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## **OxCarre Research Paper 166**

# **From Global Savings Glut to Financing Infrastructure: The Advent of Investment Platforms**

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# From Global Savings Glut to Financing Infrastructure: The Advent of Investment Platforms<sup>1</sup>

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**Abstract:** This paper investigates the emerging global landscape for public-private co-investments in infrastructure. The creation of the Asian Infrastructure Investment Bank and other so-called “infrastructure investment platforms” are an attempt to tap into the pool of both public and private long-term savings in order to channel the latter into much needed infrastructure projects. This paper puts these new initiatives into perspective by critically reviewing the literature and experience with public private partnerships in infrastructure. It concludes by identifying the main challenges policy makers and other actors will need to confront going forward and to turn infrastructure into an asset class of its own.

**Keywords:** Infrastructure, Public Private Partnership, Long-term Investors, Savings, and Investment Policy.

**JEL Classification:** H49, H54, G30, G38

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## I. INTRODUCTION

The policy debate on global infrastructure financing has reached unprecedented levels. Media coverage is dominated by discussions about the fallout from the creation of the Asian Infrastructure Investment Bank (AIIB), initiated and led by China. Controversy and debates have become heightened on account of many European and Asian countries having formally announced their commitment to join the infrastructure bank, while the US has opted to stay out and actively lobbied to discourage several countries from becoming members of the AIIB. Other so-called “infrastructure investment platforms” have been set up by development banks, though they have received considerably less international attention. The principal objective of these specialized investment platforms is to tap into the pool of both public and private long-term savings in order to channel large pools of capital into infrastructure investments. The goal of the present paper is to provide a detailed overview of these new initiatives, and to critically analyze the building blocks of the emerging global landscape for public-private co-investments in infrastructure.

Apart from the major state-sponsored efforts in infrastructure development in China and a few other Asian countries, infrastructure development in most parts of the world has been seriously lagging over the past three decades. The initial hopes that the privatization wave of the 1980s would fuel a private-sector funded greenfield infrastructure investment boom have fallen well short of expectations. (see Estache and Fay, 2007 and Iossa and Martimort, 2012). The motivations for privatization were: i) governance; ii) incentives, and iii) budget constraints (see Vickers and Yarrow, 1991). The experience with public sector infrastructure up to the 1980s in low-income countries and advanced economies was one of large cost

overruns, poor maintenance, corruption, and little positive externalities. In other words, many infrastructure projects have turned out to be white elephants. Early evidence of privatization was encouraging as it resulted in greater efficiency, better maintenance and new sources of funding, with the development of public private partnerships (PPPs). However, the most recent evidence clearly points to a relative slowdown in infrastructure development in many parts of the world (see Figure 1).

There is new hope for infrastructure development given the size of the asset under managements of long-term investors including traditional institutional investors and sovereign wealth funds in Asia and the Middle East, who are searching for longer term assets as savings vehicles. Long-term investors are relatively much better placed investing in longer term global infrastructure assets, where they are likely to face less competition, and where remarkably there is also a huge demand for funding. At a time when the world recovery from the financial crisis is still timid and public debt levels remain elevated, the provision of financing to help replace aging infrastructure in advanced economies and build brand new ones in emerging markets could contribute to reignite their economic engines.

While there are opportunities, there are also important bottlenecks including on financing and origination of infrastructure projects. Recent attempts to remove or circumvent these bottlenecks point to the need to take stock of those initiatives including investment platforms and to go further and critically discuss what the emerging landscape of private-public co-investment in infrastructure will be. This paper aims to shed light into what that new model could be.

The remainder of the paper is organized as follows. Section II provides the state of play of long-term investing in infrastructure. Section III offers a critical review of the experience and the literature on PPPs. Section IV discusses the advent of infrastructure investment platforms. Section V provides concluding remarks and observations.

## **II. STATE OF PLAY**

To contextualize our subsequent discussion on infrastructure investments, we begin with a brief overview of the current landscape of long-term investments, emphasizing the fact that long-term investors massively underestimate the relatively high returns on infrastructure related investments. We then turn to discussing the global financing gap in infrastructure.

### **A. Investment Patterns of Long-Term Investors**

Institutional investors such as pension funds, insurance companies and mutual funds, and other investors such as sovereign wealth funds hold around \$100 trillion in assets under management. In 2013 *CityUK* estimated that pension funds, insurance companies, and mutual funds respectively held \$33.9, \$26.5 and \$26.1 trillion in assets under management (see Figure 2). In addition, sovereign wealth funds and central banks have accumulated savings approaching \$15 trillion. One gets a clearer grasp of the enormous size of this global wealth by, for example, comparing it to US nominal GDP (\$18 trillion in 2015:Q3), or to the IMF's new arrangements to borrow (\$0.576 trillion in 2013), or even to the total market capitalization of US listed companies (\$18.7 trillion in 2012).

According to a recent OECD report (Çelik, S. and M. Isaksson, 2013), out of \$85 trillion held by all institutional investors covered in the report, 38% (\$32 trillion) was held in the form of publicly traded equity, with the remainder being held mainly in fixed-income securities. Traditional institutions such as pension funds and insurance companies, held \$28 trillion (38%) in publicly traded equity, and alternative institutions, while mainly sovereign wealth funds, private equity and hedge funds, held \$4.6 trillion (40%) in publicly traded equity. The report however warns that investment allocations for each category of institutional investors are complex to pin down, largely due to cross-investments among institutional investors, increased complexity in equity market structure, and an increase in outsourcing of ownership and asset management functions. That being said, the main lesson from these studies is that a large fraction of traditional and non-traditional investors appear to be investing primarily in government bonds and other fixed income securities.

There are however important differences across regions and individual investors, and it is encouraging to note that the targeted shares of investments in infrastructure are growing across the board, reflecting the growing realization among long term investors that infrastructure assets are a natural habitat for their investments (see Figures 3 and 4). Long-term investors are indeed well placed to invest in more long-term global infrastructure assets, which match their long-term horizon, where they are likely to face less competition, and where remarkably there is also a huge demand for funding. In the current low-yield environment, in particular, harvesting the illiquidity premium has become increasingly important for many long-term investors. The global financial crisis and the subsequent multiple episodes of excess volatility in supposedly very liquid markets have also exposed the fact that the liquidity of a whole asset class can suddenly and dramatically evaporate.

This new reality, if anything, strengthens the relative value of illiquid asset classes that offer an illiquidity premium, such as infrastructure investments.

## **B. Infrastructure Financing Needs**

Against this backdrop of a largely untapped pool of global savings, estimates suggest that the world needs to increase its investment in infrastructure by nearly 60 percent until 2030 (see McKinsey Global Institute, 2013). To attain those aggregate needs, investment in infrastructure will have to increase from an accumulated total of \$36 trillion over the past 18 years to \$57 trillion over the next 18 years. Figure 5 provides several estimates, using different approaches, all pointing to massive global infrastructure needs. These estimates can be seen as somewhat conservative considering that they correspond to a scenario where current levels of infrastructure capacity and service relative to GDP are maintained under projected economic growth.

There is a huge infrastructure investment gap in a large number of countries. The average infrastructure investment gap amounts to between \$1 to 1.5 trillion per year (see Figure 6). Infrastructure investment needs range from a low 3 % of GDP in advanced economies to 9 % of GDP in emerging economies, and more than 15 % of GDP in some low income economies (see World Economic Forum, 2010, and 2012). Infrastructure investment needs are mostly earmarked for upgrading depreciating brownfield infrastructure projects in the EU and in the US and for greenfield investments in low-income and emerging markets.

Available estimates for Europe indicate that infrastructure investment needs up to 2020 are within the range of €1.5-2 trillion, or an annual amount of €150-200 billion on average (see European Commission, 2007). Within the infrastructure domain, energy is identified as the largest sector for investment, ahead of transport and communication. More recently, the European Commission (2013) estimated that for the EU, “overall investment needs for transport, energy and telecom infrastructure networks, amount to €1 trillion for the period up to 2020.” Those estimates cover a limited set of sectors and should thus be treated as a lower bound. It is worth noting that the European Investment Bank (EIB) has an annual volume of financing in the €50-70 billion range, and the Juncker investment plan is around €315 billion over three years, thus significantly falling short of estimated infrastructure investment needs.

In the US infrastructure needs are estimated to be over \$2.75 trillion by 2020 to be able to adequately serve the growing U.S. population and increased economic activity, as well as maintain or rebuild infrastructure in need of repair, or replacement (see American Society of Civil Engineers, ASCE). However, only \$6 billion of Recovery Act funding was available to spend on infrastructure in the Fiscal Year of 2012. Overwhelmingly the most pressing need for infrastructure is in surface transportation, including highways, bridges, railroads, and other transit systems.

Overall, however, the future growth in the demand for infrastructure will come increasingly from emerging economies. Over the past 18 years, more than 70% of global infrastructure investment originated in advanced economies (see McKinsey Global Institute, 2013). But over the next 18 years emerging economies are likely to account for 40 to 50 percent of all

infrastructure spending. Around 70% of the current pipeline available to equity investors consists of green-field projects, which are viewed as much riskier than brown-field investments, particularly in emerging economies<sup>2</sup>. Even though a growing number of investors are rethinking their investment strategies in light of these developments, they will continue to demand higher returns and will be more selective considering the riskier nature of green-field investments.

Available estimates suggest that if institutional investors (excluding SWFs) were to increase their allocations for infrastructure financing to their target levels, it would result in an additional \$2.5 trillion in infrastructure investment capital through 2030 (e.g. McKinsey Global Institute, 2013). This study however highlights that while “This is a sizeable amount, [it is] still only a fraction of global infrastructure investment needs. We therefore need to look elsewhere for a complete solution...” As mentioned earlier, assets under management by long-term investors have reached \$85 trillion. Even if a small portion of assets under management of long-term investors were to be earmarked for infrastructure development on a global scale, the impact on the global economy, as well as commercial returns could be bigger than any other source of large-scale private investments.

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<sup>2</sup> To the extent that greenfield investments involve a higher time to maturity and greater regulatory and enforcement risks they are fundamentally riskier for investors than proven brownfield investments that are already in operation.

### **III. INVESTING IN INFRASTRUCTURE THROUGH PUBLIC-PRIVATE PARTNERSHIPS**

We now turn to our analysis of public-private partnerships. We begin by relating how the growth in PPPs is closely connected to the privatization wave of the 1980s and the re-conceptualization at that time of the role of the state in the economy. Second, we highlight how the economics literature on PPPs is almost entirely framed around incentive issues that were prominent when privatizations were initiated, and is almost entirely silent on the financing issues that are more relevant today. Third, we point to the critical role of a third actor in the PPP relation, the development banks. They are a unique repository of technical expertise and government long-term relations, which make them essential facilitators for the origination of greenfield-investments as well as the financing of infrastructure projects.

#### **A. Privatization and the Genesis of PPPs**

The 1980s and 1990s ushered in a world-wide wave of privatizations and a retrenchment of the role of the public sector in the economy. This was true of developed countries (Western Europe, Japan, Australia, Canada), developing countries (Latin America, Turkey, Malaysia), as well as most transition economies (Eastern Europe, China). Widespread evidence of inefficient management of state-owned enterprises, fiscal and debt crises in many countries, together with new economic thinking on incentives, competition, regulation and the monitoring role of capital markets (see Vickers and Yarrow, 1991) underpinned the new economic consensus emerging in this period around a model of development led by private sector investment and market liberalization.

This wave of privatizations inevitably brought about a reduced role of the public sector in infrastructure and opened up the gates for a surge in infrastructure investments funded and

operated through public-private-partnerships. In all a total of over 2700 projects were initiated in developing countries between 1990 and 2003 (see Hammami, Ruhashyankiko, and Yehoue, 2006). However, it is now increasingly apparent that the early aspirations of a new investment and development boom have largely been disappointing. Not only has the flow of new PPP infrastructure projects been disappointing, but also the touted greater efficiency of PPPs has not always materialized. The cost of capital of PPPs relative to public funding, and assumption of risk, has proved to be significantly higher than initially estimated. Although risk transfer to the private sector inevitably requires compensation increases in the cost of capital sometimes incorporated more than just compensation for risk. This in turn has driven user costs up disproportionately, which has led to adverse public opinion around PPPs. The bad reputation of some PPP projects has been further exacerbated when the quality of service delivery of some PPPs deteriorated due to budget cuts or other constraints. These reasons partly explain why PPP deal flow has not been as large as some hoped. Figure 7 highlights the relatively flat flow of PPP project origination both in volume and value around the world. Figure 8 also reveals the limited penetration of PPP projects relative to other infrastructure investments in Europe. As Estache and Fay (2007) have concluded:

“The vision did not play out as expected. Almost 20 years after privatization began to be touted as the solution to infrastructure woes, the role of the large scale private sector in the delivery of infrastructure services in energy, water or transport is far from being as widespread as many had hoped for, at least in developing countries.” [Estache and Fay, 2007, page 1].

As a result, while aging infrastructure facilities deteriorate, population continues to grow, and urbanization trends endure, massive and growing infrastructure needs remain unfulfilled. The reality is that the global privatization experiment of the past three decades has held back the supply of new large-scale infrastructure projects in many parts of the world. Moreover, private sector funding of infrastructure will not be forthcoming in sufficient quantity under the current PPP models to meet the future global infrastructure needs. The current private funding levels only meet a fraction of the huge \$57 trillion of global infrastructure needs. Indeed, the global annual volume of infrastructure investments must be multiplied by four or five from current levels, starting immediately, to be able to reach the total investment amounts estimated by the McKinsey Global Institute by 2030. Just as when the Washington Consensus (Williamson, 1989) emerged as a possible new template for development thirty years ago following the collapse of the central planning development model of previous decades, the world today is at a new cross-roads. Similarly, new institutional innovations are required in the current era that can channel the vast pools of long-term savings parked in low-yielding assets towards higher-return long-term infrastructure assets. Before outlining how a re-conceptualization of PPPs and the role of development banks can remove an important obstacle in the deployment of private long-term savings towards infrastructure assets, we briefly discuss the key economic rationales for PPPs that have been proposed in the existing academic literature.

## **B. The Microeconomics of PPPs and the emphasis on Incentive Issues**

Most of the economics literature on PPPs is cast in a dynamic bilateral Principal-Agent framework (see Iossa and Martimort, 2015 for an overview). The Principal is the government and the Agent is the infrastructure provider. The early contributions to this literature are motivated by the privatization experience in the UK in the 1980s and the subsequent proliferation of infrastructure service provision under PPP arrangements. The record of publicly provided infrastructure services in the UK prior to the privatization wave of the 1980s was rife with inefficiencies and underinvestment in maintenance and technological upgrades. In light of this evidence, economists not surprisingly, pointed to the lack of incentives for the public infrastructure service providers to minimize cost, increase quality, and maintain the infrastructure facility. A basic observation of incentive theory (Mirrlees 1999, Holmstrom 1979) is that the agent providing a service will have stronger incentives to perform if her compensation is tied to performance. Given that public infrastructure service providers were not compensated based on performance it was not surprising that public infrastructure service provision, whether in transport, energy, water, health, education or telecommunication was deficient.

A major advantage of privatization, and of the private provision of infrastructure services, is that the provider is compensated based on performance, as measured by profit. However, a major “inconvenience”, well recognized by the early proponents of privatization, is that maximization of profit by a monopoly infrastructure service provider exploiting its market pricing power is generally not a desirable social objective. If private provision of infrastructure services can deliver desirable incentives for cost and quality performance, it

also introduces undesirable monopoly distortions. Therefore, private provision of infrastructure services has to be accompanied at a minimum by rate and standards regulation, setting up a first unavoidable long-term link between the private service provider and the public regulator.

But the PPP economics literature is more specific than that. First, as Donahue (1989) has noted, the benefits of privatization are highest when private providers are also subjected to competition. When horizontal competition is not feasible because the service provider is a natural monopoly, some discipline may be introduced through vertical competition and by periodically organizing an auction for the license to provide the service. Accordingly, the UK and many other countries have introduced fixed term concession contracts that are up for competitive bidding or contract renegotiation when the private service-provision contract expires.

An important policy question is then how broad a scope and how long a term to specify in the concession contract. A central insight of the economics literature on PPPs regarding this question is that it is generally incentive-efficient to structure the concession contract by bundling construction and service-provision together with a single private operator. In practice PPPs can take several different forms: there are PPPs that combine building, owning and operating (BOO), building, owning and transferring (BOT), building, rehabilitating, owning and transferring (BROT), rehabilitate, operate and transfer (ROT), and build, lease, own (BLO). According to Hammami, Ruhashyankiko, and Yehoue (2006), from 1990 to 2003 a total of 690 BOO, 317 BOT, 234 BROT, 108 ROT, and five BLO PPPs have been initiated. A striking result in the economics literature on PPPs is that whenever there are

positive spillovers between construction and operation of an infrastructure facility it is optimal to design the PPP in the form of a BOO or BLO (see Hart, 2003, Bennett and Iossa, 2006, Martimort and Pouyet, 2008, and Iossa and Martimort, 2012 and 2015). In simple and general terms the reason why bundling is efficient is that by assigning construction and operation to the same provider, the latter has strong incentives to construct the facility so as to minimize future operating costs.

One drawback of structuring the PPP by bundling construction and operation, however, is that this generally involves a very long-term contract, lasting over 25 to 40 years. Moreover, under such a contract the operator faces significant risk, both during the construction phase and in the operating phase<sup>3</sup>. It is generally not efficient to expose the operator to the entire risk of the project. Again, a central lesson from agency theory (Mirrlees 1999, Holmstrom 1979) is that the optimal contract between a principal and an agent involves trading off risk-sharing and incentives. To the extent that the government is better able to absorb risk it makes sense to provide some insurance to the PPP operator, even if this comes at the expense of incentives to deliver services.

How much insurance should be offered, and what types of risk should be insured is not clear from the existing economics literature on PPPs. With the exception of a few studies (in particular Engel, Fisher and Galetovic, 2008) this topic has not been studied systematically.

The main argument in the economics literature against any form of insurance is that investors

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<sup>3</sup> During the operating phase some PPP concession-holders may be subject to significant volume risk such as toll road operators. On the other hand, hospitals, prisons, and other such PPP operations are less subject to such demand risk during the operating phase.

in PPPs are diversified investors and as such are best able to hold the risk, provided of course that it is properly priced. The argument in favor of insurance is that the government has a greater ability to raise funds through taxation (see Holmstrom and Tirole, 1996) and therefore should take on as much as of the funding cost as is compatible with maintaining incentives for service provision by the PPP operator. Neither of these arguments is fully compelling nor is it always relevant to the constraints faced on the ground by the contracting parties in specific PPPs. It is striking how little attention the economics literature has devoted to the fundamental question of how to structure financing of investments under PPPs, how much should come from private sources and in what form and how much should come from public sources. An equally striking observation is that almost all the economics literature on PPPs frames the contract as a bilateral contract between a private provider and a government agency. One important exception is Dewatripont and Legros, 2005, who emphasize the important role a third party can play as a monitor to improve the efficiency of contract enforcement. In most developing countries the obvious third party is a multilateral development bank, which can play not only a key monitoring role of both the service provider and the government agency, but also a fundamental role in structuring financing efficiently and providing optimal insurance or guarantees to private investors in PPPs.

### **C. Origination and Financing: The New Economics and Finance of PPPs**

As little as the economics literature has explored the issue of financing of PPPs, the most important concern of private operators and investors in practice is how to structure financing and minimize the cost of capital of PPP projects. Structuring financing of PPPs is not just a technical question; it is what supports the delicate balance between the interests and

comparative advantages of the different partners in the PPP. It is not just a question of optimally allocating the different risks involved in an infrastructure project, as illustrated in Figure 9, but also a question of setting up the right governance structure to ensure the sustainability of the project. Given the public goods nature of most PPP projects a fundamental difficulty is to find a way to internalize the positive externalities produced by the project without excessively excluding all the potential beneficiaries of the project.

This is, of course, not a new problem; what is new is the institutional context that evolves over time and technological advances. Before we discuss the new institutional context and how it shapes new approaches to the financing of PPPs it is worth mentioning a particularly instructive old model of PPPs from the Middle-Ages in Europe and to contrast it with a successful modern equivalent:

“The Bridges were always the weakest links in the road network and the most difficult for occasional labour to maintain. In the course of the twelfth century local efforts began to be supplanted by a more powerful organization of resources, often of a charitable nature.” [pp 176] “It was an extremely expensive enterprise to maintain...It was normal for a toll to be levied from those using such a bridge, and sometimes as at the Pont St Esprit, from those using the river under it, to help pay for its upkeep and repair. However, tolls by themselves were not adequate to maintain a bridge. Those who planned to build one did not simply have to look for enough funds to build it in the first place, but for an adequate permanent endowment in land. The first years’ rents from the bridge’s lands paid for the initial building. The fact that the Pont St Esprit and its associated works took forty years to complete was not because medieval masons could not work any faster, but because it needed forty years’ income to pay them. The endowment was then intended to pay for the maintenance of the fabric, of the brotherhood and of their chapel. ” [From “Power and Profit: The Merchant in Medieval Europe” (2002), Peter Spufford, Thames & Hudson, New York pp 177-178.]

A modern equivalent of the medieval “bridge financing” model is the striking example of “value capture” implemented by Hong Kong’s mass transit rail corporation (MTR), a private

operator with a majority stake held by the Hong Kong government. Just as medieval bridge operators had endowments of land to establish a sustainable revenue source the MTR owns properties in Hong Kong whose value appreciates as a result of the extension of the transit network (see Cervero and Murakami, 2009). As a result MTR is hugely profitable unlike most mass transit systems in the world even though ticket prices are relatively low. In 2013, for example, MTR realized an operating profit of HK\$ 16.3 billion (or \$2.10 billion) of which revenues from property development, rental & management, and station commercial businesses represented over 50% of the profit ([www.mtr.com.hk](http://www.mtr.com.hk)). This example illustrates how a well-designed PPP can better exploit the comparative advantages of the different partners in capturing revenue to finance infrastructure construction and operation. In MTR's case it was better placed as a private operator to combine property development with transit extension than the Hong Kong government.

A well-known problem that all too many heavily-indebted poor countries (HIPC) have faced is that their public finances are just too stretched to be able to support large infrastructure investments that are nevertheless sorely needed. Often the only way for these countries to be able to build an infrastructure facility is to rely on private financing through a PPP. It is most likely the reason why Hammami, Ruhashyankiko, and Yehoue (2006) have found that PPPs are most prevalent in HIPC. In these countries what drives the way the financing of the PPP is structured is basically a very tight government financial constraint. The private funding of an infrastructure project generally comes against a concession contract which assigns future toll revenues to the provider. But this is only the beginning of the PPP financial-structure problem. Two other major issues are: First, how senior the claims of the private investors

should be: should private investors be senior secured lenders, subordinated bond-holders or common equity holders? If they are debt-holders, to what extent should this debt be guaranteed and by whom? Second, what are the control rights of private investors and what are their protections against the hold-up risk by host governments?<sup>4</sup>

The reality of infrastructure assets as an investment class is that most investors are only comfortable holding debt instruments, preferably guaranteed, in relatively safe infrastructure assets.<sup>5</sup> This generally means that private infrastructure investors crowd into the relatively safe *brownfield* infrastructure-asset class (that is, projects that are already built and operating), in which yields are no longer that attractive. Far fewer investors venture into *greenfield* infrastructure-projects (that is, projects that are still under development), which expose them to construction, regulatory, and demand risk and involve much longer payback periods. For routine transport and energy infrastructure the construction risk is limited, but demand and regulatory risks may not be. For more unusual infrastructure investments, such as nuclear reactors, long tunnels, or major urban redevelopment projects construction risk is much more of a concern.

Another consideration in the greenfield space is that most private investors only want to hold senior, secured, and if possible, guaranteed debt. Far fewer private investors venture into

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<sup>4</sup> Toll revenues in developing countries are not well accepted by users, which reinforces the risk of hold-up and expropriation by the Government. In addition, toll revenues are subject to currency risk and the lack of long-term currency hedging mechanisms is a major concern for investors.

<sup>5</sup> Guarantees are rarely available and therefore seldom sought by investors (non-recourse debt remains the norm).

holdings of common equity stakes in greenfield projects because the perception of high risks, especially for investors with limited expertise in infrastructure project finance, who are most exposed to adverse selection. One notable example of a long-term investor taking equity positions in greenfield projects is the private equity firm *Meridiam* (<http://www.meridiam.com>), which remarkably imposes on its long-term limited partners lock-up periods of up to 20 or 25 years, more than double the typical length for a lock-up period in private equity funds.

A cutting-edge example of one of the largest PPP projects ever to be envisaged, currently in the final pre-construction stage in the UK, is the Hinkley Point C nuclear power EPR plant project involving the French electric utility company EDF as the private provider, a strategic partnership with China's General Power Corporation (GPC), and the UK government.<sup>6</sup> Early consultations on the project began in October 2008 and the project is now reaching the point when construction is about to begin<sup>7</sup>. Currently, the estimated time for construction of the new EPR plant is eight years, the expected operational lifetime is sixty years, and the total capital commitment for the two reactors is expected to be around €43 billion<sup>8</sup>.

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<sup>6</sup> Nuclear power plants are a very special type of infrastructure, from which private investors shy away due to the enormous construction or operational risks. Outside investors are only willing to step in as liquidity providers under the condition that the totality of risk is assumed by another stakeholder (State or other entity).

<sup>7</sup> See: <http://www.edfenergy.com/energy/nuclear-new-build-projects/hinkley-point-c/about>

<sup>8</sup> See the European Commission Press Release IP/14/1093 on 8 October 2014.

EDF and GPC will respectively own 66.6% and 33.5% of the capital, and the UK government will provide a £20 billion loan guarantee<sup>9</sup>. Under this structure most of the construction risk is taken on by the equity owners in the PPP, and credit risk is transferred to the UK government, who is a stronger counterparty than any private default protection seller. Moreover, a particularly innovative feature of the PPP is the so-called contract for difference provision that locks in and front-loads the future prices for the Hinkley Point C electricity sold by EDF to the national grid. This provision, in effect, allows the private provider and the UK Government to share operating risk, and thus lower the cost of financing of the project<sup>10</sup>. It is worth mentioning that the guarantee fee has been significantly raised by the European Commission in order to “reduce the subsidy” by the UK Government, although the subsidy had been authorized by the Commission on the grounds that the “UK authorities demonstrated that the support would address a genuine market failure”. The impact of the project on EDF’s balance sheet and risk profile is so large that EDF has decided for risk management purposes to increase its liquidity holdings by selling €10 billion of assets over the next five years<sup>11</sup>.

This example is remarkable not just for the sophistication of its financial structure and risk allocation, but also for its sheer size and the particularly long-term commitments that may be involved in infrastructure projects: more than seven years from the first consultations to the

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<sup>9</sup> Under a previous financing structure which received support from the European Commission, construction costs were estimated at around €31 billion with debt financing of about €22 billion covered by the State guarantee.

<sup>10</sup> See the European Commission Decision of 08.10.2014 on the Aid Measure, which the United Kingdom is planning to implement for Support to the Hinkley Point C Nuclear Power Station, SA.34947.

<sup>11</sup> See: <http://www.ft.com/intl/cms/s/0/fcd6a462-7578-11e5-a95a-27d368e1ddf7.html#axzz3rIy5BHcu>

beginning of construction, eight years of construction, and sixty years of operating income. Such an investment asset is obviously only well suited for long-term investors, which besides the operating companies include pension funds, insurance and re-insurance companies, and sovereign wealth funds. The example is also noteworthy for its reliance on guarantees to lower the cost of debt financing. The UK Government is, of course, in the enviable position of being able to extend such a guarantee at virtually no cost, and thus to significantly lower the cost of capital for such projects. A simple back-of-the-envelope calculation gives the following ball-park number: assuming that the required interest payment on a thirty year AAA bond is 3%, and the required interest payment of a thirty year bond without the guarantee is 5%, the yearly interest savings to service the AAA bond versus the non-guaranteed bond for a total issue of 17 billion pounds is approximately  $(850 - 510) = 340$  million pounds.

Development banks and foundations can play a critical in fostering infrastructure investment especially by alleviating governments' financial constraints and risk sharing. Development banks and foundations are however also constrained. In the aftermath of the global financial crisis of 2008, central banks around the world have been called to the rescue and have expanded their balance sheet in order to help ease financial conditions especially through private bank credit channel. That led to an extraordinary expansion of central banks' balance sheets which effectiveness has been put into question considering that the anemic credit recovery of private banks. At a time when the debate in the U.S. in particular is switching toward how to unwind the balance sheets of central banks, it is perhaps time to think about whether and how development banks can take the lead and act on the more "structural"

margin including through alleviating infrastructure bottlenecks. For that to happen, development banks and foundations would need to increase the leverage their own capital tapping into available vast pools of long-term savings or allow for greater and innovative co-financing of projects including through allowing private investors. For instance, two years ago JPMorgan Chase and the Bill & Melinda Gates Foundation formed an investment fund that will back late-stage development of technologies to fight killer diseases in low-income countries. The private financing seeks to address the fact that global health funding barely grew last year. Given the risks of investing in the clinical development of new technologies, the Gates Foundation and the Swedish International Development Cooperation Agency will partially offset potential losses in the fund, which will seek a financial return for investors by targeting technologies with public health applications in both developed and emerging markets.<sup>12</sup> The Bill and Melinda Gates Foundation has over the years been a very pragmatic and innovative partner in solving global and regional challenges mainly in the health sector.

Further involvement of development banks and foundations can help scale up global infrastructure investment not just through alleviating governments' financial constraints. Most PPPs are too small in scale for large long-term institutional investors, such as pension funds, reserve funds, and sovereign wealth funds, who do not always have dedicated infrastructure experts in their management teams. Considering the breadth and depth of development banks' expertise in infrastructure, development banks can facilitate the origination and the development of large scale projects and reduce political risk associated

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<sup>12</sup> Lion's Head Global Partners LLP, a London-based asset manager specializing in sustainable development, will be responsible for originating, managing and exiting the fund's portfolio investments.

with the project. For that development banks need not only respond to the needs of governments around the world but also follow to the leads of private investors whom may also help identify viable projects. Considering the opportunity presented by the large pools of long-term savings, the provision of expertise in origination, guarantees and an improved institutional framework by development banks can be a catalyst for more private sector involvement and in turn scaling up the volume of PPPs. The scaling up on infrastructure can lead to the densification of networks both domestically and regionally. Indeed, the degree of “bankability” of individual infrastructure projects rests on the whole infrastructure network. Development banks can help governments and private actors internalize those externalities and further alleviate financial constraints.

#### **IV. MULTILATERAL AND REGIONAL INFRASTRUCTURE PLATFORMS**

There is growing recognition globally that development banks can play an important role in facilitating the preparation and financing of infrastructure projects by private long-term investors. A number of infrastructure platform initiatives have been launched very recently, most of them still at a prototype development stage. We discuss four different models that are currently at various stages of development. These platforms are all different attempts to tap into the vast pool of global long-term savings by better meeting long-term investor needs to attract them to infrastructure assets and by relaxing operating and governance constraints traditional development banks have been facing. One specific example of constraints development banks have been subject to is their governance structures centered exclusively around governmental actors, which de facto make it impossible for private investors to be

actively involved in the orientation given to infrastructure investments both on the origination and financing fronts. We begin with a brief description of four noteworthy models of platforms, which will help give context to the subsequent critical assessment of the existing trade-offs and potential limitations of the models currently being proposed<sup>13</sup>.

### **The European Investment Bank Model**

With total assets just exceeding half a trillion Euros in 2014 and funded projects in over 160 countries, the European Investment Bank (EIB) is currently the world's largest multilateral investment bank. The EIB has been set up by the European Union with a very conservative business model under which the EIB is only allowed to borrow 2.5 times its committed capital. This ensures that it can always issue AAA-rated bonds. Not all of EIB investment is in infrastructure. The EIB also plays a major role in the funding of innovation, climate change mitigation, and SME loans.

The EIB's most innovative infrastructure investment activities are in project finance. This is where the EIB provides an interesting new infrastructure platform model for development banks that can support PPP infrastructure projects. The EIB's involvement can reinforce PPP projects at several levels, whether it is in project preparation, as a co-investor, a lender, or a servicer. A typical PPP in which the EIB is involved will have about 70% of the cost funded

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<sup>13</sup> There are several other important global infrastructure investment initiatives that are at various early stages of development. They include: the Juncker Plan, November 2014, the G20 Global Infrastructure Initiative, November, 2014, the establishment by the European Commission of infrastructure investments as a new asset class, October 2015, and the launch by the International Finance Corporation (IFC) of a new accounting platform earmarked for infrastructure projects in emerging markets, November, 2015 (Winrow, 2015).

initially either through a bank loan, that may subsequently be refinanced in the bond market, or through a long-term project bond, with the EIB providing support either through a credit enhancement scheme, to remove exposure of creditors to construction and early operating risks (a line of credit, a subordinated debt tranche), or through an equity co-investment with a private long-term infrastructure investor such as Meridiam or DIF (<http://www.dif.eu/>) among others.

Participation by the EIB in a project has two main advantages. A first obvious benefit is that the EIB offers more loss absorbency protection to private investors who buy the project bond. As a result, these investors are prepared to both extend the maturity of the bonds and lower their required rate of return, thus reducing the overall cost of capital of the project. The second related benefit is that when the EIB is involved as an investor and in the servicing of the PPP debt, the government partner in the PPP is more likely to honor the terms of the concession contract. The reason is that the EIB is a key long-term agent in the infrastructure investment space, with essential expertise in project preparation and servicing, with whom the government entity will be expecting to have to interact with multiple times on future projects. This entity will therefore think twice before renegeing on contractual promises or before deciding to hold up the PPP operator. A third important benefit is that when the EIB is involved, even with a relatively small stake in the form of a project bond credit enhancement, it will apply its due diligence expertise and rigorous standards for investment, thus further reducing the credit risk for project bond investors.

## **The World Bank's Global Infrastructure Facility (GIF)**

The World Bank Group launched a major new initiative with the GIF, officially established at its October 2014 Annual Meeting. The World Bank's involvement in infrastructure investment is of course not new. It has been engaged in infrastructure financing ever since its creation in 1945, and has thus accumulated a deep expertise in this area. In recent years the World Bank has progressively recognized that there is a new reality for global infrastructure investment and that there are untapped funding opportunities from private investors, which could help respond to the huge demand it receives from member countries. This is why it has launched this major new initiative. The World Bank has two important objectives for the GIF. First, make better use of its exceptional talent pool to accelerate origination of new projects, and second relax its current tight funding constraints driven by its current limited capital base which will be difficult to increase substantially, by co-investing more with private investors. As prompted by the G20, the World Bank hopes to leverage its global infrastructure expertise by bringing in private funding from long-term investors through the GIF facility set up specially to co-invest along with private investors. Originally, the GIF has been set up as an entity outside the World Bank with a total capital of \$200 million. That capital was destined to be leveraged with A+ rated debt held by private investors so as to finance potentially much larger projects.

The initial contours of the GIF, however, appeared problematic to the World Bank membership. Two main issues, in particular, have arisen. First, there was a view that building a sound "infrastructure balance sheet" could take a long time. Second, the participation of new actors would have implied a change in the governance structure which

appeared unlikely at the time. In that context, the current design of the GIF with a more limited scope was deemed more realistic. One of the important logistical issues is at what stage to bring in private investors: at an early project preparation stage or much later as a residual financial contribution when all the parameters of the project have all been set. Issues regarding oversight in social and environmental protection in large-scale infrastructure projects in developing countries by the World Bank's GIF have also been met with criticism, for initiatives such as offering funding approval for fossil fuels in Africa and a mining project for coal production in Kosovo, expected to displace approximately 7000 people (Bretton Woods Project, 2014).

Currently, the GIF platform is designed to help identify, prepare, and also supervise projects. In addition, since there are issues also on a project by project basis in every country, which requires policy amendments or policy interventions, and considering that the World Bank Group is present all over the world, it is better positioned to enhance the overall policy framework. Building on the World Bank's expertise in infrastructure financing, the GIF offers services in terms of identifying and preparing projects. The GIF will start with a few pilot projects amounting to \$2 billion or so. A total of \$80 million is being budgeted for preparation of those projects. And on the downstream side, GIF is budgeting \$200 million. The modalities on how to integrate the upstream and downstream sides are yet to be decided upon.

## **The European Bank for Reconstruction and Development (EBRD) Equity Participation Fund**

Investors are admitted as Limited Partners adhering to the terms of the Fund. The General Partner (GP) will be an English limited liability company, owned 100% by a third party administrator. The GP appoints EBRD as the fund manager through a management agreement. The Fund buys an equity return swap (“ERS”) from EBRD in respect of each eligible EBRD equity investment ( $ERS = \text{participation rate} \times \text{cost of the EBRD's equity investment}$ ). A fixed allocation ratio will be followed for eligible investments in equity with 30% of investment risk allocated to the fund. The EBRD retains 70% of the investment risk. Investors in the fund are passive and follow the EBRD investment process. The target size of the fund is between EUR 750 million and 1 billion. The expected investment size is between EUR 10 to 100 million. The expected portfolio return is 15% internal return rate. The fund term is 12 years. Hence, one of the biggest limitations to EBRD's Equity Participant Fund is that the time horizon for return on investments in infrastructure is far too short, bearing closer resemblance to private equity investment patterns than to long-term investors in global infrastructure, with a minimum period of 25-30 year time horizons. In North Africa, for example, the EBRD's Equity Participation Fund is the largest limited partner in infrastructure initiatives, by serving as co-investor in more than 170 private equity funds. To date, the EBRD has made €10 billion cumulative equity investments in infrastructure across 36 countries.

The main advantage of the fund is to provide an opportunity to invest in the growth potential across the EBRD countries of operation, which is not accessible via public markets or

traditional private equity funds. Indeed, global institutional investors who participate in the EBRD's direct equity investment portfolio and strategy will benefit from geographic and sector diversification, as well as the long-term capital growth and return opportunity in line with market benchmarks. In addition, fund investors also benefit from the EBRD adherence to the highest environment, social and governance (ESG) standards and unique access to a universe of both public (pre-privatisation) and private companies. In terms of risk mitigation, the EBRD has stringent internal processes as well as very low-cost intermediation (cost sharing management fee, no carried interest).

### **The Asia Infrastructure Investment Bank**

The latest multilateral development bank to be created is the Asia Infrastructure Investment Bank (AIIB) expected to start operations this year. Unlike other development banks it is entirely dedicated to infrastructure investment, as its name indicates. It has a start-up committed capital of \$50 billion with another \$50 billion in future capital commitments. While the total committed capital of the AIIB is lower than the EIB's, its maximum leverage ratio is much higher (borrowing may be as high as 20 times capital) so that total assets of the AIIB could be double those of the EIB when it reaches full capacity.

The launch of the AIIB has been held back by US opposition to Asian countries joining the AIIB. However, the recent announcement that the UK, France, Germany and Italy are joining the AIIB has been a turning point. The AIIB now has more than thirty member countries,

including India and Indonesia, with each member's voting rights on the governing board benchmarked to be proportional the member country's share of GDP.

The creation of the AIIB is a significant step towards meeting the \$8 trillion of Asian infrastructure investment needs over the next decade estimated by the Asia Development Bank (ADB). That being said, it is highly unlikely that the AIIB will be crowding out investment efforts by existing multilateral development banks, given that these institutions do not have the balance sheets to be able to meet these enormous infrastructure investment needs. The ADB has a committed capital base of about \$160 billion and the World Bank about \$220 billion, but much of that capital is already deployed in existing projects and their mandates are much broader than infrastructure. A multilateral development bank entirely dedicated to infrastructure and with significantly larger potential leverage than existing development banks is much closer to the future infrastructure platform model that can unlock the bottleneck preventing the flow of long-term savings towards long-term infrastructure assets. With a higher projected leverage it is likely that the AIIB will not just be issuing AAA rated bonds to long-term investors, but also lower rated bonds with a higher yield, which should make these particularly attractive to long-term investors in the current global low yield environment. Another advantage of a large development bank, fully dedicated to infrastructure, is that it can fund much larger projects and coordinate investment for entire infrastructure networks, thus increasing the bankability of individual projects. This is particularly relevant for transport, water, and electricity infrastructure projects.

## **Tradeoffs and Next Challenges**

Several lessons can be drawn from this brief description of the four infrastructure investment platforms. A first obvious lesson is that the ability of development banks to leverage public money—committed capital from government contributions—by attracting private investors as co-investors in infrastructure projects is increasing the efficiency of development banks around the world. It is not just the fact that development banks are able to invest in larger-scale infrastructure projects and thus obtain a greater bang for the public buck, but also that these private investors together with development banks can achieve more efficient PPP concession contracts. Development banks are not just lead investors providing some loss absorbing capital to private investors. They also give access to their expertise and unique human capital to private investors, who would otherwise not have the capabilities to do the highly technical, time-consuming, due diligence to identify and prepare infrastructure projects. In addition, they offer a valuable taming influence on opportunistic government administrations that might be tempted to hold up a private PPP concession operator. Private investors in turn keep development banks in check and ensure that infrastructure projects are economically sound and not principally politically motivated. No wonder that this platform model is increasingly being embraced by development banks around the world.

At the same time these platforms look more like green shoots next to the enormous global challenge of originating an aggregate flow of infrastructure projects of the order of one trillion dollars per year for the next two decades. As promising a model for future PPP infrastructure concessions they can offer, this model needs to be scalable to deliver on the promise of channeling under-used, long-term, savings towards more sustainable investments.

To achieve greater scale a number of aspects of the infrastructure platform model could be further refined and other avenues for infrastructure platforms should be pursued.

A first area that merits rethinking is the process of project preparation and the protocols for allocating human capital resources inside development banks to specific infrastructure projects. A related issue is how development banks can ensure that reliance on human capital resources is adequately compensated, given that only a fraction of the projects that are being considered will turn out to be 'bankable' and worth bringing to completion. The current model is essentially one where a host government approaches a development bank to initiate the investigation and preparation of an infrastructure project. It is only after a first round of screening that the development bank undertakes more thorough due diligence and project preparation. Private investors are brought into the picture fairly late in this process, if at all. They are often the last parties to be brought into the picture, at a point when the main contours of the project are already set. Institutional investors have become so accustomed to being spoon-fed nearly completed deals that they currently show little interest in getting involved in earlier stages. However, if the deal flow is to be significantly ramped up the current model has to be revamped to incentivize institutional investors to work with development banks at earlier stages of the preparation of bankable projects.

There are a number of potential obstacles created by this process. First, if there are no clear rules for allocating the right infrastructure experts to new projects, as they come along, there could be substantial inefficiencies and unnecessary bureaucracy involved in the project preparation phase. Not all development banks are yet fully set up to fulfill their role in

providing expertise optimally to the right projects. Ideally development banks should have an internal labor market for infrastructure experts with sufficiently widely available information on who is expert on what and who is available to work on a new project. There should be a form of bidding process in place so that experts get matched to the right projects and are adequately incentivized to work on the right projects. Equally, there should be a shadow price for this expertise that is included in the overall cost of infrastructure projects. One difficult pricing problem is how to charge for this expertise on projects that are not undertaken. If the cost of project preparation and due diligence is only imputed on those projects that end up being developed then there will be a number of distortions. Development banks could end up being flooded by requests; too many to be able to handle. And they may have to devote a significant fraction of their income to pay their experts. This, in turn, could give rise to understaffing and the creation of too small infrastructure teams. Development banks could, of course, relax this staffing constraint by outsourcing project preparation to outside consultants, but without the long-term commitment of institutional investors to participate in the origination of new projects and, possibly, in sharing project preparation costs, development banks will not have sufficient financial resources to bring in such outside consultants.

But possibly the most important shortcoming with the current process of project preparation is that private investors are largely thought of as passive players, with perhaps the exception of the handful of private infrastructure investment funds that actively cooperate with development banks in the preparation of projects they co-invest in as long-term equity investors. But, if the infrastructure platforms are to be scaled to an adequate size then the

overwhelming source of private capital will come from long-term asset managers such as pension funds, insurance companies and sovereign wealth funds. These investors are currently mostly thought of as passive players that will only be approached when the project preparation work has been completed and additional sources of funding are sought.

However, the largest private investors, who after all could hold a large bundle of infrastructure assets, should be brought in much earlier and be allowed to play a much more active role. These investors will have a more global view of which infrastructure projects are bankable than the development banks that are currently geographically restricted. They should also be able to initiate or propose projects to be studied and prepared. Global institutional investors could have a better sense of what a whole infrastructure network should look like—a network of waterways, canals, sewage systems, electric grids, roads, railways, etc—to make each individual project in the network bankable<sup>14</sup>. This is all the more likely if the efficient growth of the network is transnational and involves coordination of neighboring host governments, who are not necessarily used to cooperate with each other on infrastructure development. In sum, an infrastructure project initiative could also come from investors, with development banks providing investors access to host governments and playing the role of project preparation facilitators.

Furthermore, another important role of development banks in supporting infrastructure investment platforms is to undertake more comprehensive planning of infrastructure

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<sup>14</sup> So far, most PPP projects have been envisioned at a national level, even in the EU. The coordination of PPP projects at a transnational level is complex and involves significantly longer preparation, which makes them less attractive to private sector investors.

investments and how each individual project may fit into a broader infrastructure network development plan. An obvious risk in considering each project on an ad-hoc and isolated basis is that the project is more likely to be assessed as non-bankable. Building and operating a new highway may be seen as generating too few immediate development benefits and toll revenues if the subsequent development of an entire road system and other infrastructure projects is not taken into account. The same is true for investments in electrification, water, railways, and other transport networks. To the extent possible infrastructure investments should also be structured to allow the developer and operator to capture the external value created by the investment. As the Hong Kong MTR example strikingly illustrates, value capture especially for urban infrastructures is an effective way of ensuring the bankability of infrastructure investments.

Finally, as the EBRD experience illustrates many of the investments currently made by development banks are either not in infrastructure at all or not sufficiently in greenfield infrastructure projects. The reason is that a ten or twelve year payback horizon for a project is just too short. A recent example that illustrates the risk of development banks creeping away from greenfield and more into brownfield is the EBRD's investment in the modernization of railways in Moldova in November 2014. The investment no doubt enhances the efficiency of the railway and its revenue generating capacity. It is also an important contribution to the economic development of Moldova. Nevertheless, this is not a true greenfield investment in a new railway, which the EBRD is not set up to do given its somewhat short investment horizon.

## V. CONCLUSION

This paper has critically reviewed and offered an in-depth discussion on the emerging global landscape for public-private co-investments in infrastructure. The paper has documented that new platforms of investments have emerged. Notwithstanding, they are confronted with serious structural limitations. These platforms will certainly help on two important fronts namely on financing and origination of infrastructure projects, which this paper has focused on. Formally integrating these dimensions in models of PPP are important avenues for academic research.

Besides financing and origination, there are other important challenges to complete the broader task that lie ahead, such as in making infrastructure investment an asset class of its own. Two important directions are needed to further the agenda. First, the lack of standardization of underlying infrastructure projects is an important impediment to the scaling up of investment into infrastructure-based assets. Large physical infrastructure projects are indeed complex and can differ widely from one country to the next. In that respect, making use of securitization techniques such as collateralized bond obligations (or CBOs) or collateralized loan obligations (or CLOs) allow for better price discovery which will enhance the efficiency of the market and allow a more effective pooling of risk. It would also allow to “bulk up” the bond offering by addressing the problem of insufficient large sized bond issues. Overall, securitization will provide many advantages such as diversification for investors, lower cost of capital by allowing senior tranches to be issued with higher credit ratings, as well as higher liquidity. At the same time, securitization also creates debt instruments of variable credit risks to match the different risk appetites of

investors. Second, there are important complementarities between actors participating in the “value chain” created by platforms including host countries, financial investors, guarantors and financial intermediaries. For all these reasons, the EIB has recently launched a renewable energy platform for institutional investors (REPIN) to offer repackaged renewable energy assets in standardized, liquid forms to institutional investors<sup>15</sup>. Although interest from institutional investors has been limited so far, the new carbon footprint disclosures and regulations of institutional investors that are expected to be implemented after the Paris COP 21 climate summit, could nudge more pension and sovereign wealth funds to take on these securities.

Finally, host countries may put forth viable long term infrastructure projects but without the provision of guarantees to address construction, demand, exchange rate risks or without the securitization of underlying assets by financial intermediaries, those projects will not be funded, thus leaving everyone worse off. There is obviously also a need for enhanced coordination and cooperation across the various platforms in existence and for the creation of a global infrastructure investment platform. Part of the coordination should lead to risks being assumed by those best placed to hold them. Governments are the natural holders of political, regulatory and governance risks. The private sector for obvious incentive reasons should take on most of the construction risk, and demand risk should probably be shared, depending on the sector and type of project.

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<sup>15</sup> See <http://climatefinancelab.org/idea/renewable-energy-platform-for-institutional-investors-repin/>

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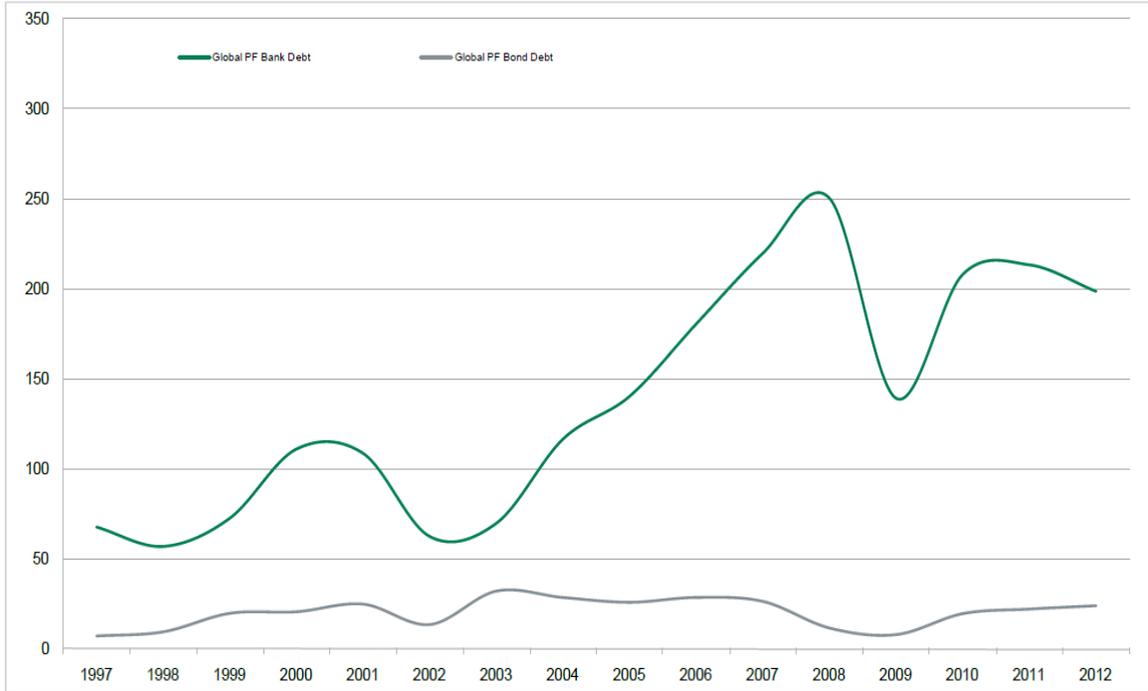
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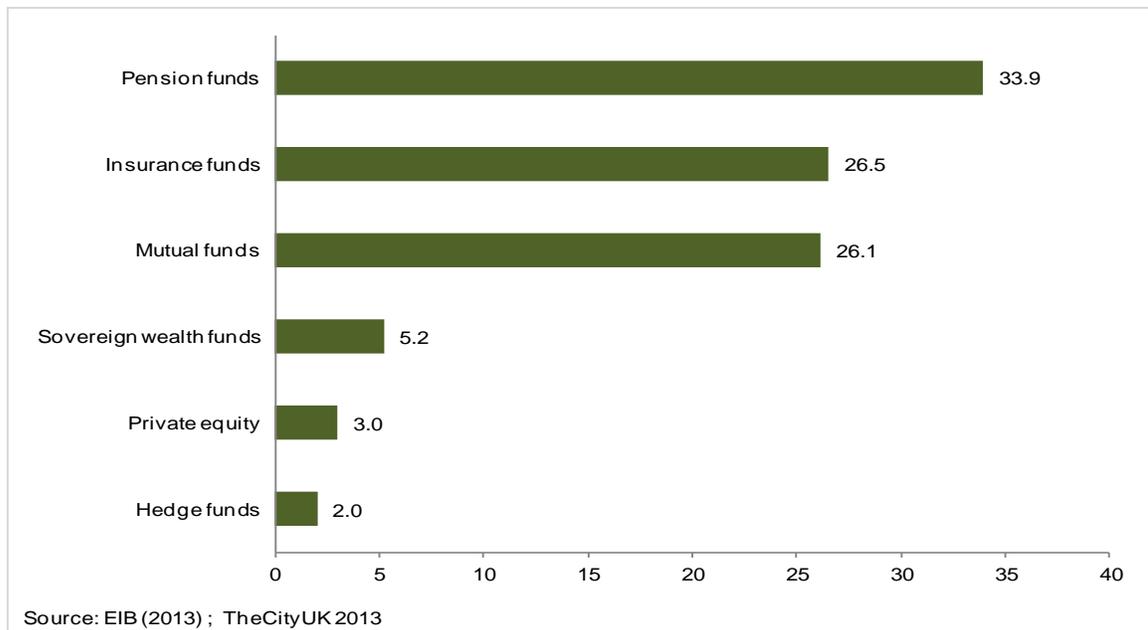
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# Appendix

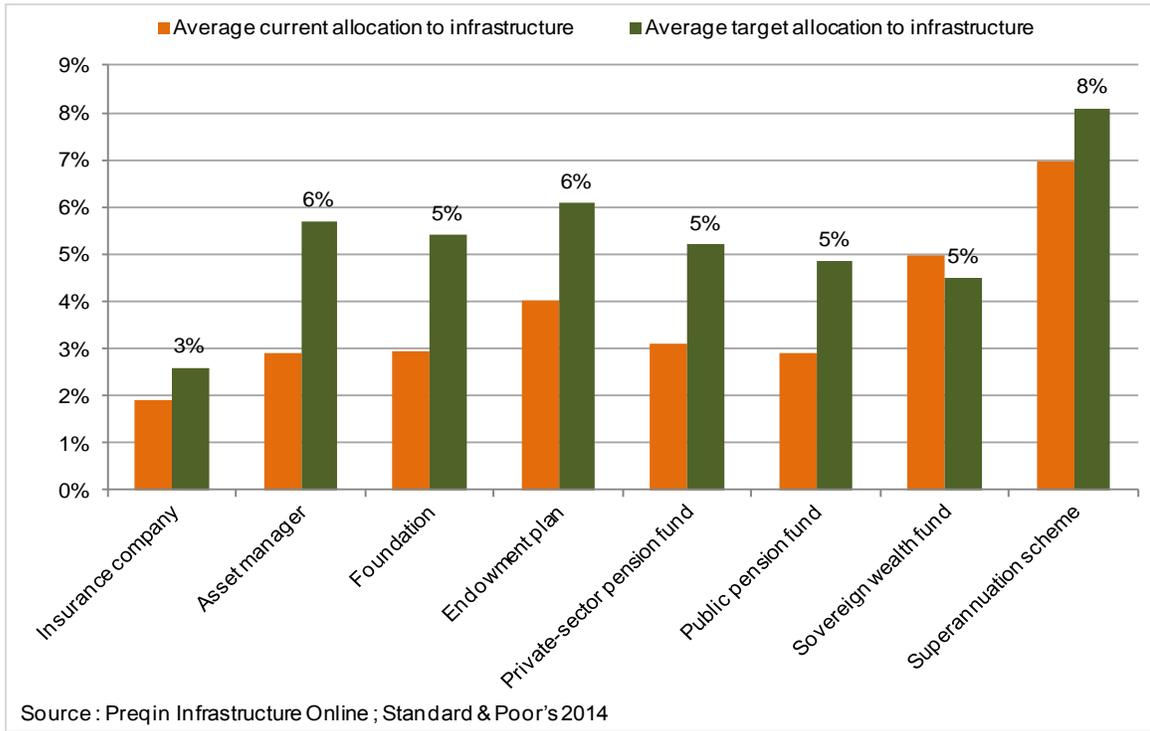
**Figure 1: Global Project Finance Volumes**  
US \$billion



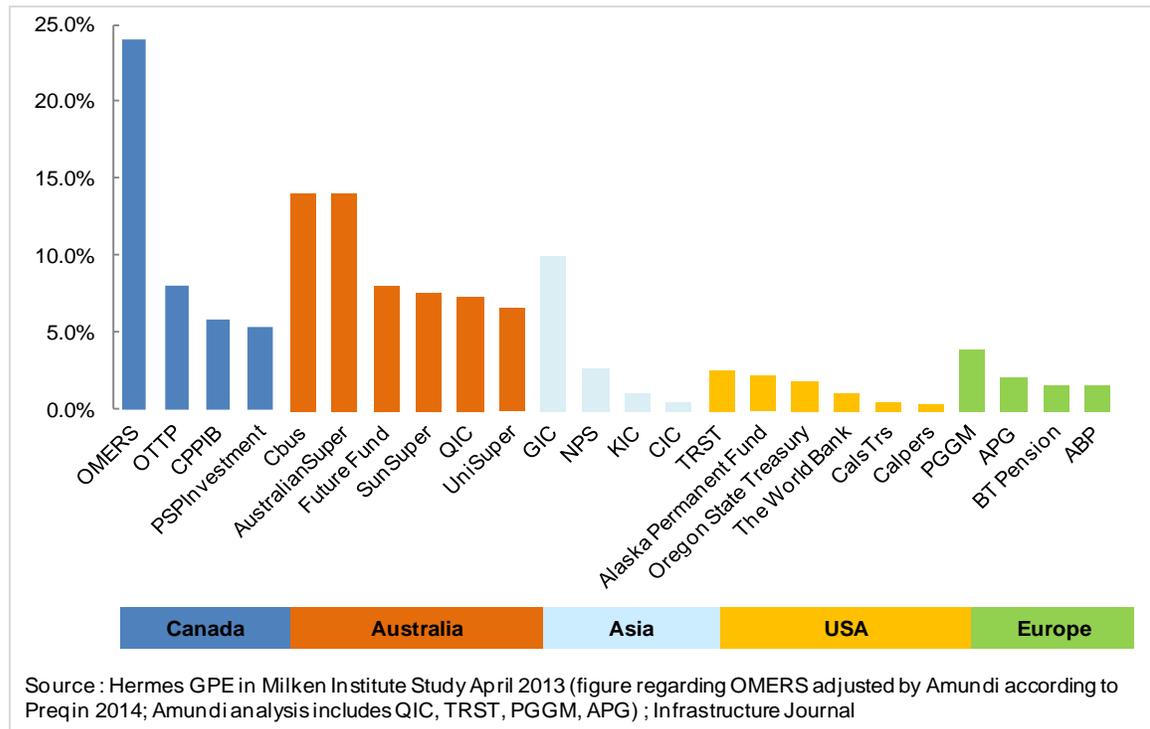
**Figure 2: Global Assets under Management**  
\$ trillion, end-2012



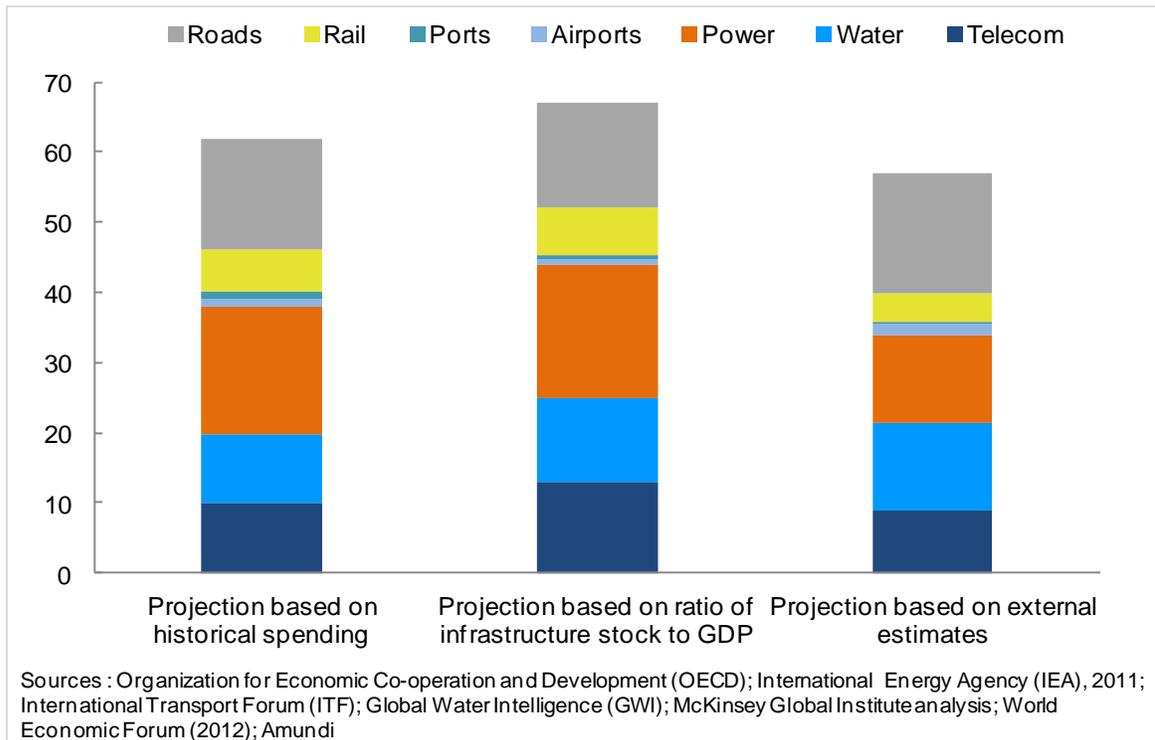
**Figure 3: Breakdown of Average Current/Target Allocation to Infrastructures by Investor Type**



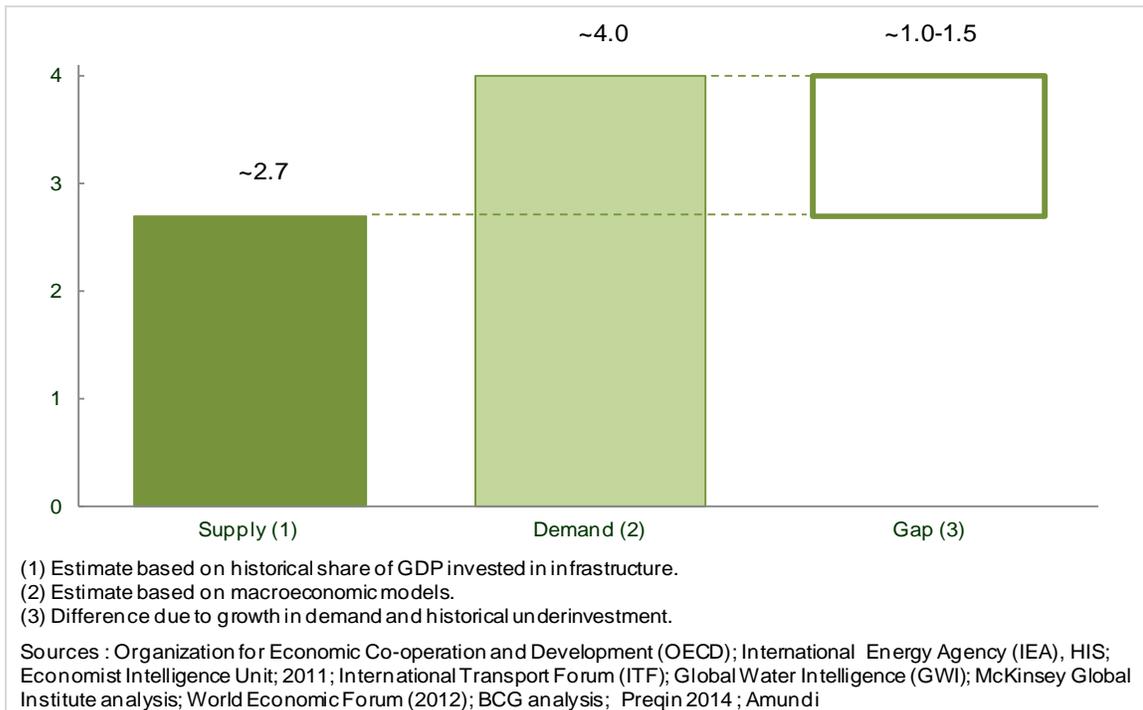
**Figure 4: Different Levels of Capital Allocation**  
Allocation infrastructure (%)



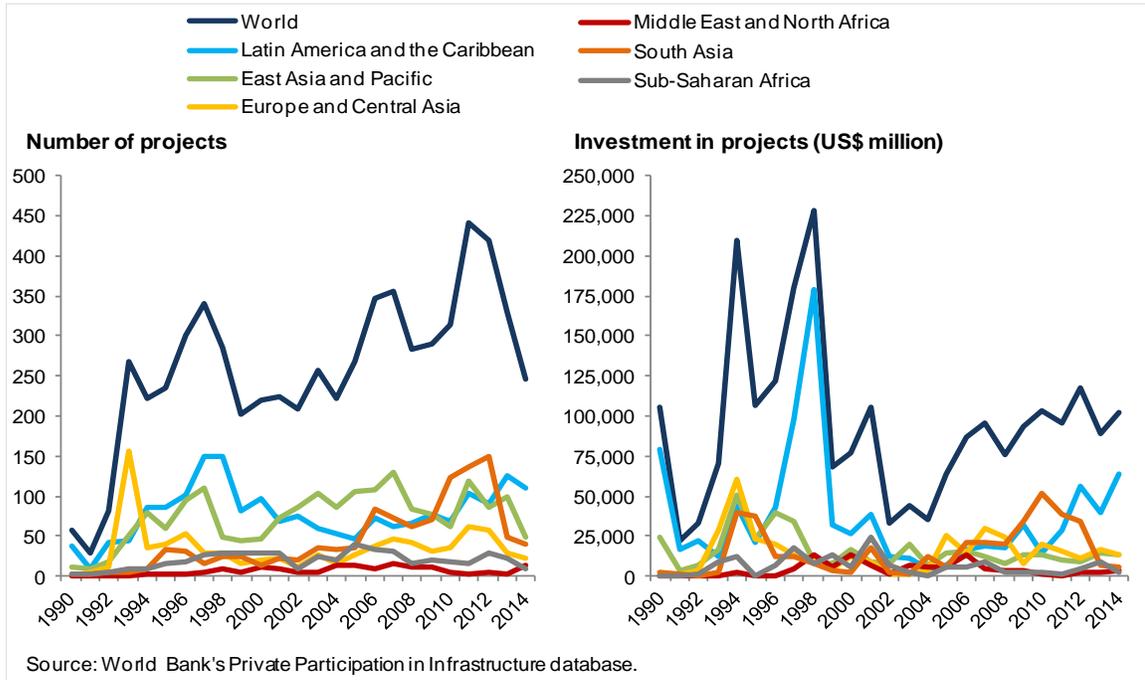
**Figure 5: Estimates of Needed Infrastructure Investments, 2013-2030**  
(\$ trillion, constant 2010 dollars)



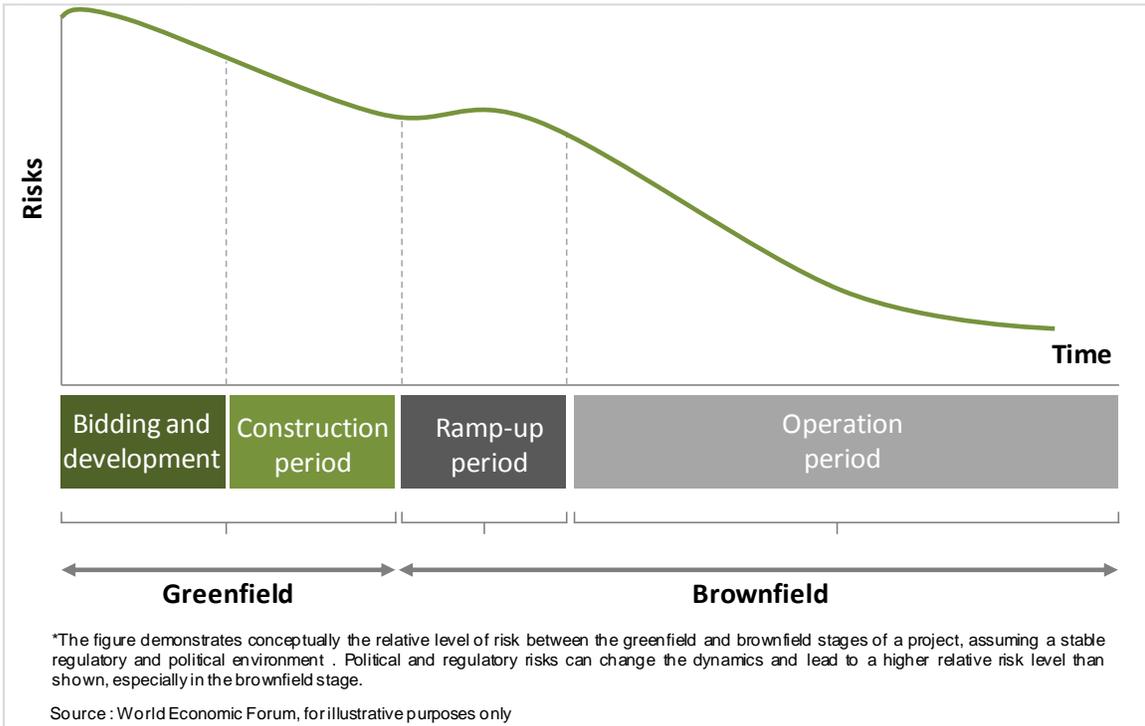
**Figure 6: Gap between Infrastructure Supply and Demand**  
Investment (2010 constant \$trillions)



**Figure 7: Evolution of the number of Public Private Partnership Projects**



**Figure 8: Risk profile development of an infrastructure asset\***



Sources: www.citywire.co.uk; Infrastructure Journal; Amundi

\* 2013 Global Project Finance, figures from the Infrastructure Journal, a Euromoney Institutional Investor plc service

**Figure 9: Private Infrastructure Spending in Europe\***

