Public Infrastructure: A Framework for Decision-making

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1. Introduction

The issue of how best to deliver investment in public infrastructure has been receiving significant policy attention around the world of late. Population growth, demographic change, greater urbanisation and rising expectations are putting pressure on existing infrastructure networks and facilities in both advanced and developing countries. The need for infrastructure investment is being identified across a range of sectors including transport, utilities, communications, education and health.

The characteristics of some types of infrastructure mean governments have an important role to play in ensuring important services are provided in the interests of the broader community. However, tight fiscal conditions prevailing in many countries, combined with a more challenging climate for sourcing private capital for long-term infrastructure projects in the wake of the global financial crisis, have renewed interest in infrastructure financing models. This includes questions about whether the design and use of public-private partnership (PPP) models can be improved, and how projects can be structured to encourage greater private investment from a wider range of debt and equity investors, including superannuation/pension funds. As well as interest at the country level there has also been growing discussion on infrastructure financing in multilateral forums such as the G20 and the Asia-Pacific Economic Cooperation (APEC). Historically low interest rates for government borrowing in some countries have also renewed discussion about the relative merits of public versus private financing models more generally.

The question of how to finance a project presumes that a decision has been made that the investment is the best use of limited resources in the first place. However, policymakers need first to identify public infrastructure service needs, the appropriate role for government in addressing these over time, and priorities for public investment. Once a decision is made to build the infrastructure, the central economic question becomes how the project can be delivered most efficiently.

This paper sets out thinking about these issues from a policy perspective. It does not assess infrastructure issues in any specific country. Rather, it sets out a high-level framework that could be applied to guide the role of government as a facilitator of, and as an investor in, infrastructure. Section 2 outlines the characteristics of public infrastructure and a framework for decision-making; Section 3 discusses issues around risk allocation in public infrastructure projects; Section 4 considers different financing options and relevant issues; and Section 5 concludes.

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2. Investment in Public Infrastructure

2.1 Characteristics of public infrastructure

Infrastructure refers to the long-lived physical structures, facilities and supporting operating systems that provide essential services to consumers and facilitate the flow of goods, information and factors of production between buyers and sellers. Ultimately, the underlying assets are important for the services they deliver. Economic infrastructure (such as utilities, transport and communications networks) provides essential services to individuals, households and businesses, and influences the efficiency of an economy. Social infrastructure (such as education, health and community facilities) provides important services for the day-to-day activities of individuals and supports economic and social objectives.

Infrastructure has several characteristics that distinguish it from most other forms of investment (Grimsey and Lewis 2002; Inderst 2010). Major economic and social infrastructure projects typically involve:

- significant upfront capital expenditure
- long-term revenue and/or benefit streams linked to the services provided by the infrastructure asset
- costs and revenues subject to a range of uncertainties and project-specific risks
- irreversible and illiquid investments that can lock in technology and future upgrade options
- assets and services that exhibit public good and/or monopoly characteristics.

In the context of this paper, 'public' infrastructure is an investment where the government has the primary role in, and responsibility for, deciding on whether and how the infrastructure is provided in the interests of the broader community and on the source of the revenue streams to pay for the infrastructure over its life. Thus, public infrastructure extends beyond infrastructure that is owned or directly funded by the public sector. For example, this definition would capture infrastructure assets and services owned and operated by the private sector, but where the government has created the overarching policy and regulatory framework, or possibly retains a contingent liability for the infrastructure assets and continued service provision.

The traditional economic rationale for government intervention is that socially beneficial infrastructure assets and/or services would be underprovided by the private sector. Potential underprovision arises where services exhibit public good characteristics (notably non-excludability for infrastructure such as most road networks), network effects and positive externalities, or where a facility has natural monopoly characteristics such that a private provider would have the ability and incentive to raise prices and/or restrict output below socially desirable levels. Governments may also become involved to address certain social or equity objectives, such as equivalent service pricing or universal coverage (though from an economic perspective, such interventions should still pass a social net benefit test). The case for government intervention based on market failure should also be balanced against risks of government failure. A number of studies have explored the scope for government intervention to create inefficiencies, not least because of an absence of market signals and commercial disciplines. Indeed, this has become a prime reason for increasing the involvement of the private sector in public infrastructure provision (Krueger 1990; Winston 2006, 2013; PC 2008b).

Even where governments assume primary responsibility for deciding that certain infrastructure assets and services should be provided, there are numerous ways to bring about their delivery. These range from the direct provision of services by the government using government-owned assets, to full divestiture to, and provision by, the private sector, albeit subject to regulation. Between these two extremes are various mixes of public and private involvement in delivering projects and services, ranging from government as a purchaser of services from the private sector (contracting out) to the private sector building, operating, owning and financing infrastructure with and without taxpayer funding (see Box A).

All approaches involve efficiency trade-offs, the balance of which will vary, and consequently need to be assessed on a case-by-case basis. For example, though government provision may be more likely to ensure that socially beneficial infrastructure services are provided to the community, designing an incentive-compatible framework to ensure they are provided cost-effectively can be challenging. On the other hand, notwithstanding the scope for partnership approaches to draw to a greater extent on the productive efficiencies of the private sector, factors such as asymmetric information and incomplete contracts, along with the transaction costs of contracting and monitoring, can undermine potential gains (Brealey, Cooper and Habib 1997).

Box A: Roles for Government and the Private Sector in Delivering Public Infrastructure Services

There are a number of separable tasks and roles involved in delivering public infrastructure services, ranging from planning and regulation to funding, design, construction, operation and maintenance. The different delivery models involve assigning more or less of these tasks to the private sector.

While many of these roles can be performed by the government or private sector, some can only be performed by government. For example, only governments can regulate and provide public (taxpayer) funding. Thus, even if responsibility for providing public infrastructure is divested fully to the private sector, governments will normally maintain a regulatory role, potentially affecting the private provider's pricing, service delivery and investment decisions. Governments also generally retain overarching planning responsibility for public infrastructure, even though private owners may have responsibility for making decisions about particular investments.

Ultimately, governments must fund public infrastructure from taxes and/or allow users (or indirect beneficiaries) to be charged. Government as funder does not preclude private provision. Governments as owners and providers can purchase services from private providers directly, or make payments to private sector infrastructure owners and providers, effectively buying services on behalf of the community. Traditionally, in many countries, government has owned and provided public infrastructure. Models for government ownership of infrastructure include statutory monopolies and corporatised entities such as government trading enterprises.

Private sector involvement typically centres around design, construction, operation, maintenance and, in some cases, ownership of a particular piece of infrastructure. Revenues must come from

user charges or taxpayers via government. The private sector may simply provide specific services on a short-term contract basis. Such models do not involve private project financing. A range of models fall within the spectrum of 'partnership' models, including different types of PPPs, concessions and lease arrangements that involve private project financing.[1] Distinct features of PPPs are long-term contracts (20+ years), the bundling of construction and operation to a single private partner (though that partner may comprise a consortium of firms), scope for greater degrees of risk sharing and private project financing. Fully privatised infrastructure gives private owners greater operational and investment autonomy, as well as residual risk.

1 The term 'PPP' is often applied broadly to many and various contractual arrangements involving the government and private firms. In many developing countries, the term is used to describe any contract with a private firm including medium-term service contracts and outsourcing arrangements, as well as privately financed long-term contracts with the government for the provision of assets and/or services by private firms (including build, own, operate and transfer arrangements).

The rationale for, and nature of, government involvement may change over time (see Box B). For example, improvements in technology may overcome non-excludability issues (therefore allowing infrastructure services to be provided privately), such as electronic tolling on roads (though the costs of such technologies must be weighed against their efficiency benefits). Growth in the size of the market and new technology can introduce competition into market segments previously characterised by monopoly provision, such as in electricity generation. A well-designed access regime targeted at natural monopoly infrastructure may be more efficient at managing some of the private incentives associated with the provision of services (unless there is a non-trivial probability of a costly regulatory error). And more sophisticated instruments may be developed to regulate, tax or subsidise externalities directly, leaving service provision and investment decisions largely to the private sector within an overarching policy or regulatory framework.

Thus, although governments in many countries have historically played a dominant role in the construction, ownership and operation of key economic and social infrastructure, more recent decades have seen a shift towards greater involvement of the private sector, not just as builders, but also as operators, financiers and owners of what would otherwise be considered 'public infrastructure' assets and services.[1] This has occurred through a wide range of privatisation and contracting models (PC 2008b; World Economic Forum 2010; Jett and Verink 2013).[2]

1 There are exceptions. Winston (2013) notes that in the case of the US transportation sector, all modes of transport were initially developed and operated by the private sector in the 19th century. It is only in later decades that the public sector began to assume a more dominant role in the ownership, provision and regulation of these assets and the related services.

2 In Australia, a number of key economic infrastructure assets (electricity, gas, telecommunications and airports) were corporatised then restructured and privatised over the past two decades. Infrastructure reforms have also included the introduction of competition and industry-specific regulatory frameworks in key economic sectors. Recent decades have also seen the increased use of long-term contractual 'partnership' models between the public and private sectors for economic and social infrastructure projects.

Box B: Government and Private Sector Involvement in Key Economic Infrastructure Services in Australia

Roads: The full private ownership and provision of roads has not been implemented in any jurisdiction on a network-wide basis. The Productivity Commission has previously attributed this to a range of factors including public good characteristics, concerns about monopoly power, the need to deal effectively with community access and public interest issues. However, there has been increasing use of tolls on major new road links (in New South Wales, Queensland and Victoria) planned by government, and delivered and operated by the private sector (PC 2006). Technological developments, for example improved vehicle identification systems, may expand future road pricing options.

Urban water: Most urban water assets (distribution and retailing networks, bulk-water supply and treatment assets) remain owned by state governments, although there is private ownership of some assets. The Productivity Commission identified likely areas of market failure in this sector to include the natural monopoly elements of the supply chain, health and environmental externalities, and public goods. In its view, while governments should continue to play a substantial role, this role needs to be carefully designed and there may be scope for markets to have a greater role within the framework established by governments (PC 2011a).

Electricity: While particular elements of the supply chain are generally considered to exhibit natural monopoly characteristics, the structure of the electricity supply industry has shifted over time, with some vertical separation of generation and retailing from the natural monopoly elements of the industry (which includes transmission and distribution), and horizontal integration of network businesses. The National Electricity Market was established in 1998 as a wholesale market for the supply of electricity to retailers and end-users in the eastern states of Australia. Mixtures of public and private firms operate within this market and are subject to an industry-specific regulatory regime. Again, new technologies appear likely to offer scope for improving links between pricing and consumer willingness to pay (PC 2013).

Airports: Historically, most major airports were owned and operated by the Australian Government. There was considerable cross-subsidisation across and within airports. This made it difficult to fund investment to cater for growth in passenger traffic and to improve service quality. In 1997, the Australian Government commenced the process of privatising its airport holdings through the sale of long-term leases. In recognition of the market power of some larger airports, privatisation was accompanied by the introduction of price regulation, which has subsequently been restricted to a more light-handed price monitoring regime (PC 2008b, 2011b).

2.2 Public infrastructure decisions – a framework

Exploring the merits of different financing options for public infrastructure is an important area of inquiry for policymakers. However, a focus on project financing options presumes that the decision has already been made that the investment is the best use of limited resources. Given that the source of financing itself cannot fundamentally alter the economics of a project, a necessary first step is ensuring that good projects – that is, ones that generate net social benefits – are

chosen. Questions for the government to consider at this early stage include: how to identify infrastructure 'needs' (or gaps); is there a facilitation role for government in addressing identified needs; is addressing the public infrastructure need a priority; and how can a public infrastructure project be delivered in the most efficient manner (Rajaram *et al* 2010; Klein 2012).

2.2.1 The importance of getting the planning and institutional framework right

Estimates of infrastructure 'gaps' or 'deficits' might indicate a need for new and continued investments in infrastructure (both private and public).[3] However, they should not substitute for effective processes that ensure service needs are properly identified, the highest value projects are selected and services are delivered as efficiently as possible. Building the wrong projects will impose net costs on the economy. Yet, identifying the right projects is especially challenging for those public infrastructure services where there is no market mechanism, such as price or profitability, to signal future needs, consumer willingness to pay or the need for capacity adjustments. Instead, in these circumstances, governments must rely on other tools to identify needs, such as setting clear overarching policy objectives, developing long-term plans for infrastructure and service delivery, and applying social cost-benefit frameworks to help guide priorities and decisions on how services can be best delivered.

Effective infrastructure planning is particularly important given the network nature of many public infrastructure assets (particularly economic infrastructure), where investments in one element of an integrated system of assets and services have system-wide impacts. Network externalities need to be considered in the planning process, as do other interdependencies, such as disruptions during construction phases and the competition for scarce construction resources.[4] For larger projects in particular, the effective sequencing of investments may offer economies of scope or avoid higher per unit costs due to capacity constraints (e.g. if construction capabilities and skilled labour inputs are limited in supply).

The governance arrangements and the institutional environment within which infrastructure decisions are made are also crucial factors. Sound governance arrangements that promote evidence-based analysis, transparent decision-making and independent review can improve the quality of, and confidence in, public infrastructure decision-making. Some countries have established specialist institutions with the aim of improving infrastructure planning and project selection across multiple infrastructure sectors, and the public sector's capability to engage with the private sector. These specialist institutions include Canada's Infrastructure Ontario, Singapore's Land Transport Authority, Infrastructure Australia and Infrastructure UK.

3 Various estimates of global infrastructure investment 'needs' exist, although these types of estimates can be subject to qualification and criticism, and are highly dependent on a range of other factors, including forecasting methodology (top-down or bottom-up), the type of investments considered (new, maintenance, etc) and data availability, among others (Inderst 2013). The Organisation for Economic Co-operation and Development (OECD) estimates that US$53 trillion in infrastructure investment will be needed between 2010 and 2030 in telecommunications, electricity, surface transport and water sectors (OECD 2011). Dobbs *et al* (2013) estimate that US$57 trillion of global investment will be needed in road, rail, ports, airports, power, water and telecommunications between 2013 and 2030 to keep pace with projected global GDP growth.

4 As noted in an Australian context by Lowe (2013), in recent times, private business investment has been at a record high level as a share of GDP because of the resource boom. At times, this has created pressures in parts of the labour market, including for workers with engineering and specialist building skills. However, he notes that over the next few years, resource investment is expected to decline significantly as the Australian economy moves from the investment to the export phase of the boom, which creates an opportunity for infrastructure investment to rise as a share of GDP without putting undue pressure on domestic capacity.

2.2.2 Government as investment facilitator

Even once an infrastructure need has been identified, before considering the case for public investment (with government as either a 'provider' or 'partner'), it is relevant to consider whether governments have other (lower-cost) policy options and tools available to address the identified need in the short or long term (Banks 2008). Possible options will depend on the nature of the infrastructure and the regulatory and institutional settings that already apply.

For instance, policy or regulatory barriers may be preventing profitable private investment in socially beneficial infrastructure and services from taking place. The commercial viability of some infrastructure projects may depend on the government (in its 'policy setter' role) providing a clear policy environment, appropriate regulatory approvals or access rights. In these circumstances, the government can play a facilitation role to allow investment to proceed on a commercial basis by resolving uncertainties, including those arising from its own policies. Conversely, inconsistent or unpredictable government actions could create uncertainties and discourage investment.[5]

Where public infrastructure assets and services are highly regulated, there may be opportunities to make adjustments to the overarching policy and regulatory frameworks to promote more efficient investment and service outcomes. In a range of reports into various infrastructure sectors in Australia, the Productivity Commission has observed that poorly designed pricing or regulatory requirements can create incentives for underinvestment or overinvestment. For example, existing service standards in the electricity sector, which do not necessarily reflect consumer preferences, have led to overinvestment in electricity transmission infrastructure (PC 2013). In the urban water sector, price was not used to reflect water scarcity in times of shortage (water restrictions were used as the rationing mechanism). This was a factor that later contributed to inefficient supply augmentation in new large-scale desalination plants (PC 2011a).

Infrastructure services may be assessed as warranted on net social benefit grounds where private revenues necessarily fall short of private costs. In these cases, public funding will be needed but public funding may not require public investment: it may be feasible for the government simply to 'buy' otherwise uncommercial services from the infrastructure provider on behalf of the community (e.g. to service a regional area). These contracts can be structured as an ongoing payment for services, through community service obligations (CSOs),[6] as a one-off upfront contribution in cash or in kind, or as another arrangement.

When barriers to private investment cannot be efficiently removed by efforts to resolve policy uncertainty, or private funding shortfalls cannot be addressed through purchasing arrangements, public investment is an option. As discussed further in Sections 3 and 4, the decision by government to provide the infrastructure itself or in partnership with the private sector will be informed by a range of factors, including the nature and magnitude of the risks associated with the project, and how well placed the government and/or private partners are to manage them.

5 Risk of the expropriation of assets or equity of a private provider can be a concern for private investors in some countries. While the risk of direct expropriation may have dissipated in many countries, other forms of political risk (such as breach of contract, civil disturbances or regulatory restrictions) remain a key concern for private investors (Henisz and Zelner 2010; MIGA 2013). Araya, Schwartz and Andrés (2013) find that a difference of one standard deviation in a country's sovereign risk score is associated with a 27 per cent increase in the probability of having an infrastructure commitment with private participation.

6 CSOs are non-commercial activities undertaken by government trading enterprises at the direction of government to achieve social policy objectives. They can range from transport concessions for pensioners, below-cost electricity charges, or the provision of non-commercial ferry services (PC 2008a).

2.2.3 Prioritise public investment and funding

While there are different empirical assessments of the aggregate economic impacts of infrastructure investment, inevitably such investments are made in the presence of real resource and funding constraints. In other words, they involve opportunity costs – not only the costs of resources used up in building and operating the infrastructure, but also the opportunity costs of raising taxes or diverting public funds from other uses.

Without appropriate frameworks in place, poorly chosen projects run the risk of diverting resources from more socially productive activities.[7] Cost-benefit analysis is used in many countries as an *ex ante* assessment tool to help guide and improve public sector appraisal of public infrastructure projects, although the quality of and weight given to these assessments vary widely (Ergas and Robson 2010; Mackie 2010; Pickford 2013).

A well-constructed social cost-benefit analysis of viable options for addressing a recognised need is an essential tool for identifying the option that meets the need at the lowest cost/highest net benefit. Ensuring that the public gets the best value may not necessarily mean prioritising the largest or the most 'iconic' projects, as those delivering the largest economic and social pay-offs may not involve immediate or large investments. For example, smaller investments that address bottlenecks in existing networks (such as rail access to some major ports, or the use of intelligent traffic systems instead of adding to new road capacity) may deliver large net benefits and substitute for, or defer the need for, larger network augmentation.[8] Where investments involve considerable uncertainties it can be beneficial to include the 'option value' from delaying a large and substantially irreversible commitment of capital, or make smaller-scale investments to retain flexibility where these risks are known and acceptable (Dixit and Pindyck 1994).

That said, a social cost-benefit analysis of infrastructure investment options is rarely a straightforward exercise in practice. Major public infrastructure investments typically involve both positive and negative spillovers that can be difficult to predict and quantify. There is often debate on key inputs to the analysis, such as the costs and benefits that should be included, the baseline assumptions and the appropriate discount rate to apply.[9] Decision-makers are also often confronted with

7 The link between investment in public infrastructure and broader growth and productivity outcomes has been extensively considered and debated in the literature, particular since Aschauer's (1989b) empirical finding of a strongly positive link in the United States. Reviews of the relevant literature by Romp and de Haan (2005) and Straub (2008) show that while some studies conclude a high impact of infrastructure on growth, others find negative or zero returns, and significant empirical challenges remain. A more recent International Monetary Fund (IMF) working paper shows a generally positive link between the public capital stock (rather than investment) and economic growth across OECD member and non-member countries, with the quality of infrastructure expected to influence the estimated strength of the link (Arslanalp *et al* 2010). Adjusting infrastructure spending for the quality and efficiency of the public investment management process is another area being explored in recent IMF work (Dabla-Norris *et al* 2011).

8 For example, Dobbs *et al* (2013) cite estimates that the average benefit-cost ratio (BCR) for 'traditional' road capacity is 2.7, while that for the use of intelligent traffic management is 14 and that for optimised traffic signals is 17. Infrastructure Australia's latest National Infrastructure Priority List indicates that 'smaller' projects (by estimated capital value) often have higher forecast BCRs (Infrastructure Australia 2013).

9 There is often debate on how to choose appropriate discount rates for the appraisal of public infrastructure investments (and public policy evaluation more generally) (see Baumol (1968); Arrow and Lind (1970); and Brealey *et al* (1997)). Where an infrastructure investment directly or indirectly draws resources away from an alternative investment, and the timing of benefits differs from the funding flow, the choice of discount rate should reflect the opportunity cost of the capital (Baker *et al* 2008; Harrison 2010).

'optimism bias' in estimates from project proponents (Flyvbjerg 2009).[10] Notwithstanding these challenges, entrenching the transparent use of cost-benefit analysis in the project appraisal process should improve the rigour of, and impose discipline on, public sector investment decisions (Ergas and Robson 2010). When applied in a systematic and transparent manner, there is scope for independent audit or testing of the analysis and review (including *ex post* review), and thus potential for significantly improving the quality of public investment decision-making (Freebairn and Corden 2013).[11]

Another issue relevant to the cost-benefit analysis is the size of the 'gap' between user charges and costs, which will have a direct bearing on the government's funding task. In some cases, it may not be technically possible to levy user charges (although technological advancements can change the options over time, such as in the case of electronic tolling systems for road use). In other instances, structuring user charges based on the full recovery of financial costs may conflict with the broader economic and social policy objectives of providing the infrastructure (potentially reducing use to below socially optimal levels, which is the primary rationale for government intervention). For example, a rationale for subsidising public transport networks is often to reduce congestion on roads where congestion charging is infeasible (Parry and Small 2009; Button 2010). Decision-makers must also consider other relevant trade-offs, such as the transaction costs of implementing and administering pricing systems, or any other relevant policy, regulatory or legal impediments.

Nonetheless, where there are clear linkages between user benefits and costs, it is generally desirable from an efficiency perspective to link consumer 'willingness to pay' with charges for use of the infrastructure. In principle, well-calibrated user charges (such as two-part pricing) can provide signals for efficient use of infrastructure once it is deployed, signal the need for future adjustments to capacity (based on users' willingness to pay) and minimise or even eliminate the need for government funding. Additionally, user charges, and the scope providers have to vary prices, can provide incentives for service innovation.

Where user charges are not applied, or fall short of the revenue required to service debt, governments may adopt a variety of funding mechanisms (whether financed through general revenue, borrowing or selling existing assets), such as annual lump sum CSO payments, 'pay as you go' arrangements and 'block funding' at any or all of the various phases of the infrastructure development. The funding method adopted can affect the incentives of the infrastructure operators to maximise efficiency if funding is not linked in a clear way to performance.

10 Flyvbjerg (2009) notes that *ex ante* estimates of infrastructure costs and benefits are often very different from actual *ex post* costs and benefits. In the context of transport infrastructure projects (based on a sample of 258 projects in 20 countries), he found that the average cost overrun was 44.7 per cent for rail projects, 33.8 per cent for bridges and tunnels, and 20.4 per cent for roads. In terms of forecasts of patronage, the results of Flyvbjerg's study indicate that actual patronage was, on average, 51.4 per cent lower than forecast for rail projects and 9.5 per cent higher than forecast for road projects.

11 Many texts and studies provide important insights for the application of social cost-benefit analysis assessments to public decision-making (Layard and Glaister 1994; Mishan and Quah 2007; Boardman *et al* 2010). Some agencies within government also establish guidelines and frameworks for the use of such assessments. For example, in Australia, the Department of Finance and Administration provides a *Handbook of Cost-Benefit Analysis* (DOFA 2006).

2.2.4 Deliver the project efficiently: funding versus financing

Once a decision is made by government to prioritise a public infrastructure investment, the next question is how to deliver it in the most efficient way. In selecting the delivery model, it is critical to distinguish between 'funding' and 'financing'. Funding is how investment costs are repaid over time, compensating those who provide the debt or equity capital for the project. Ultimately, public infrastructure is funded by users of the infrastructure (e.g. through direct user charges), other beneficiaries[12] or taxpayers (IFWG 2012; Maddock 2013).

Financing is about raising money upfront to pay for the design, construction and early operational phases of an infrastructure asset, whether through debt or equity instruments of a public or private nature. The role of financing is to bridge the intertemporal gap between the large upfront costs of an infrastructure investment and the revenue stream accruing over its life. Finance providers will never knowingly *fund* an infrastructure project – they will only provide finance in the expectation that they will be repaid, including a rate of return commensurate with the risks they bear.

For large public infrastructure projects, the choice essentially comes down to either some form of partnership model (such as a PPP) supported by private financing, or a range of government procurement approaches involving public financing. The extensive literature on the use of PPPs indicates that while they can bring efficiency benefits, these are by no means certain and there are risks – for example, if governments are motivated to use them purely to 'escape' budget discipline (and fiscal limits). Indeed, as pointed out by many academics, this latter motivation rests on an illusion because in the absence of efficiency gains, PPPs and publicly financed projects have similar long-term effects on public finances (Engel, Fischer and Galetovic 2010; Funcke, Irwin and Rial 2013).[13]

3. The Role of the Private Sector – Risk Management and Allocation

From an economic perspective, the central case for the use of private financing models rests on whether they can lead to efficiency benefits by harnessing the skills and know-how of private partners combined with commercial incentives. An important consideration is whether the private sector is better placed to manage project-specific risks. Better risk management encompasses actions to reduce costs as well as increase benefits, thus enhancing the net social value of the project. Experience with PPPs has shown that there are a number of challenges that need to be considered with respect to risk allocation. First, risks change over the life cycle of a project. Second, there is an ongoing debate as to which party is best placed to manage demand risk. Third, the capability of and incentives for the public sector to design, negotiate and enforce well-designed contracts will be critical for ensuring net benefits are realised. Finally, the transaction costs (e.g. negotiating and monitoring costs) associated with using different models can be non-trivial.

12 For example, 'other beneficiaries' in this context could include the use of value capture mechanisms, such as tax increment financing (IFWG 2012).

13 That is, in some types of PPPs the government defers payments but ultimately must still pay the full costs of the project. In others, government concedes the right to collect user fees, and thus loses revenue it would have collected if the project had been financed traditionally.

3.1 Why is risk allocation important?

All infrastructure projects face risk and uncertainty that affect realised benefits and costs. Many risks associated with the delivery of public infrastructure are similar in nature, if not magnitude and scale, to those confronting private commercial ventures. They include risks surrounding:

- *Construction and operating costs* such as project design, approval processes, delays, maintenance costs, factor costs, regulation impacts and monitoring and enforcement of contracts.
- *Revenue (funding) streams* such as prices and volumes, which in turn are affected by service quality, the availability and price of close substitutes, price regulation (which affects user charges), other regulation, operational risks that can disrupt services and general economic conditions.
- *Financing costs* such as interest rates, exchange rates, and liquidity and refinancing risks, all of which are affected by the broader regulatory and policy environment in which firms operate, as well as general economic conditions and the structure of domestic financial markets.

Risks associated with public infrastructure projects are ultimately borne by government (taxpayers), users and/or private sector investors. The allocation of risks between private parties and governments will be largely determined by the chosen model of private sector involvement (OECD 2007). Where government acts solely as a 'policy setter' and infrastructure is delivered, operated and owned by a private firm subject to regulation, many of the risks (including financing risks) are transferred permanently to the private sector (although governments may still retain some residual risk for continued essential service delivery). Where government acts as a 'provider' many project risks are retained by taxpayers (either directly or through a government trading enterprise (GTE)), although there is scope to transfer specific risks under different contracting models.[14] In principle, partnership models (such as PPPs) offer scope for greater degrees of risk to be assigned to the private partner, although in practice risk assignment may not differ much from simpler contracting models.

A commonly accepted principle is that risks should be allocated to the party best able to manage them. However, putting this broad principle into practice is not straightforward. The World Bank and the OECD provide more specific guidance (see Irwin (2007) and OECD (2007)), arguing that risk should be allocated to:

- *the party best able to control the likelihood of the risk occurring* – for example, the private party might be better placed to minimise construction cost overruns or delays or unnecessarily costly project design because they are in control and have more expertise;
- *the party best able to control the impact of the risk on project outcomes, by assessing and anticipating a risk and responding to it* – for example, while no party can control the risk of an earthquake, a private firm might be more effective in using design techniques to reduce damage should one occur; or

14 For example, governments may engage the private sector to design and construct an infrastructure asset under a fixed-priced contract where the intention is to transfer construction risk to the private sector and provide the firm with incentives to ensure cost-efficient construction.

- *the party best able to absorb the risk at lowest cost, where the risk cannot be controlled by either party* – the cost of absorbing a risk depends on several factors, including: the extent to which the risk is correlated with the value of the party's other assets and liabilities; the ability to pass the risk on (e.g. to users or third-party insurers); and the nature and risk preferences of the ultimate risk bearers.

Transferring risk to the private sector is not 'free'. Private operators require compensation for assuming risk. An asset's price incorporates the risks associated with the asset's expected net revenue stream. For example, under a PPP with private financing, risks transferred to the private sector will be reflected in a higher price or required rate of return (OECD 2007). A criticism of PPPs has been the magnitude of the 'premium' that public authorities pay relative to the typically lower government borrowing rate to finance public infrastructure projects. Estimates of this differential vary by country and over time, although some sources indicate that the cost of capital can be in the order of 200–300 basis points higher than the government's explicit cost of funds (Yescombe 2007).[15]

The concept of a 'PPP premium' has been refuted by some on the grounds that the government's apparent financing advantage reflects its ability to tax. Taxpayers bear the residual or contingent risks if a project fails to deliver as planned, yet they are not compensated for this risk like private investors would expect to be (Brealey *et al* 1997).[16] Others focus on the scope for the higher cost of capital in a well-designed PPP contract to reflect the 'flip side' of the efficiency or 'value for money' advantage of using a PPP from better private sector management (Engel *et al* 2010). At issue is the size of the additional value, and what share of the improvement accrues to the private partner. This is a crucial issue for consideration in PPP design as naturally each partner has an incentive to seek additional returns without assuming commensurate additional risk. Drawing on empirical evidence, a recent UK Government review of their PPP program (the Private Finance Initiative, or PFI) expressed a general concern that private sector investors had made an unreasonable level of profit relative to the risks they had borne (HM Treasury 2012b; Vecchi, Hellowell and Gatti 2013).

Relevant factors to consider in any 'value for money' assessment of financing options (notably public debt versus private finance) include the return paid to investors, the cost of contingent liabilities to government arising from the exposure to project risk, the transaction costs of the financing arrangement, and the efficiency gains that can be expected from aligning private sector accountabilities with financial exposure to project risks (Chan *et al* 2009). Conducting such an assessment at the project level is not straightforward (Burger and Hawkesworth 2011). Many countries use some form of 'public sector comparator' (PSC) as a quantitative policy tool to assess the expected value for money of a PPP compared with public debt financing (OECD 2008). The PSC analysis includes, among other things, the identification and valuation of the risks retained by government and those transferred to the private partner under the PPP. While PSC analysis is considered a useful tool in many jurisdictions, particularly because of the systematic discipline it can bring to considering different procurement options, its value has been subject to debate (WBI-PPIAF 2012). Identified limitations include: a shortage of relevant data; results being highly

15 Yescombe (2007) also estimates that the spread between the cost of capital for a PPP and the lender's cost of funds lies in the range of 75–150 basis points.

16 Further to this, Brealey *et al* (1997) state that taxpayers may arguably bear more risk than shareholders because the latter are protected by limited liability in a way that taxpayers are not.

sensitive to assumptions about the discount rate used and the methodologies used to value risk transfer to the private sector (and, therefore, results potentially being open to manipulation); and that it focuses on financial costs to government rather than comparing the net social benefit of different procurement approaches (Leigland and Shugart 2006; Chan *et al* 2009).

Some studies have measured cost savings arising from PPPs from a broader, multi-project perspective. For a selection of PPP projects in Victoria (Australia), the estimated cost savings ranged from 28 per cent for a wastewater facility at Echuca–Rochester, to 5 per cent for the Spencer Street Station Redevelopment (Fitzgerald 2004). More recent studies based on a broader selection of projects find evidence that PPPs lead to fewer cost overruns and more on-time delivery compared with traditional government procurement.[17]

Others are less convinced about the robustness of whole-of-life cost savings from using PPPs. Drawing on a survey of international evidence, Hodge and Greve (2007) consider that the economic and financial benefits of PPPs are still subject to debate and considerable uncertainty; an OECD study considers the evidence 'inconclusive' (Araújo and Sutherland 2010). Other studies point out that a lack of credible data (for reasons including that many projects are still ongoing) has hindered a more systematic and broad-based evaluation of actual whole-of-life cost savings from the use of PPPs (Posner, Ryu and Tkachenko 2009; Hodge 2010; Istrate and Puentes 2011; UK NAO 2011; Willoughby 2013).[18] Whatever view is taken on the evidence of the efficiency benefits thus far, it is clear that the issue of risk management and allocation is central to establishing whether the use of partnership models, such as PPPs, can be expected to deliver net social benefits. Hence, rigorous and transparent assessment of risks and who bears them is vital.

3.2 Practical issues to consider with risk management and allocation

Contracting is the central risk allocation tool used in public infrastructure projects. Yet risks are not always easy to identify, measure or contract in a timely fashion (Leruth 2012). Indeed, the challenge of designing contracts may be one factor that explains the relatively low use of PPPs despite the widespread interest in them, and some recent trends in their use (Box C). Recognising that risk assessment is highly sector and project specific, it is nonetheless useful to explore some of the issues and challenges confronting policymakers, particularly in the context of 'partnership' models.

17 An analysis of 54 projects across Australia showed that the average cost overrun from contractual commitment to completion was 1 per cent for PPPs, compared with 15 per cent for traditional procurement. The average completion time, weighted by project value, was 3 per cent ahead of schedule for PPPs, compared with 24 per cent behind schedule for traditional procurement (Allen Consulting Group, Duffield and Raisbeck 2007). A separate analysis of 67 projects across Australia found that PPPs had an average cost escalation of 4 per cent post contract execution, compared with 18 per cent for traditional procurement (Duffield, Raisbeck and Xu 2008). The UK National Audit Office surveyed 114 projects across different economic and social infrastructure sectors between 2003 and 2008. The results indicated that 65 per cent of PFI projects were completed on budget to the contracted price, compared with 54 per cent of non-PFI projects, while 69 per cent of PFI projects were delivered to timetable, compared with 63 per cent of non-PFI projects (UK NAO 2009).

18 In its 2011 review of the PFI, the UK National Audit Office noted that: 'There is no clear data to conclude whether the use of PFI has led to demonstrably better or worse value for money than other forms of procurement' (UK NAO 2011, p 6).

3.2.1 Risks change over the life of an infrastructure asset

Risks change as an infrastructure asset passes through the planning, construction, operation and decommissioning phases. This evolution of risks provides important context for thinking about risk allocation and trade-offs between different procurement approaches.

In the planning phase of a project, the risks over the construction, operation and decommissioning phases need to be assessed and allocated. Risks in the construction phase may be generally best managed by the construction firm (Quiggin 2004). The numerous risks associated with sourcing inputs, price fluctuations, quality assurance, occupational health and safety, unforeseen site costs and, to a degree, changes in design are generally part of normal business for construction firms. Under a private financing model, the exposure of the private financier and government partner to construction cost overruns and delays depends largely on the nature and detail of the contract with the construction firms. This trade-off between the contract price and who bears construction cost overruns is relatively straightforward.

A less straightforward, but potentially important, trade-off is between construction costs (how well the facility is designed and built) and operational costs (the cost of operation including maintenance). Internalising this trade-off can provide net savings over the life of the asset. This could be done 'hands off' through contracting if the sources of construction and operational risk are observable (and able to be contracted), or more 'hands on' if the sources of risk are less easy to observe, there are information asymmetry issues between the procuring parties, and/or external monitoring is more difficult. The 'bundling' of the design, construction and operation phases is one of the main efficiency arguments for using a PPP, on the basis that it can encourage the private partner to internalise cost reductions at the operational stage arising from investment at the design/construction stages, leading to lower whole-of-life project costs (Dewatripont and Legros 2005; Yescombe 2007; Maskin and Tirole 2008). In principle, PPPs are expected to work better as a mechanism to internalise this trade-off where the quality of the service can be well specified in a contract by government, whereas the quality of the construction cannot (Hart 2003).

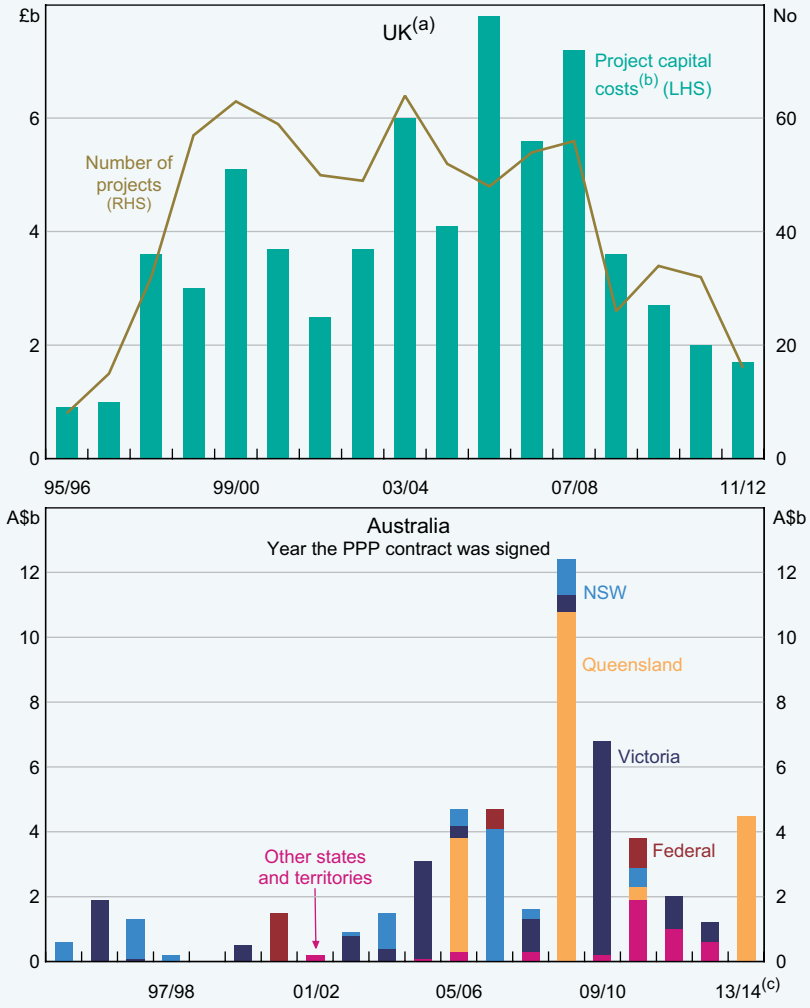
Box C: Use of PPPs in the United Kingdom and Australia

Despite their relatively high profile, PPPs have accounted for a relatively modest share of overall investment in infrastructure, even in countries that are considered leading PPP users, such as the United Kingdom and Australia. In the United Kingdom, they have been a 'small but important' part of overall government investment in public infrastructure and services (HM Treasury 2012b). In Australia, contract closures for PPP projects have amounted to around 5 per cent of the value of total infrastructure investment since 1995 (Chong and Poole 2013), although the proportion has been as high as 10 per cent in states such as Victoria over the past decade (Partnerships Victoria 2013). Della Croce (2011) estimates that PPPs were used to finance less than 10 per cent of total public infrastructure investment in a sample of OECD countries.

There is also some evidence that PPP transaction volumes and values have declined in some regions in recent years (PwC 2013). This includes countries such as the United Kingdom and

Australia (Figure C1) (Chong and Poole 2013). These trends are likely to have been influenced by a wide range of factors, including more challenging conditions for obtaining long-term debt financing for major infrastructure projects in the aftermath of the global financial crisis, as well as the often lumpy nature of these projects, which means that deal flow is not always consistent.

Figure C1: The Number and Value of PPPs in the United Kingdom and Australia



Notes: (a) Projects closed using the UK Government's PFI
(b) 2011/12 prices
(c) As at February 2014

Sources: HM Treasury; Infrastructure Australia

In the operation phase the trade-off between demand volume and operations cost is usually internalised. That is, the firm operating the facility will trade off the quality of the service and the effect this has on demand with the cost of providing that quality. However, there may be other sources of demand risk that the operating entity cannot manage. For example, it has been suggested that PPPs involving the transfer of demand risk to the private sector are better suited to infrastructure where demand is more stable and predictable (such as port services), and less suited where there is more need to retain service and policy flexibility and responsiveness to service delivery in the future (such as with hospitals) or where technology changes at a faster rate (such as with information and communications technology services) (Araújo and Sutherland 2010).

Regulatory requirements are likely to affect the risks and costs in the decommissioning phase. Clarity about these requirements is ideally sought at the planning phase, but as experiences with nuclear power plants and a range of 'super clean-up' sites has shown, insufficient attention has often been paid in the past to this phase. Whether by design or by default, governments have often ended up bearing these costs, which, had they been internalised, might have changed the way in which an asset was planned, constructed and/or operated. Not all infrastructure assets will have a decommissioning phase, but those that do not are still likely to require major overhauls or upgrades over time. These can be regarded as new investments and the cycle will start over again.

3.2.2 Nature and source of risks to the revenue (funding) stream

The risk that forecast revenues do not materialise is a crucial factor in determining the commercial viability of any public infrastructure project (Grimsey and Lewis 2002). Risks to the future revenue stream for an infrastructure project can arise whether it is funded from user charges or government payments. The given mix of funding, along with the degree of volatility over time, will affect the types of financing arrangements that can be applied and the potential efficiency pay-offs.

To date, and perhaps unsurprisingly, economic infrastructure PPPs have been more likely to involve a 'user-pays' structure than social infrastructure PPPs. The levying of tolls, fares or user charges on infrastructure such as roads, bridges, tunnels, ports and airports can provide much of the revenue needed to compensate private investors. In this situation, demand risk is tied to decisions made by a multitude of users, which in turn will be influenced by service quality (largely within the operator's control) and service alternatives available to users. For social infrastructure PPPs related to facilities like schools, hospitals and prisons, revenue flows are largely government determined, and this infrastructure is more likely to have 'availability-based' or other direct payments from government in addition to any use-based payments.

Where user charges are applied, the central question is whether the government or private sector is better placed to manage the associated demand/patronage risk. This requires consideration of the main sources of demand risk. As noted above, demand risk arises from users' choices about using the infrastructure, which are dependent on factors such as price, quality and substitution possibilities. All major infrastructure investments can be subject to policy and regulatory risk, but by their nature public infrastructure projects (even where assets are owned and operated by the private sector) are more likely to be subject to demand risk arising from government decisions. Many assets will be subject to price regulation or regulatory review that may not be fully specified in a PPP contract. Further, as much infrastructure forms part of a network (such as

roads or electricity transmission), or competes with other infrastructure (such as ports or electricity generation), government policy, and regulatory and investment decisions in other areas of the network, or in competing markets, may also affect demand risk.

Consequently, in some circumstances the judgement might be that it would be more efficient for governments to assume patronage/demand risk (Engel *et al* 2010; Maddock 2013). Various funding mechanisms have been used for toll road PPPs where the government has retained demand risk (see Box D).

Box D: Mechanisms to Reduce Demand/Revenue Risk for Private Partner in Toll Road Projects

Availability payments: Government payments are provided if the private partner meets certain quality and availability standards rather than payments being based on utilisation. In Australia, availability payments are being used to deliver the Peninsula Link Freeway PPP project, where the private partner will receive quarterly payments from the Victorian Government in the operating phase based on meeting certain key performance indicators (IFWG 2012). This type of payment mechanism has also been used for toll road projects in Canada, India and the United States (Storr 2009).

Government guarantees: Governments might issue traffic forecasts, and provide payments one way or another if traffic growth is different from forecasts (effectively providing a minimum revenue guarantee) (IFWG 2012). This approach has been used for toll roads in Canada, Ireland and Korea (BITRE 2011a). There may be scope to design contracts such that the public and private partners share in the upside if demand/patronage is above that forecast.

Present-value-of-revenue contracts: The private partner operates the infrastructure for as long as it takes to earn an amount of revenue agreed upfront in net present value terms. The contract is awarded in a competitive auction process. This model has been used in Chile and Portugal (Engel, Fischer and Galotevic 2011).

Build-Own-Operate-Privatise: The government initially uses its own capital by financing and operating a new infrastructure project (such as through borrowing or using the proceeds from privatising brownfield assets), and accepts all demand/patronage risk, but with the intention of introducing private investment and finance once the revenue streams are more certain. Broadly, this appears to be the model being used for Sydney's planned WestConnex toll road (NSW Government 2013a).

However, government assumption of demand risk can create other issues. Where the main funding source of the project is government payments over time (such as through CSOs, promises of availability payments or buyback after a specified period), a private partner may demand compensation for the risk of a change in government policy, especially if it anticipates political and regulatory instability. These types of mechanism may weaken the risk management

intent, and consequently reduce the potential efficiency benefits, of a partnership arrangement where the private operator would otherwise be better able to manage those risks (such as by using more innovative mechanisms to link pricing with consumer preferences and willingness to pay) (EPEC 2011). They can also weaken private sector incentives to encourage utilisation. In circumstances where the use of private financing models can bring greater market discipline or other scrutiny to bear on the initial investment decision, the retention of demand risk by government arguably weakens the private sector's incentives to act as an additional filter for projects with questionable net social benefits and/or patronage forecasts (Chan *et al* 2009).

3.2.3 Are risks effectively transferred to the private sector?

The extent of actual risk transfer in a partnership arrangement may not be clear. This might be deliberate where governments seek to conceal the extent of their residual funding obligations. It may reflect information and capability asymmetries or simply the prohibitive costs of contracting for every possible contingency. Whatever the reason, incomplete contracts may mean that governments retain a residual obligation to step in to ensure a project does not fail, contracts may need to be renegotiated, or clauses in the original contract may limit actual risk transfer and/or create other risks for taxpayers (Quiggin 2005; Connoly and Wall 2013).

There are examples where, despite the apparent transfer of risk in a contract, the government has subsequently intervened to provide extra financial support or guarantees in PPP projects. For example, in the United Kingdom, the three London underground PPPs signed in 2003 ran into financial difficulties that led to the government providing additional unanticipated financial support (Shaoul, Stafford and Stapleton 2012). In Australia, the NSW Government provided conditional deferred equity of A$175 million to the Waratah Train PPP project to overcome concerns regarding the private partner's ability to refinance its debt in 2018 (Hayford 2013).

The renegotiation of PPP contracts may sometimes undermine the original risk allocation model. Contract renegotiations are not unusual; Iossa and Martimort (2012) report that renegotiations occurred in 33 per cent of PFI projects signed by central UK government departments between 2004 and 2006, equivalent to 17 per cent of the value of the project on average. This can be particularly problematic for a government in a weak negotiating position, because it has a strong interest in maintaining service continuity and avoiding breaking the contract. Based on a sample of 50 PPP concessions awarded in Chile between 1993 and 2006, total investment increased by nearly one-third as a result of renegotiations, 84 per cent of which were payments for 'additional works' not specified in the original contract (Engel *et al* 2010). In the United States, 6 out of 20 projects surveyed by Engel *et al* (2011) underwent major change in the initial contractual agreements favouring the concessionaire.

There are other examples where contracts contained clauses that mitigated the actual extent of risk transfer to the private partner, and created contingent risks for taxpayers. For example, in the case of the Fergatus suburban passenger rail in Portugal, despite the initial contract formally transferring demand risk to the concessionaire, the government was required to assume the debt if traffic remained below the lower traffic-band level for several years (Araújo and Sutherland 2010).[19]

19 The Portuguese Court of Auditors now recommends against transferring demand risk to the private sector (Araújo and Sutherland 2010).

Early PPP toll road projects in Australia (such as Citylink, M2 and the Eastern Distributor) contained 'materially adverse effect' clauses, which allowed the private partner to delay the payment of concession fees if certain returns were not made (Brown 2005; Chan *et al* 2009).

Contract clauses may also inappropriately constrain future policy choices. Engel *et al* (2011) provide the cautionary example of a PPP contract for tolled express lanes in the United States that were added to an existing highway (Orange County SR91), which included a 'no compete' clause preventing the upgrade of the other existing lanes. Once it became apparent that expansion of the road was necessary to deal with increasing congestion on the non-tolled elements of the road system, the government was forced to purchase back the infrastructure at a very high price.

Risks have been more successfully transferred in other contracts, in some cases resulting in significant losses for private investors. For example, the very large Channel Tunnel project saw full transfer of risks to the private sector, which subsequently made substantial losses following a financial restructure (Eurotunnel Group 2008). (Of course, transfer of risks to the private sector does not of itself ensure that the project is socially beneficial and may simply redistribute losses.) As another example, while overly optimistic patronage forecasts have been a common feature of many toll road PPPs in a range of countries, recent experience in Australia (such as the Cross City and Lane Cove Tunnels in Sydney, and the Clem 7 and Brisbane Airport link in Brisbane) has been that patronage risks were effectively transferred to private investors that incurred significant losses from miscalculating traffic forecasts (Hayford 2013).[20] The poor financial performance of recent Australian toll road projects has reduced the appetite of some private sector investors to take demand risk in future PPP-type projects for greenfield infrastructure in Australia (Hayford 2013; DIRD 2013).

3.2.4 Transaction costs

The long-term nature of partnership contracts with the private sector and the use of private finance means they are often more complex to negotiate, have longer lead times than more traditional procurement contracts and involve higher transaction costs for both government and private parties (Araújo and Sutherland 2010; RICS 2013). This includes transaction costs associated with searching for and negotiating with bidders and managing the contracts into the future (Vecchi *et al* 2013). Higher transaction costs are eventually either borne by taxpayers or reflected in higher user charges.

Some studies estimate that the transaction costs associated with PPPs are in the range of 7–10 per cent of a project's capital value (Araújo and Sutherland 2010; Engel *et al* 2010; Willoughby 2013). Dudkin and Välilä (2005) find, based on a sample of 55 PFI projects in the United Kingdom, that the combined pre-contractual transaction costs for the public sector and winning bidder were on average 7 per cent of the total capital value of the project (split approximately equally between these parties). There is also the issue that all those participating in the bidding process face bidding costs that will not necessarily be recouped. Evidence provided to a recent inquiry in Australia

20 In a review of global traffic forecasts for toll roads, BITRE (2011b) finds that there was an asymmetric pattern of forecasting errors between toll and non-toll roads, with consistent overestimation of demand for toll roads. Based on a sample of 14 Australian toll road projects, Li and Hensher (2010) estimate that actual traffic volumes were 45 per cent below forecast levels. Bain and Polakovic (2005) find evidence of an average optimism bias of 20–30 per cent in year one traffic forecasts from 104 international toll road studies.

into infrastructure financing found that PPP 'bid costs' were in the order of A$2–3 million for a A$250 million project and A$5–6 million for a A$1 billion project (KPMG 2010; IFWG 2012).[21] PPPs can also take time to negotiate. On average, negotiations have taken 14–18 months in Canada, 17 months in Australia and up to 35 months in the United Kingdom (HM Treasury 2012b; Iossa and Martimort 2012; RICS 2013).

High transaction or bidding costs for the establishment of a PPP may act as a barrier to entry and diminish competition in the bidding process. Dunleavy and Carrera (2013) note that the PFI in the United Kingdom increased procurement costs substantially and produced an oligopolistic market for most major projects, with very few bids per contract even in the supposedly competitive construction sector. The UK National Audit Office (UK NAO 2007) find that for PFI projects between 2004 and 2006, 30 per cent of the projects received only two bids, 50 per cent three bids and 20 per cent four bids. Hellowell and Vecchi (2013) find a consistent pattern of excess profitability for primary equity investors in the UK PFI market and attribute this to a lack of competition, which is particularly an issue in the exclusive bidder phase.

The public sector's capability to negotiate, contract, monitor and enforce PPP contracts also affects costs. As noted by Reeves (2013), PPPs require an active commitment by government to monitoring, supervision, performance measurement and relationship management for the life of the contract. Consequently, effective contract management requires an adequate stock of public sector skills. Again, the need for appropriate institutions, transparent and open processes, and public sector capability and incentive alignment arises. Over one half of OECD countries report the existence of a dedicated PPP unit of some kind (OECD 2010). A capability gap has also been recognised as an important issue for emerging countries (APEC 2013).[22] However, concerns remain that a lack of commercial skills in the public sector to match those of the private sector puts governments at a disadvantage in the negotiation and management of contracts (UK NAO 2011).

4. Infrastructure Financing: Options and Policy Issues

There are a number of factors specifically related to financing decisions that can affect the relative costs of private participation and public procurement. Public financing for upfront construction costs of a project can be provided through several channels. These include government debt issuance, higher taxes, a reallocation of government spending from other areas of the budget, the proceeds of privatisations and/or through the off-balance sheet activities of GTEs. These options have different trade-offs in terms of transparency, accountability, cost and incentives for efficiency in the underlying project. For partnership arrangements, the cost of private capital will depend on the cost and availability of equity investment, bank lending and bond issuance. As different types of private investors are willing to take on different types of risks, risk allocation is a crucial factor in determining the pool of willing investors. Finally, in the case that a market failure is deemed to exist in the provision of private infrastructure financing, then a final option is for the government to invest alongside private parties through vehicles such as national development banks or pooled investment funds.

21 A caveat for this figure is that bid costs in Australia were found to be between 25 and 45 per cent higher than in a comparable overseas market such as Canada, though lower than in the United Kingdom (KPMG 2010; IFWG 2012).

22 A key outcome of the September 2013 APEC Finance Ministers meeting was a commitment to establish an APEC PPP Experts Advisory Panel to enhance infrastructure development in this region, and ongoing support for a pilot PPP centre within the Indonesian Ministry of Finance.

4.1 Public financing options

General budget appropriations are the most common form of government financing, which in turn can be financed through the issuance of general-purpose or specific-purpose government debt, higher taxes or a reallocation of government spending from other areas of the budget. Alternatives to generate capital include 'capital recycling', where existing government infrastructure assets are privatised and the funds raised are used to finance new infrastructure projects, and off-budget financing by GTEs.

The most efficient choice will be determined by myriad factors, including the characteristics of the project in question, the level of government (federal, state or local) responsible for the project, prevailing fiscal constraints (including the level of government debt) and the potential pool of assets available for privatisation. It is important that public financing is transparent so that the government is held accountable for their financing decision. Box E examines trends in the public financing of infrastructure in Australia over the past two decades.

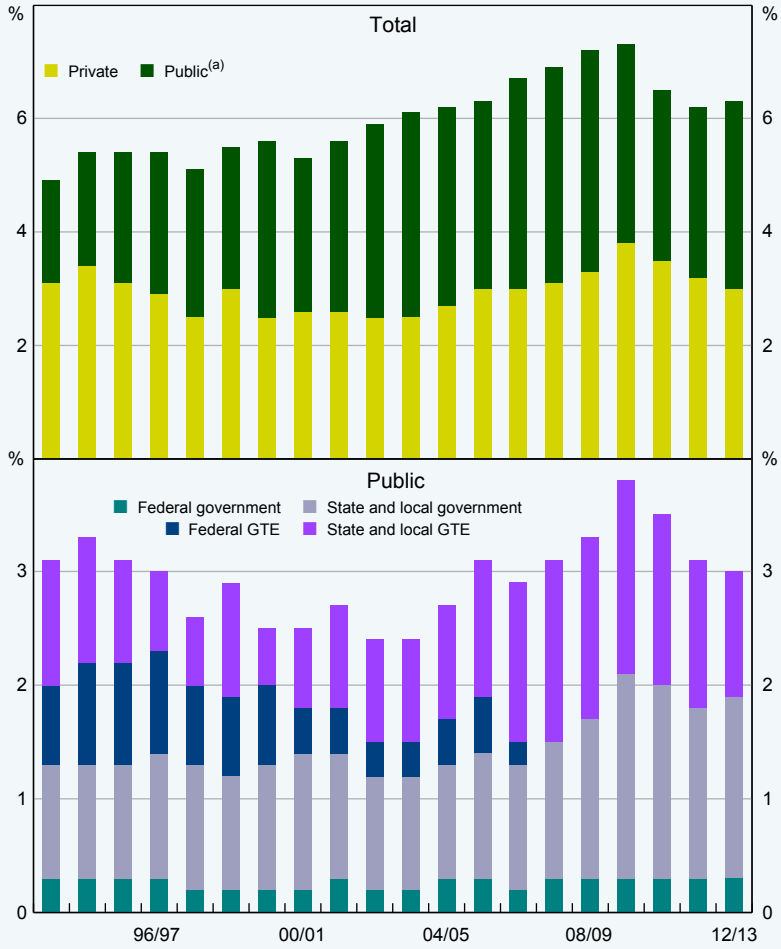
Box E: Trends in Infrastructure Financing in Australia over the Past Two Decades

The most striking change in public infrastructure investment in Australia over the past two decades has been the large-scale privatisation of state and federal GTEs, such as Telstra and Qantas, from the mid 1990s. These privatisations often followed a period of 'corporatisation', where GTEs were required to achieve certain commercial benchmarks and operate under competitive neutrality (RBA 1997).

In Australia, total private and public infrastructure investment has averaged around 6 per cent of GDP over the past two decades, with the share of fully public financing declining to around 50 per cent from more than 60 per cent in the early 1990s (Figure E1) (Chong and Poole 2013).[1] State and local governments, either directly or through GTEs, now account for almost all direct public infrastructure investment in Australia. The relatively low amount of direct federal government infrastructure investment is concentrated in the education and healthcare sectors. However, it should be noted that a large portion of state government funding for infrastructure projects comes from federal transfer payments, including payments to assist in financing specific infrastructure investments through programs such as the Roads to Recovery program. For example, federal grants provided almost 13 per cent of financing for public infrastructure projects in New South Wales in 2012/13 (NSW Government 2013b).

1 This is likely to overstate the amount spent on infrastructure relative to GDP. The fixed asset investment data from which this measure of infrastructure investment is derived include some items that are excluded from national accounts aggregates, such as transfers of existing structures.

Figure E1: Infrastructure Investment in Australia
Per cent of GDP



Notes: Includes gross fixed capital formation in: transport; communications; education; health care; electricity, gas, water & waste services; and postal & warehousing services
(a) Includes GTEs
Source: ABS Cat No 5206.0

4.1.1 Budget appropriations – taxes now or government debt issuance now (and taxes later)

An important advantage of using general budget appropriations over other types of public financing is greater transparency and accountability, which should improve the quality of decision-making (Chan *et al* 2009). Regardless of whether tax revenue or debt is used to finance general budget appropriations for infrastructure projects, the legislative process helps ensure that capital spending is scrutinised and open to public view.

The debate over whether to finance infrastructure investments using government debt or taxes is a long-running one, reflecting the broader debate on debt and deficits in the public finance literature. The government faces an intertemporal budget constraint, meaning that an increase in government spending in the current period must be financed either by increasing taxes by an equivalent amount in the current period, or by issuing debt, which must be repaid by higher taxes in the future. Most economists agree that the decision of whether to use tax or debt will have different effects on private consumption and investment (Elmendorf and Mankiw 1999).[23] Whether debt or tax financing for public infrastructure is optimal depends on a number of factors, including the expected economic impact of the infrastructure project, intergenerational considerations, political-institutional factors, the existing capital stock and capital market imperfections (Feldstein 1985; Aschauer 1989a). Consequently, this decision will differ across infrastructure projects, countries and time.

At the project level, a common argument in favour of debt financing over tax financing for infrastructure projects is one of intergenerational equity. Infrastructure is a capital rather than a consumption good, meaning that well-selected economic (and some social) infrastructure projects should result in higher incomes in the future. Debt financing shifts the burden of paying for the infrastructure from current taxpayers, who (at the extreme) receive no current benefit from the project, to those future taxpayers who will. The 'golden rule' of public sector borrowing used in the United Kingdom between 1998 and 2009, that over the economic cycle the government should only borrow to invest and not to fund current spending, is based on this 'user pays' principle.[24] Of course, intergenerational equity issues will be less problematic where the infrastructure project leads to relatively immediate benefits to taxpayers, for example intelligent traffic systems.

At the country level, political-institutional factors can have a significant influence on whether debt or tax financing for infrastructure is preferred by voters and politicians. Political economy theory suggests that countries with more fragmented coalitions, polarised political parties and politicians with geographically dispersed interests have greater difficulty in achieving balanced budgets (Alesina and Perotti 1994). Therefore, countries with these political features would presumably be better served from the point of view of the voters through tax financing in order to prevent running up large government debts. However, from the point of view of politicians interested in being re-elected, 'fiscal illusion' can provide strong motivations for debt financing. Fiscal illusion argues that voters are systematically biased towards overestimating the benefits of current expenditure and underestimating the impact on the future tax burden, meaning that politicians do not get sufficiently punished by voters for increasing fiscal deficits (and debt) (Buchanan and Wagner 1977). The use of budgetary frameworks such as balanced budget rules are often promoted as tools to overcome the political barriers and better align the interests of politicians and voters; however, their success in practice has been mixed (IMF 2009).

Finally, across time, the current level of government debt can be a practical constraint on a government's ability to increase debt further for infrastructure financing. This is the situation

23 In contrast, proponents of Ricardian equivalence combine the government budget constraint and the permanent income hypothesis to argue that the private sector rationally perceives a budget deficit (higher debt) today as leading to higher taxes in the future and as a result they will not change their consumption decisions in the current period in the face of a change in the fiscal mix (Barro 1974). However, Ricardian equivalence has not been supported empirically (Elmendorf and Mankiw 1999).

24 Two significant problems in implementing these types of rules in practice are defining what period constitutes an economic cycle and what can be counted as capital spending (Emmerson, Frayne and Love 2001).

that many governments, particularly in advanced countries, consider themselves to be in at the moment. A government's ability to issue debt at the prevailing market interest rate is constrained by investors' perceptions of the impact of additional lending on the sustainability of the stock of government debt. While a well-selected debt-financed infrastructure project should boost productive capacity in the future, investors may be concerned about higher levels of debt constraining the government's ability to respond to adverse macroeconomic shocks in the near term. Factors such as the current level of government debt, a country's credit rating, the strength of the country's infrastructure selection and macroeconomic policy frameworks, and prevailing global conditions will be important factors (among others) in determining the impact of additional government borrowing on investors' risk perceptions and, therefore, the pricing of government debt.

4.1.2 Off-balance sheet financing by GTEs

GTEs are legally independent entities, at least partially owned and overseen by the government, that charge fees for the goods and services they provide. GTEs are commonly used to provide services in sectors with monopolistic or public good characteristics where user charges can provide the bulk of revenue, such as utilities and public transport networks. Infrastructure projects undertaken by GTEs may or may not be subject to the scrutiny of the budget appropriations process depending on how they are being financed.

GTEs can finance their infrastructure investments through retained earnings, government capital injections, bond issuance or borrowing from banks (although these latter two are often constrained by governments). The capacity of a GTE to finance investments using retained earnings is also dependent on government policies regarding dividend payments and pricing. A capital contribution will be subject to budget appropriation and so is potentially subject to more scrutiny. Depending on the jurisdiction, debt issuance can be tied to financing a particular project (specific-purpose borrowing), issued directly by the GTE, or issued indirectly as part of general government borrowing.[25]

Two related concerns with GTEs in practice are that they may be inefficient and a source of contingent liabilities for governments. In the absence of the profit-maximisation incentives provided by the market, principal-agent problems between the government and the managers of the GTE can result in inefficient capital management (Shapiro and Willig 1990; PC 2008a). Conflicting policy objectives, regulatory error and an inability for the government to distinguish between policy-induced losses and operational losses can also contribute to inefficiencies. These concerns can be mitigated to some extent with transparent external evaluation, strong governance processes and independent regulators, or even privatisation in the presence of strong policy and regulatory frameworks (Kikeri and Nellis 2004; Bortolotti and Perotti 2007). For example, in Australia, GTEs in principle are required to operate on a commercial basis, with funding for non-commercial activities explicitly identified and accounted for by governments, and are subject to the same tax rates on profits as private businesses.

25 Specific-purpose bonds are repaid using the income generated by the infrastructure project (either user charges or government payments). They are commonly used in Canada and the United States where they are referred to as revenue bonds, but they have been phased out in Australia. Proponents of specific-purpose bonds argue that they impose market discipline on a project; opponents argue that they encourage rent-seeking behaviour (as they often give special tax treatment) and are a more costly way of raising finance than general government debt (Chan *et al* 2009).

4.1.3 Privatisations and 'capital recycling'

'Capital recycling', where the proceeds from the sale of a commercially viable infrastructure asset are used to fully or partially finance a new investment project, provides governments with an alternative to financing infrastructure through taxation revenue or debt issuance. Of course, government revenue and debt is fungible so this is technically equivalent to the privatisation proceeds being used to reduce government debt. However, explicitly linking the two projects is considered by some as a useful political tool for reducing community resistance to privatisation of the infrastructure asset. A recent example of capital recycling in Australia is the tying of the proceeds from the long-term leases of Port Botany and Port Kembla to financing for several infrastructure projects in New South Wales, including the WestConnex motorway (O'Farrell 2013). The WestConnex project is also planned to involve a second form of capital recycling, whereby the government will provide equity financing for the first phase of the project, but private sector capital will be raised against toll revenue once the first phase becomes operational to finance the construction of subsequent phases (NSW Government 2013a).

From a risk allocation perspective, both these forms of capital recycling have the government taking on the bulk of the risks in the greenfield phase of the infrastructure asset, with the private sector providing finance in the brownfield phase. Conservative investors, such as pension funds, are often more willing to invest in brownfield assets than greenfield projects, as they are not exposed to construction risk and demand risk is lower once the asset has been in operation for a period of time. Investor reticence may be more of an issue in 'thin' markets for infrastructure, in particular where the scope for diversification of greenfield investment is limited, and where greenfield investments are a relatively large share of the available portfolio.

The amount of funds that can be raised through privatisation is restricted by the value of publicly owned infrastructure assets that are presently 'suitable' for privatisation. There may be a wide variety of motivations for governments to pursue privatisation, including that private ownership can raise the internal efficiency of government-owned businesses through aligning the incentives of managers towards profit maximisation.[26] On the other hand, a private provider brings the risk of inefficiency arising from abuse of market power and thus the scope for and costs of regulating market power must also be considered. Privatisation changes the nature of the principal-agent problem as it introduces an information barrier between the government, regulators and the privatised entity, meaning that the regulatory framework must be carefully designed to take this into account and incentivise the optimal behaviour (Shapiro and Willig 1990; Vickers and Yarrow 1991). Regulatory incentives will also have implications for the ownership structure, including leverage and the type of owners (Helm and Tindall 2009). Welfare studies of privatisations in a range of countries have found that the gains from privatisations are greatest and distributed more evenly across stakeholders when combined with effective competition and regulatory frameworks (Kikeri and Nellis 2004).

Moreover, the proceeds of privatisations ideally should be allocated to maximise their social value, which may or may not involve reinvestment in a public infrastructure project. Linking

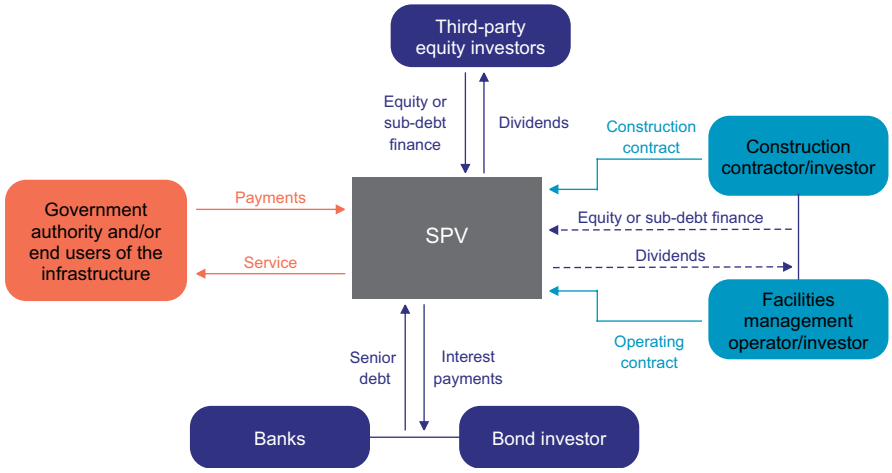
26 Based on a sample of Mexican non-financial firms privatised between 1983 and 1991, La Porta and López-de-Silanes (1999) find a 24 percentage point increase in the operating income-to-sales ratio after privatisation, of which 5 per cent is explained by higher prices, 31 per cent is explained by transfers from laid-off workers and the remainder is the result of productivity improvements.

proceeds to new infrastructure is essentially a form of hypothecation that limits the options for using funds, though the practical implications of this may be negligible where there are many socially worthwhile infrastructure projects. Nevertheless, the need for infrastructure proposals to be subject to a robust and independent cost-benefit analysis remains.

4.2 Private financing of public infrastructure

Private financing of public infrastructure is most commonly associated with PPPs.[27] The financing cost of a PPP will depend on the mix and relative cost of the debt and equity financing, which (as discussed in Section 3) will in turn depend on the risk characteristics of the PPP project and the composition and risk appetite of investors. The core financing structure at the greenfield stage is very similar across a variety of PPP models (Figure 1). Typically, a non-recourse special purpose vehicle (SPV) is created that protects investors against losses greater than the amount they invested in the project. Senior debt financing is sourced from banks and the capital market in exchange for fixed interest payments. Equity financing is typically at least partially provided by the construction company (which may also hold subordinated debt), but may also come from third-party investors such as large pension or superannuation funds. Equity investors are rewarded through dividend payments and any capital gains made upon the sale of their equity stake. Projects with government-contracted service payments, such as schools and hospitals, generally have higher leverage (ratio of debt to equity) than projects that are funded through user charges, as the more certain revenue streams suit the regular servicing of debt.

Figure 1: Typical Project Company Financing Structure



Source: Adapted from UK NAO (2012, p 13)

The ability to sell both debt and equity stakes in the secondary market means that the leverage and composition of investors may change in response to the changing risks over the life of the PPP project. For example, once the construction phase is complete and construction risk is removed

27 Another form of private financing is investment in the listed equity and debt of privatised public infrastructure companies.

from the project, the construction contractor may wish to sell their equity stake to realise any profits and enable them to finance construction in another project. Further, debt financing from banks may be refinanced through long-term bond issuance to investors. A little-explored question in the literature is whether the ability for private parties involved in the construction or early operation phases of the asset to sell their stakes to secondary investors creates perverse incentives at the bidding stage or undermines the 'bundling' efficiency advantages of PPPs over public procurement. In the presence of imperfect information, the incentives for parties responsible for construction and maintenance to minimise costs over the lifetime of the project are likely to be weaker when they can pass on their financial exposure to another investor at an early stage of the project's life.

4.2.1 Debt financing – bank lending and bond issuance

Bank financing is the dominant source of debt financing for PPPs in most countries (EPEC 2010; Inderst 2013). However, deleveraging by banks following the financial crisis and greater investment in infrastructure by pension funds has seen bond financing increasingly being discussed as an alternative debt financing source (PwC 2013). The key advantage of bond over bank financing is lower refinancing risk, as bond issuances typically have longer tenors than bank loans. However, there are a number of drawbacks with bond financing relative to borrowing from banks, particularly in the greenfield phase of a PPP, that need to be considered when comparing the relative cost of bank and bond financing, including (Yescombe 2007; EPEC 2010, 2012):

- Uncertainty of tenor and pricing prior to the completion of the bond underwriting process.
- Greater difficulty in coordinating bondholders relative to banks to monitor the project and make any required decisions.
- Higher prepayment penalties and fixed preparatory costs of issuance, such as attaining a credit rating.
- Higher interest costs as, during the construction phase, bank interest is only charged on funds that have been drawn to date (plus a commitment fee), while bond funds are drawn all at once and can generally only be reinvested at a lower interest rate until needed. This 'negative arbitrage' means that more debt needs to be issued under a bond issue than a bank loan for a project with the same construction costs.
- Attracting sufficient demand from institutional investors, for which the bond is likely to require a credit rating of at least A- (EPEC 2012). Because 'typical' project finance structures deliver lower credit ratings than this, the senior debt may need to be 'enhanced' through either a credit guarantee or debt tranching. The difficulties experienced by monoline insurers during the financial crisis mean that, in some jurisdictions, a government partner or a supranational body, such as a development bank, may provide credit guarantees or enhancements on debt in exchange for a fee.

These drawbacks mean that bond financing is likely to be a more attractive financing option during the brownfield phase of an infrastructure project, particularly for projects seeking to attract risk-averse institutional investors. In this sense, bank and bond financing may increasingly play a complementary role in infrastructure financing. Banks, which typically prefer to lend for shorter tenors, can finance the construction phase of the project where the monitoring needs and risks

are higher, with these loans subsequently being refinanced through long-dated bond issuance to institutional investors once the project becomes operational.

A final consideration is that the domestic capital market may not be developed enough in terms of depth or liquidity to make domestic project bond issuance an attractive alternative to bank financing. Prerequisites for bond financing to be a viable alternative include an available pool of investment capital outside the banking system, sufficiently strong governance and legal framework for project bonds, and balanced tax treatment for bank debt and bonds (PwC 2013).[28] In the case that conditions in the domestic capital market are not attractive, the project company may need to turn to offshore bond markets, such as the private placement market in the United States.

4.2.2 Equity financing by institutional investors

If they have any asset allocation to infrastructure at all, institutional investors, such as pension funds, have historically favoured indirect equity investments in brownfield infrastructure through infrastructure funds (Preqin 2012; Inderst 2013; OECD 2013a). These types of investments allow institutional investors to overcome scale issues, outsource decisions such as which specific infrastructure projects to invest in, and avoid involvement in day-to-day management issues that they are unlikely to have the in-house capacity to make, while maintaining the key attractions of infrastructure investments. These include the long life of infrastructure assets being a better duration match for pension fund liabilities and the potential for assets with payments linked to inflation to act as an inflation hedge (Della Croce 2011). However, the fees charged by external fund managers erode returns.

A more recent development has been the direct involvement of several large (predominantly Australian and Canadian) pension funds in the equity financing of brownfield, and occasionally even greenfield, infrastructure projects (Inderst and Della Croce 2013). These funds have made the decision that devoting resources towards building up in-house teams capable of analysing and bidding on complex infrastructure deals provides better value for money than paying fees to external managers. There are also cases of pension funds pooling their resources to establish investment platforms or funds capable of directly investing in infrastructure. An example of this in Australia is IFM Investors (formerly Industry Funds Management), which is wholly owned by 30 Australian industry superannuation funds and has two open-ended infrastructure funds that invest primarily in brownfield infrastructure assets in advanced countries. However, direct investment currently remains out of reach of most pension funds – of the 1 650 active infrastructure investors monitored by Preqin (2012), only 29 per cent were expecting to make new direct infrastructure investments over the next year, compared with 91 per cent looking to make new investments in unlisted funds.

While pension funds are often held up as a large potential source of private infrastructure financing, in many countries a range of factors may inhibit a rapid increase in infrastructure investment by pension funds. These include structural factors, such as a lack of appropriate financing vehicles, liquidity requirements of prudential regulators, limited expertise, regulatory disincentives and a lack of information on risk and returns, as well as more cautious investment strategies favouring

28 PricewaterhouseCoopers has identified Australia, Benelux, Canada, France, Germany, Latin America, Mexico, the United Kingdom, and the United States as being regions and countries where the market conditions are largely in place for an infrastructure bond market to be operational.

fixed income following the financial crisis (World Bank 2013). These impediments could help explain the OECD finding that infrastructure investments only accounted for 0.9 per cent of total assets under management on average across large pension funds in 2012 (US$72.1 billion in total), as well as the significant differences observed in levels of investment across countries (OECD 2013a).

Where some have argued that this is a 'policy problem', various options have been raised to address some of these impediments. These include improving information availability and transparency (for examples, see OECD (2013c)), and establishing a clear pipeline for future infrastructure projects to encourage pension funds to devote the internal resources required to build up capacity in analysing investment projects in a particular country or sector (IFWG 2012). However, in some circumstances pension funds may be fundamentally unsuited to taking on a number of the risks associated with greenfield infrastructure projects – construction, demand and regulatory risks in particular – and, therefore, such reforms may have little impact in the absence of financing arrangements or instruments that can shift these risks onto other parties.

4.3 Government financial assistance

A final way that the government has acted as a partner in infrastructure investment is through providing financing assistance in the form of loans, guarantees and/or equity injections. A common channel for this assistance, particularly in developing countries, is through the creation of sub-national or national development banks (NDBs) that target financial support to infrastructure projects. A more recent innovation is for the government or NDB to contribute capital towards a pooled infrastructure investment fund, with the aim of encouraging private investors, such as pension funds, that would not have been willing to invest without the government having 'skin in the game'. As with other models, government co-financing brings its own set of risks.

4.3.1 National development (or infrastructure) banks

Many countries have NDBs that aim to provide credit to sectors of the economy that the government has judged to have been underserved by private financial institutions (ideally from a net social benefit perspective). NDBs can provide credit directly to the borrower (tier 1) or indirectly through private financial intermediaries (tier 2), using a variety of products, including loans (at market or concessional rates), guarantees and equity investments. Conditions are generally attached to the provision of funds to financial institutions from tier 2 NDBs. For example, these funds must be on-lent to a certain sector (such as infrastructure or small and medium enterprises) or for a specific purpose (such as trade financing).

There are two rationales for why NDBs might be relevant for infrastructure financing (Smallridge and de Olloqui 2011). First, and most commonly, NDBs are sometimes justified by governments or others on the grounds of filling a market 'gap' that has arisen because the private sector is unwilling or unable to accept certain risks or faces prohibitively high transaction costs. However, it should also be noted that the presence of a market gap is a necessary, but not sufficient, justification for NDB involvement – total (indirect and direct) benefits still need to exceed the cost to the government. Moreover, from an economic perspective, the case for government involvement is more appropriately based on the existence of a market failure, and even this needs to be weighed

against any costs of government intervention. Second, through the use of risk-sharing instruments, NDBs are often seen to be justified on the grounds of being able to 'catalyse' private financing in a particular sector or play a countercyclical financing role during times of heightened risk aversion. Like GTEs, NDBs have a funding advantage over private financial institutions in that, aside from the initial government capital injection, they are also supported by an implicit or explicit government guarantee and so are able to issue debt at a lower cost than commercial banks.

Regardless of the justification used, the performance of NDBs as measured against outreach to their target sector(s) and financial sustainability has generally been judged as disappointing (Yaron 2004; Rudolph 2010; Smallridge and de Olloqui 2011). A common weakness identified with poorly performing NDBs is the lack of a clear mandate and governance framework, with the resulting problems of political interference in lending decisions, poor transparency, a lack of managerial skills and incentives, conflicting and/or multiple policy objectives, and crowding out of private financing. To combat these problems, an NDB should, at the very least, have defined target sectors that address identified market failures, play a complementary role to private financial institutions and have a specified minimum rate of return on capital to ensure financial sustainability (Rudolph 2010). While NDBs are generally not profit maximisers due to their public policy mandates, ensuring that they are financially sustainable is essential to avoid the NDB being a continual drain on the government's budgetary resources. Further, they are not necessarily a solution to other structural problems in the financial markets that may be better addressed by promoting a healthy and competitive financial system.

4.3.2 Official involvement in pooled infrastructure funds

Official involvement in pooled infrastructure funds is becoming an increasingly popular form of support for private financing in infrastructure. Recent examples of initiatives launched by multilateral development banks (MDBs) include the ASEAN Infrastructure Fund (AIF) and the US$1.2 billion IFC Global Infrastructure Fund. National initiatives include Macquarie's Mexican Infrastructure Fund and the UK's Pensions Infrastructure Platform.[29] Given that these funds are only in their infancy, it is not possible to evaluate their impact on private infrastructure financing, but a significant question surrounds the degree to which they could be crowding out other sources of private financing.

Pooled infrastructure funds seek to tap into private sources of infrastructure financing through governments, NDBs and/or MDBs co-investing alongside private investors in an infrastructure fund targeted towards a particular sector, country or region. The purported attractions for private investors, and particularly institutional investors, of these types of pooled funds include gaining access to the project selection and management expertise of the fund manager/sponsor, as well as a perceived reduction in the political risks associated with the infrastructure investments (OECD 2013b). The involvement of MDBs in pooled funds targeting infrastructure investment, particularly in developing countries, is viewed as reducing the likelihood of the government making changes to regulations that threaten the financial viability of the investments.

The key barrier to these types of funds being successful in increasing private financing for infrastructure has been a mismatch between the type of infrastructure projects that these pooled infrastructure funds are targeting and the type demanded by investors. As previously

29 For further information on these initiatives, see Macquarie Group (2010), ADB (2011), HM Treasury (2012a) and IFC (2013).

discussed, institutional investors are risk averse and tend to prefer brownfield assets in developed countries, not the greenfield projects in emerging market countries that these pooled funds are often targeting. Therefore, in order to attract institutional investors into pooled funds targeting investments in developing countries, the official sponsor may have to take on a significant amount of risk themselves, or choose only highly creditworthy projects that would have received private financing regardless. As such, the pooled fund may merely crowd out private financing rather than increasing it. Fund structures created by the official sector can also contain unattractive features for private investors, including high fees and a complicated legal structure.

5. Concluding Remarks

This paper sets out threshold issues for governments making decisions about public infrastructure investment. A crucial point is that financing decisions must follow the investment decision, acknowledging that at times risk assignment resulting from the financing arrangements may influence the net benefit of the project.

Rigorous and transparent project selection and planning processes are essential to ensuring the efficient use of scarce public and private resources. Once it has been determined that a project warrants prioritisation, attention can turn to how it should be delivered and the optimal role for government (policy setter, purchaser of services, provider or partner). A key decision with significant implications for the subsequent delivery model, and hence financing decision, will be whether the project is to be funded through user (or other beneficiary) charges or government payments (taxation).

The choice of financing options must be guided by the benefits that private sector participation can bring, not as a source of finance *per se*, but in terms of expertise to manage risks and reduce the costs associated with infrastructure investment. Indeed, unless PPPs deliver real efficiency benefits, or somehow affect the ability of the project to generate revenues efficiently from user charges and thus reduce the need for public funds, they can only change the timing of government funding of the infrastructure (and revenue raising) and the composition of financing. Allocating risks to the party best able to manage them is crucial for realising efficiency benefits, and should be done transparently to avoid becoming just a slogan. Optimal allocation is more obvious for some types of risk than others, and may change over the project's life. In particular, the party best able to manage demand risk is currently a contentious issue in many countries, including Australia, following experiences with overoptimistic private traffic forecasts on toll road PPPs.

Decisions on financing should aim to minimise costs, including contingent liabilities and transaction costs, as well as ensuring that incentives are aligned for appropriate decision-making through the (long) life of the project. The financing decisions facing the private partner are related to how the project is structured. This will depend on the features of the project itself, particularly the allocation of risk between the government and private partners, as well as the investment climate of the country. Therefore, even in the absence of explicit government support mechanisms such as NDBs or co-investment funds, government decisions will have important implications for the cost of private financing, and therefore the value for money of the project itself. The composition of investors may also change over the life of the project, in line with the changing nature of risks. For example, the shorter and riskier construction phase of the project may better suit the risk and

maturity profiles of banks and private equity investors, while the operational phase may be more aligned with long-term investors seeking stable incomes, such as pension funds.

As a provider, the government faces the choice between higher debt and/or taxes, shifting the composition of government spending or selling public assets. Factors to consider include intergenerational equity, relative costs and benefits, and prevailing fiscal constraints. The relative weights of these factors will differ over time and between countries and types of project. Importantly, even for projects involving private financing, to the extent that there is a gap between efficient user charges and costs, the shortfall must be met by government over the life of the project and these payments must be financed through a combination of taxes, debt or privatisations. In other words, governments inevitably must raise funds to pay for those aspects of public infrastructure services that cannot be directly charged for if such services are to be provided, whether by the private or public sector.

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