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## Understanding the challenges for infrastructure finance

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Keywords: infrastructure finance, G20 initiatives,  
syndicated project loans, infrastructure bonds

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# Understanding the challenges for infrastructure finance

## Prospects for new sources of private sector finance

Torsten Ehlers<sup>1</sup>

### Abstract

What is holding back infrastructure investment, even though real long-term interest rates are low and the potential supply of long-term finance is ample? The answer matters to policy makers, because infrastructure is a key determinant of the growth potential of an economy. This paper identifies some key obstacles for better and greater infrastructure finance and investment. One such obstacle is the lack of investable projects. Often, projects are not properly designed and contractual arrangements imply a distribution of risks and returns that create the wrong incentives among the various partners. The greater involvement of private investors and the design of economically rational financing structures can mitigate such problems. They also improve the efficiency and success of infrastructure projects. A pipeline of investable projects would allow large investors to commit a greater share of their financial resources to infrastructure. Tapping the vast resources of capital markets, which thus far have been underutilised, could significantly boost infrastructure finance. A greater variety of financial instruments for infrastructure finance would help to make infrastructure more attractive for a broader group of investors and would allow a better diversification of risks.

Keywords: infrastructure finance, G20 initiatives, syndicated project loans, infrastructure bonds

JEL classification: O16, O18, G210, G23, H54

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## 1. Introduction

Why is infrastructure investment lagging, even though the potential supply of long-term finance is ample? This is a question of great concern to policy makers. While there is a consensus that there is an infrastructure bottleneck, the underlying reasons for the lack of infrastructure finance by the private sector seem to be less debated. This paper analyses the main challenges for infrastructure investment and private sector infrastructure finance.

Overcoming the infrastructure bottleneck would boost long-term economic growth. Infrastructure is an input to a wide range of industries and, as such, an important driver of long-term growth. At the same time, delays in the realisation of infrastructure projects pose potentially large economic and social costs. And those projects which are realised are sometimes badly designed and cannot deliver the expected performance. In some emerging markets, the lack of well-performing infrastructure holds back economic development. But also in advanced economies, a lack of investment in well-designed transport, renewable energy, and social infrastructure is becoming more evident.

If the benefits of infrastructure are so obvious, why are so few infrastructure projects successfully implemented? The main impediment to greater infrastructure investment cannot be the lack of available financing – given abundant funds in world markets and very low long-term interest rates. The problem is rather that of matching the supply of finance from the private sector with investable projects. The potential supply of long-term financing is ample. Pension funds, insurance companies and other long-term institutional investors have very large and growing long-term liabilities. Hence they need long-term assets. But very little of their financial resources is allocated to infrastructure. In addition, the vast financing potential of international capital markets remains largely untapped.

Private investors could not only help to provide the financing, but also help to ensure that a project is run efficiently. If contracts are designed properly, private investors have an incentive to see that an infrastructure project is executed efficiently – because it increases the likelihood that their investment is safe and as profitable as expected. The challenge for project owners, and hence the public sector, is to design contracts such that the risks and returns are distributed in an incentive-compatible way.

As private sector involvement can improve both the execution and the financing of a project, the crucial role of the public sector is to provide the right conditions to reap those benefits. Apart from a proper contractual structure, a solid legal framework is crucial. Infrastructure projects are long term and political risks loom large for investors. Investors will be prepared to commit large sums of financing at long horizons only if they can trust the legal and political procedures.

But, mobilising the necessary funds to satisfy the growing demand for infrastructure investment will require new sources and instruments of finance. Currently, the lion's share of the growth in infrastructure financing is shouldered by banks. Banks will remain important financiers, in particular in the early stages of new projects. But banks, which have mostly short-term liabilities, are not well-placed to hold long-term assets on their balance sheets for an extended period of time. Therefore, a much broader group of investors needs to be targeted. Bonds would be suitable instruments for large institutional investors, such as pension funds and

insurance companies with their long-term liabilities. Development banks and export credit agencies, which have a crucial role in financing infrastructure investments in both developing and developed countries, may be able to enhance the efficiency of their finite resources by the judicious use of financial instruments such as guarantees or mezzanine capital. In addition, other new forms of finance, such as infrastructure investment funds, can help to tap some of the vast resources of international capital markets. Importantly, a broader mix of financial instruments would also allow a better diversification of risks among a broader group of investors.

The remainder of the paper is structured as follows. The next section illustrates the significance of the infrastructure gap and argues that a key issue for the public sector is the development of a predictable pipeline of well-structured projects. The following sections then turn to the main impediments to increasing the supply of financing. Section 3 identifies the key economic characteristics and difficulties of infrastructure projects and infrastructure financing. Section 4 describes the different phases of infrastructure projects, which each require a different mix of financing instruments. Section 5 outlines the elements of successful contractual design of infrastructure projects. Section 6 outlines the potential financing instruments for the construction phase, the developments in the syndicated project loan market, and the role of development banks and export credit agencies. Section 7 looks at the potential of bonds and new financing instruments. The final section concludes.

## 2. The infrastructure bottleneck

Infrastructure financing will need to come increasingly from the private sector. The demand for infrastructure investments is likely to grow faster than output, and therefore tax revenues. A McKinsey study estimates that the share of total infrastructure financing in GDP will need to increase from around 3.8% to 5.6% in 2020 worldwide (McKinsey Global Institute (2012)). In emerging markets, the required increase would be even more pronounced. Analysis for the G20 suggests that developing countries will need to invest an additional \$1 trillion a year up to 2020 to keep pace with the demands of urbanisation, and better global integration and connectivity (G20 (2013)). Developed countries will likely need to invest a similar amount to finance low-carbon emission energy projects through 2050; on top of necessary investments into transport and social infrastructure at potentially similar amounts.

While additional government funding for new infrastructure may come from privatisation of existing infrastructure assets, this is unlikely to be enough. For many infrastructure projects, such as military infrastructure or public schools, pure public procurement may be the only feasible option and may absorb large shares of public funding capacity. The key sources of increasing infrastructure demand, such as the large infrastructure gap in developing economies or the shift to renewable energy sources in developed economies will therefore require additional sources of financing from the private sector.



At the same time, institutional investors such as pension funds, insurance companies or sovereign wealth funds<sup>2</sup> have a growing need for a diversified portfolio of long-term assets. One recent study puts this investor base at about \$90 trillion globally (HSBC (2013)). According to figures from the OECD<sup>3</sup>, the demand for assets from this long-term investor base has also been increasing rapidly over the last decade. For OECD member countries, total assets of pension funds and public pension reserve funds stood at less than \$25 trillion in 2002 and increased to over \$55 trillion by the end of 2012. Even so, portfolio allocations of pension funds to infrastructure debt and equity are small, at around 0.5% (Della Croce (2012)). While overall allocations for pension funds or insurance companies will remain small – given the financial risks involved – slightly higher allocations seem sensible. In emerging markets the development of such an investor base is still at relatively early stages, but is expected to proceed rapidly.<sup>4</sup>

## 2.1 Pipelines of investable projects

What creates this bottleneck of channelling funds of long-term investors into infrastructure projects? A major reason for the apparent mismatch between infrastructure investment demand and the supply of infrastructure finance is the lack of a pipeline of properly structured projects. Infrastructure investments entail complex legal and financial arrangements, requiring a lot of expertise. Building up the necessary expertise is costly, and investors will only be willing to incur these fixed costs if there is a sufficient and predictable pipeline of infrastructure investment opportunities. Otherwise, the costs can easily outweigh the potential benefits of investing into infrastructure over other, less complex, asset classes.

Creating a pipeline of suitable projects requires a coherent and trusted legal framework for infrastructure projects. In some countries, those frameworks do not exist. Political risk is among the greatest concerns of private investors (OECD (2014)). The arbitrary exercise of political power can take many forms: sudden cuts in the prices private infrastructure operators are allowed to charge; new regulations; or the unilateral renegotiation of existing contracts by new governments.

But even where solid legal frameworks exist, governments can still fall short of best practices. Positive efforts are needed to correct this. In some countries, such as the United Kingdom, central government agencies have been set up as a central point for the development of large infrastructure projects. Crucially, this enables a successive building up of expertise. In countries where infrastructure projects are undertaken by provincial authorities, such as Australia, an effective dissemination of best practices and expertise can be successfully implemented. The establishment of such practices and institutions take time, but their development can help to realise enormous efficiency gains and enables governments to successfully undertake a much larger number of projects.

<sup>2</sup> See World Bank Group (2014a) for a discussion on the potential role of sovereign wealth funds for infrastructure investment.

<sup>3</sup> See OECD (2013): "Annual survey of large pension funds and public pension reserve funds", OECD, October.

<sup>4</sup> Inderst and Stewart (2014) discuss potential models of institutional investment in infrastructure in developing countries.

This requires effective private investor involvement in the operational aspects of infrastructure. Investors expect adequate returns in compensation for the risks they are taking. But infrastructure projects only generate positive cash flows and consequently positive financial value after many years. Infrastructure provides services, often to very many: correctly pricing such services and valuing the proceeds from the provision of services should be the starting point for setting up properly structured and investable infrastructure projects.

Understanding the economics of infrastructure projects and the unique challenges involved in infrastructure finance is pertinent to addressing these problems.

### 3. What makes infrastructure special and its financing difficult?

A few common economic characteristics differentiate infrastructure assets from other asset classes. These characteristics also make it more difficult to match investment demand and financing supply:

1. Even though the direct payoffs to an owner of an infrastructure project may not cover its costs, the indirect externalities can still be hugely beneficial for the economy as a whole. Externalities include large benefits of infrastructure services to a wide range of other sectors. Such benefits are fundamentally difficult to measure. Even if they can be measured, charging for them may not be feasible or desirable.
2. Infrastructure projects are often complex and involve a large number of parties. Infrastructure often comprises natural monopolies such as highways or water supply, and hence governments want to retain the ultimate control to prevent an abuse of monopoly power. This requires complex legal arrangements to ensure proper distribution of payoffs and risk-sharing to align the incentives of all parties involved. But any measures needed to restrict monopoly power must still ensure that governments respect pre-agreed contracts.
3. Many infrastructure investments generate cash flows only after many years and the initial phase of an infrastructure project is subject to high risks. In addition, the uniqueness of infrastructure projects in terms of the services they provide makes infrastructure investments less liquid. These three elements – the time profile of cash flows, high initial risks and illiquidity – make purely private investment difficult and costly.

Infrastructure is therefore special. Although infrastructure investments are potentially hugely profitable for the economy as a whole, they are especially subject to market failures. Markets alone will often fail to provide these services – either because an infrastructure project would not be profitable on its own, or because the associated risks are too large or too costly to insure.

As a result, infrastructure investment from the private sector in many cases cannot be realised without some form of public support. This may take the form of direct financial support or some form of insurance. In turn, the necessary involvement of a wide range of parties in infrastructure projects – construction companies, operators, government authorities, private investors, insurers and the

citizens most directly affected – make it a complex but essential task to design an efficient set of contracts. Issues such as the incentive-compatibility of contracts, the nature of contingencies and the proper sharing of risks among the different agents are pivotal. The quality of institutions and the rule of law are often determining factors in the supply of infrastructure finance, even when a project by itself appears to be financially viable.

#### 4. Different financing instruments for different phases of infrastructure finance

The traditional question “Are governments, banks or capital markets best placed to finance infrastructure?” is too simplistic. A typical project has several distinct phases. Each phase exhibits different risk and return characteristics, and each faces different incentive problems and calls for a different role for governments, banks and capital markets. Hence, each phase requires a different mix of financial instruments to cover different risk and return profiles – and so targets different types of investors. Table 1 summarises for each phase the economic and contractual issues, the financial characteristics, and the potential investors.

Phases of infrastructure projects and their characteristics

Table 1

Phase	Economic and contractual issues	Financial characteristics	Potential investors
Planning	Contracts are written in the planning phase and are crucial to the success of projects. The planning phase can take a long time (10 to 30 months) and the involved parties may attempt to renegotiate contract commitments. Ratings from rating agencies are important to secure interest from debt investors, as are credit insurance or government guarantees.	The procuring authority needs to find equity investors. The equity sponsor needs to secure commitments by debt investors (mostly banks). Given the long planning period, early commitments by debt investors come at a high cost. Leverage can be high (10:1 or more).	Equity sponsors need a high level of expertise. They are often construction companies or governments. In rare cases, infrastructure funds (Australia, Asia) or direct investments by pension funds (Canada) may be involved. Debt investors are mostly banks through (syndicated) loans. Bond financing is rare, as projects carry high risks in the initial phases.
Construction	Monitoring incentives are essential. Private involvement (as opposed to purely public investment) can ensure this.	This is a high-risk phase. Unexpected events are likely due to the complexity of infrastructure projects. Default rates are relatively high. Initial commitments by debt-holders must extend far beyond this stage, as a project does not generate cash flows in this phase.	Refinancing or additional financing is very difficult and costly at this stage. Equity sponsors may have an incentive to provide additional finance if risks materialise.
Operational	Ownership and volatility of cash flows due to demand risks are key. Models such as flexible-term present value contracts and availability-based fees reduce volatility, risk and financing costs, but have adverse incentive effects.	Positive cash flows. The risk of default diminishes considerably.	Refinancing of debt (bank loans) from the initial phase. Bonds are a natural choice, but they are not very common. Refinancing with bank loans or government funds is common.

While some important infrastructure projects are solely financed by the public (often in education) or by private corporations (mostly in the energy and telecommunications sectors), this paper focuses mainly on the challenges for projects which aim to attract private sector financing for public projects.

## 5. Planning phase: the contractual design of projects to attract private sector involvement

Infrastructure financing hinges on the techniques of project finance (Brealey et al (1996)). These techniques entail two sets of contractual arrangements: (i) the creation of a legally and economically self-contained entity (SPV) against which all legal contracts are written, and (ii) a set of contracts dictating the distribution of risks and returns.

The creation of a project SPV (Figure 1) is a precondition to attract private forms of finance, as it allows the contractual pledging of cash flows to creditors and the distribution of risks among the contract partners. It also helps to limit agency problems, as owners and operators cannot simply divert revenues away from the project to other entities. It replaces the role of the government in traditional public procurement and becomes the core entity. This structure is a prerequisite for using the techniques of project finance.

The degree to which the private sector is involved in an infrastructure project is then determined by the contractual arrangements. These can take many forms, from simple management contracts to part or full private ownership.<sup>5</sup>

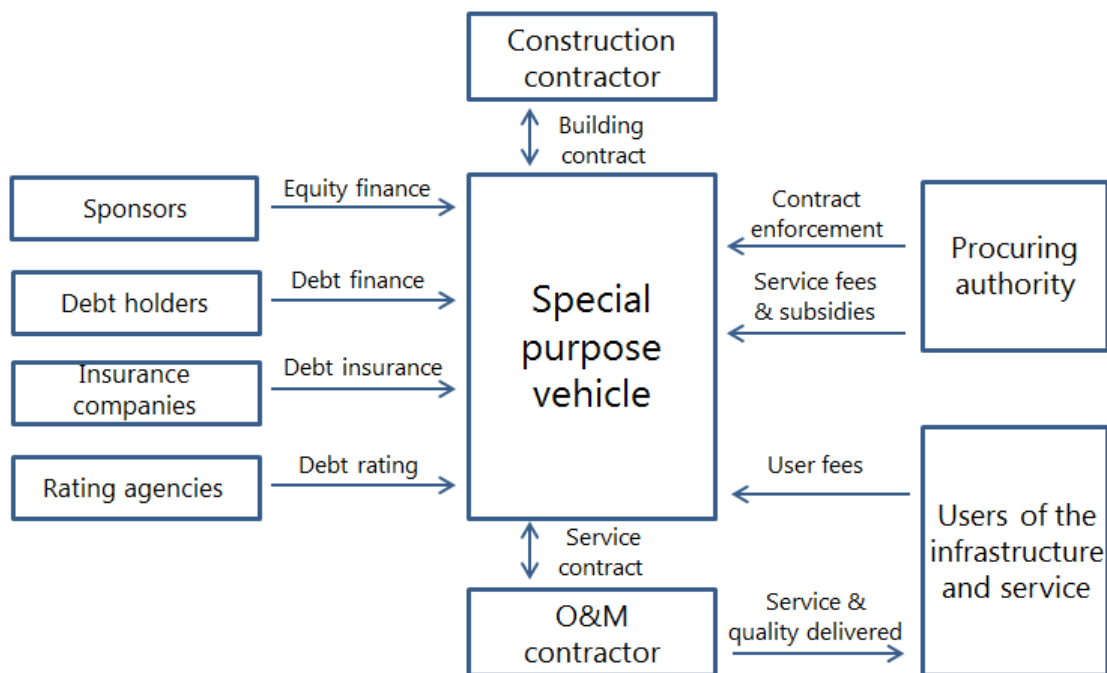
### 5.1 Public private partnerships: the efficient distribution of risks and returns

The involvement of the private sector: efficiency gains as well as additional sources of financing. Achieving efficiency gains compared to purely public procurement should be the first and foremost goal. Simply attracting additional financing would be inefficient, as funding costs for governments (sovereign bond yields) are usually lower than private sector financing – on average the additional cost can be 200–300 basis points (Yescombe (2007)).<sup>6</sup> If projects are structured properly, the efficiency gains from private sector involvement can easily outweigh additional funding costs.

Hence, private sector funding should be seen as a way of encouraging private partners to ensure that infrastructure projects are built and operated in the most efficient way. The incentive structure of investors is determined by the distribution of risks and returns through the web of contracts. The type and degree of private sector involvement can take many forms, and is not at all restricted to standard contractual arrangement like operation and maintenance. But, the type of private involvement should match the risks that are transferred to the private sector (Figure 2).

<sup>5</sup> See Engel et al (2010) for a discussion on the economics of PPPs versus public provisioning.

<sup>6</sup> See Yescombe, E (2007): "Public Private Partnerships: Principles of Policy and Finance", Butterworth-Heinemann, London.

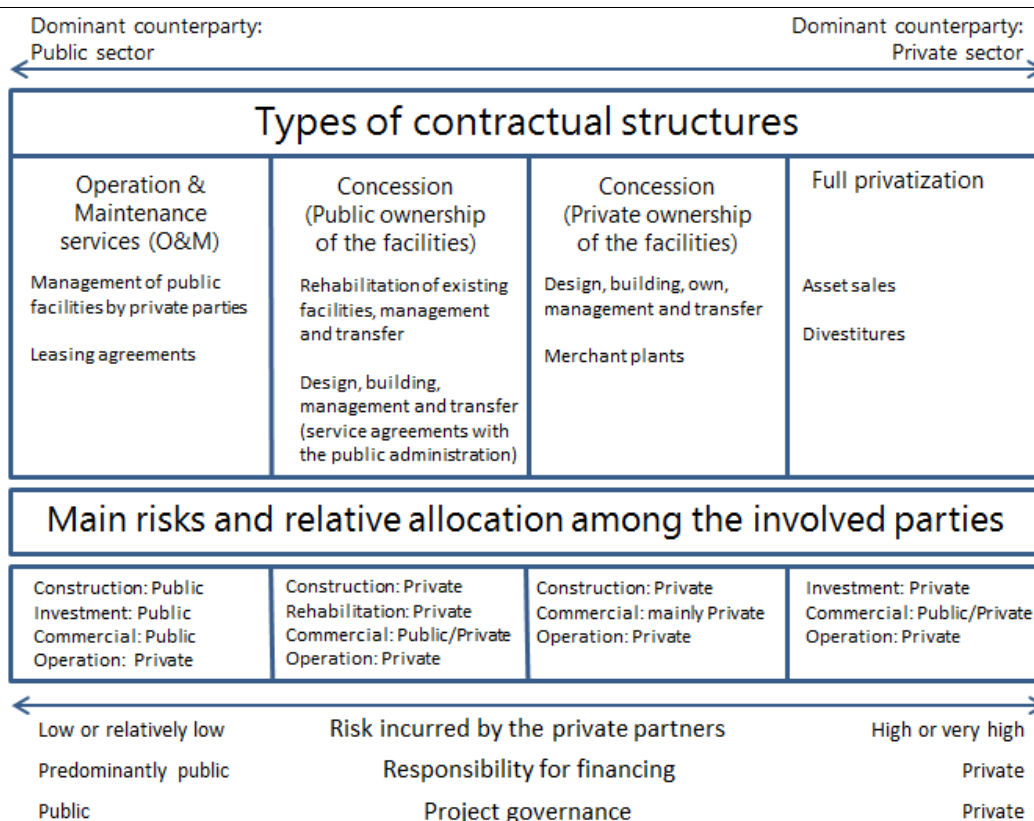


Source: Engel et al (2010).

## 5.2 Fallacies in distributing risks between public and private partners

Risk transfers in infrastructure projects are often ill-structured and this is a main reason for cost overruns or even failures. A relevant example is the provision of credit or cash flow guarantees by governments: full insurance against any potential losses is bound to destroy the incentives for cost minimisation and quality maintenance. Such guarantees typically result in costs which are much higher than planned. In this case pure government procurement is more effective, as funding costs are lower while incentive structures remain the same, or may even improve. Accordingly, the lack of government guarantees is typically not seen as a barrier to investment in infrastructure by the private sector (Gatti (2014)).

Equally, transferring too much risk to the private sector also leads to wrong incentives and therefore inefficiencies. Transferring to the private sector those risks which it cannot insure against, such as political risks, will either significantly increase funding costs or even lead to a failure to attract private investment at all. Equity sponsors willing to take on high risks are usually companies which are also involved in the construction or operating process. High-risk exposure will prompt them to seek higher returns by charging higher construction or maintenance costs.



Source: Gatti (2014).

### 5.3 Rules of thumb for establishing PPPs and proper distribution of risks

While different types of projects entail very different types of risks, there are arguably some fundamental rules which can guide the establishment of PPPs and a proper distribution of risks between the government and private investors:

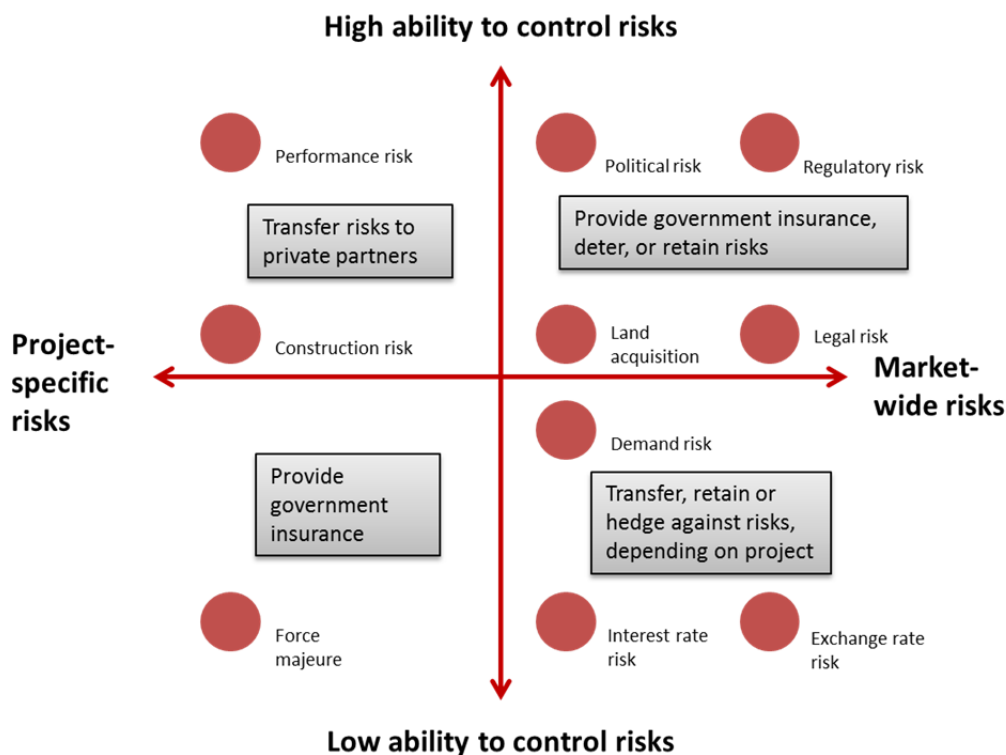
- PPPs require complex long-term contracts, hence they make sense for larger projects where potentially large efficiency gains can be expected
- PPPs are sensible when private partners bring significant expertise and capacity for innovation
- PPPs should be seen as a method to procure infrastructure services over a long period of time and should not focus on construction of infrastructure only
- Compensation to private investor should be based on performance and quality indicators
- Responsibility and the associated risks for achieving performance and quality goals should lie with the operator
- Contract parties which take responsibilities and risk must receive an appropriate degree of control of the project in return

- Available financing options critically depend on the legal structure of the project. The decision for enabling structured loan instruments or bond refinancing at a later stage should be made before the legal structures are implemented

In terms of the distribution of risks, a general rule should be that only those risks should be transferred to the private investors which they either control or are able to insure against (Figure 3). Infrastructure projects often entail political risks. Governments have the power to renegotiate contracts, and sometimes are tempted to do so. Infrastructure projects generate positive value only over a considerable period of time, and hence private parties have to be sure that the transfer of cash flows is credible. Precedents of contract renegotiations and one-sided political interference greatly increase the perception of risks for private investors. This is also reflected in ratings of infrastructure debt<sup>7</sup>, which are an important determinant of financing costs. Hence governments must take decisive measures to deter or insure against such risks.

Proper risk transfers in public private partnerships

Figure 3



Source: Akash Deep, Harvard Kennedy School; adapted from Miller et al (2001).

The credibility of the transfer of risks and returns is also of utmost importance. Contracts need to be written to limit the chances that the distribution of risks and returns can be altered. This is also to the benefit of the public partner. Governments will often be pressed hard to bail out private partners, in particular if the failure of

<sup>7</sup> See Ehlers, Packer and Remolona (2014) for a discussion on the determining factors of infrastructure bond ratings.

prominent infrastructure projects creates political pressures. Private investors may gamble for bail-outs by increasing costs of construction or operation. A credible transfer of the commercial risks, such as performance and construction risks, is therefore necessary to ensure that efficiency gains from private sector financing can be realised.

## 6. Construction phase: enabling equity and loan financing

As equity investors, sponsors bear the highest risks in case of a failure and hence they have the incentive to ensure successful execution. Consequently, they should bear the ultimate responsibility for funding, developing, and managing the project. Leverage can be quite high, often 10 to 1 or more. The sponsors are the residual claimants and hence the decision of potential lenders whether to supply debt financing hinges on the credibility and financial capacity of the sponsor and the special purpose vehicle (SPV).

Highly specialised technical expertise and monitoring are crucial in the construction phase. Not many investors possess the expertise and monitoring abilities and hence the group of potential equity investors is limited. At the same time, the construction phase involves high risks. Due to the complexity of many infrastructure projects, changes in design, construction delays and significant cost increases are more likely.

As a result, often construction companies themselves provide equity. This can create incentive problems such as overcharging of construction costs. Fixed priced construction contracts can limit incentive problems, but imply substantial risk transfers to construction companies, which may then retreat as equity sponsors. While governments may retain some equity share, an incentive compatible structure should include at least one more sponsor with a significant stake in the project.

### 6.1 New sources of equity financing

Recently, new groups of direct equity investors have been emerging. Investors such as insurance companies or private equity funds are investing in unlisted infrastructure equity, raising \$38 billion in 2013; which is however still lower than in 2007 or 2008 (Graph 1). Canadian pension funds have pioneered direct investment into infrastructure amounting to around 5% of total investments in 2012. According to the OECD's annual large pension fund review (OECD (2013)), the two large Canadian pension funds CPPIB and OMERS invested \$9.9 billion and \$9.1 billion in direct unlisted infrastructure equity respectively. In general, however, pension funds may not be willing or able to take the risks of direct equity investments.

There are two large potential sources of additional equity funding, which could be promoted further. First, allocations of pension funds are still small, at around 0.5% in developed countries.<sup>8</sup> Given their size, an additional allocation of 2–3%

<sup>8</sup> Inderst (2009) provides an in-depth discussion of the potential role of pension funds in infrastructure investment.



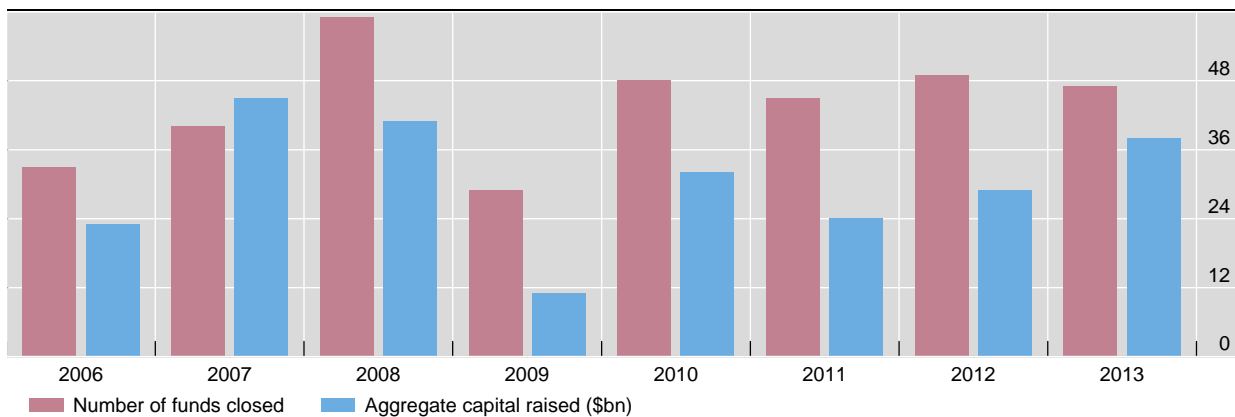
would have a very sizeable impact. Pension funds may, however, concentrate on more seasoned (“brownfield”) projects, which are generally less risky. But, pension funds also have the ability to potentially diversify their holdings across several infrastructure projects. Slightly larger portfolio allocations should hence have only a very limited impact on their risk profile.

Secondly, to enable a wider range of investors to take stakes in infrastructure projects, infrastructure companies and funds carry a high potential. Infrastructure companies and funds invest equity into a wide range of infrastructure projects with the aim to diversify the bulk risk of individual projects. The resultant equity in such entities – which may be listed or unlisted – are then subject to lower risk than direct investment into an individual infrastructure projects. The lower risks may even open the possibility of indirect investments into new (“greenfield”) infrastructure by more risk-averse long-term investors. Australian pension funds, for instance, already have significant investments in infrastructure funds. Recent important policy initiatives by the G20 look at the potential of equity instruments which pool institutional investor capital (OECD (2014)).

## Unlisted infrastructure equity fundraising

Globally, based on funds tracked by Preqin

Graph 1



Source: Preqin.

## 6.2 Infrastructure as an asset class

Taking advantage of the full potential of new sources of finance will ultimately require that long-term investors recognise infrastructure as an attractive asset class, with distinct properties that can help optimise the risk and return profiles of their portfolios – in particular for longer time horizons. Studies for the Australian market have shown that returns and risks of both unlisted and listed infrastructure funds have compared very favourably to other asset classes (Inderst (2010)). Recently, a limited number of infrastructure companies and funds have been set up, such as the Macquarie International Infrastructure Fund in Asia. Such funds are, however, still relatively small compared to the overall market for infrastructure projects.

A key obstacle to the emergence of infrastructure as a separate asset class is the heterogeneity in the setup of projects and the lack of readily available data. Across countries, but even within a given country, infrastructure projects often have completely different contractual structures. In addition, regulatory frameworks, such

as building permissions or environmental requirements, may be totally different across projects. This makes it difficult to build up expertise and to efficiently assess a larger number of infrastructure projects. Harmonisation is difficult, but promises large payoffs. Finally, investors often do not have the necessary information to properly assess an infrastructure project.

International policy initiatives could aim to harmonise regulatory frameworks for infrastructure and public private partnership and may also lead to greater data transparency.<sup>9</sup> More comprehensive data on infrastructure projects but also infrastructure debt performance would help investors to more easily assess a large number of projects and investment opportunities. New innovative approaches to modelling default risks of infrastructure debt such as Blanc-Brude and Ismail (2013) are an important step towards facilitating a more efficient financial assessment of infrastructure assets. But a larger and more international data basis is a prerequisite for developing robust financial indicators and providing investors with the necessary information. A successful one-time policy initiative has been the Africa Infrastructure Country Diagnostic (AICD), which collected a large amount of valuable information on infrastructure performance as well as detailed economic and technical data in Africa (Forster and Briceño-Garmendia (2010)).<sup>10</sup>

At the same time, the issuers of infrastructure funds have to make efforts to tailor their products to the needs of long-term investors. Currently, funds managed by external managers charge relatively high fees.<sup>11</sup> Many funds have a distinct development focus, which typically is associated with higher risks of the underlying assets and can therefore deter more conservative investors. A broader range of funds designed more for institutional long-term investors would have the potential to mobilise large additional sources of infrastructure financing.

### 6.3 Bank loans: key source of financing in the initial phase

Bank loans usually supply the largest share of financing in the initial phase of an infrastructure project. Bank loans have some key advantages over bonds or other structured financing solutions: (i) debt holders serve an important monitoring role in the project and banks tend to have the necessary expertise; (ii) infrastructure projects need a gradual disbursement of funds and bank loans are sufficiently flexible; and (iii) infrastructure projects are relatively more likely to require debt

<sup>9</sup> A number of international policy initiatives have been put forward to this end. An innovative initiative by the G20, for instance, is the Africa Infrastructure Marketplace (Sokoni), developed with the help of the African Development Bank (see G20 (2011) and AfDB (2011)). This electronic platform aims to provide project profiles for infrastructure projects and aims to better connect project opportunities with capital providers. The Asian Development Bank has developed a National Infrastructure Information System (NIIS), which is a web-based platform for sharing information on infrastructure projects currently piloted in India, Kazakhstan, Philippines and Vietnam. The United Kingdom's Department for International Development launched a data transparency initiative in 2008 called Construction Sector Transparency Initiative, which gathers, verifies and discloses information on infrastructure projects in the construction sector. Currently, 12 mainly developing countries are participating in this expanding programme (see CoST (2012)).

<sup>10</sup> Building on the AICD, the African Development Bank has initiated the more long-term Africa Infrastructure Knowledge Program (AIKP).

<sup>11</sup> According to Preqin (2011), average fees for the infrastructure funds they track are comparable to those for private equity and hedge funds; even though the targeted returns are significantly lower.

restructurings in unforeseen events and banks can quickly negotiate restructurings among each other, whereas the restructuring of bonds, for instance, is complex and time consuming.

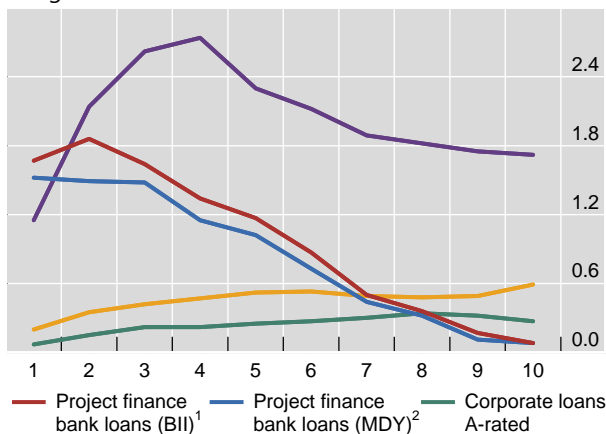
Banks take on considerable risks with their loans, particularly in the initial phase (Graph 2, left-hand panel). But risks subside over the life-cycle of a project. Hence, longer-term infrastructure loans are not necessarily riskier, compared to shorter-term ones (Sorge (2004)). The relatively long time between construction and the generation of positive cash flows requires unusually long-term funding; infrastructure loans often have tenors exceeding 10 years. This sets a high bar for attracting debt financing. Even if a project endures the initial phase, cumulative risks are still higher than for loans to investment grade corporations (Graph 2, right-hand panel).

## Default rates of project finance bank loans

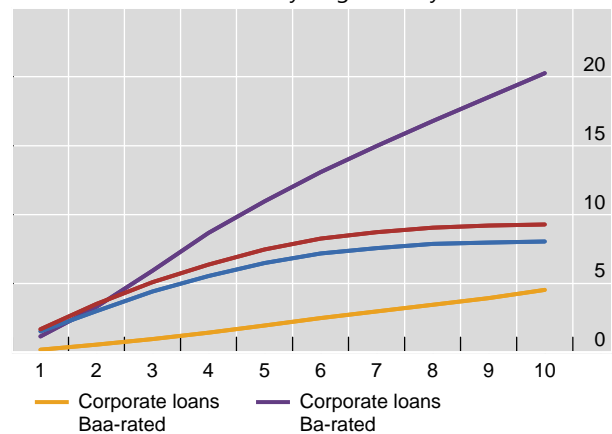
In per cent, based on Moody's data from 1990-2011

Graph 2

Marginal default rates



Cumulative default rates by origination year cohorts



<sup>1</sup> Basel II definition of default. <sup>2</sup> Moody's definition of default.

Source: Moody's (2013): "Default and Recovery Rates for Project Finance Bank Loans, 1983–2011".

The risks banks take ensure they perform a crucial monitoring role in the process of setting up an infrastructure project that is valued by other potential debt investors. Banks can hence enable efficiency gains for infrastructure projects and often also serve as an implicit insurance to other groups of investors with fewer monitoring capabilities.

Bond financing is, thus far, rare in the construction phase. Several factors put bond financing at a disadvantage compared with bank loans in this phase. One factor is that infrastructure bonds are mainly interesting for long-term investors such as pension funds or insurance companies, which are typically less willing or able to invest in high risk debt securities. Another factor is that debt restructurings are common in the construction phase of projects. Usually, restructurings would trigger selective bond defaults, whereas banks can be more flexible in restructuring existing loans. In the operational phase, however, bond finance would be preferable to bank finance (see section 7). The fact that banks have short-term liabilities inevitably limits the maturity of assets they can safely hold.

## 6.4 Developments in the bank loan markets: syndicated loans for infrastructure project finance

Bank loans for infrastructure projects are in many cases extended by a syndicate of banks rather than a single bank. Syndicated loans are common for the debt-financing of larger projects, as they allow the diversification of the large risks of a single project across a group of banks. Note that syndicated project loans would typically only be a subset of all bank loans for infrastructure projects. That said, syndicated project loans are likely to represent a major share of bank loan financing in terms of the overall volume, given that they are more likely for very large loans. Relatively comprehensive data on the syndicated loan market is available from Dealogic.

Infrastructure project finance is approximated by observed realised project finance in infrastructure-related sectors.<sup>12</sup> This includes financing for purely privately financed projects, as well as projects which are partly financed by the public sector and partly by private syndicated loans. Therefore, it underrepresents infrastructure-related sectors where public financing is more dominant.<sup>13</sup> Graph 3 shows the major trends for advanced economies (left-hand panel) and emerging markets (right-hand panel).

Overall, loan supply has been very strong since the global financial crisis. To some extent the volume for the last three years (2011–13) has shrunk compared to 2008–10. But issuance volumes in the last 2 years are still significantly higher than in the credit-boom period 2005–07. Issuance also does not seem to be extremely cyclical, as volumes during the global financial crisis 2008–10 were the highest on record. Deleveraging and adjustment to new global financial regulations by banks may have contributed to the recent short-term decline, but generally issuance volumes are clearly trending upward. In advanced economies, government budget restrictions are likely to have played a major role, as well as the deleveraging and shrinking of balance sheets in the banking sector.

Strikingly, private infrastructure finance with syndicated loans has picked up considerably in emerging markets and has surpassed the levels of advanced economies. In particular, emerging Asia (excluding China) has become a major recipient of syndicated project loans for infrastructure-related sectors. But issuance volumes have also increased considerably since 2008 (in China, Latin America, Central and Eastern Europe and Africa).

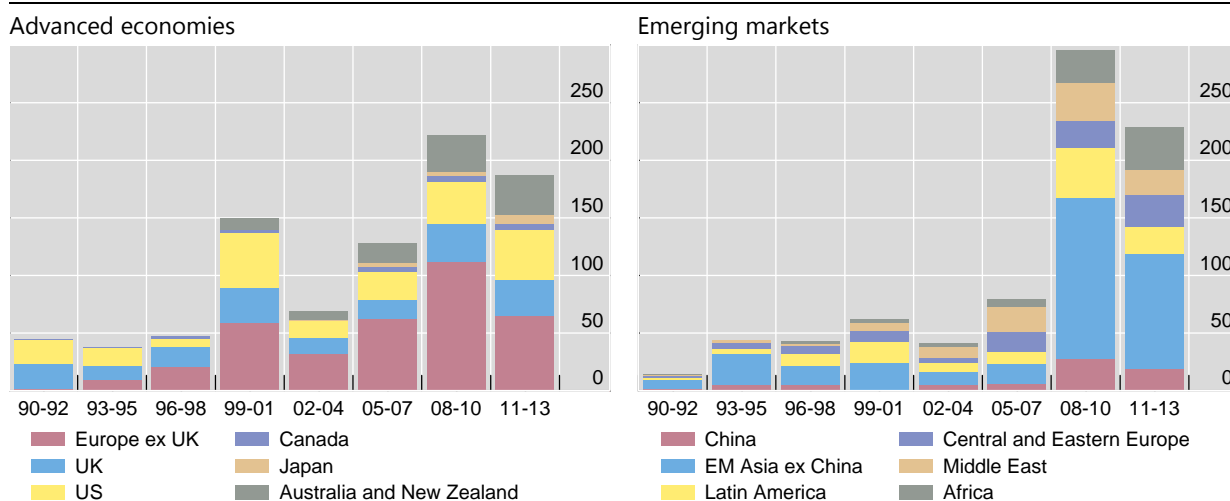
<sup>12</sup> Infrastructure-related sectors are "Construction and Buildings – Infrastructure", "Government", "Healthcare", "Professional services – Schools and Universities", "Telecommunications", "Transportation", "Utility and Energy". "Government" project may not be entirely infrastructure-related, but the public sector is generally a major player in infrastructure. Excluding government-run projects would therefore be too restrictive.

<sup>13</sup> Social infrastructure (eg social services, education) for instance is often dominated by public financing.

## Infrastructure-related syndicated project loans

In billions of US dollars<sup>1</sup>

Graph 3



<sup>1</sup> Total amount of project finance through syndicated loans in shown regions and economies for the industries listed in footnote 12.

Sources: Dealogic; BIS calculations.

Conditions for project finance syndicated loans in emerging markets are also comparable with those in advanced economies (Graph 4). In terms of both maturities and interest rate spreads, emerging markets face similar conditions. Overall, loan supply conditions seem to have even been better in some emerging market regions than in advanced economies. For instance, average loan tranche margins (Graph 4, left-hand panel) in Emerging Asia (ex China), Central and Eastern Europe or the Middle East, have been lower than in Europe or the US. Also average maturities (Graph 4, left-hand panel) in the major emerging market regions are between 13 and 18 years, which is higher than in advanced economies. In China, loan supply conditions seem to be especially favourable. This is, however, due to that fact that most infrastructure projects are state-owned or owned by state-owned enterprises. The implicit or explicit guarantees for investors permit the issuance of syndicated loans at long maturities with low rates. But, unlike in other advanced and emerging economies, large loans for infrastructure are also commonly issued by a single bank. Hence, syndicated loans are not necessarily representative of infrastructure finance through bank loans in China.

### 6.5 The role of credit guarantees and development banks

Banks, but also other debt investors, usually require additional credit guarantees to reduce the probability of default to a level which is acceptable and ensures sustainable costs of finance. Often this credit insurance is sponsored by the public sector or other multilateral agencies.

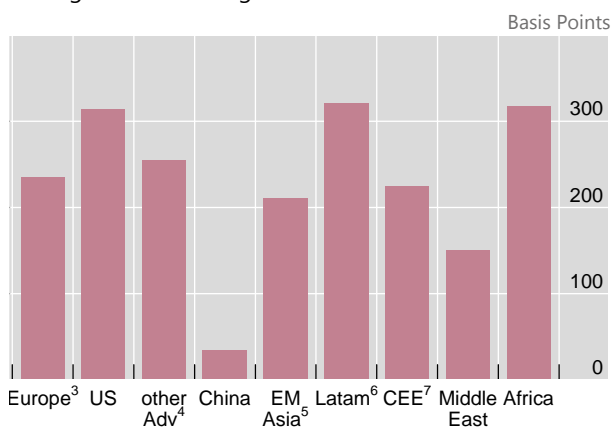
A current impediment to infrastructure finance is the demise of monoline insurers, which used to be the main provider of credit insurance in infrastructure projects. Their role needs to be filled.

## Tranche margins and maturities

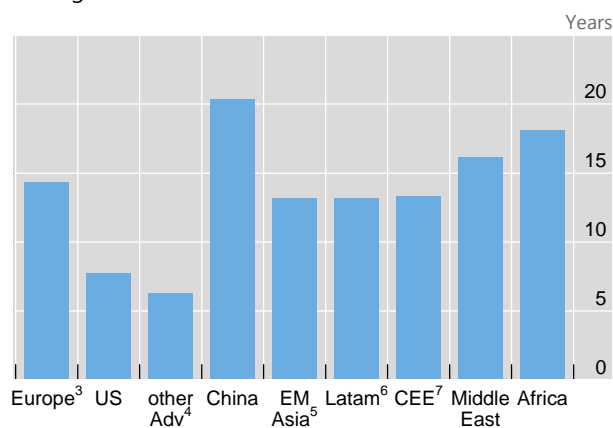
For syndicated project loans in infrastructure related sectors

Graph 4

Average<sup>1</sup> tranche margins<sup>2</sup> in 2009-13



Average<sup>1</sup> maturities in 2009-13



<sup>1</sup> Averages weighted by tranche values for the period 2009-13. For the industries described in footnote 11. <sup>2</sup> Margins are measured in basis points per annum (100 basis points = 1%). Margins represent the interest differential vis-à-vis the benchmark short-term interest rate for the currency in which the loan is issued. <sup>3</sup> Western Europe including the UK and Switzerland. <sup>4</sup> Other advanced economies = Australia, Canada, Japan, New Zealand. <sup>5</sup> Emerging Asia ex China. <sup>6</sup> Latin America. <sup>7</sup> Central and Eastern Europe.

Sources: Dealogic; BIS calculations.

Comprehensive public guarantees are counter-productive. But public authorities could nevertheless work together with large insurance companies to develop publically sponsored credit enhancement solutions for infrastructure project. Another potential solution is mezzanine credit layers provided by development banks. Mezzanine creditors in effect expose themselves to commercial risks and take a subordinated role among creditors: when the project fails or debt payments to senior creditors cannot be met, the mezzanine debt is then either converted into equity or written down. In return, mezzanine creditors are compensated by higher interest rates. Development banks hence are committed to use their expertise to closely monitor the project.

In particular in emerging markets, but in many cases also in advanced economies, the role of development banks in facilitating infrastructure deals is crucial. In EMEs, several new facilities are being established, such as the Africa50 Infrastructure Fund with support from the African Development Bank, the ASEAN infrastructure fund with support from the Asian Development Bank, or the Asian Infrastructure Investment Bank at the initiative of China. Still, financial resources of development banks are naturally limited and hence development banks usually cannot be the main financier of infrastructure projects. But as a facilitator of deals their role is often indispensable. As development banks bring vast expertise and in many cases insurance against political risks to the table, their loan commitments are in some cases a pre-condition for private lenders to make their funding available. In some emerging markets, development banks also serve a key role as the credible auditor of projects. Recent policy initiatives by the G20 aim to increase the efficiency and size of project preparation funds to improve the capacity of multilateral development banks to develop bankable PPP projects, but also to increase the attractiveness to alternative sources of capital, in particular from private investors (G20 (2012)).

## 6.6 Key issues in emerging markets and the growing role of export credit agencies

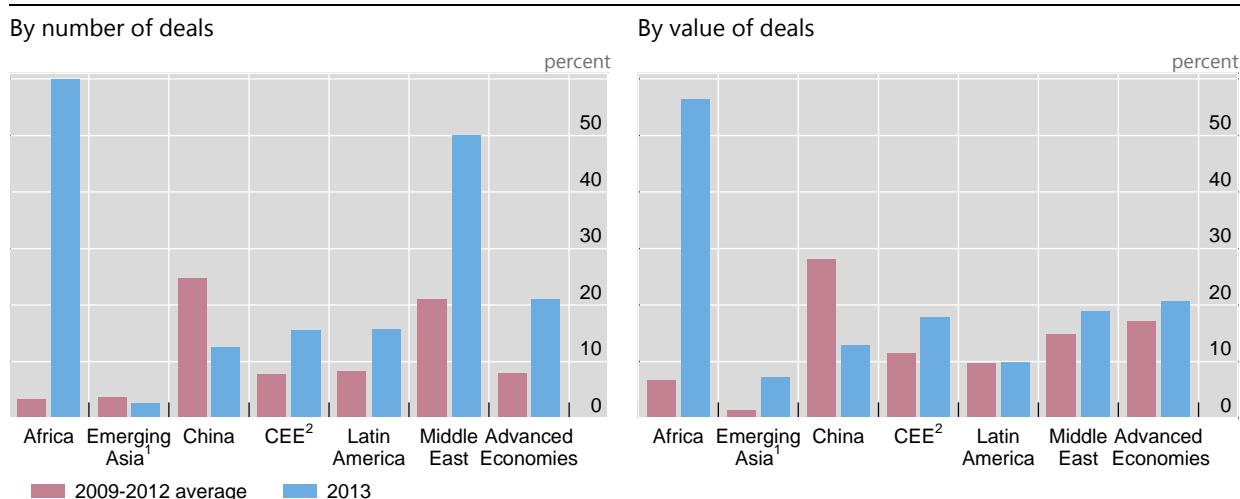
In some emerging markets, both the banking sector and long-term investors, such as pension funds or insurance companies, are still at early stages of development. They do not always possess the financial capacity to supply the often very large amounts of funds required for infrastructure projects. Because infrastructure project cash flows are mostly in local currency, international investors face additional risks. As hedging long-term currency risks is not feasible, international financing often comes in foreign currencies. But the resulting currency mismatches represent significant risks – both for the viability of a project as well as potentially for the financial system as a whole.

A financing source of growing importance in emerging markets are export credit agencies (ECAs). Their involvement has become more prominent in emerging markets (Graph 5, left-hand panel). In Emerging Asia, ECAs tend to have become more involved in large infrastructure projects (Graph 5, right-hand panel). For instance, the Japan Bank for International Cooperation and the Korea Export-Import Bank are large players. In Africa, the China Development Bank (CDB) has become a major player in the infrastructure market. ECAs usually demand that materials, machines and sometimes even labour for infrastructure projects are bought from their home jurisdictions. This can potentially raise costs. However, ECAs often allow repayment of debt in local currency, at least in part. ECAs are also seen as a potential insurer against political risks and hence help to reassure other lenders such as local commercial banks, which often do not have the necessary expertise and monitoring capabilities.

### Syndicated project finance loans with export credit agency involvement

As a share of total project finance loans

Graph 5



<sup>1</sup> Excluding China. <sup>2</sup> Central and Eastern Europe.

Sources: Dealogic; BIS calculations.

## 7. The operational phase: the potential for bond financing

The operational phase is distinctively different from the initial phases. As the infrastructure project is starting to generate positive cash flows, default risks subside rapidly over time, on average even below those of other highly rated debt securities (Graph 2, left hand panel). Infrastructure projects often represent (quasi-) monopolies and hence cash flows are relatively secure as the price-setting power of infrastructure operations is high.<sup>14</sup> With stable underlying cash flows in the operational phase, infrastructure projects are akin to fixed income securities and therefore bond financing is a natural and economically appropriate financing instrument. Bonds often come into play when initial bank loans are being refinanced, as they represent a low-cost financing alternative.

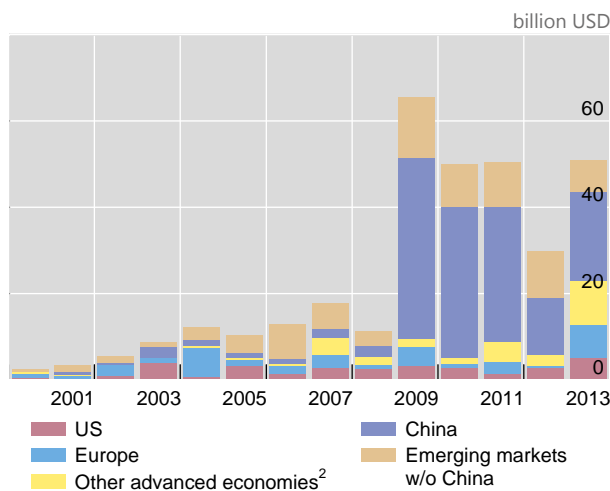
The potential for bond financing is therefore enormous. Nevertheless, the volume of issued infrastructure project bonds is surprisingly small; though it is increasing rapidly (Graph 6, left-hand panel). Still, compared to syndicated loans, bonds constitute only 10–20% of infrastructure debt financing in advanced economies – and even less in some emerging market regions (Graph 6, right-hand panel).

### The market for infrastructure project bonds<sup>1</sup>

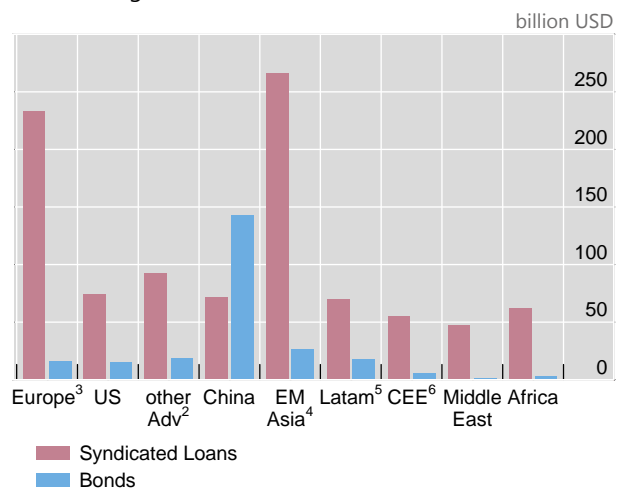
Aggregate issuance in USD

Graph 6

Global issuance of infrastructure bonds



Infrastructure bonds versus syndicated loans  
Selected regions 2009-13



<sup>1</sup> Infrastructure bonds are defined as project bonds by issuers from infrastructure-related industries. <sup>2</sup> Other advanced economies = Australia, Canada, Japan, New Zealand. <sup>3</sup> Western Europe including the UK and Switzerland. <sup>4</sup> Emerging Asia ex China. <sup>5</sup> Latin America. <sup>6</sup> Central and Eastern Europe.

Source: Ehlers, Packer and Remolona (2014).

<sup>14</sup> A default study by a major credit rating agency (Moody's (2012)) on investment-grade infrastructure bonds shows that after 5+ years, cumulative default rates for infrastructure bonds are significantly lower than those for non-financial corporate issuers.



A key question therefore is how infrastructure bonds can be promoted, especially in emerging markets.<sup>15</sup> Ehlers, Packer and Remolona (2014) find that infrastructure bonds are typically issued in local currencies, to minimise potential currency mismatches. Hence, for emerging markets, the development of local bond markets is a prerequisite for issuing infrastructure bonds. As onshore local currency bond markets develop rapidly, the potential of infrastructure bonds in emerging markets will increase accordingly. But also legal frameworks, bureaucratic efficiency and contract enforceability are found to be key factors, as they strongly affect the rating of infrastructure bonds and therefore the attractiveness for investors and the costs of financing. Further, innovative policy initiatives such as or India's Infrastructure Debt Fund (World Bank Group (2014b)) can help to establish the first infrastructure bonds with public support. The emergence of a domestic institutional investor base will further spur the development of infrastructure bond markets.

In addition, several policy initiatives have been set up to provide infrastructure bond insurance in emerging markets, such as the CGIF<sup>16</sup> in Asia. China has been relatively successful at issuing infrastructure bonds. However, issuance is entirely due to state-owned enterprises, which investors likely perceive to have implicit or explicit government guarantees. In the other countries, project bonds are virtually always issued by a separate project SPV, which retains the incentives for investors and insurance providers to push for the effective execution of a project.

Another option for EMEs is to issue infrastructure bonds off-shore to tap the international capital markets. In this context, several issues regarding legal and disclosure frameworks arise. When issuing in the international bond markets, firms can choose between the Regulation S disclosure standard, which limits them to investors outside the United States, and the 144A standard, which gives them access to US institutional investors. Some market participants say that complying with the 144A standard is more demanding, in part because of the broad anti-fraud provisions of US securities law. To comply with more complex standards is more costly and 144A compliant infrastructure bonds are very rare in emerging markets (Ehlers, Packer and Remolona (2014)).

Greater consistency in this area has a high potential for having a substantial impact on the availability of infrastructure finance. Further international cooperation to harmonise rules and assistance for infrastructure project owners may help to reduce compliance costs and encourage international issuance to access a wider investor base.

## 7.1 The potential for new financing instruments

The inherent challenges of infrastructure finance call for new types of financing instruments. Infrastructure equity or debt investors face two simultaneous issues: (i) long-term commitments of financial resources to an investment which is typically not liquid, and (ii) an inherent difficulty to price the associated long-term risks.

<sup>15</sup> In Europe, the European Commission and the European Investment Bank have launched a substantial programme to promote the issuance of project bonds in infrastructure sectors with the aim to attract additional private financing from institutional investors such as insurance companies and pension funds.

<sup>16</sup> Credit Guarantee and Investment Facility, which is a trust fund of the Asian Development Bank.

Traditional financing instruments, such as direct equity stakes or bank loans, force investors to deal with these two problems at the same time. In addition, there is a natural tendency for investors to turn to more liquid and short-term instruments in periods of high market uncertainty (“short-termism”).

But financial innovation can counter the “short-termism” of investors (Landau (2013)). Financial instruments can help to separate liquidity risks and the pricing of long-term risks. Bonds or infrastructure funds render infrastructure investments tradable, and therefore help to increase their liquidity. Greater securitisation activity for infrastructure loans seems also desirable, as this can help banks to diversify their risks and alleviate large bulk risks of a single project<sup>17</sup>, which are so difficult to quantify. New financial instruments which allow the separation of liquidity risks and long-term credit risks would help to improve the attractive of long-term financing.

Moving beyond the currently dominant financing instruments of direct equity investments and bank loans has further advantages. As argued above, it can make infrastructure as an asset class more accessible to a broader group of investors. In this light, it helps to diversify the large risks of infrastructure projects across many groups of investors. In addition, the vast resources of capital market, which are currently hardly tapped by infrastructure projects, are much more accessible with a boarder mix of financial instruments. Infrastructure bonds and infrastructure funds carry a high potential; and other financial instruments, such as collateralised infrastructure loans for instance, may also attract substantial investor demand. Finally, other financial instruments allow a better diversification of risks. This is highly desirable, as infrastructure risks are currently shouldered to a large extent by the banking sector, and the public sector through guarantees.

## 8. Conclusions

The supply of properly structured projects seems to be a major hurdle in channelling available finance into infrastructure. Overcoming this requires substantial expertise. Without a predictable pipeline of investable projects, the fixed costs of building up this expertise are often too high for potential investors.

Governments, the concessionaire for many types of infrastructure projects, have a critical role in setting up investable projects. Countries and local governments which have established proven mechanisms for infrastructure projects, for instance by introducing binding legal frameworks for public private partnerships or by setting up specialised government agencies, tend to be more successful in closing infrastructure projects. The promotion of private sector infrastructure finance hinges above all on a sensible transfer of risks and returns. If done properly, the involvement of the private sector can lift efficiency – it should not be seen merely as a source of financing. As returns from projects are generated only over a long period of time, the focus needs to turn more to the operational aspects of infrastructure, rather than merely its construction.

<sup>17</sup> As a co-chair of the G20 Investment and Infrastructure Working Group (see G20 (2014)), Germany has proposed a loan pooling instruments with possible guarantees from the public sector to help spur securitisation activity, in particular in emerging markets.

But also on the financing side, challenges remain. Currently, infrastructure finance is dominated by direct equity investments and bank loans. Boosting infrastructure finance will require the broadening of the potential group of investors and the tapping of the vast financial resources of capital markets. This, in turn, necessitates a broader mix of financial instruments. Both infrastructure funds and bonds have great potential. The better and more widespread securitisation of bank loans seems desirable to diversify risks. It may also assist the development of transparent capital market instruments. For emerging markets, financial market development, trusted legal frameworks, and the development of a long-term investor base are pertinent. Development banks and export credit agencies play a key role in promoting infrastructure finance in markets that are still developing.

All these issues above deserve the sustained attention of policymakers.

## References

AfDB (2011): "G20 Panel recommends Sokoni technology platform for infrastructure development in Africa", African Development Bank, November.

Brealey R, I Cooper and M Habib (1996): "Using project finance to fund infrastructure investments", *Journal of Applied Corporate Finance*, vol 9, no 3.

CoST (2012), "Construction Sector Transparency Initiative - Programme Summary", Construction Sector Transparency Initiative, October.

Della Croce, R. (2012), "Trends in Large Pension Fund Investment in Infrastructure", OECD Working Papers on Finance, Insurance and Private Pensions, no 29, December.

Ehlers, T, F Packer and Eli Remolona (2014): "Infrastructure and Corporate Bond Markets in Asia", conference volume of the 2014 RBA Annual Conference on "Financial Flows and Infrastructure Financing", July.

Engel, E, R Fischer and A Galetovic (2010): "The economics of infrastructure finance: Public-Private Partnership versus public provision." *EIB papers*, vol 15, no 1, pp 41–69.

Foster, V and C Briceño-Garmendia, eds. (2010): "Africa's infrastructure: a time for transformation", World Bank Publications.

G20 (2011a): "Infrastructure Action Plan", submission to the G20 by the multilateral development bank working group on infrastructure, October.

G20 (2011b): "High level panel on infrastructure recommendations to G20 – final report", submission to the G20 for the summit in Cannes, October.

G20 (2012): "Infrastructure Action Plan, 2012 Follow-up Report", submission by the multilateral development bank working group on infrastructure, October.

G20 (2013): "Demand for Long-Term Financing of Infrastructure", Issues Note (No 7) for Consideration by G20.

G20 (2014): "2014 G20 working arrangements", G20 Policy Note, June.

Gatti, S (2014): "Government and market based instruments and incentives to stimulate long-term investment finance in infrastructure", OECD Working Papers on Finance, Insurance and Private Pensions, forthcoming.

HSBC (2013): "Infrastructure and PPP bonds: Capital markets and how to access institutional capital", March.

Inderst, G (2009): "Pension Funds Investment in Infrastructure", OECD Working Papers on Insurance and Private Pensions, No 32, January.

Inderst, G (2010): "Infrastructure as an asset class", *EIB papers*, vol 15, no 1, pp 70–105.

Inderst, G, and F Stewart (2014): "Institutional Investment in Infrastructure in Developing Countries", World Bank Policy Research Working Paper, No 6780, February.

Laudau, J-P (2013), "Deleveraging, long-term finance and the G20 agenda", in *BIS Papers*, no 75, "Long-term finance: can emerging capital markets help?", December.

- McKinsey Global Institute (2012): "The future of long-term finance: Backup material", Report for Group of Thirty, November.
- Miller, Roger, and Donald Lessard, 2001, "Understanding and managing risks in large engineering projects", *International Journal of Project Management*, Vol. 19, pp 437-443.
- Moody's Investor Service (2012): "Infrastructure default and recovery rates, 1983–2012H1, Special comment", December.
- OECD (2013): "Annual survey of large pension funds and public pension reserve funds", OECD publication, October.
- OECD (2014): "Pooling of institutional investors capital – selected case studies in unlisted equity infrastructure", OECD publication, April.
- Preqin (2011): "LP Views on Infrastructure Fund Management Fees", Preqin Research Centre, September.
- Sorge, M (2004): "The nature of credit risk in project finance", *BIS Quarterly Review*, December.
- World Bank Group (2014a): "Sovereign Wealth Funds and Long-Term Development Finance: Risks and Opportunities", paper for the G20 Investment and Infrastructure Working Group, February.
- World Bank Group (2014b): "Success Stories and Lessons Learned: Country, Sector and Project Examples of Overcoming Constraints to the Financing of Infrastructure", paper for the G20 Investment and Infrastructure Working Group, February.
- Yescombe, E (2007): "Public Private Partnerships: Principles of Policy and Finance", Butterworth-Heinemann, London.