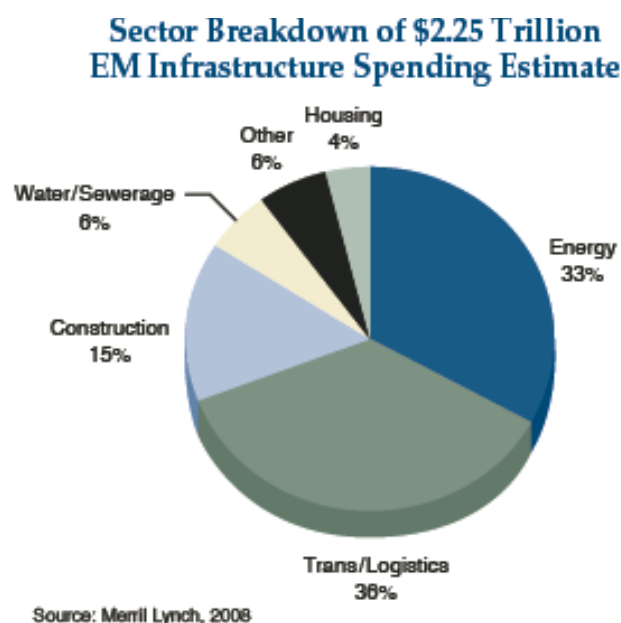
Demand for such infrastructure is only set to increase – driven by economic growth, urbanisation, technological developments and climate change.³ Yet there is already a gap in infrastructure systems not only in OECD countries (where the infrastructure stock is ageing and in need of replacement), but even more so in the developing world.

The OECD report on ‘*Infrastructure to 2030*’ (OECD 2008), estimated global infrastructure requirements to be in the order of USD 50 trillion. The International Energy Agency also estimated that adapting to and mitigating the effects of climate change over the next 40 years to 2050 will require around USD 45 trillion or around USD 1trillion a year.⁴ Developing countries needs are particularly broad (see Figure 2 below).

³ Transitioning to a low carbon and climate resilient economy and more broadly ‘greening growth’ will require shifting from fossil fuels and resource intensive and polluting technologies to newer clean technology and infrastructure (on the current trajectory, energy-related emission of CO₂ are expected to double by 2050). Green growth can be seen as a way to pursue economic growth and development while preventing environmental degradation, biodiversity loss and unsustainable natural resource use. It aims at maximising the chances of exploiting cleaner sources of growth, thereby leading to a more environmentally sustainable growth model (see OECD’s work on Green Growth http://www.oecd.org/document/10/0,3746,en_2649_37465_44076170_1_1_1_37465,00.html)

⁴ See (IEA 2008). The estimate is that around half the investment will involve replacing conventional technologies with low-carbon alternatives with the remainder being additional investment.

Figure 2: Estimated infrastructure investments in developing countries 2009-2011



Source: (Hall 2009)

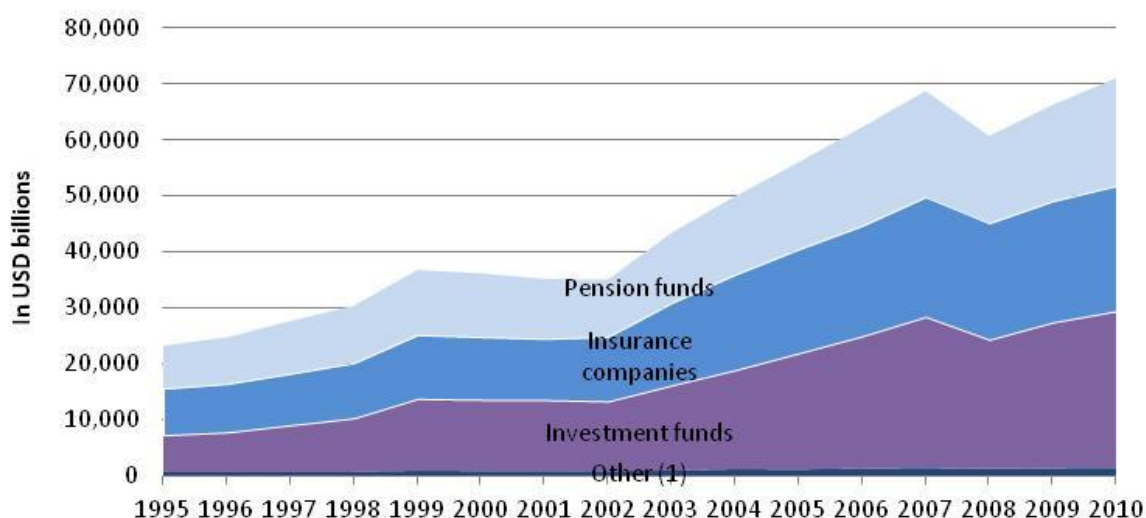
Yet, at the same time as infrastructure investment needs grow, public finances around the world are increasingly under strain. In addition, traditional sources of private capital, such as banks, have restrained credit growth since the financial crisis and may be further constrained in the coming years when new regulations (e.g. Basel III) take effect. Bridging the looming infrastructure gap will therefore require innovative approaches to financing and accessing and encouraging private capital to become involved in these projects.

There are numerous potential alternative sources of financing for infrastructure, from state development banks, to Sovereign Wealth Funds (SWFs), as well as institutional investors such as pension funds, insurance companies, mutual funds and endowments.

Institutional investors could play a more active role in financing infrastructure in the future. With over USD70 trillion in assets held at the end of 2010 in OECD countries alone (see Figure 3), institutional investors could be key sources of capital, financing long-term, productive activities that support sustainable growth. With USD 28 trillion in assets held by private pension funds in OECD countries, and annual contribution in-flows of around USD 960bn,⁵ pension funds could be key sources of capital.

⁵ OECD Global Pension Statistics.

Figure 3. Assets held by institutional investors in the OECD area, USD billions, 1995-2010



1. Other forms of institutional savings include foundations and endowment funds, non-pension fund money managed by banks, private investment partnership and other forms of institutional investors.

Source: OECD Global Pension Statistics and Institutional Investors databases, and OECD estimates.

While the potential for pension fund investment is high, there are also key considerations to be made with respect to the potential returns and risks that pension funds may be exposed to when investing in this relatively unexplored asset class. In this sense, it is critical for pension fund regulators to monitor these investments carefully and that pension funds have appropriate governance and risk management mechanisms in place and are able to properly assess the risk/return profile associated if they consider these investments.

The report is structured as follows. Section II discusses the challenges and opportunities faced by institutional investors, and in particular pension funds, when investing in the infrastructure sector. Section III presents a summary of the evidence on pension fund infrastructure investment in “new” markets. Section IV provides some policy lessons to facilitate investment flows. The last section concludes.

II. Infrastructure investment from a pension fund perspective

The infrastructure sector has a number of attractions for pension funds and other long-term investors. As a public good, with high upfront capital costs, it is often associated with regulated, stable and inflation-linked revenue flows (at least in the operational rather than construction phase of projects). Consumer demand also tends to be relatively price inelastic and the operational life of infrastructure projects can run into decades, in line with the investment horizon of pension funds.

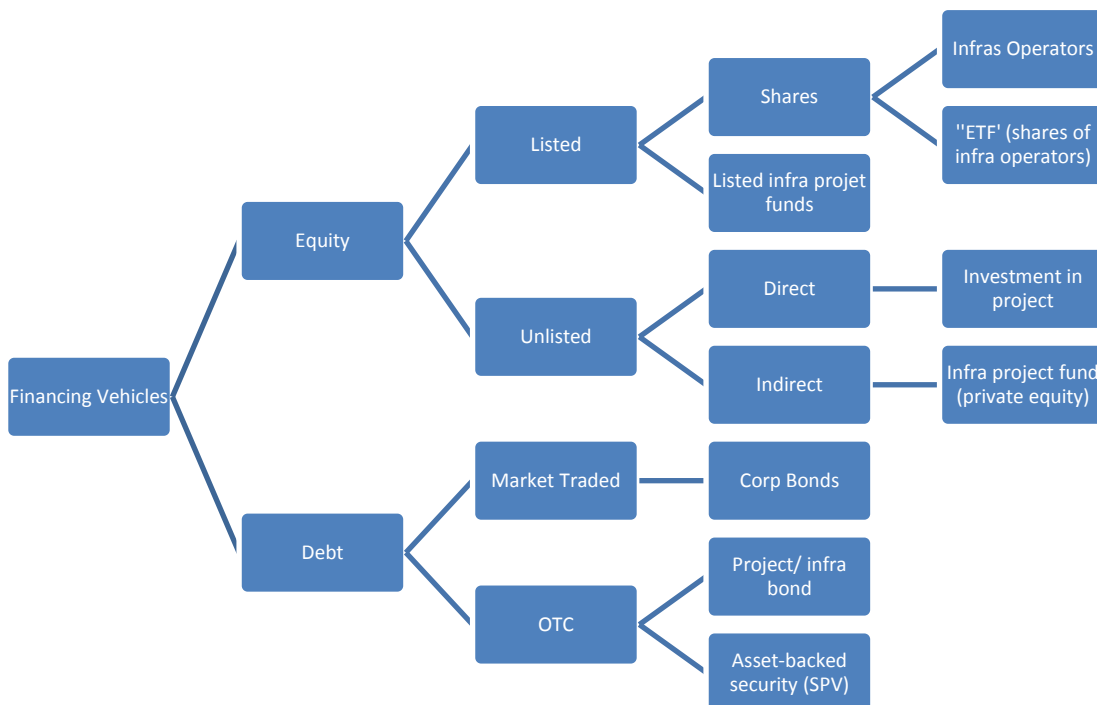
Pension funds can invest in the infrastructure sector in two main ways. They can invest in the listed equity and bonds of infrastructure corporations (including utilities) as well as the general-purpose bonds and covered bonds⁶ issued by governments and banks, who are respectively the main investors and lenders in infrastructure projects. The shares of these companies can also be bundled together in sector or thematic

⁶ A covered bond is corporate bond with one important enhancement: recourse to a pool of assets that secures or "covers" the bond if the originator (usually a financial institution) becomes insolvent.

‘exchange traded fund’ type vehicles. However, ‘listed infrastructure’ tends to move in line with broader market trends and may therefore be considered part of the mainstream, traditional asset classes.⁷

From a portfolio investment perspective, the main attraction of infrastructure and what differentiates it from mainstream investments lies in unlisted infrastructure equity, and infrastructure debt instruments and asset backed securities issued by special purpose (unlisted) entities established to finance specific infrastructure projects (see Figure 4 below). The defining financial characteristics of infrastructure project investments are low liquidity and long-term pay-offs. It also generally offers lower correlations with the traditional asset classes than indirect infrastructure investments and hence greater diversification opportunities. These investments may also generate yields in excess of those obtained in the fixed income market though with potentially higher volatility. It is these characteristics which make infrastructure investments potentially attractive to institutional investors, and can assist with liability driven investment given their long time frame and can provide duration and inflation hedging.⁸

Figure 4: Main financing vehicles for infrastructure investment



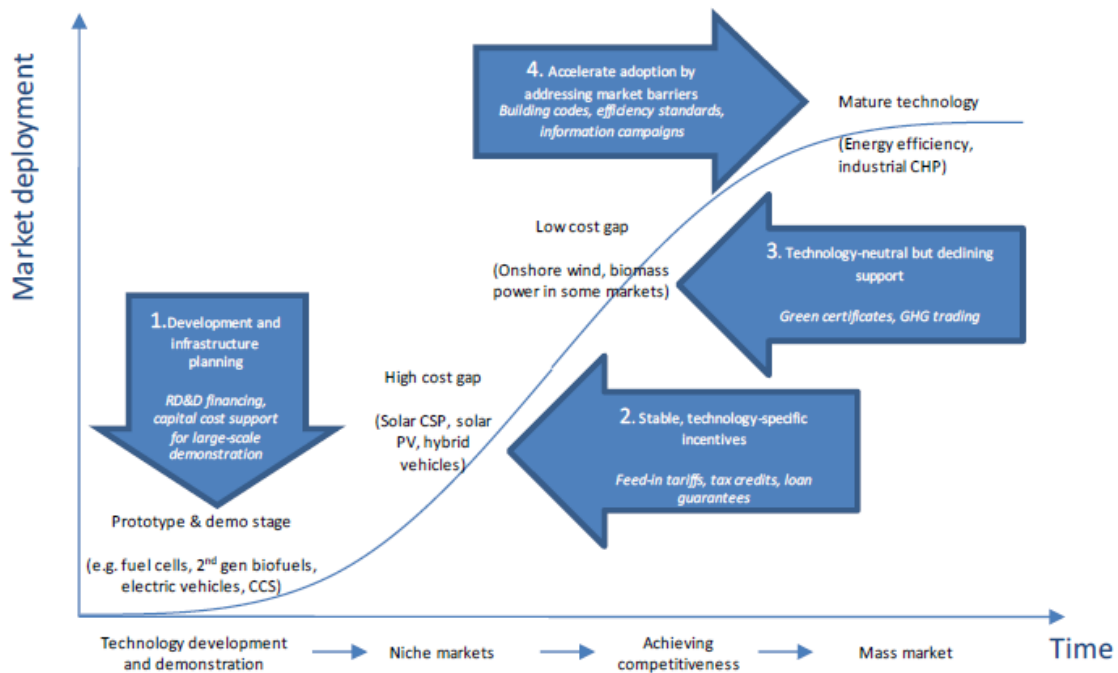
Source: Authors

As well as differing by type of financing vehicle, pension funds’ investments in infrastructure also differ according to the type of project involved. Though some pension funds – mostly larger, more sophisticated investors - are able to invest at the riskier end of the spectrum (i.e. greenfield projects, untested technologies etc.), this will only ever constitute a small percentage of their portfolios. In general, pension funds prefer to invest in large, mature operating assets that already generate cash flow (see example in Figure 5 below for renewable energy projects).

⁷ The exception to this rule is ‘infrastructure project funds’, where assets in different infrastructure projects are put together in a listed fund – such as those offered by the infrastructure company Macquarie. These instruments move more with the infrastructure sector than the listed equity markets. However, since the global economic crisis, less funds of this nature have been listed and most operate on an unlisted basis.

⁸ Pension Consulting Alliance

Figure 5: Market Development Renewable Energy



Source: (IEA 2010), (Kalamova et al 2011) Note: The figure includes generalised technology classifications: in most cases, technologies will fall into more than one category

However, despite the potential attraction of unlisted and project debt infrastructure investments, in practice, pension funds’ asset allocations remain limited - less than 1% of assets under management on average across the OECD - and mostly restricted to the largest funds in a few of the most developed pensions markets in the world. The largest Australian and Canadian pension funds have the highest allocations to infrastructure, between 5-15% of total assets. Scandinavian pension funds also have allocations above the OECD average, at around 3% on average across the region.

The 2009 OECD Working Paper ‘*Pension Fund Investment in Infrastructure*’ (Inderst 2009) discusses various factors that affect pension funds’ investment in infrastructure projects. These include a lack of knowledge and experience with infrastructure investments (including direct investment and other investment vehicles used), a lack of transparency and data related to infrastructure investments, potentially high fees, additional risks relating to such investments (including regulatory, social and political risks), and other regulatory constraints (by asset class, due to liquidity and diversification requirements, solvency constraints etc.) The paper concludes that governments have a role to play in ensuring that attractive opportunities and instruments are available to pension funds and institutional investors in order to be able to tap into this source of capital.

A more recent OECD paper (Della Croce 2011) followed up on this work, identifying similar barriers – in terms of a lack of investment opportunities, investor capability and unsupportive conditions for investment (see Table 1). In particular, one key risk for infrastructure investors to consider is regulatory change (or, more broadly, political risk), such as changes in the guarantees, subsidies and pricing conditions offered by the state for these projects.

Table 1: Barriers to Pension Fund Investment in Infrastructure

<p>Problems with Government Support for Infrastructure Projects</p>	<ul style="list-style-type: none"> • Lack of political commitment over the long-term • Lack of infrastructure project pipeline • Fragmentation of the market among different levels of government • Regulatory instability • High bidding costs
<p>Lack of Investor Capability</p>	<ul style="list-style-type: none"> • Lack of expertise in the infrastructure sector • Problem of scale of pension funds • Regulatory barriers • Short-termism of investors
<p>Problems with Investment Conditions</p>	<ul style="list-style-type: none"> • Negative perception of the value of infrastructure investments • Lack of transparency in the infrastructure sector • Mis-alignment of interests between infrastructure funds and pension funds • Shortage of data on infrastructure projects

Source: adapted from Della Croce (2011)

Infrastructure investing in developing economies adds yet further layers of complication – even for the world’s largest pension funds which are leading infrastructure investors. On top of pension fund managers and trustees not being familiar with the asset class, they are also unlikely to have specialist knowledge of developing economies and project investment in these regions. Furthermore, infrastructure investments in developing countries tend to be of the “greenfield” type, involving construction risk, as opposed to the lower risk “brownfield” projects found in the more mature OECD economies. Finally, Infrastructure projects in developing countries involve additional risks – such as country, political, regulatory and currency risks – which need to be investigated and mitigated.⁹

These challenges explain why so far very few OECD pension funds have ventured into the unlisted infrastructure sector of emerging markets, even though overall allocations to emerging market assets is rapidly increasing.

In addition to this ‘North-South’ investing, domestic pension funds in developing economies could provide an important source of infrastructure and development capital in their own countries. It could be argued that they are better placed to make such investments, having closer knowledge of local markets and projects and no currency risk or overseas investment restrictions. ‘South-South’ investing is also likely to rise in importance, with pension funds, SWFs and other institutional investors supplying much needed capital to their regions and to other emerging markets.

III. Pension funds and infrastructure investment in emerging markets

Traditionally, infrastructure investments in developing countries have been conducted by a combination of local public sources, multilateral agencies and foreign aid agencies. The private sector has been a small player, with one notable exception, the telecommunications sector. With the growing interest in emerging markets and infrastructure as a new asset class, institutional investors – and specifically pension funds - are emerging as a potentially major source of funding for infrastructure projects in developing countries.

⁹ (NEPAD/OECD 2009a) discusses risk mitigation techniques in an African context. See also (World Bank 2007).

This section reviews investment in unlisted infrastructure in by pension funds both outside and within new markets, covering major economies in Asia, Latin America and Africa.

“North-South” pension fund investing

The largest pension funds are found in OECD countries such as Australia, Canada, the Netherlands, the United Kingdom and the United States. Predictably, the funds with the largest infrastructure project allocations can be found in some of these countries, as these investments require large outlays and specific market knowledge and management expertise (see Table 2). Emerging markets are an increasingly appealing destination for these pension funds’ assets. However, up to now, infrastructure investment in emerging markets has been off limits for all except some of the more adventurous pension funds (see Box 1).

Table 2: Largest Investors in Unlisted Infrastructure (committed as of Dec 2010)

<i>Investor (Country base)</i>	<i>Assets (USD bn)</i>	<i>Investor type</i>
OMERS (Canada)	15.5	Public pension fund
AustralianSuper (Australia)	11.5	Private sector pension fund
Corp. Andina de Fomento (Venezuela)	8.4	Government agency
Ontario Teachers’ Pension Plan (Canada)	7.0	Public pension fund
Industrial Development Bank of India	6.8	Investment bank
Khazanah Nasional (Malaysia)	6.7	Sovereign Wealth Fund
CPP Investment Board (Canada)	6.0	Public pension reserve fund
TIAA-CREF (United States)	5.9	Private sector pension fund

Source: OECD, Preqin

In the past, pension fund have primarily used pooled vehicles, such as infrastructure funds, to invest in the unlisted part of the sector. These vehicles led to some disappointment as they were often highly leveraged, charged high fees, and had a short time span of less than 10 years, compared to the 25-30 years of a typical infrastructure asset.

As a result, large pension funds are increasingly looking to become direct investors in infrastructure projects. The Canadian and Australian pension funds have been leaders in direct investment, but so far they focus of their investments has been mature, developed markets. The few investments made by Canadian and Australian pension funds outside such markets have been directed at the Latin American renewable energy sector (primarily wind and hydro, see Box 1) and mainly on “brownfield” projects, once construction is completed.

Smaller pension funds are also finding opportunities to co-invest in infrastructure by joining the infrastructure funds set up by their larger peers. For instance, Australian superannuation funds jointly own an infrastructure asset manager, IFM. Borealis, the infrastructure asset manager owned by OMERS offers third party asset management service, as does PGGM, the Dutch pension fund manager owned by the second largest pension fund in the Netherlands (PFZW). As the infrastructure funds managed by these institutions grow and hands-on experience builds up, exposure to emerging markets is likely to increase.

Opportunities for cross-pension fund collaboration are more limited in other large, developed pension markets like the United Kingdom and the United States. Pension funds in these countries are more likely to continue relying on traditional infrastructure funds offered by commercial assets managers, particularly for

any emerging market investment. For those starting in the sector, pooled vehicles offer diversification and access to investment management expertise on new markets. So far, however, the major infrastructure asset managers have a very limited offer of unlisted emerging market infrastructure funds. For instance, Macquarie's Global Infrastructure Funds are primarily invested in OECD countries, with some exposure to some of the more developed non-OECD countries and jurisdictions, like Singapore and Hong Kong-China

The International Finance Corporation (IFC) is seeking to raise USD800bn from institutional investors, including pension funds, and co-invest an additional USD200bn (for a total fund of USD1bn) to channel financing into unlisted equity instruments and equity-like instruments in infrastructure projects and companies in emerging markets, particularly non-BRIC countries, which are generally underserved by foreign infrastructure investors.

Box 1. North-South Pension Fund Investment in Infrastructure

Australia: Australian superannuation funds invest in infrastructure primarily via infrastructure funds managed by IFM, a specialist investment management company wholly owned by the superannuation funds. IFM was established in 1995 and manages assets with a total value of over AD30 billion (as of December 2011). A small part of its portfolio is invested in emerging markets. For instance, IFM is the single owner of Pacific Hydro, a renewable energy (hydro and wind) operator in Australia, Brazil and Chile that was delisted from the Australian stock exchange in 2005. Pacific Holdings' first investment in Chile dates from 2004, while its first investment in Brazil dates from 2007. It pioneered the wind energy market in Brazil through the construction of two of the country's first wind farms – Millenium and Vale dos Ventos – on the northeast coast. Pacific Holdings accounts for about 12% of the infrastructure portfolio of AustralianSuper, one of the larger industry superannuation funds in the country.

Canada: The largest Canadian pension funds remain primarily focused on deals originating in North America and Western Europe (and will continue to do so in the near term) – they look at other regions on an opportunistic basis if they offer stable regulatory, economic and political environments. Some prominent deals have been made by Canadian pension funds, such as OTTP, OMERS and CPPIB. OTTP was one of the first OECD pension funds to invest in Latin American unlisted infrastructure when it bought three Chilean water companies in 2007. OTTP also owns 50% of a Chilean electricity transmission and distribution company. In 2012, the Canada Pension Plan Investment Board invested over \$1.1bn in five major Chilean toll roads. Canadian pension funds have also been courted for investment in Indian infrastructure projects. The Union Road Transport and Highways Minister invited Canadian pension funds (such as Ontario Teachers) and financial institutions to participate in the National Highway Development Project (NHDP) in 2010.³

Netherlands: PFZW (the pension fund of the Dutch healthcare sector)¹ invests in infrastructure via the PGGM Infrastructure Fund, which was established in January 2010. The fund invests in unlisted infrastructure equity. PGGM, the asset manager wholly owned by PFZW, acts as the fund's GP while PFZW and other Dutch pension funds are the LPs. The PGGM Infrastructure Fund has over €1.25bn in assets under management, of which about 5% is in emerging markets infrastructure funds managed by third parties (e.g. an India-specific infrastructure fund). The fund has a target for emerging markets infrastructure exposure of 25% by 2015. Among the new destinations for its investments, it is monitoring opportunities in China (via infrastructure funds launched by managers such as Macquarie²) (OECD 2011c). APG opened an office in Hong Kong on 2007 in order to expand its infrastructure and real estate portfolios.

Notes

1 'Dutch pension provider scouts China for infrastructure deals' IPE 3/2/11 http://www.ipe.com/news/dutch-pension-provider-pggm-scouts-china-for-infrastructure-deals_39061.php?s=scouts%20China%20for%20infrastructure%20deals

2 'Macquarie, Everbright say China Infrastructure Fund hits \$729m' China Daily 14/6/2011 http://www.chinadaily.com.cn/bizchina/2011-06/14/content_12695403.htm

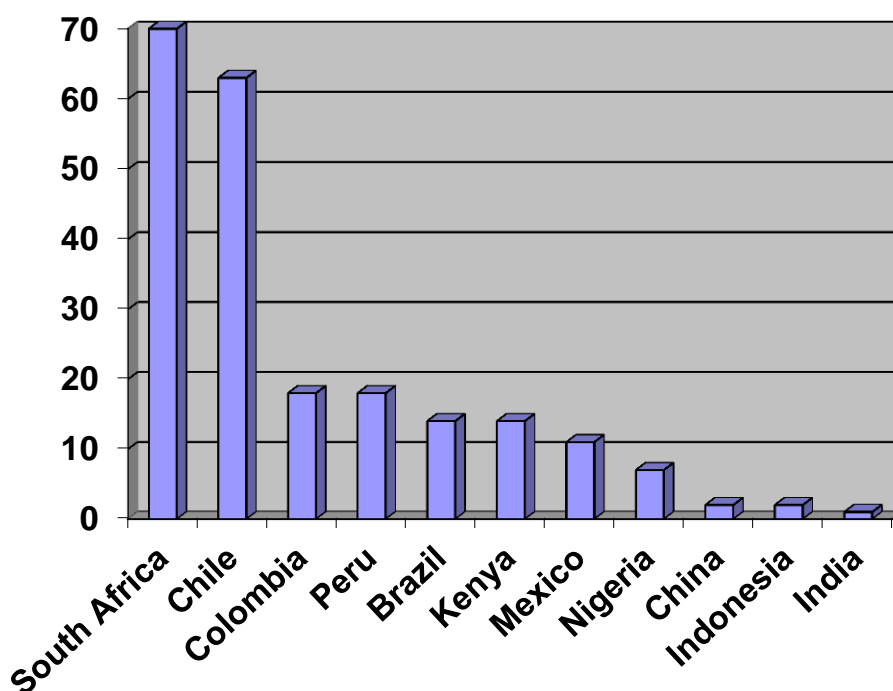
3 'About Infrastructure Projects and Pensions' Infra PPP Blogs India 31/3/2010 <http://pppinfraindia.blogspot.com/2010/03/about-infrastructure-projects-and.html>

Domestic and “South-South” pension fund investing

While the world’s largest pension funds are slowly waking up to the opportunity offered by infrastructure projects in fast growth economies, domestic investors in these countries, particularly pension funds and Sovereign Wealth Funds (SWFs)¹⁰, have been active in the sector for some time and are expected to become major players as assets continue growing at a fast pace, investment regulatory regimes are further liberalised, and infrastructure projects become better structured and regulated.

Some countries in Latin America have managed to establish large pension fund industries, in both absolute terms and in relation to the size of their economies. As shown in Figure 7, in December 2010, Chile’s pension funds had accumulated assets equivalent to 63% of its GDP, followed by countries such as Peru and Brazil with asset-to-GDP ratios close to 20%. On the other hand, pension funds and PPRFs are generally underdeveloped in low and middle-income Asian countries. One of the largest is the Chinese National Social Security Fund (NSSF) which had over USD126bn in assets as of December 2010, equivalent to about 2% of the country’s GDP. In these Asian countries, SWFs are by far the main institutional investors. African countries in general have small pension fund industries, with one main exception, South Africa, which has an asset-to-GDP ratio similar to Chile’s, at 70%.

Figure 7: Pension funds’ assets as a % of GDP, 2010



Source: OECD Global Pension Statistics, AIOS Statistical Bulletin No. 24, December 2010, Brazilian Ministry of Social Security.

¹⁰ While this paper focuses on pension funds, SWFs are also increasingly active infrastructure investors. As shown in Table 2, the Malaysian SWF, Khazanah Nasional, is one of the largest infrastructure investors in the world. It invests both locally and internationally through four main wholly owned subsidiary firms (infrastructure operators and construction companies).

As shown in Table 2, Latin American and South African pension funds also have the highest allocations to infrastructure projects, as high as 3% of total assets in countries such as Peru and Mexico, and 4% in South Africa (target allocation of the Government Pension Fund which accounts for more than half of the South African pension fund market). Countries with no pension fund allocation to infrastructure include China, India, Indonesia, and Nigeria. The total allocation to unlisted infrastructure in the surveyed countries amounted to USD 14.7bn in December 2010. The type of investment vehicle varies across countries, with infrastructure bonds being the preferred instrument in Chile and Peru while in Mexico most investment in infrastructure is channelled via a type of structured security.

Table 3 also shows the main investment restrictions affecting pension fund investment in infrastructure projects. Most countries set the ceiling at around 10% of total assets and restrict investments to infrastructure bonds and unlisted infrastructure equity funds. Direct investment in unlisted infrastructure is only permitted in Kenya and South Africa (5% ceiling).

Table 3: Pension Funds' Investment in Infrastructure Projects, 2010

Country	Total assets under management (USD bn)	Infrastructure Asset Allocation (USDbn, % AUM)	Infrastructure investment limit (% AUM)	Main Local Infrastructure Investment Vehicle
Brazil	340.0	1.0 (0.3%)	20% in infrastructure (PE) funds	Infrastructure company Private equity funds (FIPs)
Chile	135.0	2.0 (1.5%)	No specific limit for infrastructure	Infrastructure bond
Colombia	51.7	0.6 (1.2%)	15% in infrastructure bonds. 5% in unlisted infrastructure equity funds.	Private equity Infrastructure bonds
Mexico	112.1	3.7 (3.3%) - includes real estate and private equity	20% in infrastructure structured products (CKDs) and REITs (FIBRAs).	Structured product
Peru	24.6	0.9 (3.7%)	Infrastructure investments are treated as part of the overall equity and bond investment ceiling. Equity ceiling ranges from 10% to 80% depending on the fund type. Corporate bond ceiling ranges from 70% to 100% depending on the fund type.	Infrastructure bond Infrastructure (private equity) fund

China	168.0		Only the National Social Security Fund can invest in infrastructure projects (10% in PE infrastructure funds, 20% in trusts – used for infrastructure investments).	Infrastructure trusts
India	70.0	0 (0%)	Infrastructure investments are currently prohibited.	No investments to date.
Indonesia	16.0	0 (0%)	Infrastructure investments are currently prohibited.	No investments to date.
Kenya	5.5	0.1 (2%)	5% in unlisted equity; 30% in corporate bonds (including infrastructure bonds)	Infrastructure bonds
Nigeria	13.5	0 (0%)	5% via funds, 15% in infrastructure bonds (since 2010)	No investments to date
S. Africa	160.0	6.4 (4%)	5% in unlisted equity.	Infrastructure bonds Infrastructure equity fund

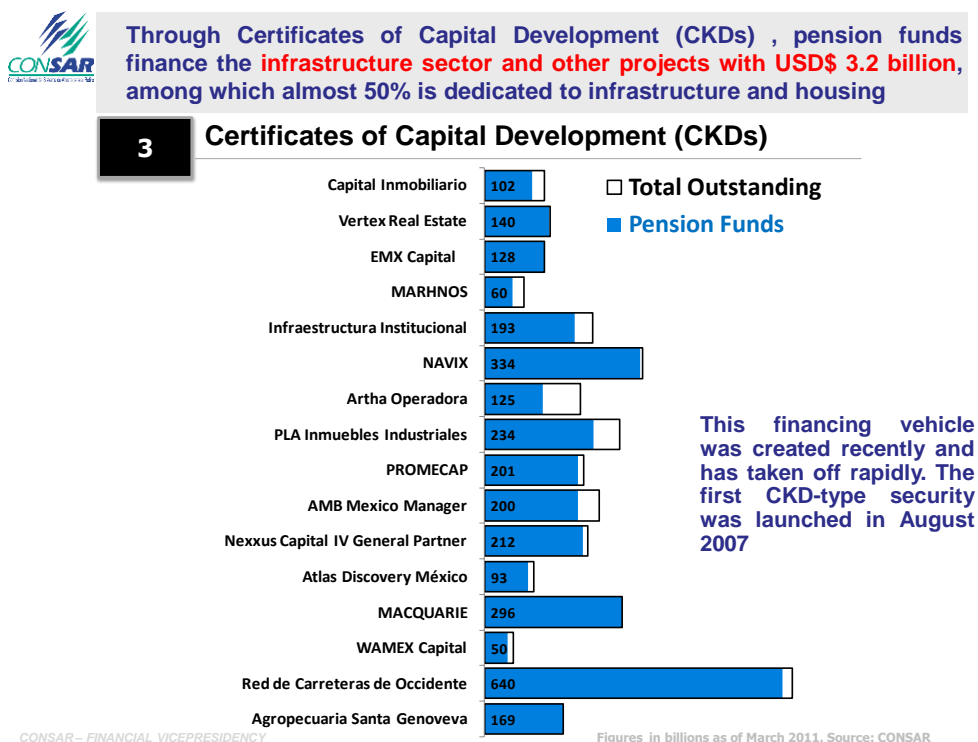
The success of infrastructure bonds in Chile and Peru stems partly from the various guarantees present. The Chilean regulator was the first to allow investment in unlisted infrastructure in 1998, via project bonds. These bonds used to be fully-guaranteed by international insurance companies (monoliners), raising their credit rating (mostly to AAA) and turning them investable from the pension funds' perspective. The concession's operator also benefited from a minimum revenue guarantee from the state. The departure of the monoliners during the financial crisis led to an increase in the yield on these bonds. As a result, there was a sharp reduction in the issuance of these bonds after 2006.

Peruvian pension funds were first allowed to invest in infrastructure bonds in 2001. The infrastructure project bonds are issued by the project operator as the project advances and carry a government certificate of completion of the stage of the project (Certificate of Recognition of Annual Payment for Works – *Certificados de Reconocimiento del Pago Anual por Obras, CRPAOs*). Peruvian pension funds have also established an infrastructure trust fund to invest in project debt. Take-up of these bonds has been relatively fast (3% of assets by December 2010) especially considering that complementary regulations regarding the concession system were only implemented at the end of 2008.

Mexican pension funds were allowed to invest in infrastructure projects in 2008, via structured products called 'Certificates of Capital Development' (CKDs). These products provide a dividend linked to the project's revenue. They were created specifically for institutional investors such as pension funds in order to allow them to invest in the sector while ensuring risk mitigation and some degree of liquidity. The

securities are quoted on the Mexican stock exchange, but are rarely traded. Originally, these instruments offered principal protection and were therefore treated as debt securities, requiring their risk rating. The guarantee was removed but they are still treated for regulatory purposes as structured products. As shown in Figure 8, pension funds practically own the totality of the stock of CKDs, about USD3.2bn in December 2010. In addition, they also invested USD15mn in Mexican Real Estate Investment Trusts (REITs), known as FIBRAs in Mexico.

Figure 8: Mexican Pension Funds' Investment in CKDs (Dec 2010)



Source: CONRSAR

Infrastructure project investing via unlisted equity is in general less popular in Latin America, in part because investment restrictions require funds to use private equity funds, which can be relatively expensive. The ceiling on such indirect investment is also relatively low, at 5% of total assets in Colombia for example. The actual investment as of December 2010, however, was only 1% of Colombian pension fund assets, or USD 450mn, which shows that even such low ceilings are generally not binding. Colombia contrasts with Chile and Peru in that most infrastructure project investment was via equity rather debt.

Practically the total investment by Chilean pension funds in infrastructure projects (USD 2.0bn in December 2010) was in the form of infrastructure bonds. Of the USD 850mn invested by Peruvian pension funds in infrastructure projects, only about USD 130mn (15% of the total) was invested in unlisted infrastructure equity (private equity funds). Among the four infrastructure / private equity funds, there is a USD 500mn, 12-year infrastructure investment fund established by the government at the beginning of 2009. It is expected that Peruvian pension funds will invest up to USD300mn in this fund (USD200mn committed as of mid-2011), thus becoming the main investor group in this fund. Most of the financing is expected to go towards roads, ports and airport construction, loss provisioning works and electricity and gas projects, with an investment period varying between 15 and 30 years.

In Brazil, most infrastructure project investment (USD 1bn as of December 2010) is channelled through private equity investment funds (fundos de investimento em participações – FIPs), through investments conducted by subsidiary companies (empresas participadas) or through direct ownership, such as the investment of Invepar, an infrastructure company owned and controlled by the three largest pension funds in the country, PREVI, Petros and FUNCEF. PREVI, the largest pension fund in the country, invests around 0.7% of its total resources in unlisted infrastructure through FIP's and subsidiaries like Invepar, Log-In and Neoenergia.

Despite the relatively small commitments to infrastructure project investments, Latin American pension funds are way ahead of their Asian counterparts, who are by and large state-controlled, and invest mainly in government instruments and bank deposits. The money lent to the government may fund infrastructure projects but the pension fund itself has no control over the choice of projects. A recent example of such form of financing is Sri Lanka, where the government recently tapped into public pension funds to partially fund new power stations. While pension funds are protected from low returns by investment return guarantees on the funds lent to government, this *modus operandi* is opaque and potentially wasteful. The government effectively uses the pension funds as a form of cheap financing (paying below-market interest rates to the pension funds), and the infrastructure projects are not subject to the necessary scrutiny.

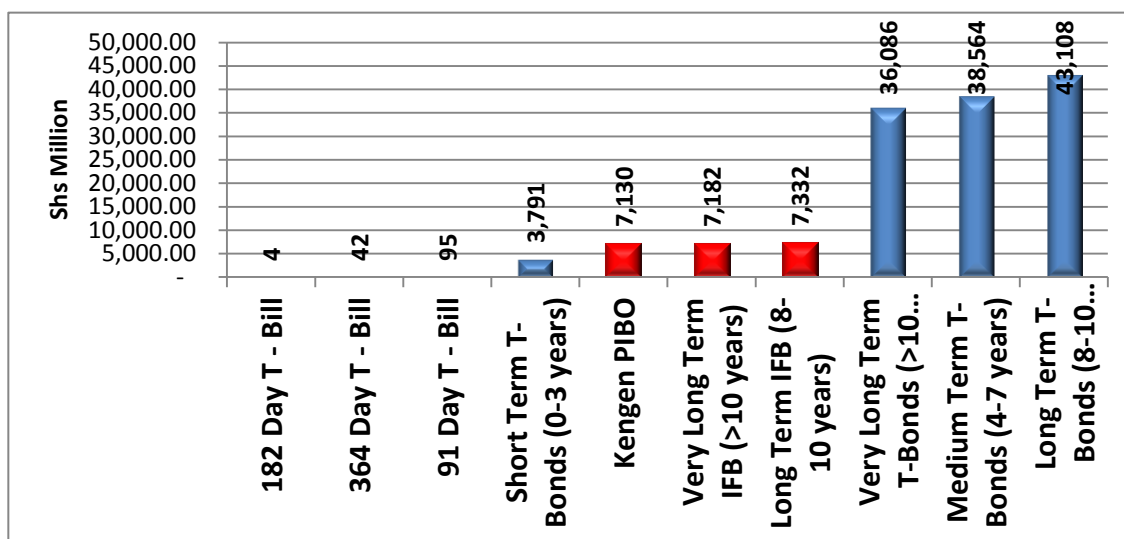
Only countries with a highly educated and largely corruption-free civil service, like Singapore, have been able to structure this financing model in a way that has ensured the delivery of commercially-viable projects. One key step taken in Singapore to ensure a successful outcome was the establishment of two autonomous, state-owned asset managers (SWFs), Government Investment Corporation (GIC) and Temasek, with a strong commercial mandate. In particular, GIC has been the recipient of the large contributions paid by employers and employees into the Central Provident Fund, the country's national savings system for pensions, health and housing. It will be interesting to see whether China's National Social Security Fund (NSSF) – which has been fashioned after institutions such as GIC and Temasek - will become a major infrastructure investor. Certainly, infrastructure needs in the country are already well covered by the state-owned banks, but NSSF could become a major source of infrastructure financing for the region and other emerging markets.

Pension fund investment in infrastructure is also being considered in India and Indonesia, two major economies with huge infrastructure needs. In India, the government recently decided that pension and insurance funds should be able to invest in the infrastructure sector via Infrastructure Debt Funds, which would use credit-enhancement mechanisms to ensure the highest rating, as required by investment rules. Currently, the main pension fund in the country, the Employees' Provident Fund can only invest in government bonds and bank deposits. A similar restriction applies to Jamsostek, the Indonesian pension fund for civil servants. Proposals to support private sector financing of infrastructure in Indonesia have been put forward, including the setting up of an infrastructure bank. In addition, the Chamber of Commerce also asked the government to encourage and provide guidance for domestic institutional investors such as insurance agencies, pension fund managers and social security to support the financing of infrastructure projects, including via infrastructure bonds.

In Africa, with the main exception of South Africa, pension funds are at an early stage of development and infrastructure project investments are practically non-existent and highly restricted by regulations. However, change is under way. For instance, Kenya is looking to the pensions industry to fund the country's infrastructure and domestic needs. Since 2009 the Government has issued five Infrastructure Bonds targeted at specific infrastructure projects. The bonds with maturities ranging from 8 – 20 years have been packaged with additional incentives as compared to the normal Government Bonds. These include exemption from withholding tax on interest payments, qualification for statutory liquidity requirements for financial institutions and higher agency commissions. These bonds have been popular

with pension funds which have taken significant portions of the total issue (see Figure 9). In addition, a Kenyan energy generating company Kengen Ltd. issued an infrastructure bond in 2009 to fund a number of new projects. The bond was able to raise KES 25 billion against a target of KES 15 billion. Pension schemes accounted for around 40 percent of the total take up of the bond at issue.

Figure 9: Kenyan Pension Fund Investment in Government Securities – including Infrastructure Bonds (Dec 2010)



Source: Retirement Benefit Authority

Nigeria liberalised its investment regime in December 2010, for the first time allowing investments in infrastructure through bond/ debt securities (with a portfolio limit of 15% of assets under management) or via fund structure (portfolio limit 5%). Pension fund investment in infrastructure assets, however, still face challenges, notably regulatory instability and political risk.

South African pension funds have had the longest experience investing in infrastructure, generally via subscription bonds (e.g. those issued by the South African National Road Agency Limited - SANRAL - financing the South African major highway system). Pension funds also invest in infrastructure through unlisted funds and specialist bond funds. The Public Investment Commission (PIC) recently created a multi-billion dollar, 25 year, Pan Africa Infrastructure Development Fund (PAIDF) to mobilize local and international investment in infrastructure development in Africa. Investors in the fund include South Africa's Government Employees Pension Fund, as well as insurance companies involved in managing pension funds and the Ghanaian Social Security and National Insurance Trust (SSNIT).

The Government Employees Pension Fund (GEPF) – which accounts for more than 60% of total South African pension fund assets - also recently unveiled a plan to invest around 4% (R28bn or USD4bn) of its R800bn (USD101bn) in infrastructure, as part of what it calls 'high impact, high returning, developmental investing (DI). The focus will be on energy and clean technology projects and those others that offer employment opportunity in both South Africa and other African countries. However, the proposal has not been without controversy, given the risks involved in the projects (for example there have been delays in the building of new power plants in the country) and the danger that the investments will be made on political or social grounds rather than a financial basis.

IV. Key Lessons and Policy Recommendations

As can be seen from the previous sections, some countries are more advanced than others in terms of utilizing both international and their own pension funds' resources to fund infrastructure projects. Such investments can help pension funds meet their long-term return objectives, while at the same time contributing to the country's economic development. What lessons can other countries looking to tap this important potential source of funding learn from their experience?

1. Ensure a Stable and Transparent Regulatory Environment for Infrastructure Projects

In order for the private sector to provide long-term financing to the infrastructure, it is critical to ensure that there is a stable and transparent regulatory framework in place for such projects. Domestic and foreign investors will provide funding as long as they can be sure that retroactive changes in the rules (e.g. feed-in tariffs) are unlikely and can at any rate be disputed in independent courts.¹¹ Private sector participation in the infrastructure sector also necessitates a smooth process for granting concessions, a problem that has thwarted the sector in some countries such as Peru, where the contractual process for a road concession can last up to 5 years and involves more than 20 government departments. One of the most important infrastructure investments by Peruvian pension funds, the Taboada water treatment plant, was severely delayed as the concession was suspended for a period of time.

Chile's regulatory stability and transparency for infrastructure projects are probably the main reason why foreign pension funds, particularly Australian and Canadian have focused their Latin American investments in this country. In particular, the concession system for toll roads has a thirty-year history that has benefited from the country's political stability and the government's high credit rating, as well as the various public and private guarantees in place. Furthermore, pension fund toll road investments in Chile typically involve the expansion and improvement of existing infrastructure which further reduces risks.

For foreign investors, political and regulatory risk remain a major concern to infrastructure investment in emerging markets, especially as such investments can run over decades and be relatively illiquid. Risks are highest when new infrastructure is being built. Such risks can be addressed to some extent by multilateral guarantee schemes, such as the Multilateral Investment Guarantee Agency (MIGA), which is part of the World Bank Group. MIGA projects foreign direct investment in some of the world's poorest countries against various political risks such as expropriation, breach of contract, exchange rate or capital controls, war, and terrorism.

2. Develop a National, Long-Term Strategy for the Infrastructure Sector

Investors need a clear understanding of the government's infrastructure plans beyond the political cycle. Governments should therefore develop national, long-term strategies for the infrastructure sector. A long term plan for infrastructures (a ten to twenty-year strategic plan) that sets out government commitments in the sector is essential to provide greater transparency and increased certainty for the private sector. A specific pipeline of projects also needs to be developed, ensuring a steady flow of investments opportunities.

In most countries analysed, infrastructure strategies and pipelines have fallen short of a comprehensive, long-term planning with a clear project pipeline. For instance, the Mexican National Infrastructure Plan launched in 2007 set out investment projects only up to 2012, and focused on the transport (roads) and telecommunications sectors. The Indonesian Government has announced a

¹¹ See also 'OECD Guidelines for Private Sector Participation in Infrastructure'
<http://www.oecd.org/dataoecd/41/33/38309896.pdf>

Masterplan-Vision to 2025, one of the key aspects of the strategy being strengthening connectivity-building infrastructure. However, the government is yet to identify the specific infrastructure pipeline.

3. Promote Appropriate Financial Risk Transfer in Infrastructure Projects and Investments

Much of the infrastructure development needs in developing countries are of the “greenfield” type, which involves construction risk. National governments and multilateral organisations can develop instruments to enable the transfer of demand risk inherent in such projects (particularly transportation) during the early years of operation (the initial "ramp-up" years after construction) thereby significantly improving the financial viability of the project and making the capital structure more robust. Examples of risk transfer mechanisms include feed-in tariffs for utilities and minimum revenue guarantees for toll road operators, as exist in Chile.

Risk transfer mechanisms can also benefit institutional investors such as pension funds. Investors can also benefit from tax incentives (e.g. infrastructure bonds in Kenya) and various risk transfer mechanisms (such as guarantees on debt instruments and first equity loss on investments), which can help contain financial risks and increase the attractiveness of infrastructure investments to investors.

The experience of Chile and Peru highlights the role played by external guarantors (monoliners in the Chilean case, the government in the Peruvian case) to allow pension funds to invest in infrastructure bonds.

4. Adapt Prudential Regulatory Frameworks for Pension Funds

The risks of investing in infrastructure projects can be substantial, from retroactive regulatory changes to volatility in project revenue. Policymakers need to ensure that pension funds have in place the necessary governance and risk management mechanisms to address these risks. This is particularly the case when using unlisted equity and other relatively illiquid instruments.

Pension funds in developing countries are often subject to quantitative investment restrictions, which often limit investment in infrastructure projects. While such restrictions can be justified for prudential reasons, policymakers should consider whether the market environment may be ripe for deregulating the investment environment surrounding pension funds in order to allow some infrastructure investment. In particular, with the exception of Kenya and South Africa, direct unlisted equity investments are prohibited in all countries surveyed, while indirect investments via infrastructure funds are strictly limited, with the highest ceilings at around 10% of total assets.

Requiring the use of infrastructure funds may make sense in order to ensure better risk diversification and pooling of resources. However, it can also create additional costs for pension funds in the form of higher fees and leverage than may be desirable. Some of the larger pension fund industries, in countries such as Chile, Mexico and South Africa certainly have the necessary scale to carry out direct investments in infrastructure, although the internal expertise would need to be developed.

While in the long term, a further liberalisation of the investment regime may be desirable, countries should avoid deregulating too quickly. Industry experience and markets need to be in place before such investments can be safely made. The protection of pension members must always take priority. As a result, it is preferable to phase in any deregulatory initiative, allowing listed infrastructure equity investment and infrastructure bonds first, then certain types of pooled investment vehicle in the unlisted infrastructure space, and only after a certain time opening pension fund investment to direct investments in unlisted infrastructure equity.

Given the political attractiveness of infrastructure investment, one major concern in some countries is that governments may be tempted to force or steer pension funds into investing in infrastructure projects.

Such action should be avoided at all costs. In particular, regulators should not set minimum investments in any particular asset class. Avoiding such pressures may be more difficult in public sector pension funds, given that often there are government officials present in the governing body. An independent pension fund supervisor should ensure in such cases that investment decisions are made in the best interest of beneficiaries.

Other regulations that can also affect infrastructure investment are solvency rules, valuation and performance rules, and credit rating standards. Solvency rules are applied mainly to defined benefit pension plans, which are rare in the countries surveyed. On the other hand, various countries, such as Chile, Peru and Colombia apply performance regulations, requiring pension fund managers to maintain investment returns within a certain band defined in relation to the industry average. Such regulations reinforce the natural herding instinct in investment strategies among pension funds and can discourage investment in new asset classes, such as infrastructure.

5. Create Appropriate Investment Vehicles and Collaboration

Currently, most successful experiences in infrastructure investment by pension funds in new markets have focused on infrastructure bonds (e.g. Chile, Peru) and structured products (Mexico). Such products have been created as a result of government initiatives to facilitate pension fund infrastructure investment that is consistent with the prudential regulatory framework in place. For instance, the monoliners' guarantee applied to Chilean infrastructure bonds raised their credit rating (mostly to AAA) and turned them investable from the pension funds' perspective. The Mexican infrastructure-backed structured products (CKDs) provide a principal guarantee and are listed on exchanges, ensuring a high degree of liquidity. All these initiatives are at the lower end of the risk-return spectrum, reflecting a bias for low risk and protection among governments and supervisors.

On the other hand, unlisted equity investment is as yet relatively untried in the countries surveyed, although for some foreign pension funds (particularly Australian and Canadian) this is an increasingly appealing route to infrastructure investment. Unlisted infrastructure investment has been in the past mainly channelled via specialist fund managers, through both closed-end and open-end funds. This approach has also been tried in more mature markets. However, two major challenges of such funds have been high levels of leverage and relatively high fees, often similar to those in the private equity sector. Similar problems exist in developing countries where pension investments in such instruments is permitted such as Brazil and South Africa.

In order to kick-start the unlisted infrastructure equity sector in developing countries, it may be necessary for the government and multilateral institutions to step in and provide initial capital for new funds. An example of such initiative is the USD 500mn, 12-year Infrastructure Investment Fund established by the Peruvian government at the beginning of 2009 and the multi-billion dollar, 25 year, Pan Africa Infrastructure Development Fund (PAIDF) established by South Africa's Public Investment Commission. The IFC is also planning to launch an infrastructure equity fund that will target developing countries. The advantage of such institutional backing is that by it can help introduce competition in the market and create the necessary scale by pooling resources from different pension funds. This should ultimately help reduce management fees and hence make such investments more attractive for pension funds. Government financing for infrastructure funds can also act as a market signal, increasing confidence in the sector and in the government's commitment to regulatory stability and contractual terms.

Policymakers should also allow pension funds to collaborate (both within and across borders) in establishing joint infrastructure funds, as was recently the case in Brazil and Peru, or may allow them to pool their resources in club deals. In Brazil, the three largest pension funds have collaborated to establish their own infrastructure equity fund (Invepar), ensuring a better alignment of incentives and lower fees. In

2009, the Peruvian Pension Fund Association created an Infrastructure Investment Trust that invests in infrastructure bonds (up to USD1.5bn) that are held to maturity. Oversight of the fund's investments is ensured by representatives of the four pension fund administrators that sit in the investment committee of the Trust.

6. Ensure Appropriate Valuation and Reporting of Infrastructure Investments

Valuation considerations are an important factor to consider in financing infrastructure. Valuation of securities associated to infrastructure must be based on transparent models and independent value appraisals. The latter is particularly important to avoid the conflicts of interest faced by infrastructure asset managers who do their own valuations.

Additionally, pension funds may be required to disclose their investments in infrastructure and to report their net of fees performance as well as the management fees charged by external asset managers. Such reporting may be expected to be at least implemented internally, so that the pension fund board is informed of the contribution of infrastructure investments to delivering the fund's objectives. It would also go a long way to improve accountability and promote a more cost-effective approach to infrastructure investing than is currently the case in most developing countries.

7. Promote Capital Market Development

Infrastructure assets are long-dated and therefore require access to fixed income instruments with long maturities to facilitate pricing. The absence of long-dated government and private fixed income securities in many developing countries, particularly Asia and Africa, is a major obstacle to the development of the infrastructure bond market. Some countries have made recent efforts at developing long-dated bonds, such as Kenya, where the government has issued both regular and infrastructure bonds with maturities of up to 20 years. The Latin American countries surveyed, in particular Chile and Mexico, are generally more advanced in developing fixed income markets with yield curves extending to maturities over 20 years.

Achieving an adequate level of stock market development with high degrees of transparency and sound governance can also facilitate the establishment of listed infrastructure products (as in Mexico) and funds and can serve as a useful benchmark for unlisted infrastructure investments.

V. Conclusion

Infrastructure needs in developing and emerging markets are huge. Reductions in public sector investment and new banking regulations are affecting the ability of these traditional sources of funding of the infrastructure sector. While pension funds and other institutional investors could be an important source of funding, exposure to the sector is as yet rather limited.

In the African, Asian, and Latin American countries surveyed, domestic pension funds invest more than USD 15bn in infrastructure projects, around 1.3% of the total assets managed (USD 1.1 trillion as of December 2010). Foreign pension funds, given their large size, could be a potentially major source of funding, but most have only recently started investing in infrastructure projects and have focused their attention in mature markets. Among the countries surveyed, Chile stands out as a major destination for foreign pension funds' infrastructure investments, but this is a relatively recent phenomenon.

Going forward, major changes in regulations are being planned in Asian and African countries to facilitate pension fund investment in infrastructure projects. However, success will only come about if the government also delivers a stable regulatory framework (covering PPPs), with an attractive pipeline of projects, and provides adequate risk transfer mechanisms for project operators and investors. It is also critical to ensure that pension funds make such investment decisions on their own, with the best interest of

beneficiaries in mind. Political pressures to steer pension fund investment in local infrastructure projects should be avoided at all costs. An independent pension fund supervisor should ensure that all pension funds, including public sector ones, follow prudential standards in the management of pension assets.

BIBLIOGRAPHY

- Africa Infrastructure Country Diagnostic (AICD), (2010), '*Kenya's Infrastructure: A Continental Perspective*' <http://www.infrastructureafrica.org/system/files/Kenya%20country%20report.pdf>
- Asian Development Bank (ADB), (2009), '*Infrastructure for a Seamless Asia*', Asian Development Bank Institute (ADBI)
- BBVA (2011a), '*Pension Funds and Infrastructure in Peru*', Economic Watch: Pensions, BBVA Economic Research, 20 May 2011. http://www.bbva.com/KETD/fbin/mult/PensionWatch_Peru_170511_tcm348-257264.pdf?ts=6102011
- BBVA (2011b), '*Infrastructure and Pension Funds in Brazil*', Economic Watch: Pensions, BBVA Economic Research, 14 July 2011. http://www.bbva.com/KETD/fbin/mult/PensionWatch140711_i_tcm348-262920.pdf?ts=6102011
- BBVA (2010), '*A Balance and Projections of the Experience in Infrastructure of Pension Funds in Latin America*' http://www.bbva.com/KETD/fbin/mult/WP_1003_tcm348-215241.pdf?ts=6102011
- Bhattacharyay, B. N., (2010), '*Financing Asia's Infrastructure: Modes of Development and Integration of Asian Financial Markets*', Asian Development Bank Institute Working Paper Series No. 229 <http://www.adbi.org/files/2010.07.12.wp229.financing.asia.infrastructure.pdf>
- Biau, C., Dahou, K., Homma, T., (2008), '*How to increase sound private investment in Africa's road infrastructure*' <http://www.oecd.org/dataoecd/40/23/41775855.pdf>
- Chuckun, V.S., (2010), '*Using Pension Funds for Infrastructure Finance in Africa: The Case of NEPAD Projects*', http://scholar.sun.ac.za/bitstream/handle/10019.1/917/chuckun_pension_2010.pdf?sequence=1
- Della Croce, R., (2011), '*Pension Funds Investment in Infrastructure: Policy Analysis*', OECD Working Paper on Insurance and Private Pensions No 13, September 2011.
- Hall, D., (2009), '*Infrastructure, the Crisis and Pension Funds*', Public Services International Research Unit (PSIRU) http://gala.gre.ac.uk/2765/1/PSIRU_Report_9817_-_2009-12-infra.pdf
- Inderst, G (2010), '*Infrastructure as an Asset Class*', EIB Papers - volume 15 -nb1 -2010 http://www.eib.org/attachments/efs/eibpapers/eibpapers_2010_v15_n01_en.pdf
- Inderst, G. (2009), '*Pension Fund Investment in Infrastructure*', OECD Working Paper on Insurance and Private Pensions No 32. <http://www.oecd.org/dataoecd/41/9/42052208.pdf>
- International Energy Agency (IEA), (2010), '*Energy Technology Perspectives 2010*'
- International Energy Agency (IEA), (2008), '*Energy Technology Perspectives: Scenarios and Strategies to 2050*'

- Instituto Peruano de Economía (IPE) (2009), '*El reto de la infraestructura al 2018: La brecha de inversión en infraestructura en el Perú 2008*', August 2009.
- Irving, J, Manroth, A., (2009), '*Local Sources of Financing for Infrastructure in Africa*' World Bank Policy Research Working Paper WPS4878 http://www-wds.worldbank.org/servlet/WDSContentServer/WDSP/IB/2009/03/27/000158349_20090327160051/Rendered/PDF/WPS4878.pdf
- Kalamova, M., Kaminker, C., Johnstone, N. (2011), '*Sources of Finance, Investment Policies and Plant Entry in the Renewable Energy Sector*' [http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=ENV/WKP\(2011\)7&docLanguage=En](http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=ENV/WKP(2011)7&docLanguage=En)
- Kaniki, S., (2010), '*What Role can Pension Funds Play in Financing Infrastructure? The Case of South Africa*'
- Kauffmann, C., (2008), '*Engaging the Private Sector in African Infrastructure*' <http://www.oecd.org/dataoecd/39/41/41775965.pdf>
- Kauffmann, C., Pérard, E., (2007), '*Stocktaking of the Water and Sanitation Sector and Private Sector Involvement in Selected African Countries*' Background note for the Regional Roundtable on Strengthening Investment Climate Assessment and Reform in NEPAD Countries <http://www.oecd.org/dataoecd/17/8/39679099.pdf>
- Kim, Y-H., (2005), '*Financing Infrastructure Development: Asian Developing Countries Need to Tap Bond Markets More Rigorously*', Asian Development Bank, Economics and Research Department Policy Brief No. 34 http://www.adb.org/Documents/EDRC/Policy_Briefs/PB034.pdf
- KPMG (2009), '*Infrastructure in China: Foundation for Growth*' http://www.kpmg.de/docs/Infrastructure_in_China.pdf
- NEPAD- OECD, (2009a), '*Africa Risk Mitigation Initiatives for Infrastructure Financing*' <http://www.oecd.org/dataoecd/27/47/42749326.pdf>
- NEPAD- OECD, (2009b), '*Increasing Private Investment in African Energy Infrastructure*' <http://www.oecd.org/dataoecd/44/46/43966848.pdf>
- NEPAD- OECD, (2009c), '*Boosting Africa's Energy Sector through Carbon Finance*' <http://www.oecd.org/dataoecd/27/47/42749326.pdf>
- OECD, (2011a), '*Towards Green Growth: A Summary for Policy Makers*' <http://www.oecd.org/dataoecd/32/49/48012345.pdf>
- OECD, (2011b), '*OECD Economic Surveys: India 2011*'
- OECD (2011c), '*Pension Fund Investment in Infrastructure: A Survey*' <http://www.oecd.org/dataoecd/59/33/48634596.pdf>
- OECD (2011d), '*The Role of Pension Funds in Financing Green Growth Initiatives*' (forthcoming)
- OECD (2011e), '*Survey of Investment Restrictions*' <http://www.oecd.org/dataoecd/9/1/48094890.pdf>

- OECD, (2009), ‘*Economic Policy Reforms: Going for Growth 2009*’, Chapter 6 - Infrastructure Investment: Links to growth and the role of public policies. http://www.oecd.org/document/52/0,3746,en_2649_34325_41935009_1_1_1_1,00.html
- OECD, (2008), ‘*Infrastructure to 2030*’, Policy Brief <http://www.oecd.org/dataoecd/24/1/39996026.pdf>
- OECD (2007), ‘*Principles for Private Sector Investment in Infrastructure (OECD 2007)*’ www.oecd.org/daf/investment/ppp
- PEI/ Infrastructure Consortium for Africa, (2011), ‘*Infrastructure Investor Africa Intelligence Report*’ http://www.icafrica.org/fileadmin/documents/2011/Ica_investor_report.pdf
- Servén, L. (2008) ,Infrastructure and Development in Latin America. Advances and Challenges (Infraestructuras y desarrollo en América Latina: Avances y retos), Infrastructure Seminar 2020, CEPAL. Santiago de Chile.
- Stewart, F., Yermo, J., (2009), ‘Pensions in Africa’, *OECD Working Papers on Insurance and Private Pensions*, No. 30 <http://www.oecd.org/dataoecd/41/6/42052117.pdf>
- World Bank, Public Private Infrastructure Advisory Facility (2007), ‘*Review of Risk Mitigation Instruments for Financing Infrastructure*’, <http://www.ppiaf.org/ppiaf/sites/ppiaf.org/files/publication/Trends%20Policy%20Options-4-Review%20of%20Risk%20Mitigation%20Instrument%20-%20Matsukawa%20Habeck.pdf>
- World Bank, Public Private Infrastructure Advisory Facility (2011), ‘*Toward Better Infrastructure Conditions, Constraints, and Opportunities in Financing Public-Private Partnerships in Select African Countries*’, <http://openknowledge.worldbank.org/bitstream/handle/10986/2331/634330PUBOTowa000public00BOX361512B.pdf?sequence=1>
- World Economic Forum (WEF), (2009), ‘*The Global Competitiveness Report 2009-2010*’.
- World Economic Forum (WEF), (2010), ‘*Paving the Way: Maximizing the Value of Private Finance in Infrastructure*’ <https://members.weforum.org/pdf/FinancialInstitutions/Infrastructure2010.pdf>

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