Infrastructure Finance -The core debates

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In the 4th century B.C. the Greek philosopher, Aristotle, developed the earliest known model of narrative form in his treatise "Poetics". Ever since, analysts of literature have highlighted the basic forms that tales take, like "rags to riches" or "voyage and return" and the typical characters animating them like the "hero" or the "villain". Debates rage over whether there are seven or eight archetypal stories. If anyone looked at the basic stories about infrastructure finance, they would be disappointed. There seems to be a single dominant narrative that we encounter in countries across the globe:

"In the land, the need for infrastructure was great. The people and the business folk told tales of woes, of power cuts and street congestion. Alas, the government had fallen upon hard times. Its budget was squeezed. No longer was it able to fund the public works. Politicians searched far and wide for a savior - with riches to match the needs. And they found her. It was the private sector. They begged her to fill the potholes and generate the power. They offered a new fellowship – the public private partnership. Politicians explained the great attractions of infrastructure that should please even the mightiest of investors, the giant pension funds. Investments in infrastructure were safe, long-lasting, protected against inflation, with steady returns, unfazed by ups and downs in the economy – just the bounty the pension funds were seeking. Private investors seemed enthusiastic one day, yet coy the next. In the face of great need in the land they made much ado about the dowry the government would bring to the fellowship – a treasure trough of guarantees and undertakings. And the government fell in despair as potholes grew."

Again and again, news reports as well as learned articles claim that financing is the problem that prevents needed infrastructure from being created. Here is an example: "Although high needs and future demands for infrastructure assets are generally recognized, the factor that typically constrains the provision of these goods is the lack of financing resources" (Inderst, 2010). The OECD uses the term "infrastructure gap" for the difference between infrastructure needs and what can be financed with traditional public sector approaches (OECD, 2007).

In this note I explore the basic story, which also underlies the current debates in the G20. Estimates of infrastructure investment needs are discussed, followed by a review of the arguments (and the confusion) about lack of government funding and the need for private finance to fill the infrastructure financing "gap". The discussion then moves to what we can expect from financial engineering, including the potential role of pension funds. It turns out the biggest hope to plug any financing gap is the potential for productivity improvements that can reduce the very need for finance.

Infrastructure needs

The McKinsey Global Institute recently provided an estimate of global infrastructure needs (McKinsey, 2013). Making the best of the spotty data on infrastructure investment, McKinsey estimates that around $60 trillion are needed from now till 2030 to support global economic growth in the order of 3.5% per year. Spending is dominated by transport – 41% of the total. Roads alone account for 29%, whereas ports, airports and railway investment are more modest. Power investment needs account for nearly 23% of the total, water for 20% and telecommunications for almost 17%[1].

[1] This note focuses on this definition of infrastructure (transport, power, water and telecommunications) and does not deal with so-

A typical way to estimate infrastructure investment applies the historical share of such investment in GDP to future estimates of GDP. McKinsey follows this approach and complements it with sectoral estimates as well as estimates of the size of the infrastructure capital stock as a share of GDP. Among countries there is wide variation of investment levels. China spends a massive amount at 8% of GDP. The United States and most countries in Europe spend 2 to 3% of GDP on infrastructure, Latin America a little less than 2%. The world average lies around 4 % of GDP. Japan spends a fairly high level of about 5% of GDP. Japan's stock of infrastructure capital at about 179% of GDP vastly exceeds the global average of 70% of GDP.

McKinsey also presents an estimate of average annual investment needs between now and 2030 – about $2.7 trillion. This excludes telecommunications and forms the basis for estimates of potential productivity improvements in the remaining sub-sectors (transport, power and water). The exclusion reflects the view that telecommunication investments do not normally pose a major financing challenge and that competition in the sector has already taken care of possible productivity improvements.

The estimates are fairly standard in that they are mostly driven by assumptions about "normal" levels of investment as a share of GDP. Immediately a question jumps out: why is financing infrastructure in the future – at the same level as in the past – often seen as a difficult challenge, if it has already been done in the past and, if anything, with less sophisticated financing approaches?

Fiscal problems and their implications

Worries about infrastructure finance tend to emerge when governments run into fiscal problems. The history of funding problems in Latin America following the debt crises of the 1980s suggests that infrastructure finance can suffer from fiscal problems (McKinsey, 2013). "The government has run out of money; so we need the private sector to come in" is the typical refrain.

Ability to pay. The refrain is as typical as it is misguided. If the government cannot finance, why would the private sector do so? The private sector does not pay for infrastructure; it just finances. Investors want their money back – with a return. We need to distinguish between paying for infrastructure and financing infrastructure. Only users or taxpayers pay for infrastructure, financiers do not.

Governments can have multiple roles. Taxpayers may act as payers - substituting for user fees, where such fees are not feasible or not desirable. Governments may also act as financiers, for example, by providing export credit to firms investing in infrastructure. If governments run their investment operations on commercial principles, taxpayers get a return. Otherwise taxpayers may provide a more or less explicit subsidy, which helps pay for the cost of infrastructure services.

When infrastructure projects depend on payment from the taxpayer, a fiscal crisis may put such projects in trouble. Yet the solution has to be either increased user fees or some new way of generating tax revenue. Otherwise project cash flows will be inadequate to repay financiers. The issue is pervasive and severe in developing countries' water sectors – a case of sustained unsustainability. There, water prices cover just about 30% of costs on average (Klein, 2012). In this case there is no way that private investors will be able to solve the problem – unless user fees are raised or subsidies can be found. In the vernacular of project financiers the issue is not financing, but deal flow.

Generating deal flow is relatively easy when payment from user fees or tax revenues is adequate. This tends to be the case for telecommunications, ports, airports and freight rail investments. Financing is hard in sectors, where user fees are well below cost. Water tends to be the hardest in the developing world. But electricity can also be problematic as user fees cover just at best 80% of cost on average in developing countries (Klein, 2012). India and Pakistan are cases in point. In advanced economies where full-cost covering user fees are normal deals in these sectors are easier. Everywhere, road financing tends to raise the biggest headaches. User fees are often not feasible or insufficient to support road projects. Tax-based payment becomes problematic when fiscal problems emerge.

Willingness to pay. Suppose user fees or government subsidies are sufficient to generate profitable deal flow, is there still reason to worry about financing? In principle, all sorts of financing options are now feasible. Governments can borrow and invest the money in infrastructure

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called social infrastructure, for example, investment in health care and educational facilities. These tend to amount to much less of total spending, about 1% of GDP in Europe in recent years (Wagenvoort et. al., 2010).

ventures. Or the government may put a state-owned enterprise (SOE) in charge of projects and the SOE then raises funds in the financial markets. Or the government allows private companies to provide infrastructure services who then raise funds. These three approaches account for the overwhelming majority of infrastructure finance models in OECD economies – typically exceeding 90% of total investment (Wagenvoort, 2010). Alternatively, the government establishes one of an array of public-private partnerships (PPP) with various forms of risk-sharing between government and private sector[2]. The PPP can then raise funds. Any arrangement can be for multiple projects or for a single one. In the latter case we are in the domain of project finance. These arrangements account for a growing share of infrastructure finance, about 10% of infrastructure finance in Europe, with greater shares in Portugal and the United Kingdom.

Why then might a government prefer to let a private company provide infrastructure services or raise funds rather than doing it itself or putting an SOE in charge? While there may be adequate cash flow available, fiscal troubles may prompt a government to "dip into" the finances of the infrastructure venture and divert cash flow for extraneous purposes. By establishing private property rights such "dipping" becomes harder. Hence many privatizations have led to increased investment when governments were in fiscal trouble (Galal, 1995). Private property rights are thus a sort of collateral for financiers – they tend to make rights to cash flow more secure. Project finance is a particularly elaborate form of securing financiers' rights to cash flow.

The scope for private participation in infrastructure deals is significant. A number of countries feature telecommunications and power sectors that are dominated or fully run by private firms. Strong private participation is also found in water (100% private in the United Kingdom and substantially in France), in freight rail systems, ports and airports. Roads remain the quintessential public infrastructure, even though countries like Chile have made significant advances in designing sound toll road schemes run by private firms. While the scope for re-defining or clarifying property rights is thus significant, many governments have used it with reluctance, unless pushed by crises.

Similarly, earmarking of some form of fiscal revenue for repayment of financiers helps improve their rights to cash flow. In effect, governments thus clarify the source of fiscal support that is payment in lieu of user fees. Fuel taxes may be earmarked for road construction and maintenance. Betterment levies or so-called tax increment funding may dedicate tax revenues from increased property values caused by new infrastructure to pay for the infrastructure.

When all has been done to make sure projects generate cash flow and cash flow actually is used to repay financiers as agreed at the time of financing, there is typically no serious financing problem anymore. The financing issue underlying the standard "tale" about problems with infrastructure investments turns out to be a problem of credibility of government behavior and the infrastructure investment proposition rather than a problem of financing.

The scope for financial engineering

Off-budget finance. Yet, faced with difficult choices most governments have a habit of "kicking the can down the road". Many shy away from tackling the core issues of user fees or establishing credible property rights. Instead, they try out "innovative" ways of circumventing budget procedures as well as shifting payments into the future and obligations off-balance sheet. Much financial engineering is affected by such motives. Little value is added, unless one argues that standard government procedures are inefficient.

For example, many governments try to keep the current fiscal deficit low by letting a PPP invest and then repay the PPP over time. Examples are roads that do not rely on any kind of user fee. The current government budget then looks good, but future ones are hit. This kind of financing does not per se change the net present value of costs to the taxpayer. Other time-honored ways to avoid budgetary strictures involve the use of guarantees instead of debt or equity investments. Most governments do not reflect the expected costs of guarantees in their budget. Many do not provide any systematic accounting for such contingent liabilities.

The cost of capital. Reluctance to embrace private forms of property rights is often justified with reference

[2] Note that there is a continuum of ownership and risk sharing arrangements from full government to full private ownership. A simple delineation of PPPs from the rest is not possible, even though many authors assume so (Klein, 2012).

to the perceived high cost of private finance. Of course, sovereign bonds are typically cheaper than even the best debt issued by domestic corporations. If that was the whole story, governments should provide all finance.

Yet, government finance is not cheaper, because governments are systematically better at managing the risks of infrastructure projects than private providers. Sovereign government finance is cheap, because taxpayers pay back even when a project fails (as long as there is no major fiscal crisis). In all cases, when government acts as financier, including as guarantor, it intermediates between final investors and the infrastructure project. This form of intermediation – rather than going entirely through private financial intermediaries – tends to expose taxpayers to financing risk. The taxpayers de facto provide unremunerated credit insurance. Were they to be compensated for this, the ostensible advantage of government finance would disappear (Klein, 1997 and Engel et. al., 2010).

When taxpayers cover risks, incentives to perform are weakened. The real issue is whether the incentive structures of the deal are better than before and whether they raise efficiency, not how the government budget is affected or whether the ostensible return required by investors is lower. Better incentives in turn require exposing infrastructure providers (of any type) to performance risk, where they have the ability to control some or all of the relevant risk. This useful exposure to risk is reflected in the cost of capital – a function of incentives embedded in a market, regulatory scheme or contract. The key issue is the designing of a sound incentive scheme by way of laws or regulation, property rights or contract design.

The search for new financing solutions: Infrastructure as an asset class and pension funds. Designing a sound incentive scheme entails allocating risks to those best able to manage or bear them. New financing solutions may help. In particular, the search is on for investors who are best able to bear unavoidable risks. Here the prospect of enticing pension funds to invest in infrastructure is a popular preoccupation of politicians. The hope is that infrastructure projects provide a good match for the liabilities of pension funds or other contractual savings intermediaries such as life insurance companies. It is argued that infrastructure projects are long-lived, safe with steady regulated returns and only weakly correlated with economic fluctuations and many other assets. Such long-term, almost bond-like returns would be a good match for the long-term liabilities of pension funds. This would help reduce the cost of capital for projects and tap sources of funds.

Investors can get exposure to infrastructure investments in a variety of ways (Inderst, 2010). They may buy equity or bonds issued by infrastructure companies and have been able to do so for many years, for example, in electricity companies. Such companies may be privately owned or state-owned like Electricite de France.

Since the 1990s more and more special infrastructure investment vehicles have been established as well as indices of the performance of infrastructure-related assets[3]. Vehicles include listed and unlisted funds investing in debt or equity of infrastructure companies or projects. Their history is not long enough and too spotty to draw firm conclusions but some preliminary observations are possible. Existing analyses have covered the performance of infrastructure investments as measured by indices, fund performance or deal performance. Altogether, they suggest that it is by no means clear that there is a special infrastructure asset class.

In general, infrastructure assets are indeed long-lived, but the duration of investments is limited. Investment funds often have durations of just about 4 years, refinancing investments at the end of their holding period (Bitsch et al, 2010). Returns have been strong in many cases but this may reflect the equity-type nature of the relevant investments in the cases that were analyzed. Volatility has often been similar to that of other similar asset classes, for example in the case of equity-type investments. It is just not clear that exposure to infrastructure assets per se adds value beyond investing in traditional asset classes like debt and equity. Some of the Australian unlisted funds have had periods of low correlation with the market, but the periods under study are short and correlations can change. Portfolio analyses based largely on the performance of Australian funds suggest that the addition of some infrastructure exposure may improve overall portfolio performance. Yet, we do not know how robust this is or what exact type of exposure to choose ex ante to replicate this.

[3] For example: FTSE/Macquarie global infrastructure index (2003); S&P global infrastructure index (2001); NMX30 Infrastructure Global Index (1998); S&P EM infrastructure index (2004)

Pension funds have started to invest in special infrastructure investment vehicles. Globally some 300 public and private pension funds report exposure to infrastructure. As a share of total infrastructure assets the amounts involved remain very modest. Global infrastructure assets may amount to some 70% of global GDP or about $50 trillion. Pension fund assets are close to $30 trillion globally (OECD, 2012). Traditionally there has been exposure to bonds and equities of infrastructure utilities as part of traditional investment categories. Yet, less than 1% is allocated to special infrastructure vehicles, i.e. not more than about $300 billion or about ½ % of infrastructure assets. Doubling this would be significant for alternative investments of pension funds, but still very modest overall.

A few pension funds, particularly from Australia and Canada have been particularly aggressive. For example, some Canadian pension funds have built the expertise to participate as co-financiers in individual infrastructure projects. Some funds have raised exposure targets to infrastructure-related investments to up to 20% of their portfolio in the most aggressive cases (Damm, 2012).

For now we are still in an experimental phase. Not only is there no clear evidence from studies that infrastructure assets constitute a suitable alternative asset class for pension funds. There is as yet no conceptual foundation for it – other than to say that infrastructure assets may be long-lived and subject to some form of regulation. There is, of course, also the danger that political pressure on pension funds to invest in infrastructure may backfire and undermine the solvency of pension funds in the long run.

Conceptual underpinnings for an infrastructure asset class. This brings us back to the core issue in infrastructure investment – the design of incentive schemes. We need incentive schemes that achieve various goals:

- Establish whether there is real demand for a service, not just a deemed "need"
- Raise adequate revenue to pay for the cost of projects
- Provide incentives for investors to perform efficiently
- Protect those who pay against excessive fees or tax contributions
- Establish credibility for investors to attract finance

For sectors like telecommunication these goals are relatively easily achievable. Prices can be set in competitive markets. Based on prices consumers decide whether to buy service or not. This provides a real test for demand. Competition provides incentives for investors to perform efficiently. When competition works, the level of prices reflects cost thus protecting consumers against market power. Investors are protected by private property rights and contracts. The incentive to challenge such rights and contracts is minimized, because competition makes sure providers do not earn excessive returns.

Roads and water are at the other end of the spectrum. Road pricing is often not feasible, technically or politically. Demand is thus assessed on the basis of studies of "need" and easily influenced politically. Water pricing is often politically contentious. Need assessments and politics drive decisions. Head-to-head competition is not possible as roads and water systems tend to be natural monopolies. When regulation or contracts provide infrastructure companies with strong incentives to perform efficiently, the providers make attractive returns, precisely when they are successfully implementing projects. Ex post this often prompts allegations of overly generous terms and can lead to pressure on politicians or regulators to lower payments to investors, to re-negotiate contracts or, in the extreme, to nationalize the venture. A classic case is the ex post imposition of an excess profit tax on privatized English and Welsh utilities when they made ample profits under price cap regulation, which allows investors to retain gains from more efficient operations. The problem is a variant of the "obsolescent bargain", under which investors are at the mercy of authorities once the investment is made.

As a result, telecommunications investments perform broadly like others in competitive markets be they in the form of bonds or equity. Investments in other types of infrastructure are often plagued by political risks that can lead to extreme outcomes. Intriguingly, initial financial analysis suggests that infrastructure asset returns may feature relatively high tail risks (extreme outcomes – for example, expropriation) or that returns are more likely to be in negative territory than for other assets (Sawant, 2010 quoted in Inderst, 2010). Water and road projects are most likely to be either re-negotiated or expropriated (Guasch, 2004).

Any systematic approach to infrastructure as an asset class needs to pay attention to these incentives. They are

determined fundamentally by choices of market structure and resulting regulatory or contractual arrangements (Klein, 2012). These are the drivers of risk and provide a conceptual basis to assess characteristics that amounts to more than the simple observation that infrastructure assets are often long-lived and regulated. Risks will vary by sector and by country reflecting both intrinsic characteristics of the sector, the design of incentive schemes and the political dynamics of the country.

Precisely when countries are able to design, implement and sustain good incentive schemes, they reap the biggest prize of all. Better use of existing assets, better ways to screen new projects, and better implementation could well cut required infrastructure investments by some 40% (McKinsey, 2013). Infrastructure finance would hardly be a problem in that case. No amount of financial ingenuity can achieve as much for the ability to finance infrastructure.

In sum, it may be worth making some effort to find new ways of financing infrastructure making use, for example, of pension funds. Yet, the biggest issue remains the design of incentive schemes that limit unnecessary finance and improve productivity of infrastructure assets. At the same time, focusing on the design of incentive schemes is likely to help clarify how the addition of infrastructure assets to an investment portfolio may improve its performance.

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