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## Beter regulation of public-private partnership for transport infrastructure: Summary and conclusions

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# Better Regulation of Public-Private Partnerships for Transport Infrastructure

Summary and Conclusions

06

**Discussion Paper 2013 • 06**

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# **Better Regulation of Public-Private Partnerships for Transport Infrastructure**

**Discussion Paper No. 2013-6**

## **SUMMARY AND CONCLUSIONS**

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**April 2013**

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1. The author is grateful for the advice and comments of Kurt van Dender, International Transport Forum Secretariat and Roger Vickerman, University of Kent and Chairman of the Roundtable and for the contributions and comments of the Roundtable participants.

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## **SUMMARY AND CONCLUSIONS**

## **ABSTRACT**

This report is based on discussions at an International Transport Forum Roundtable<sup>1</sup> convened in September 2012 to review experience with the regulation of public private partnerships (PPPs) in the transport sector. Conclusions from the debate are developed with reference to the literature, particularly in relation to managing the risks associated with forecasting traffic. The report focuses on actuarial, structural and behavioural approaches to improving the regulation of PPPs and containing liabilities created by PPPs for public finance. It also examines the potential for private financing of infrastructure by treating packages of transport projects as regulated utilities. The report aims to clarify the objectives of PPPs, their impact on public finance and the different types of risk that need to be managed.

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## EXECUTIVE SUMMARY

The financial crisis has spurred interest in new sources of private finance for transport infrastructure at the same time as exposing the scale of liabilities that off-balance sheet financing mechanisms can create for taxpayers. Many governments seek to attract private finance from a broader spectrum of investors through new models of partnership in order to maintain investment at the same time as limiting public spending. Others are struggling to make payments due for roads delivered under existing public private partnership (PPP) contracts, agreed when the economy was growing more rapidly.

### ***Finance***

PPPs concede construction, operation and finance of a public project under a single contract. They involve several distinct phases of finance. A project first has to be designed and appraised, which involves expenditure with no guarantee of return. To close the agreement, some equity is required together with short term bank loans. In some cases bonds or shares are offered to the market before construction starts. In many cases the project is refinanced on completion, paying-off short term loans by issuing bonds. This is the stage at which pension funds and other long term investors usually invest in PPPs. Long term investment funds seek predictable returns and are generally averse to the risks associated with the early stages of the PPP finance cycle.

Private finance is typically more expensive than public finance. This reflects commercial borrowing rates that are higher than public borrowing rates, although the difference may be small. It is also a reflection of project risk. This is borne by the taxpayer under public financing but allocated to private investors under PPPs and priced explicitly. Risks not backed by government guarantee have to be covered by the purchase of insurance, hedging and other financial instruments. The fees for appraising projects and establishing contracts are also substantial.

Bank recapitalisation in the wake of the financial crisis means that investment banks have less capital available for providing short term finance for PPPs than before the crisis. This has reduced the share of PPPs in project finance in recent years. Constraints on public spending to control deficits limit the ability of governments not only to invest directly in infrastructure but also to service PPP agreements where these involve availability payments rather than user tolls. These factors have led governments to reassess PPPs to see if risks can be managed in ways that might attract a broader range of private investors and at the same time limit contingent liabilities.

### ***Efficiency***

Much transport infrastructure is associated with market imperfections, including natural monopoly characteristics and the external benefits that arise from being part of a network. Under-provision and over-charging would likely prevail without government intervention. Purely public provision suffers from government failures including stop-go funding cycles that undermine planning for long term investment and often results in neglect of

maintenance. A mix of public and private transport infrastructure provision is the norm in market economies. Where private investment is subject to government intervention there is a risk of government confiscating the value of private assets by, for example, setting tolls too low on privately financed roads. The purpose of PPP contracts is to provide a legally enforceable framework that solves this “time inconsistency” problem, with remuneration of private investment regulated by the terms of the PPP contract.

PPPs are usually promoted on the grounds that they can deliver infrastructure more efficiently than conventional public procurement and that they relieve strained public budgets. Experience with PPPs has, however, been mixed. This applies across countries at all stages of development and regulatory sophistication. Some transport PPP projects have delivered major cost savings but many more have resulted in renegotiation at the expense of taxpayers. Projects most often get into difficulty because of uncertainty in projecting traffic demand and the way this is addressed, or overlooked, in PPP contracts.

PPPs can potentially improve efficiency relative to pure public procurement in three ways. They bundle operation and construction under a single contract creating incentives to minimise costs over the lifetime of the concession. They bundle construction contracts together under the responsibility of a single company, in principle transferring coordination risks out of government and benefiting from the project management expertise of a private sector developer with a good track record. And PPPs protect maintenance budgets by making payments conditional on service quality and availability.

PPPs can sometimes achieve major cost savings through innovation involving radical redesign of projects and changes in construction techniques. For this to happen developers have to be freed of the detailed specification typical of public procurement, and indeed typical of many PPP projects. In some cases project costs have been reduced by a third through innovation although in many projects the scope for innovation is actually very small.

### ***Costs and risks***

The costs of many PPPs have been inflated by renegotiation of contracts. Renegotiation can result from a range of factors:

- Weaker than expected economic growth undermining traffic levels and toll revenues or undermining the ability of government to make availability payments;
- Revision of over-optimistic revenue forecasts afflicted by optimism bias as a result of incentives to get the project launched;
- Strategic misrepresentation, where over-optimistic revenue forecasts are used by creditors to launch a project with the expectation that more favourable terms can be extracted from government under the pressure of the political costs of cancellation or delay and the financial costs of re-letting the contract;
- Ministries avoiding funding limits or legislative approval for spending by negotiating contract extensions for work that could have been foreseen under initial contracts.

Such cost inflation needs to be factored into tests of the affordability of PPP programs, on the basis of historical monitoring of PPP contracts. For this, systematic records of PPP projects need to be kept from cradle to grave as some ultimately successful contracts delivered on time and to budget are, on closer inspection, renegotiated contracts for projects that became distressed because of initially over-optimistic traffic forecasts. Optimism bias can be countered by the use of reference class forecasts although they are of only limited use in countering strategic misrepresentation. Reference class forecasts are derived from

historical experience with similar projects and need to be undertaken independently from any party directly involved in the PPP.

Some types of project bear lower revenue risks than others. At one extreme, the risk is relatively low for new capacity in a currently congested network and for which there are no direct alternatives. Tolerated bridge and tunnel crossings forming essential links in busy trunk road networks are one example. The public liabilities associated with such tolled PPPs can be small. In some jurisdictions, notably the USA, there appears to be a large potential for establishing relatively low risk tolled PPPs. At the other extreme, traffic can be very uncertain on infrastructure in networks with little congestion and ample alternatives. In general projects subject to lower demand risk are more suited to PPP finance. There is a spectrum of PPPs that differ according to project characteristics, revenue stream, shares of equity and debt finance and share of grant funding. These differences affect the distribution of risks and the impact of PPPs on public finances.

### **Liabilities**

Remuneration of investment under PPPs can be provided through tolls on users or annuities paid to the PPP company by government, usually in the form of availability payments that specify the condition of the infrastructure to be maintained. Availability payment based PPPs delay public spending for the period of construction, thereafter spreading payment in much the same way as a loan. This type of PPP thus defers public spending rather than replacing it. In contrast, toll-based PPPs shift payments from the taxpayer to users but, by conceding the right to collect tolls, the government loses revenue it would have collected if the project had been financed traditionally.

The impact of availability payment-based PPPs on public finance resembles public procurement much more closely than privatisation and almost all PPP programs create liabilities for future taxpayers. It is prudent therefore to treat the public finance flows associated with PPPs as on-balance sheet public finance in budget decisions and public accounts. Typically, governments record spending on publicly financed projects as and when they are invoiced by contractors building the infrastructure. Spending on PPPs is usually recorded only once construction is complete, and spread over the period of the concession. This encourages a government under pressure to reduce its deficit or debt in the short term to prefer PPPs over public financing, even if in the long run the PPP costs more. The bias resulting from accounting conventions creates a risk of accumulating financial commitments that prove unaffordable.

To counter this risk, the size of public liabilities created by PPPs should be subject to limits. A fixed budget for PPP programs is the simplest way to achieve this. At the same time, a fixed budget for a specific class of investment (e.g. transport infrastructure) can be used to create certainty that funds will be available for investment.

Governments can reinforce the fiscal sustainability of PPP programs in a number of ways:

- Supplement public finance accounts with data that counts PPP companies as part of the public sector.
- Publish forecasts of expected future spending on PPPs and incorporate these projections in fiscal forecasts and treasury debt-sustainability analysis.

- Budget for construction of the PPP assets as public spending: subjecting PPPs to standard budgetary approval including authorization by parliament for expenditure commitments over the term of the contracts; or approving PPPs first as publicly financed projects as part of medium-term expenditure plans.

Change underlying fiscal accounting rules to treat PPPs as creating government assets and liabilities.

These rules and procedures will avoid PPPs being used essentially as presentational budgetary tools to work around spending limits. Where PPP policies are the subject of sharp party-political disagreement any budgetary rules or procedures risk being exploited for political ends (Poole 2013). Nevertheless, budget and liability limits and legislative approval procedures have been adopted in environments as different as India (Haldea, 2012) and the United Kingdom, under PF2 guidance issued in 2012 (HMT, 2012). The rules should contain the volume of availability payments and potential liabilities associated with PPP finance within prudent fiscal limits.

### ***Reducing the cost of finance***

Even within sustainable liability limits, some governments are concerned that insufficient private capital will be available for transport PPPs, partly because of competing opportunities for investment. They seek to broaden the attraction of PPPs to a wider range of investors. Relatively little investment in transport PPPs has been attracted from insurance, pension and sovereign wealth funds to date, largely because of the expertise necessary for assessing demand risk. Demand risk is retained by Government under availability payments, lowering the additional cost of debt finance and making PPPs more accessible to non-specialised investors. Their use is therefore likely to grow in relation to toll-based PPPs in many jurisdictions.

Regulated utility models offer an alternative to PPPs for private investment in transport infrastructure. They have the advantage of providing greater flexibility to adapt to changes in external circumstances whilst providing a long-term commitment that investors will recover their sunk costs. The regulator sets rates of return, usually indexed to inflation, and monitors quality standards. Periodic review of rates of return is usual with utility type regulation, providing a useful degree of flexibility in adjusting to external conditions that is lacking in PPP contracts. Investment in regulated utilities listed on the stock exchange is accessible to a broader range of investors than PPPs. Many European airports and Great Britain's rail infrastructure is financed this way, with investment remunerated at a rate of return set by an independent regulator. Road networks could be financed this way as could packages of projects that create sufficient scale to merit the costs of establishing a regulator.

A number of sovereign wealth funds have taken significant share holdings in airports that are regulated in this way, although this has usually resulted in public companies being taken off the stock exchange. The RAB model does not suit all types of "patient capital". The infrastructure funds of pensions institutions also prefer unlisted assets as the objective of this part of their portfolio is securing stable returns that are insulated from stock market cycles and inflation.

Their preferred investment is in government-guaranteed infrastructure project bonds, or bonds in PPP projects issued on completion of construction and secured by toll revenues or availability payments. This is known as securitisation. It is facilitated in some jurisdictions by simplified administrative procedures (e.g. under the 1981 *Loi Dailly* in France) and is

perhaps the main route to broadening the range of investors in PPPs over the full project cycle. At the same time the proportion of loans to a PPP that can be sold on in this way may be subject to a maximum limit (for example 70% in Chile) in order to preserve the link between construction and operation of the facility and the incentives for long run efficiency that result.

Relatively few institutional investors have the in-house expertise needed to assess and manage the risks associated with PPPs in the early stages of the project cycle and design contracts to make revenue profiles match their needs for reliable long-term returns. Contracting these services externally is expensive and often cannot be carried by the relatively modest returns on this kind of investment. Some governments and some project developers are working with institutional investors to facilitate equity investment at reasonable cost (Ugarte, Gutierrez and Phillips 2012).

### ***Focus on the suitability of projects for private finance***

Once it is accepted that the share of PPPs in overall transport infrastructure investment will be limited it becomes clear that projects for PPPs should be selected according to the maximum efficiency gains that can be expected to be delivered. This prioritises projects susceptible to achieving major cost savings from redesign or modification of construction techniques. It also requires governments to remove the strings of detailed project specification for suitable projects.

## **1. INTRODUCTION**

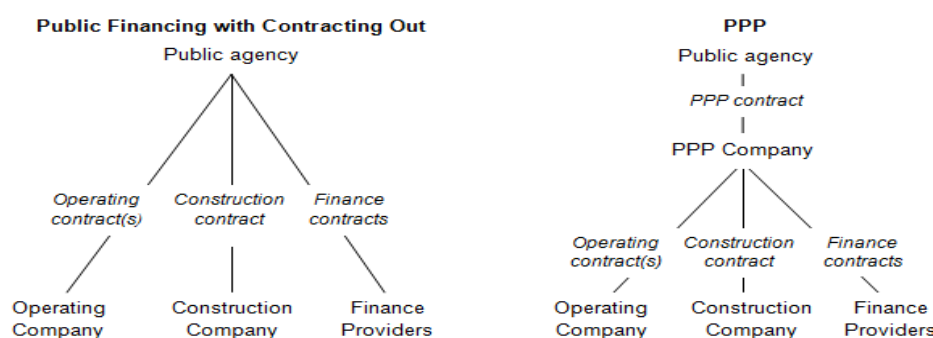
### **1.1. Essential Features of PPPs**

Public private partnerships involve temporary private ownership of public assets through concessions to build, operate and then transfer infrastructure to the government. Experience shows that upfront public sector commitment to land acquisition and planning procedures including compensation is essential. PPPs vary in structure but can be characterized by two key factors (Funke, Irwin and Rial 2012). First, PPPs create different cash flows to direct public procurement. They require little or no public expenditure at the outset of construction, with compensation to the private partners paid either through direct tolls on users of the infrastructure or payments from the public purse spread in periodic instalments (annuities or availability payments) over the lifetime of the concession. Compared to public loans, repayments are delayed until construction is complete. A combination of direct tolls and availability payments is sometimes employed. In all cases the drain on public cash flow is delayed in comparison to public financing but ultimately the cost of finance is higher.

Secondly, a single contract with a PPP company or “special purpose vehicle” replaces direct contracts between the government agency sponsoring the project and the multiple suppliers involved in delivering a traditional publicly financed project. The “SPV” is a consortium of construction and finance companies that work together to deliver the project under the leadership of the project developer. The risks related to coordinating activities and incentives between suppliers are transferred from the government to the SPV (Figure 1). Responsibility for both construction and operation of the project are also bundled together,

which creates incentives to optimize resource allocation over the whole lifetime of the concession with the potential to reduce overall costs. However, this incentive may not always operate in practice because, as Figure 1 shows, the construction and operating companies are separate and possibly competing companies seeking to maximise their individual returns.

**Figure 1.** Project Bundling under PPPs



Source: Irwin, Funke and Rial, 2012.

Terminology varies over time and between countries. P3 and public private venture are both employed for PPP in the USA. Private Finance Initiative (PFI) is used in Australia and the UK interchangeably with PPP. In the UK, PFI initially referred to a policy to increase the scope for private financing of capital projects, launched in 1992 and followed by successive governments. What distinguishes PFI projects from other forms of partnership in the UK is that the private sector contractor arranges finance for the project as well as construction and operation (Allen, 2001). Special purpose vehicles are also known as special purpose entities, special purpose companies and bankruptcy-remote entities. They are usually a subsidiary of the project developer or one of the construction companies or banks involved in the project. They enable the parent company to finance a large investment without putting the rest of the company at risk. Conversely the SPV's obligations are protected from creditors of the parent company should the parent company go bankrupt.

The structure of PPP finance varies with the composition of the SPV and the way in which investment is remunerated. Different models create different incentives and tend to be associated with different allocations of risk. Discussions at the Roundtable concluded that rather than seeking an ideal template, or even aligning different categories of PPP along a spectrum between direct public procurement and outright privatization, it is more useful to consider whether different forms of PPP are appropriate for different economic circumstances and for meeting different policy objectives. These objectives are discussed in section 4. It should be noted that it is difficult to make direct comparisons of the merits of alternative forms of PPP, or compare PPPs with publicly procured projects, because the counterfactual case cannot be assessed *ex-post*.

## 1.2. Cost Drivers

### ***Design Guidelines and Freedom to Innovate***

Public administrations use design guidelines to manage design and construction risks. Public procurement contracts typically specify the number of tons of concrete and asphalt to be poured. The level of specification is typically extremely detailed (Nilsson, 2012).



This removes risk from the contracting companies, facilitating competition and removing a risk premium from pricing. For the administration, close project specification reduces the risk of a project falling short of standard. But rigid specification also prevents project managers from taking straightforward measures for economy and may thus tend to inflate costs overall. By specifying outputs (quality of infrastructure and availability) rather than inputs, PPPs provide some flexibility to cut costs, assigning some construction and design risks to the SPV rather than the administration. However, most PPPs are also subject to standard design guidelines, limiting their potential to achieve cost reductions in this way. Detailed specification of inputs should not be necessary for PPPs. If it is unavoidable PPP financing is probably not suitable for the project.

The largest potential cost savings arise from the freedom to fundamentally redesign projects. In a report prepared for the Roundtable, Ugarte, Gutierrez and Phillips (2012) report examples of major savings on the costs of multi-billion dollar road projects specified by public administrations through innovation in design under PPP contracts. Cintra's redesign of the LBJ Expressway managed lanes project in Dallas, Texas reportedly reduced construction costs by USD 970 million from an initial estimate of USD 2.875 billion. Clearly this is the type of project that brings the biggest benefits from PPP contracting but, by number, such schemes represent a small proportion of the transport sector PPP projects contracted around the world to date.

### ***Cost of Finance***

PPPs often enable projects to be undertaken earlier than they would under public financing. But the advantage of relieving or, more often, delaying public expenditure comes at a cost. Special purpose vehicles use a combination of debt and equity finance. Many projects are highly leveraged and Governments can usually raise debt finance more cheaply than the private sector. Private debt finance also always involves expenditure on secondary financing instruments to hedge and insure risk. Legal and consulting fees for establishing PPPs are also substantial. For example, advisors' fees amounted to £500 million for the three PPP contracts with Metronet and Tube Lines, covering investments of £17 billion and £5.4 billion respectively over 30 years (Shaoul, Stafford and Stapleton, 2012). Given these added costs, governments generally require PPP projects to undergo a comparison of value for taxpayer money with a theoretical equivalent project procured directly with public finance. Such comparisons are not simple to make and depend critically on assumptions about the cost of public capital that are implicit in the social discount rate employed.

Government loans can be made available to PPP projects, for example TIFIA loans in the USA and Viability Gap Funding capital grants in India. Government loans and grants have to be factored into comparisons of value for money.

Value for money in relation to public financing depends on the balance of a number of factors. On the positive side for PPPs are potential cost savings from bundling construction contracts and combining responsibilities for design, construction, maintenance and operation. On the negative side are certain differences in interest payments, returns on equity, the cost of hedging risk and other "credit enhancement" guarantees and the legal and consultancy fees associated with setting up special purpose vehicles and tendering for the PPP.

***Cost Overruns, Delays and Renegotiation***

The margins that determine comparisons of projected value for money can be swamped when projects get into trouble, by the impact of cost over-runs and project completion delays under direct public procurement and by refinancing of PPPs when contracts are found to have been based on over-optimistic traffic forecasts. Shaoul, Stafford and Stapleton (2012) report that a large share of UK transport sector PPPs have been subject to renegotiation under distress, concerning projects with a book value of £35 bn out of a total portfolio of £91 bn. Guasch (2004) reports that 54% of transport sector PPPs were renegotiated, an average of three years after award, in a survey of nearly 1 000 PPP concessions in Latin America. Most renegotiations were at the request of the PPP company and resulted in delays in investment or increases in tolls or availability payments. It should be noted straightaway that refinancing and renegotiation are to be expected and allowed for under PPPs because the length of contracts inevitably means they cannot be fully closed. For comparisons of cost, however, the average cost overrun for PPPs (the long run outcome of re-negotiations and defaults) should probably be factored into assessments of affordability. This requires monitoring of PPP performance from cradle-to-grave and a reporting system to be established by the agency awarding contracts.

Empirical data on the incidence of cost overruns according to project ownership model is sparse. Flyvberg, Skamris Holm and Buhl (2003, 2004) have compiled the largest set of financial data, controlled for comparability, to date. They report great difficulty in getting accurate and unbiased financial data, particularly from private sector projects and PPPs. Their data covers 258 rail, road and fixed link projects in Europe, North America and Japan worth \$90 billion. Information on the ownership of projects was available for just 183 of these projects. The authors compared the incidence of cost escalation for three types of ownership: private, state-owned enterprise and other public ownership. They included the whole range of public private partnership models under the third category, mixed in with pure public procurement. They were unable to compare publicly procured projects with PPPs but their results are nevertheless of interest. They found that state-owned enterprises performed far worse on average than the other types of project, with an average cost overrun of 110%. There was little difference in the average performance of private projects (34% overrun) compared to public procurement and other forms of public ownership (23% overrun). The authors attributed the poor performance of state owned enterprises to weak governance as a result of “falling between two stools”, escaping the normal reporting standards of public spending whilst not subject to shareholder pressure to minimise costs. The study concluded that “in planning and decision-making for (transport infrastructure) projects, the conventional wisdom, which holds that public ownership is problematic whereas private ownership is a main source of efficiency in curbing cost escalation, is dubious.”

De Brux finds that not only is renegotiation to be expected and anticipated with contracts that are inevitably not fully closed but that in some cases renegotiation creates surpluses for all parties – public, private and users. She cites an example of a tolled tunnel concession in Marseille, renegotiated at the instigation of the public partner to include a new feeder tunnel to relieve congestion on surface feeder routes. This was untolled and built entirely at the cost of the concession holder. The increase in revenues generated by extra users on the tolled part of the tunnel was sufficient to cover the extra costs and users benefited from congestion relief. The extent of such beneficial renegotiation is little researched.



Renegotiation is to be expected with long term projects typical of the transport sector and should be planned for. Contracts that apply over very long periods will inevitably be incomplete. Macro-economic conditions on which revenue flows depend, for example, cannot be forecast with any certainty ten years into the future. Inflexibility is one of the drawbacks of PPP contracts and part of the appeal of discretionary regulation (section 5) lies in its broader flexibility (ITF, 2011).

Re-negotiation of PPPs can be planned for to an extent. Conditions that can be renegotiated and an ex-ante framework for holding such negotiations can be included in PPP contracts. Care has to be taken to avoid effectively underwriting the SPV's income and as with any risk sharing arrangement it may create new opportunities for strategic behaviour and gaming. The view of most roundtable participants was that such arrangements should be included in PPP contracts and are as important as the conditions for the initial award of the contract.

### **1.3. Tolls and Availability Payments – Incentives and Innovation**

PPPs can be designed so that investment is remunerated directly from tolls (revenue-based PPPs) or through periodic availability payments (annuities) from government. Toll funding can make the PPP self-standing financially but a number of hybrid models also exist. With "pass-through tolls" government takes the toll revenue and passes on some of it to the SPV. Where direct toll revenues are expected to be insufficient to recover costs, service-related availability payments can be used to top up direct toll revenues. Governments often subject tolls to limits. Reasons include standardizing toll rates nationally for regional equity or public acceptance and relating tolls to marginal costs or to average costs across the network. Such policies can result in toll revenues falling short of costs on specific projects or on all tolled parts of the network. In these cases tolled PPPs can be supported by grants from government, such as India's Viability Gap Funding grants, which are available to cover up to 20% of project costs (Haldea, 2012).

On most road networks there are likely to be projects assessed to have high benefit-cost ratios but where the full toll rate would be well above short run marginal costs, e.g. the much delayed A14 project to serve the UK's main container port. Viability gap type support could be used more widely to introduce tolls at publicly acceptable levels on traditionally toll-free networks.

Service-based availability payments and "shadow tolls" have also been used on roads where the network is traditionally toll-free, such as in the UK. With shadow tolls payments to the SPV are determined on the basis of traffic counts. However, UK shadow tolls have tended to be structured to allow full payment to be made at relatively low levels of usage, turning them effectively into availability payments.

The UK's use of shadow toll and availability payments has evolved through series of phases, with different arrangements developed for different circumstances. Availability tolls are, for example, better suited to urban roads with specific local economic development objectives than a linear shadow toll.

Availability payments are made conditional on maintaining service levels in terms of road surface quality, lane availability and timing of maintenance works. Tolled infrastructure is also usually regulated for quality of service but the link to revenues is less direct.

This difference can incentivize a degree of over-engineering or “gold plating” of infrastructure under availability payment financing in order to reduce the risk of penalties for failing to meet availability criteria. Other things being equal this tends to inflate costs compared to the tolled alternative or to public procurement<sup>2</sup>.

Several Roundtable participants argued that this has been the case in practice. However, cost inflation may instead have more to do with over-specification of projects by the government agency in its contract with the SPV inadvertently eliminating the potential for innovation in project design.

Pure availability contracts have become increasingly prevalent in parallel with a maturing, or proliferation of government guidance on PPP project design. It is not clear whether these trends are purely coincidental or if governments are willing to leave more freedom to project developers in scoping projects when direct tolls are levied. The latter might be the case because projects most suited to tolls are also least sensitive with regard to design criteria. For example, highways between major cities through areas of low population may be better suited to tolling than urban roads as they have fewer connections to the rest of the road network, with fewer charging points and less potential for diversion of traffic to un-tolled parts of the network. Such environments are less risky (see Table 1) and may also require less specification, with more scope for redesigning projects to cut costs where land availability and alignments are less constrained.

Table 1. **Demand Risk Characterisation for Roads**

	<b>Less Risk</b>	<b>More Risk</b>
<b>Charging Regime</b>	Availability payments  Tolls well established, data on actual use established Toll rates in line with tolls on existing facilities Simple toll structure  Flexible toll rate - revision without government approval	User tolls  Toll roads absent or unusual  Tolls higher than the norm  Complex structure (local discounts, frequent users, variable pricing) All tariff rises require regulatory approval
<b>Forecast horizon</b>	Near term	Long term – 30 years plus
<b>Infrastructure</b>	Facility already open Extension of existing road Estuarine crossings Radial corridors in urban area Highly trafficked corridor Good, high capacity connectors Standalone facility	Early planning stage Greenfield development Dense road networks Ring roads, beltways Absence of congestion Congested links to network Dependent on connections to other proposed improvements

<b>Route</b>	No competing alternative route Competition protection e.g. truck bans on alternative routes Alignment with clear rationale Alignment with strong economic rationale Clear plan for future network extension No competition from other modes	Many alternative roads Local authorities free to change rules Confused road objectives (not where people want to go) Alignment with political rationale Many options open for future network extensions Competition on route from air, rail or ferries.
<b>Users</b>	Few key origins and destinations Clear market segments Dominated by single purpose journeys (commuting, airport...) High income, time sensitive market Flat demand profile	Multiple origins and destinations Unclear market segments Multiple journey purposes Average/low income market Highly seasonal or peaky demand
<b>Commercial users</b>	Fleet operators pay toll Clear operating cost/time savings Simple route choice decisions Strong compliance with weight limits	Owner/drivers pay toll Unclear competitive advantage Complicated decision making Overloading common
<b>Data</b>	Legal basis for collection Experienced surveyors Locally calibrated parameters Zoning framework established	Difficult/dangerous to collect No culture of data collection Parameters transferred from elsewhere Zoning framework to develop from scratch
<b>Macroeconomics</b>	Strong, stable, diversified local economy Strict land-use planning Stable, predictable population growth	Weak/transitional local or national economy Weak planning controls Population growth dependent on many exogenous factors
<b>Traffic growth</b>	Driven by established and predictable factors High car ownership	Reliance on future factors, new land use developments or structural changes. Low car ownership

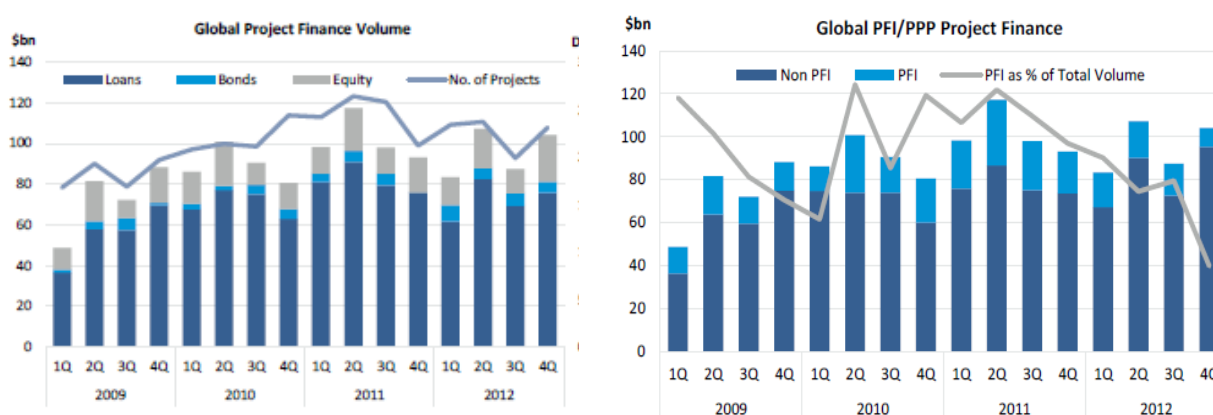
Source: Based on Bain (2002).

The choice between tolls and availability payments also has some influence on the way demand risk is allocated between the government and the private partners, that is risks related to the number of users of the infrastructure. This is discussed in section 3.

## 2. FINANCING STRUCTURES – DEBT, EQUITY AND RISK

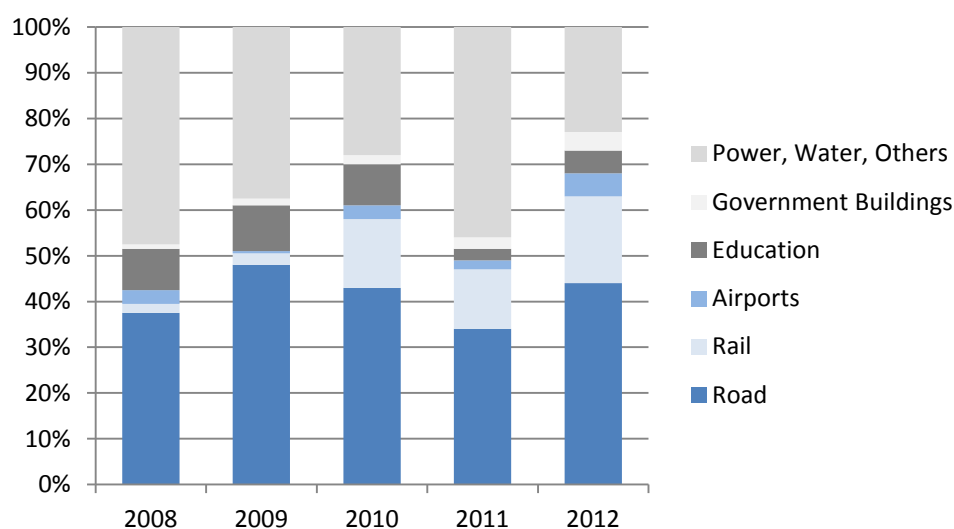
PPPs have accounted for around 20% of overall project finance globally in the years since the financial crisis (Figure 2). Project finance overall is split roughly 30% each to oil and gas; power; and transport and water infrastructure taken together. The split of PPP investment between infrastructure sectors is shown in Figure 3). Transport dominates and roads account for the largest share.

Figure 2. **Global Project Finance Volume and Share PPPs in Project Finance**



Source: Dealogic Project Finance Review, Full Year 2012.

Figure 3. **Breakdown of Global Infrastructure PPP/PFI Investment by Value**

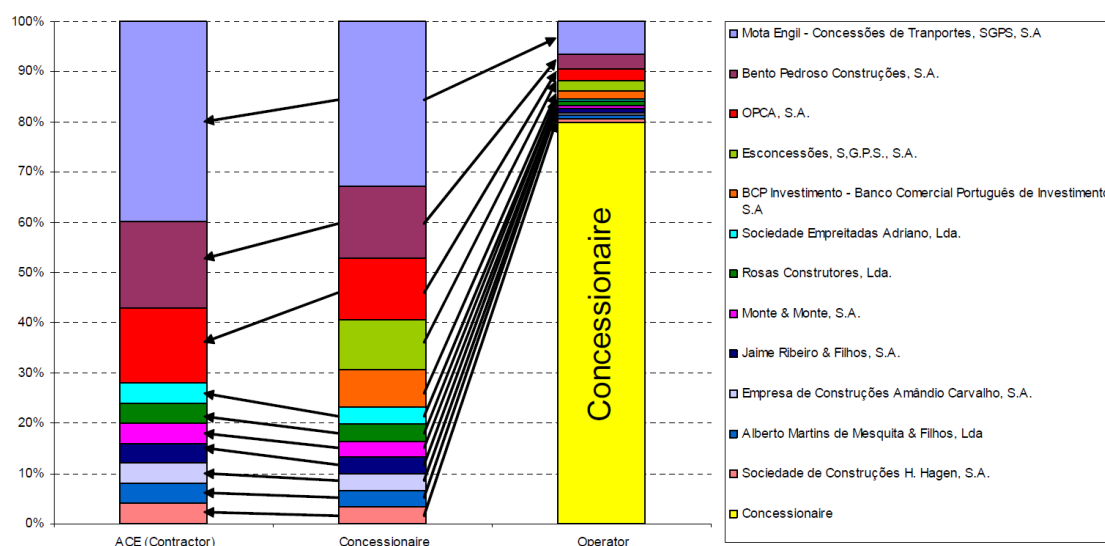


Source: Dealogic Project Finance Review, Full Year 2012.

The financing of a PPP project consists of debt and equity, typically up to 70-80% debt and no more than 20-30% equity (EIB 2012). Equity is contributed by the project developer and construction companies in the SPV. There are different types of equity investor. There are construction companies who make equity investments and are well placed to understand and manage certain types of risk. There are facility management companies that make equity investments and understand long term operating risks but may or may not understand construction risks. And there are sometime private equity firms that may not have a detailed understanding of either construction or operating risks. The SPV has little risk carrying capacity (ability to control construction and operating risks) and therefore risks allocated to it by contract will not rest in the SPV but are passed to a construction or facility management company, which may not wish to hold the risk and will therefore hedge and insure, adding cost.

The banks in the SPV issue and syndicate the loans that make up the balance of finance. This “top tier” of finance, facilitating the project, is known as senior debt as these lenders have priority access to the cash flows of the PPP in case of distress<sup>3</sup>. Top tier finance also includes contributions from capital market investors (private equity funds, sovereign wealth funds and the equity funds in the portfolios of pension and insurance funds) who typically have little detailed information on project specific risks. Many PPPs involve only “pinpoint equity”, often accounting for less than 1% of finance. This is typical of availability payment based contracts in the UK, as discussed in the paper prepared for the Roundtable by Shaoul, Stafford and Stapleton (2012). Lenders require that, should a project suffer cash flow shortfalls because of poor performance by one of the project subcontractors, the costs are borne in the first place by the subcontractor to prevent impairment of the SPV's ability to service debt. An example of the way equity is structured in a PPP is illustrated in Figure 4. With around 70-80% gearing the sponsor's 30% equity stake in this SPV accounts for no more than 10% of total project finance.

Figure 4. **Shareholdings in the SPV (Concessionaire), Contractor and Operating Company of Portugal's A25 Motorway PPP**



Source: Carola, 2004.

Most of the finance in a PPP is extremely risk averse. Only the facility operator and construction companies are willing to take on risk. In the facility operator's case this is its core business. For the construction companies the interest is in generating cash flow from construction activity and their objective is to sell their equity as soon as possible.

Incentives differ between SPV members according to whether they invest equity or debt. Incentives also differ because some of the banks will receive consulting and financial service fees on the award of a PPP contract. More generally, project finance is far from the most profitable part of the business of an integrated bank. The bank's interest in providing short term finance for a PPP often lies principally in maintaining a relationship with a client that generates more profitable business elsewhere. The balance of equity and loan finance in a PPP is also determined by the nature of the project and whether investment is remunerated by tolls or availability payments.

From a pure finance perspective and other things being equal, the higher the gearing of a project the more affordable it will be for the public sector because senior debt is less expensive than equity. The level of gearing banks are prepared to accept is determined largely by the variability of the project's cash flow. Availability payments carry less risk than direct tolls as they are not dependent on actual traffic flows. They are therefore preferred by banks and permit higher gearing, or at least this was the case until the financial crisis. Institutional equity investors also prefer lower risk, favouring availability payment-based investments. In the current economic climate this preference is probably less important than the relationship between the principle project developer (construction or facility operating company) and the banks.

Tolled PPPs require a relatively larger share of equity. It was argued in the Roundtable that more equity at stake, or "skin in the game", reduces insolvency risk in tolled PPPs compared to availability payment schemes. As loans have the first call on cash in case of liquidation, equity contributors have the strongest incentives to control costs. Some of the equity investors are also best placed to manage construction cost risks. The core benefit the private sector should bring to a PPP is the project management experience of one of the equity investors. Their experience is crucial in managing technological risks in major civil engineering works and avoiding the major sources of error in complex projects identified by Brooks (1975); the tendency for mission creep and the hidden overheads of coordination and management. For example, when manpower is added to speed up delivery, "Brooks law" rules that adding personnel to accelerate a late project adds further delay. In principle equity investors also have strong incentives to ensure that revenue targets are feasible and should be averse to strategic misrepresentation in bidding for PPP contracts, although Section 3.1 below suggests this incentive does not necessarily operate effectively in practice.

It was suggested that minimum limits for the share of equity finance in PPPs might be used to reduce risks related to costs and demand, or that tolls should systematically be preferred to availability payments. The downside of setting minimum equity limits would be to drive up the cost of finance, as equity normally requires higher returns, reflecting the higher risk. Equity floors would limit the scale of private finance available for PPPs. How counter-productive this would be depends on the main purpose of policies towards PPPs, discussed in Section 4, but a majority of participants saw a continuing, indeed a growing role for availability payment-based PPPs as these have a lower headline cost of finance.

PPP finance often progresses to a second stage once construction of the infrastructure is complete. At this point the concessionaire can issue bonds backed by toll revenues. This kind of refinancing is known as "securitisation".

These bonds are often bought by pension funds and insurance funds. The risks at this stage of the project are reduced and securitisation broadens the access of PPPs to capital markets. Securitisation is facilitated in some jurisdictions by simplified administrative procedures, such as the 1981 *Loi Dailly* in France and is the main route to broadening the range of potential investors in PPPs over the full project life-cycle. Some jurisdictions limit securitisation to preserve incentives for coordination of design and operation to maximise efficiency over the lifetime of the concession. In Chile, for example, concessionaires cannot securitize more than 70% of the debt raised to finance the project (Engel, Fischer and Galetovic, 2008).

In practice, toll-financed PPPs have not proved immune from overbidding. Empirical evidence discussed in Section 3 suggests toll-based PPPs may actually be subject to a greater degree of optimism bias than availability payment-based projects. One of the reasons for this may lie in the dispersed holding of equity typical of PPPs (Figure 4). Shareholders who provide less than 5 per cent of the capital of a business are not effective equity participants (Kay 2012). In some of the toll projects discussed in Ugarte, Gutierrez and Phillips (2012) equity provided as much as 50% of finance. At these levels equity may indeed provide the discipline necessary to limit risks. Minimum equity limits at this level would significantly restrict the finance available for PPPs. Equity limits may not therefore be generally relevant to injecting realism into PPP project proposals although they might have the effect of selecting only the projects most suited to private finance.

### 3. DEMAND RISK

Demand (revenue) risk has proved more difficult to manage under PPP contracts than construction and project coordination risks. It is made manifest in bids for projects that turn out to over-estimate revenue. Overbidding can arise for a number of reasons including inadequate data and forecasting models and incentive structures that drive optimism bias and strategic misrepresentation. More broadly contracts are awarded on the basis of a bidding process that is inevitably susceptible to the “winners curse” (Thaler, 1988), that is the tendency for the party that most overestimates the intrinsic value of the contract to bid the most. This can be addressed, for example by awarding the bid to the second highest bidder, but such techniques have rarely been employed.

Incentives are addressed in section 3.2 below. On the more technical factors, knowledge of the distribution of values of time is crucial in modelling usage, and especially the likely split of the traffic between tolled roads and free alternative routes (Hensher and Goodwin, 2004). The information on which assumptions are made for values of time as well as differentiation between different types of users is often inadequate.

Another reason for overbidding in toll projects may be that there is some room to raise tolls in response to demand falling short of projections and investors are therefore willing to take a more bullish view. Their ability to respond to demand risks is, however, much more limited than government, which might for example adjust fuel tax policy in economic downturns to counter falling demand.

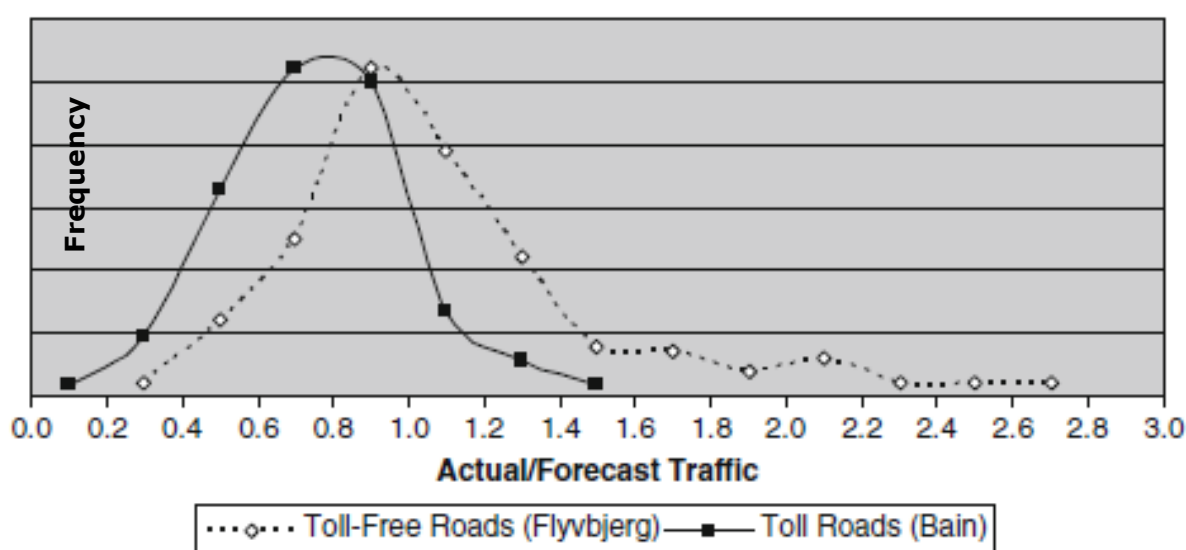


Where the private partner is able to influence demand, by adjusting tolls, or where its costs are related to demand it is efficient to allocate demand risk to it. In many cases, however, demand will be largely exogenous and most of the costs of the project (the investment) unrelated to demand. In these circumstances requiring the private partner to bear demand risk will lead to higher financing costs rather than improving value for money (Vickerman and Evenhuis, 2010).

### 3.1. Traffic Forecasts – Tolloed and un-tolloed roads

The Australian Department of Infrastructure and Transport recently reviewed traffic forecasting performance for toll roads (RBConsult and Oxera, 2011), finding that in general it has been poorer than for toll-free roads. The review drew particularly on empirical work by Rob Bain on Standard and Poor's database of PPP projects and work led by Bent Flyvbjerg. Standard and Poor's has released a series of reports on traffic forecasting risk in new toll road projects. Their 2005 survey (Bain and Polakovic, 2005) covered 104 roads, bridges and tunnels in Europe, the Americas, Asia and Australia. It found that on average toll road traffic forecasts over-estimate first year traffic by 20% to 30%, confirming results obtained in earlier years on smaller samples. The variability was large with outcomes ranging from just 15% of forecast traffic to 50% above the forecast (Figure 5). Li and Hensher (2010) surveyed 14 Australian toll roads, most of which were PPPs, finding average traffic volumes in the first year of operation to be only 55% of forecast levels.

Figure 5. Traffic Forecasting Performance: Toll-free versus toll roads



Source: Bain (2009).

The original Standard and Poor's survey (Bain 2002) separately identified user paid and shadow toll projects. Only 4 of the 32 projects surveyed that year used shadow tolls but all of these employed reasonably accurate traffic forecasts, averaging 102% and ranging from 90% to 119% (the two low estimates accounted for half of the under-estimates in the entire sample). This suggests that optimism bias is less prevalent in availability payment based PPPs than in tolled PPPs, although the sample size was too small for the results to be statistically significant. This runs counter to the discussion in Section 2 that suggested tolled projects with relatively high shares of equity finance should be less subject to bias and may



reflect weaker optimism bias where there is greater certainty over revenues. The study also examined the reliability of forecasts commissioned by banks compared with forecasts made by project sponsors. Half the sample forecasts were by banks, half by sponsors. The sponsors did considerably worse, with an average over-estimate of 34%. The banks averaged 18% with a narrower range of error.

Flyvbjerg, Holm and Buhl (2005) surveyed 183 road projects around the world, 90% of which were toll-free and most publicly financed. The sample covers projects completed between 1969 and 1998 in 14 countries on 5 continents. The study found a similar spread of results to Bain but a much lower average figure for over-estimation. Bain (2004 and 2009) compared the results (Figure 5) finding that the toll road distribution is shifted 20 percentage points to the left. The inaccuracy in forecasting is similar for both types of road, indicated by the spread of results and the shape of the curve, but un-tolled projects are free of the systematic over-estimation that characterises toll roads.

The un-tolled roads show a long tail of projects experiencing much higher levels of traffic than forecast (although they number only 7). Bain accounts for this difference by the motivation for promoters of privately financed projects to identify any upside potential, making under-estimation less likely for tolled projects.

### **3.2. Sources of Inaccuracy and Bias and Potential Remedies**

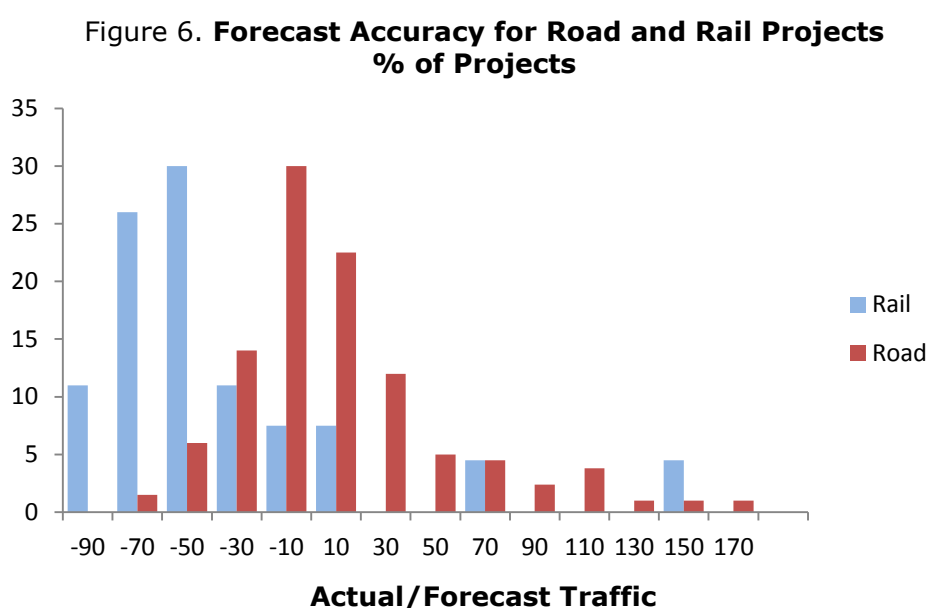
Forecasting errors can be driven by a large range of factors including limited data, inadequate models and uncertainty about land use development along the infrastructure project and the general rate of economic growth. These inaccuracies translate into risk factors and the list considered in the financial assessment of projects is long (Table 1).

Some facilities are exposed to a larger number of demand risks than others. As discussed in section 1.3, this may make projects that mainly correspond to the lower risk column, such as isolated river crossings in a heavily used trunk road network, more suited to direct tolling than others.

Modelling demand becomes more difficult the more characteristics of the project fall in the right hand, higher risk column. For example, Bain 2002 points out some of the factors affecting the use of toll roads by commercial vehicles. Despite their relatively low number, trucks usually contribute a significant part of total toll revenues; Vinci Autoroutes, Europe's largest motorway concession operator, reports 29% of revenues from heavy vehicles in 2011. Commercial operations can have much higher values of time than even business travel by private car but who pays the toll makes a difference. Owner-drivers may have different incentives from company drivers and where low paid drivers are given cash to pay tolls they may take un-tolled detour routes and keep the cash. This can be the dominant pattern in lower income countries. Introducing company account cards can limit the effect and markets dominated by large fleet operators are less risky for toll road concessions. The presence of many convenient, low cost/relatively high quality truck stops for refreshment on alternative un-tolled routes can also influence route choice. And in countries where overloading of vehicles is poorly policed except by toll road operators that weigh vehicles to protect their assets, much commercial traffic may stick to slow detour routes because of the major operating cost advantage conferred by exceeding legal limits. Conversely, toll road operators will be inclined towards pricing truck traffic off their facility where revenues from light duty vehicles are adequate because of the disproportionate wear of the roadway caused by heavy vehicles.

The long list of factors in Table 1 explains the spread of traffic forecasts in Figure 5 but not the bias between tolled and un-tolled road traffic forecasts. Bias was also present in the survey by Flyvbjerg, Holm and Buhl, where passenger forecasts for the 27 rail projects in the survey were much more inaccurate than the road traffic forecasts (Figure 6).

The study found that 9 out of 10 rail passenger forecasts were inflated, with an average overestimation of 100%. There was no difference in the spread of results between road and rail projects, but a systematic bias towards overestimation with rail. The authors attribute this bias to three factors: competition for funds, which is typically more pronounced for rail than road; prevalence of a political or ideological desire to see passengers shift from road to rail; and, more generally, politicians using forecasts to show political intent rather than the most likely outcome.



Source: Flyvbjerg, Holm and Buhl (2005).

Systematic overestimation can be attributed to two main causes: optimism bias and strategic misrepresentation. Kahneman and Tversky (1979) set out the psychological drivers for optimism bias, which they labelled the “planning fallacy”, to include a natural tendency for any analyst with an interest in the success of a project to focus on optimistic rather than pessimistic outcomes and to focus on the details of specific tasks in planning the project rather than the whole process, thereby ignoring uncertainties beyond the most identifiable tasks involved.

Kahneman and Tversky proposed the use of reference class forecasting to counter the myopia underlying optimism bias. With this technique an outside view is taken in order to add a reality check to planning forecasts by examining outcomes (time taken for completion, cost, traffic levels etc.) for similar past projects. Reference forecasting has been employed in the UK for major transport projects since 2004 following guidance issued by the Treasury in 2003. The process is outlined in Flyvbjerg (2005, 2006) with the first practical transport sector application in assessing the projected capital costs of the Edinburgh tram, although the cost over-run in this project has been large despite the use of reference class forecasting. A number of other European countries have adopted similar procedures,

including Denmark, the Netherlands and Switzerland, and the American Planning Association recommends its use.

Reference class forecasting can also counter the "authorization imperative", a form of strategic behaviour likely to occur when forecasters have a stake in getting financial approval for a project and more broadly where success is measured by the approval of projects even when the forecaster has no direct financial stake. The tendency for bias towards more optimistic forecasts is natural and maybe reinforced by a perception by the analyst that the client is overly risk-averse.

Strategic misrepresentation can arise where those responsible for traffic forecasts or cost estimates have a financial stake in authorization of the project. This includes, for example, presenting over-optimistic usage and revenue projections in order to win a PPP contract, with the intention of renegotiating at a later stage when the contracting agency may be inclined to refinance rather than cancel the contract in order to avoid lengthy delays and when the contracting agency is expected to be highly averse to abandoning the project. This is renegotiation with hold-up. RBConsult and Oxera (2012) point out the difficulties in identifying strategic misrepresentation, given that providing deceitful information is generally illegal and some jurisdictions penalise misleading forecasts. But they also report a tendency for the short-term focus of some PPP bid consortium members to result in manipulation of forecasts. Requiring project promoters to consider reference class forecasts is unlikely to eliminate bias in situations where there are incentives for making strategic adjustments to forecasts. The onus is on the contracting agency to use reference class forecasts as a check on the SPV's business case.

Those responsible for PPPs in the government's contracting agency are of course also potentially exposed to authorisation imperative risks. The number of projects delivered is likely to be one of the measures of success of a PPP unit. An external agency such as a general accounting office might be better placed to run reference class checks.

Considerable regulatory effort is required to counter strategic forecasting techniques as these tend to evolve to out-manoeuvre rules established to counter them. Back-loading is one technique frequently employed to enhance results on tests of feasibility and value for money. For example, traffic forecasts can be made to fit with reference class forecasting values in early years but be followed by continuous growth into the later, more uncertain years of a concession to inflate the net present value of the proposal. Similarly, if investments can be staged over the concession period, large expenditures for enhancements can be scheduled late in the concession. The profile of revenue forecasts and expenditures over time can be shaped for optimal results in relation to discount rates etc. Back-loading of risks is facilitated if there are break points in the concession period when the contract can be revised or ended subject to only minor penalties. Demand risk sharing arrangements whereby the government makes up shortfalls in revenues or takes some of the additional profits when actual traffic and revenue diverges from an agreed band of projections create more subtle opportunities for back-loading risk. Often the more sophisticated the rules the more opportunities there are for gaming them. Shaping projections to suit the rules is always to be expected. One consequence is that governments negotiating PPP contracts need significant expertise and resources for making decisions on the award of contracts. And because of the problem of success being measured by project approval rates, contracting out such expertise is of itself risky.

### 3.3. Over-optimistic Demand Forecasts and Risk Transfer Case Study: The Channel Tunnel Rail Link in the UK

The contract to build the Channel Tunnel Rail Link to London and take over running of Eurostar international train services was awarded to London & Continental Railways Limited (LCR) in 1996 with the government providing grants totalling £1.8 billion for the construction of the rail infrastructure and its use by domestic train services. Construction was to start in 1998 once the company had raised private finance from a stock market flotation and the issue of debt. Funding prior to flotation consisted of £60 million in equity and £430 million short term bank loans. Opening of the line was planned for 2003.

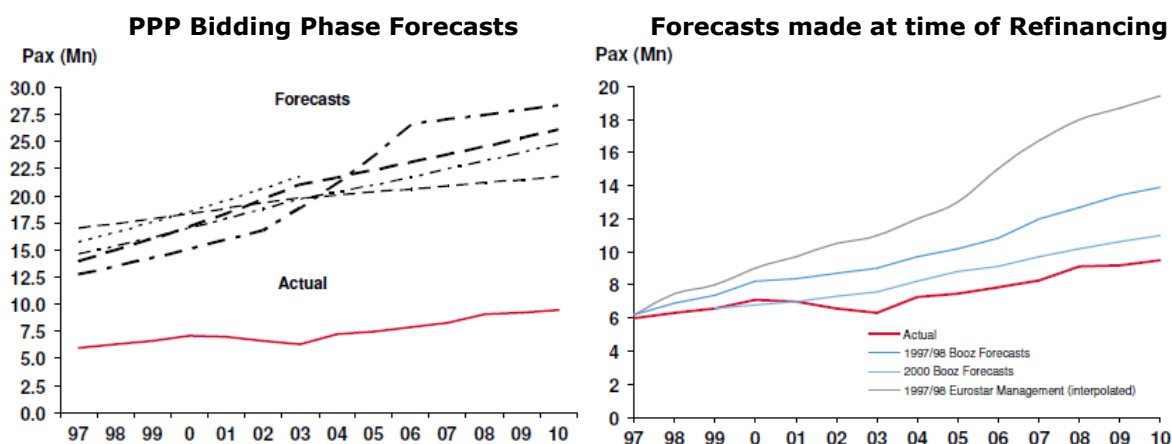
The company failed to raise the funds needed as it became clear that the forecasts for Eurostar traffic and revenues were over optimistic and Eurostar was losing money heavily. In bidding for the project, LCR forecast that Eurostar would attract 9.5 million passengers in 1996-97, the second full year of operation of the service, running on the existing track. The actual number of passengers that year was 5.1 million, passing 9 million only in 2011. LCR stuck to its forecast even after its French Eurostar partner, SNCF, had revised its own forecasts to 6 million for 1007 (Kain, 2002).

In January 1998, the company asked for an additional £1.2 billion in grants. The government refused but did not terminate the contract. Termination would have made the Government liable for costs of up to £0.8 billion under debt guarantees issued with the contract. The transaction costs of finding another partner were also prohibitive; around £200 million was spent on establishing the initial PPP. Instead of terminating the agreement, the Government therefore agreed to a restructuring, with £3.75 billion in bonds to be backed by government guarantee, exposing the taxpayer to further substantial risk. It also wrote off £109 million in cancelled leases for trains and took a small shareholding in the company with extensive rights to undertake further restructuring. The bonds were issued in 1999 and 2003 and subsequently classified as government borrowing by the National Office of Statistics (Butcher 2011).

The first stage of the line opened in 2003 and the whole project completed in 2007 at a total cost of £5.8 billion (£6.2 billion including additions). The project was completed within the extended time and budget envelope made available at refinancing but 11 months behind target completion date and 18% over target cost (NAO 2012). There is of course no counterfactual publicly procured project to make a direct comparison with but British Rail's project for the high speed line before privatization in 1994 foresaw completion in the last quarter of 1999, seven years earlier.

Under the bonds issued by the Department of Transport, the government guaranteed debt repayments from 2010 onwards in case of a shortfall in revenues from Eurostar services. The Department of Transport did not expect the guarantees to be called on but traffic remained well below the forecasts made for it by Booz&Co around the time of refinancing (right hand graph in figure 7). By 2009 it was clear that the guarantees would be called on and ownership of the project was transferred to the government together with debt totalling £5.169 billion. In 2010 the government awarded a concession to operate the line for 30 years to Borealis Infrastructure and Ontario Teachers' Pension Plan for £2.1 billion, with the line to be maintained to standards set by the Office of Rail Regulation. The National Audit Office estimates that net taxpayer support, largely as a result of debt service obligations will, total £10.2 billion through 2070 in 2010 prices (NAO 2012).

Figure 7. CTRL Passenger Forecasts and Actual Passenger Numbers Carried



Source: Booz 2012.

The Public Accounts Committee in Parliament reviewed the causes of financial difficulty of the PPP (HoC, 2002). Its report noted that the forecasts had been accompanied by a downside scenario assuming cost over-runs and traffic shortfalls but not of the scale that materialized. There were external factors; a fire that closed the Channel tunnel for several months and the emergence of strong competition from low cost air carriers. But subsequent development of demand reveals these factors were of little relevance. Both the Committee and later National Audit Office report attributed the problems to over-optimistic forecasting. The Committee criticized the fact that neither the company nor the government commissioned independent forecasts until 1998.

The Committee concluded as follows. "The level of equity capital was insufficient to reflect the high level of commercial risk in the project, which depended on inherently risky forecasts of passenger numbers. If a project involves a high degree of commercial risk, then it needs to be financed with a commensurately high level of risk capital relative to bank debt" (paragraph 25).

It also concluded that "the government needed the co-operation of London & Continental's shareholders if the deal was to be renegotiated without further delay to the construction of the Link. As a consequence, the Department was not in a strong position to insist that the shareholders should bear full responsibility for the near collapse of the project. Under the PFI, the private sector is paid for taking risk. Responsibility should therefore remain with the private sector should these risks actually occur. Departments should ensure that equity risk in PFI deals is real and that over-optimism in bidding for contracts will lose money for the shareholders if things go wrong" (paragraph 27).

An earlier parliamentary Committee<sup>4</sup> concluded that it would be "regrettable and anomalous if the project were to receive uniquely favourable consideration" through government underwriting of bonds. It therefore recommended much wider use of such guarantees to help finance infrastructure projects (Kain, 2002). This is anathema to the transfer of commercial risk to the commercial partner. In the case of the CTRL the revenue risk was not amenable to standard commercial risk assessment practice. There were no relevant existing traffic flows to use as a reference for assessing risk. The project was to be remunerated from the increase in traffic consequent on raising train operating speeds. But the forecasts were to be made even before services at conventional speeds had started. This placed forecasts clearly in the realm of uncertainty rather than quantifiable risk. Other

projects are much better suited to revenue based PPPs. Estuary crossings such as the Queen Elizabeth II and Severn bridges in the UK for example (see section 3.4) where an existing crossing provides data on traffic trends and location in a busy existing trunk network provides latent demand for the service. The 2002 committee's recommendation suits this kind of project. For the CTRL the conclusion might instead be that it was simply unsuitable for concession as a PPP.

#### 4. MANAGING DIFFERENT CLASSES OF RISK

Risk allocation in PPPs is the subject of a large literature but debate over the merits of PPPs is often confused by a compounding of different classes of risk. Irwin (2007) provides some of the necessary detail to operationalize the standard principle of assigning risks to the party best able to manage them. Irwin's principle is as follows.

Each risk should be allocated, along with rights to make related decisions, so as to maximize total project value, taking account of each party's ability to:

Influence the corresponding risk factor;

Influence the sensitivity of total project value to the corresponding risk factor—for example, by anticipating or responding to the risk factor;

Absorb the risk.

As Irwin explains, this reflects the three ways in which a risk can be managed. First, there are times when one party can influence the risk factor. For example, a construction company can change construction costs by its choice of techniques. This risk should therefore be allocated to the construction company. Such an allocation does not eliminate the risk but compared with other allocations it will tend to lower the cost of construction risk.

Second, there are times when one party can influence the sensitivity of the value of the project to the risk factor. For example, no one can influence whether a severe storm will occur but the design of a project may be able to reduce the damage caused by storms. Third, there are times when no one can influence, anticipate, or respond to a risk factor in a way that changes the project's value. At such times, the risk should be allocated to the party that can absorb the risk at the lowest cost. The firm may be able to absorb a risk because it can buy derivatives or insurance to protect it from the risk (although of course the government might be able to do this at lower cost).

Applying the principle of risk allocation can be hard and Irwin concludes that trying to give definitive general advice on whether governments should bear particular risks is futile. However governments should be inclined to bear project specific risks that they control or strongly influence, such as risks related to standards for construction that they set. They should also probably be inclined to hold risks where there is no clear benefit to the risk being transferred to the SPV from where it is likely to be passed down to a construction or operating provider.



Governments sometimes strongly influence other risk factors, such as the demand for a road when that demand depends heavily on the construction of competing and complementary roads in a government-planned network. In such a case, it may make sense for the government to bear demand risk by giving a revenue guarantee or by making availability payments independent of demand.

Irwin argues that governments should be disinclined to bear economy-wide risks. Although governments can often influence such risks, they should not shape economy-wide policy to suit the interests of a particular project. Moreover, although the firm and its creditors cannot influence economy-wide risk factors, they can often influence the sensitivity of the project's value to the risk factor. Their choice of the extent of borrowing in foreign currency, for example, influences how sensitive the value of the project is to the exchange rate. It was argued by many roundtable participants that road operators are comfortable with handling demand risk when project characteristics fall in the lower risk category in Table 1, for example for extensions to existing facilities or concessions. Most importantly, Irwin's principle implies that the risks a government should bear depend on the way it allocates rights to make decisions related to the ability to manage or respond to that risk.

Table 2 summarises risk categories for typical transport sector PPPs, noting common ways in which governments intervene, sometimes inadvertently, to limit the allocation of risk through the planning process and by issuing detailed design guidance. Where decisions are constrained this way risk is effectively retained by government and the potential for cost saving in relation to conventional public procurement is curtailed. The trade-offs to be made in allocating risks in design and construction become clear once they are separately identified.

**Table 2. Constraints on Risk Allocation to Private Partners and Mechanisms for Limiting Risk Exposure**

<b>Risk category</b>	<b>Constraints on allocating risk to private partner</b>	<b>Mechanisms for retaining or sharing risk</b>	<b>Private mitigation instruments</b>
<b>Route/ planning</b>	Planning authorisation	Phasing of contract award in relation to planning authorisation	-
<b>Design</b>	Design guidance	-	-
<b>Construction</b>	Design guidance	-	Insurance
<b>Debt finance</b>	-	Loans guarantees	Hedging, other credit enhancement guarantees
<b>Demand/ traffic/ revenue</b>	-	Availability payments; Revenue caps and collars; Exclusive concessions.	-

### ***Planning, Design and Construction Risks***

Planning risk is widely accepted to rest with government but can nevertheless be partly re-allocated to the private partner by phasing contract awards in step with planning decisions. Design and construction risks are split between government and private partners depending on the specification of the project under guidance and design manuals that can be very detailed. Design risks are often bourn entirely by the government as a result of specifications in the contract even though the biggest potential efficiencies from PPPs are achieved when the risk and freedom to innovate in design is transferred to the project developer. Construction risk is often transferred in surprisingly large measure to government by detailed specification of the techniques and materials to be employed.

**Coordination Risk**

As discussed in section 1, coordination risks are transferred to the SPV under PPPs. This key transfer is not always successful. The UK National Accounting Office attributed the 2007 bankruptcy of Metronet, holder of two of the three London Underground PPP contracts, to failure in its corporate structure and governance under which its five shareholders, each a supplier to the SPV, were expected to make unanimous decisions (NAO 2009).

**Demand Risk**

How best to allocate demand risk (traffic / revenue risk) is least evident. Demand risk for a transport infrastructure project depends on a number of factors:

- development of feeder routes and connections to the rest of the network;
- competition with alternative routes;
- inter-modal competition;
- fuel prices and taxation;
- development of housing, commercial and industrial property in the vicinity of the infrastructure;
- overall economic activity, with growth increasingly uncertain the further into the future it is projected.

Government can influence these factors to some degree, for example through planning decisions and authorisations for projects on nearby parts of the network. It can offer exclusive concessions and limits to access to infrastructure for competitors, as for example with passenger rail franchises in Great Britain. Feeder routes for a PPP road can be built with public finance. Adjacent river crossings may be bundled into a single PPP to contain competition. Toll facility operators lobby hard against toll-free projects in their vicinity that would compete with them, for example in the case of the 83 year old Ambassador Bridge between Detroit and Windsor where future revenues are threatened by a proposed toll-free crossing to be built by the Canadian government. Where there are such network-related risks Governments may choose to bear demand risk through availability payments in place of direct tolls.

As noted, economy-wide risks should not be taken over by the government even if it is better placed to respond to some of these risks because it should not make responses to protect returns on an investment that distort the wider economy, for example, lowering fuel taxes to counter a decline in road traffic during an economic downturn. Project-specific responses are more appropriate. This is another reason governments employ availability payments in place of tolls. An alternative is to employ minimum revenue guarantees, and revenue-sharing agreements for later periods in tolled concessions.

The difficulty of forecasting traffic far into the future makes it hard for either party to determine the value of projects. Rail franchises in Great Britain have historically used a cap and collar approach to share demand risk.<sup>5</sup> If revenues fall short of the central forecast band, government makes up part of the shortfall. When revenues exceed forecasts the surplus is shared. Judging the appropriate level for the collar has also proved difficult, however, as 7 of the 10 franchises employing this mechanism have made recourse to supplementary compensation from the first year in which it was available under the terms of the contract (Ford 2012).



Engel, Fisher and Galetovic (2011, 2001) argue for greater use of variable concession length as the most appropriate way to manage demand risk. In its purest form concessions are awarded on the basis of the lowest bid for the net present value of revenues under tolls<sup>6</sup> fixed by the government. The concession ends at the point when actual revenues have accrued to the level of the bid. A boom in traffic will shorten the concession; depressed traffic levels will lengthen it. Demand risk is retained by the government, with future income from re-concessioning foregone to the extent the concession lengthens. Chile was the first country to use net present value of revenue as the sole criteria for awarding a PPP concession with the Santiago to Valparaíso highway in 1988. The government also chose this approach because it lends itself to calculating the residual value of the concession without controversy in case the government seeks to end the concession prematurely; in the case of this project re-concessioning early to expand the highway to cope with rapidly growing traffic was seen as a distinct possibility.

The Queen Elizabeth II bridge estuary crossing downstream of London (Dartford Crossing) is a leading example of employing a simple formula to manage uncertainty in traffic forecasts this way. The project was financed 100% by debt, with no equity contribution. The contract specified that the bridge would revert to public ownership either after 20 years or when toll revenues had covered principal and interest, whichever happened first. The concession was agreed in 1987, the bridge opened in 1991 and the concession ended in 2002. The project was relatively low risk in terms of the factors summarised in table 1, an isolated link in a trunk road network and effectively an expansion of an existing facility as the concession packaged the bridge with two existing tunnels that had reached capacity. Nevertheless traffic forecasts were uncertain and making the concession variable should have reduced financing costs. The Second Severn Bridge, also in the UK, employed a very similar variable concession length to manage demand risk, coupled with taking over the concession for the existing tolled bridge on the crossing. For both the Severn and Dartford Crossings the new links were not financially viable on their own and existing capacity was therefore included in the deal. In the case of Dartford one existing crossing with no related debt was given to the concessionaire.

India's 2005 Model Concession Agreement for Highways also provides for risk mitigation through concession period extension when traffic growth is lower than expected and shortening of the concession period when growth exceeds the expected level (Haldea 2012). The Agreement limits extension to 20% of the concession period and uses a formula for establishing the extension according to the percentage shortfall in traffic after 10 years.

Variable term concessions have a number of advantages. First, the incentive to make over-optimistic traffic forecasts in order to win the concession is much reduced. Second, the mechanism replaces costly contract renegotiation when traffic is lower than expected avoids direct calls on public finance when traffic falls short of forecasts. The contract is either lengthened by a formula based on actual traffic records or extended up to the point when the firm has obtained the total revenue stipulated in its bid.

A variant of variable term concessions might include lowering tolls in situations of low demand and raising them if the road experiences congestion problems, promoting efficient pricing of the facility (Nombela and de Rus, 2004). Variable concession length has also been successfully employed in Chile to manage demand risk although Engel, Fisher and Galetovic also cite less successful cases of employing variable concessions for toll roads both in Chile and in Portugal, using more complicated formulas. As with other risk sharing arrangements, the more complicated the arrangement the more scope there is for gaming the rules and this may have contributed to the difficulties. More generally, equity investors are likely to be put

off by an arrangement that prevents the realisation of additional returns through cost savings in operation.

The purpose of PPPs is to transfer at least some design and construction risk and all of the coordination risks to the private partner. The extent to which it is appropriate to transfer demand risk is less clear but for all of these risks the desire to attract private finance in the face of competition for funds from other kinds of investment has often led governments to retain risk through project specification requirements and the use of availability payments in place of direct user tolls. The largest benefits from employing PPP contracts arise when a maximum of risk is transferred (as distinct from simply allocated) to the private party. When risk transfer is substantially curtailed, much of the rationale for PPP's rests on advancing projects in the face of short term limits on public finance rather than efficiency.

## 5. POLICY OBJECTIVES OF PPP PROGRAMS

Bringing forward investment when a political decision has been made that finance is not otherwise available is perhaps the primary attraction of PPPs but the rationale usually advanced for employing PPPs in place of public financing of transport infrastructure is three fold: avoiding the short-termism typical of public finance; cost-efficiency and innovation; responding to public finance constraints. A number of other objectives and motivations may also underlie the purpose of introducing PPPs in the transport sector. Each of these rationales is briefly discussed or recalled in this section.

### 5.1. Avoiding short-termism

Traditional public procurement is subject to political cycles resulting in stop-go investment decisions which are always problematic but particularly so with long-lived assets. Stop-go problems affect the annual budget cycle as well as longer political cycles, with budgets for investment agreed at the beginning of the year frequently cut back before year end. This problem afflicts maintenance budgets particularly as there is scope to defer maintenance from one period to the next at relatively little additional cost. However, repeated deferral can lead to greatly increased overall maintenance and renewal costs in the long run that are invisible to many budget decision-makers (Nilsson 2012). PPPs protect against this cyclicity, myopia and uncertainty through a long-term contractual engagement. However, because the cost of PPPs must be met, their costs add pressure to the remaining transport budget, potentially exacerbating the short-termism problem in relation to non-PPP projects.

### 5.2. Efficiency, cost savings and innovation

As discussed in section 1.2, PPPs can save construction costs and enable the design of projects to deliver the services required at lowest cost if contracts avoid over-specifying projects. When project guidance is sufficiently flexible PPPs can stimulate innovation in both project design and execution. Projects can sometimes be downsized compared to what government initially plans without sacrificing capacity or service quality, resulting sometimes in cost-savings running to billions of dollars (Ugarte, Gutierrez and Phillips 2012). These are the grounds most commonly advanced for financing transport projects under PPP

contracts. A majority of PPPs projects are, however, specified in ways that severely limit this scope for achieving efficiencies.

A number of roundtable participants noted that financial indicators for PPP proposals tend to get distorted to fit tests of value for money, undermining the value of such assessments. This problem might be alleviated by explicit acknowledgement of some of the other goals discussed in this section. Guidance for assessing value for money usually rules out broader considerations, in order to ensure consistency. UK Treasury Guidance (HMT 2006), for example, requires the decision to undertake a PFI investment to be made on value for money grounds alone, once affordability (in relation to the Transport Department's current budget plans) is established. Accounting treatment is not to be part of assessment (paragraph 1.17). The restriction promotes clarity in this stage of decision making.

The value for money test might be complemented, however, by an appraisal summary table analogous to that used in the UK<sup>7</sup> and elsewhere for informing decision-makers on the results of economic and environmental assessment of transport investments. The quantitative results of financial, economic and environmental appraisals are presented side by side with notes on economic and environmental impacts that are difficult to quantify and the relevance of the project to social equity and relevant policies pursued by the government. A PPP appraisal summary table would include the results of tests of affordability and value for money, economic return on investment and a statement of how the project relates to fiscal sustainability, accounting objectives and infrastructure investment and maintenance policy.

### **5.3. Public finance considerations**

PPPs spread capital expenditure over time and delay payments on borrowing from the public finance point of view, making it possible to initiate projects when public finance is insufficient, because of government or externally imposed constraints, to cover capital expenditure up front. PPP projects financed through availability payments shift public expenditure to a slightly later date. The major part of public expenditure begins when the facility enters service rather than at the start of construction. In comparison to public financing the public liability is deferred, and increased, rather than avoided. Tolloed PPPs substitute user funding for public finance but at the cost of foregoing future toll revenues, which then accrue to the concessionaire instead of the government. Many publicly financed roads are tolled by government, as is the case for example with the New Jersey Turnpike.

Engel, Fisher and Galetovic (2011) demonstrate that either type of PPP has a fiscal impact that resembles public finance more closely than privatisation. They point out that although PPPs are frequently justified on the grounds that they release public funds or reduce distortionary taxation, any resources saved by a government that does not finance the upfront investment are offset by giving up future revenue flows to the concessionaire. That is, the government could have collected toll revenues, and is of course obliged to make payments under availability contracts.

The long run utility of PPP projects rests chiefly on cost effectiveness. Any improvement in efficiency compared to public procurement is set against any distortion in the order in which projects are undertaken in a network planned by the state; more broadly their opportunity cost.

To the extent that liabilities under PPPs do not appear in public accounts, PPPs enable investments to be made that cannot be publicly financed because of public spending limits. Unless there are new sources of revenue (user tolls) and cost savings, accelerating

investment in this way has little economic merit because private finance is typically more expensive than public borrowing<sup>8</sup>. In the absence of new sources of revenue, investment to off-set short term cyclical declines in economic activity can be financed at lower long run cost with public borrowing.

Limits on public expenditure, such as those imposed by the European Union on its members under the Maastricht Treaty, do not make a distinction between investments bearing economic returns and other types of expenditure. This diverges from general accounting practice and could result in chronic underinvestment in productive assets. PPPs can be used for off-balance sheet funding of investment, getting round spending limits, and many commentators see this as the primary motivation for recourse to PPPs.

Public spending limits are usually imposed to address chronic budget imbalances, which future PPP liabilities are likely to exacerbate. Rather than allowing one special class of investment to escape the rules, public accounts should distinguish between capital and current expenditure.

PPPs have made a major contribution to acceleration of the improvement of infrastructure in some rapidly developing economies. Chile, for example, developed a high quality highway system through concessions established on the basis of a 1991 law establishing conditions for infrastructure PPPs. By 2007 \$10 billion had been invested in the Pan-American Highway, interurban connections and motorways in Santiago with 26 concessions. Above all the legislation dispelled fears of expropriation (Engel, Fisher and Galetovic, 2008). PPPs can play a useful role in strengthening governance but are not immune to changes in policy or changes in government as experience in Argentina in the same period. The twelve highway contracts awarded in 1990 were called in for renegotiation by the Government after only 5 months. As Engel et al. document, another round of renegotiations started in 1995, dragging on until 2000. The quality of the roads improved but defects in the design of concessions and abrupt changes in policy resulted in relatively few kilometres of highway for the money spent and high toll levels.

The acceleration of investment facilitated by PPPs can be useful in a rapidly developing economy where infrastructure has been neglected and where transport bottlenecks are identified as an obstacle to growth. But traffic is not easy to forecast where market conditions are changing rapidly and a slowdown in growth can leave investors in tolled facilities unable to service debt. This happened with the M1 Budapest-Vienna motorway in Hungary, let as a concession in 1993, opened in 1996 and nationalised in 1999. Traffic was below forecast not only because of weaker economic growth but also the level of tolls, which discouraged much of the potential domestic traffic from using the road. The level of tolls was also contested in the courts and ultimately ruled to be unconstitutional.

PPPs funded by shadow tolls and availability payments can result in unsustainable financial liabilities for government when economic growth is weaker than forecast. The weakness of public finance in Portugal in the wake of the 2008 financial crisis forced renegotiation of seven motorway PPPs in 2012, cutting payments by a total of \$2 billion over the 30 year term of the concessions. RBConsult and Oxera (2012) report that Portugal's SCUT (Sem Custos para os Utilizadores – no cost to the users) shadow toll highway program became financially unsustainable even before the global financial crisis. It was designed to promote regional development, and as the number of concessions grew government SCUT payments rose to 0.4% of GDP by 2008. A number of local and regional governments in Europe and North America have suffered similar problems from over ambitious PPP programs. Aversion to accumulating future public finance liabilities has resulted in a strong preference for toll-based PPPs in India (Haldea 2012). And the UK Highway Agency's shadow

toll PPP program has now reached maximum capacity, with PPP payments consuming 40% of its annual budget but PPPs only accounting for 17% of its motorway network (RBConsult and Oxera 2012).

#### **5.4. Renegotiation without holdup**

Engel, Fischer and Galetovic (2006, 2008) suggest that spending authorities use PPPs to get around oversight by the legislature that constrains public spending. They propose that this accounts for the pervasiveness of contract renegotiations that benefit PPP concessionaires in cases where terms are renegotiated after a project is built or before it is completed but at the initiation of the spending authority. In their model, an administration that spends more on public works is more likely to be re-elected. This creates an incentive to bring infrastructure investment forward by raising debt. Raising debt usually requires budget approval that in many countries involves negotiation with the opposition.

Knowing that higher spending increases the chance of losing an election, the opposition will try to limit borrowing as it will increase spending in the future. Renegotiations, on the other hand, are not subject to opposition scrutiny as they are not usually included in budgetary approval procedures.

The authors see renegotiation as a vehicle through which the administration obtains higher spending and the concession holder obtains better conditions than those in the original contract, but at the cost of adversely affecting social welfare and future administrations. They view the widespread renegotiation of PPP contracts in Chile as consistent with their model, as in other respects Chile's PPP contracts are a model of efficiency, avoiding most of the pitfalls associated with PPPs in Latin America (Guasch 2004). The authors acknowledge that long term contracts may need adjustment in response to unforeseen events because of the natural difficulties in writing complete contracts, but stress that renegotiations in Chile came early in concession periods in response to events foreseeable when contracts were made. Twelve out of sixteen highway projects awarded in 1998 had been renegotiated by May 2002. Renegotiation took the form of "complementary contracts" to provide additional infrastructure, representing a 15% increase in cost overall. Further renegotiations followed at the same rate, totalling \$1.27 billion by 2005 on top of initial contracts worth \$9 billion. Some but by no means all of this additional work can be attributed to oversights in the initial project designs. It should be noted that projects are also frequently renegotiated under public procurement.

#### **5.5. User funding**

It was suggested at the roundtable that PPPs are a useful device for advancing the introduction of user charges as a source of funding where public and political opinion is otherwise hostile. Though charging for infrastructure use on the basis of cost recovery may not always be optimal, it is preferable to long term degradation of infrastructure as a result of political limits on public funding and offers an alternative to earmarked funding of maintenance and investment from fuel and vehicle taxes. Tolling is also useful for demand-management on congested infrastructure. It is not evident, however, that the main function of PPPs should be to make tolling possible as there are examples of tolls on publicly owned facilities. Nevertheless, this was seen as the primary rationale for recourse to PPPs for roads in the USA as federal fuel tax revenues earmarked for road investment are in decline and there are deep seated political obstacles to raising taxes for investment.

## **6. REGULATED ASSET BASE MODELS FOR PRIVATE INVESTMENT IN INFRASTRUCTURE**

Regulated utility models are employed in many countries for private investment in energy, water and telecoms infrastructure with similar economic characteristics to transport infrastructure (Oxera, 2012). Many airports are financed this way. The prevalent regulated asset base (RAB) model establishes a value for the assets managed by the private company and employs an economic regulator<sup>9</sup> to determine the level of investment expected for maintenance and expansion together with the rate of return on investment the company is allowed to make (the model is also used for non-profit and state-owned companies). Charges for use of the asset are also regulated, sometimes with freedom to set prices for some services. Rates of investment, rates of return and prices are reviewed periodically, often on a five year cycle. The model has tended to be applied where capital expenditure is incremental, albeit in many cases large, relative to existing assets.

Setting charges for the use of infrastructure on the basis of the value of assets carries a risk of over-investment and linking profits to capital assets, e.g. through rate of return regulation, creates a strong incentive to expand capital investment regardless of efficiency (Averch and Johnson, 1962). Price and revenue caps are usually employed to counter this tendency, most commonly employing a RPI-X formula to ensure prices rise at a rate below general inflation. Even under price cap regulation, infrastructure pricing is often controversial.

The regulatory model has a number of strengths. Fundamentally it provides flexibility to adjust contracts to changes in external economic factors over the long term while still providing long-term commitment and protection from relatively short-term political considerations. All very long term contracts are inevitably not fully complete and regulated utility models can be seen as a means to address this problem. Periodic review enables transparent adjustment to external conditions within the constraints of regulatory duties. This may be more efficient than renegotiation of a PPP contract.

However this model does require a fundamental political decision to remove the sector from the general public budget and to ring fence suitable revenue streams to remunerate the capital. Inevitably this reduces the freedom of manoeuvre of the Ministry of Finance and can lead to tensions between the Regulator and the Government regarding the required rate of investment. There are also challenges concerning the initial asset valuation and, in the particular context of roads, demarcation of the national and local road networks.

An independent regulatory office is more likely to be able to maintain a stable and adequate team of experts for the negotiation of regulatory conditions than a Ministerial department handling PPPs, where rapidly evolving priorities are likely to result in relatively frequent reallocation of resources. In this way, establishment of an independent regulator can be seen as a logical extension of the use of long-term contracting frameworks such as PPPs for providing infrastructure projects with a degree of insulation from relatively short-term political considerations. Regulatory offices are thus often better placed to address risk



management issues including strategic behaviour. Independent regulation usually enhances transparency in decision-making as the regulator publishes the analysis supporting decisions, and the results of periodic reviews into regulatory conditions are usually subject to a formal consultation process.

The principles by which decisions are made are stipulated in the legislative instrument establishing the regulator, which enhances predictability and lowers risk whilst preserving a degree of flexibility to adapt to changed external conditions.

Independent regulation is likely to be prohibitively expensive for application to most individual projects, but bundling potential PPP projects with similar characteristics into a regulated network generates economies of scale once critical mass is passed. Such regulation is then likely to be less costly and/or deliver better outcomes than making contractual agreements case by case for PPP projects.

In many cases, the regulator's duties include ensuring that the licence-holder has the ability to finance their functions, subject to efficient behaviour. These duties combined with periodic review eliminate much of the strategic behaviour and the risk of ad hoc renegotiation of contracts that prove financially unsustainable. This has the potential to achieve large cost savings in the long run, not least through a lower cost of capital.

Problems with the bidding process in particular, and the introduction of private capital more generally, are not eliminated under RAB models but modified and concentrated in the setting of the initial value of the regulated asset base. However, the regulated asset model is typically employed for existing assets where the demand risks are relatively well understood and in these cases the scope for strategic behaviour is likely to be less.

Regulated utilities are a familiar category of investment for capital markets with a clear role in investment portfolios. The British Airports Authority, for example, was floated on the London Stock Exchange under a RAB model in 1987. In 2006 Ferrovial purchased the company and it delisted from the Stock Exchange. 2012 saw a name change to Heathrow Limited and shareholdings acquired by three sovereign wealth funds, Qatar Holding, Singapore Investment Corporation and China's CIC International. Regulated infrastructure companies are able to provide returns to investors from year one, without the delay characteristic of PPP projects during the construction phase. PPPs on the other hand attract only more specialised investors that have the expertise to analyse the risks involved at the level of individual projects. For both these reasons RAB models for transport infrastructure have the potential to attract private finance at lower cost and from a broader pool than PPPs.

A RAB model for private investment in rail infrastructure has been adopted in Great Britain. This was the result of the vertical separation and privatisation of the national railway rather than a bundling of individual investment projects. Establishing the initial asset value is always controversial with this approach to regulation and UK rail infrastructure was no exception. The model generally displays the benefits described above in terms of economies of scale, expertise in risk management and transparency.

Nevertheless, the private infrastructure owner, Railtrack, collapsed as a result of failing to manage risks associated with asset quality effectively. The Regulator had identified this failure and was preparing an order for remedial action when track failure caused a derailment, ultimately leading to bankruptcy of the company. Track assets were transferred to Network Rail, a not for dividend company in which shareholder functions are carried out by 'members' drawn from Network Rail's customers and other industry players, that continues to be regulated by the Office of Rail Regulation (ORR). Train services are instead

subject to franchise contracts (concessions) negotiated directly with the Department for Transport and awarded by competitive tender. The franchise agreements are similar to PPP contracts, where a high proportion of revenue risk is transferred to the franchisee. One stretch of UK rail infrastructure, the high speed rail link between London and the Channel Tunnel, was built as a PPP (section 3.3).

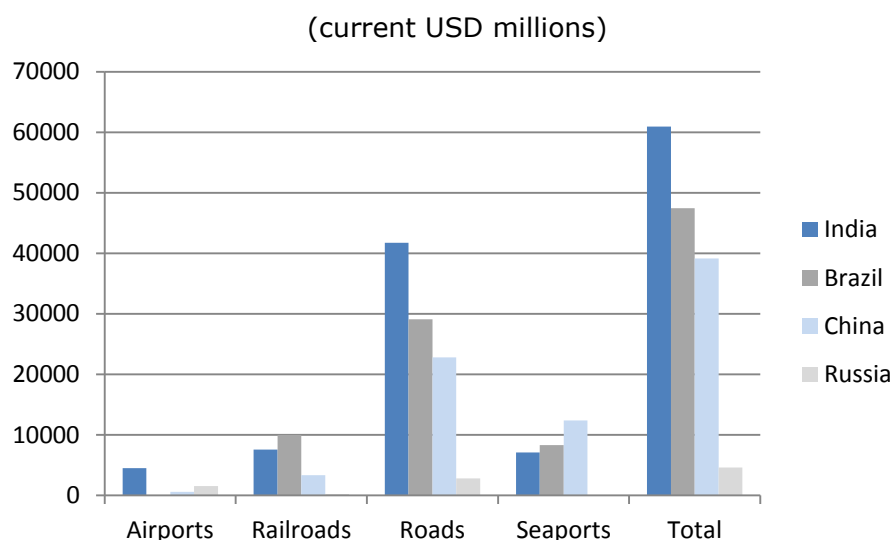
RAB models are able to accommodate a mix of public and private finance and can be adapted to a range of ownership models. Rail infrastructure in Great Britain was owned by a public limited company on privatisation but is now owned by a not for dividend company. Most of its financing is raised from capital markets and currently supported by a state guarantee.

Roads could be suited to the RAB model if a sufficiently large part of the network is included in the asset base to achieve the economies of scale required to establish a regulator. The UK Government is considering the possibility of managing the English strategic highway network this way. Under such a model it would be possible to introduce private finance incrementally as the model becomes more established and investors get comfortable with the risk profile. User-charging would be compatible with but not a requirement for applying a RAB model to a road network.

## **7. GOVERNANCE OF PUBLIC PRIVATE PARTNERSHIPS**

PPPs in OECD countries currently represent about 0.8 trillion USD (OECD, 2012), and there are projects in the pipeline of about equal value. The World Bank's PPI database reports a similar volume of PPP investment<sup>10</sup> in middle and low income countries, 0.85 trillion USD invested between 1990 and 2011 (<http://ppi.worldbank.org>). The distribution of transport sector PPPs in the largest of these countries is shown in figure 8 and a global breakdown of infrastructure PPPs by value shown in figure 3 above. Clearly, governments and the private sector see PPPs as an effective way of delivering public service infrastructure. However, experience shows that it can be difficult to get value for money out of PPPs if government agencies are not equipped to manage them effectively. Moreover, PPPs can obscure real spending commitments by taking financing off-budget, creating risks for fiscal sustainability.



Figure 8. **Transport Sector PPPs in Major Non-OECD Markets, 1990-2011**

Source: World Bank and PPIAF, PPI Project Database. (<http://ppi.worldbank.org>) Date: 01/26/2013.

The recent OECD Recommendation on Principles for Public Governance of Public-Private Partnerships (OECD, 2012) is designed to help governments make best use of PPPs by outlining best practice based on Member country experience with what works (and what does not). The Principles (Box 1) focus on how to align the different parts of the public sector to ensure success, covering institutional design, regulation, competition, budgetary transparency, fiscal policy and integrity at all levels of government. The Principles also stress that just as much attention should be devoted to the PPP after the deal is done – i.e. during the operational stage, which can often be 20-30 years – as during initial negotiation of the contract.

Funke, Irwin and Rial (2012) examine the fiscal liabilities associated with PPPs and set out rules and procedures for minimising fiscal risks. As they discuss, part of the appeal of PPPs is that they allow new investments to be made with any immediate increase in reported government spending or debt. Typically, spending on a publicly financed infrastructure project is recorded as invoices are received during construction. Spending on a PPP is, in contrast, recorded only once construction is complete and is spread over the period of the concession. Similarly, if the government borrows to fund investment this is recorded as an increase in debt. But a commitment to make availability payments to a PPP company is not reflected in the figures for national debt. This encourages a government under pressure to reduce its deficit or debt in the short term to use PPPs even if their costs exceed public financing in the long run. This bias towards PPPs can ultimately lead governments to assume financial commitments that prove unaffordable.

**Box 1. OECD Recommendations on Principles for Public Governance of PPPs**

- A. Establish a clear, predictable and legitimate institutional framework supported by competent and well-resourced authorities
1. The political leadership should ensure public awareness of the relative costs, benefits and risks of PPP and conventional procurement. Popular understanding of Public-Private Partnerships requires active consultation and engagement with stakeholders as well as involving end-users in defining the project and subsequently in monitoring service quality.
  2. Key institutional roles and responsibilities should be maintained. This requires that procuring authorities, PPP units, the central budget authority, the supreme audit institution and sector regulators are entrusted with clear mandates and sufficient resources to ensure a prudent procurement process and clear lines of accountability.
  3. Ensure that all significant regulation affecting the operation of PPPs is clear, transparent and enforced. Red tape should be minimised and new and existing regulations should be carefully evaluated.
- B. Ground the selection of PPPs in Value for Money
4. All investment projects should be prioritised at senior political level. As there are many competing investment priorities, it is the responsibility of government to define and pursue strategic goals. The decision to invest should be based on a whole-of-government perspective and be separate from how to procure and finance the project. There should be no institutional, procedural or accounting bias either in favour of or against PPPs.
  5. Carefully investigate which investment method is likely to yield most value for money. Key risk factors and characteristics of specific projects should be evaluated by conducting a procurement option pre-test. A procurement option pre-test should enable the government to decide on whether it is prudent to investigate a PPP option further.
  6. Transfer the risks to those that manage them best. Risk should be defined, identified and measured and carried by the party for whom it costs the least to prevent the risk from realising or for whom realised risk costs the least.
  7. The procuring authorities should be prepared for the operational phase of the PPPs. Securing value for money requires vigilance and effort of the same intensity as that necessary during the pre-operational phase. Particular care should be taken when switching to the operational phase of the PPP, as the actors on the public side are liable to change.
  8. Value for money should be maintained when renegotiating. Only if conditions change due to discretionary public policy actions should the government consider compensating the private sector. Any re-negotiation should be made transparently and subject to the ordinary procedures of PPP approval. Clear, predictable and transparent rules for dispute resolution should be in place.
  9. Government should ensure there is sufficient competition in the market by a competitive tender process and by possibly structuring the PPP programme so that there is an ongoing functional market. Where market operators are few, governments should ensure a level playing field in the tendering process so that non-incumbent operators can enter the market.

- C. Use the budgetary process transparently to minimise fiscal risks and ensure the integrity of the procurement process
10. In line with the government's fiscal policy, the Central Budget Authority should ensure that the project is affordable and the overall investment envelope is sustainable.
  11. The project should be treated transparently in the budget process. The budget documentation should disclose all costs and contingent liabilities. Special care should be taken to ensure that budget transparency of PPP covers the whole public sector.
  12. Government should guard against waste and corruption by ensuring the integrity of the procurement process. The necessary procurement skills and powers should be made available to the relevant authorities.

Source: OECD 2012.

To reduce bias towards PPPs, government can improve the information available on the future fiscal costs and risks of PPPs and can modify accounting practice to change the way PPPs affect reported spending and debt. Governments often measure debt and deficits in more than one way. To limit bias, the "headline" indicators used in setting fiscal rules and targets need to change so that they treat PPPs as creating public assets and public liabilities. Bias can also be countered by changes in budgeting. PPPs can be treated in the same way as publicly financed projects in medium term budgets, requiring the same approvals in budget plans as pure public investments. Commitment budgeting can be used, in which the legislature approves commitments to spending in future years under projects at the same time as approving cash expenditure in the current year. A two-stage budgeting process can also be adopted under which all projects must first be approved in budget planning under the assumption that they will be publicly financed, and a decision on the method of financing is made at a later stage. These approaches to limiting bias are summarised in Table 3, with examples of measures taken nationally.

The simplest approach to limiting the liabilities created by PPPs is to impose specific limits on the size of the PPP program. As well as containing the volume of PPP finance within prudent fiscal limits the changes in procedures outlined avoid PPPs being used essentially as presentational budgetary tools.

Table3. **Examples of measures to counter fiscal accounting bias**

<p><b>ACCOUNTING</b></p> <p>On-balance sheet accounting for PPPs to International Financial Reporting Standards (under IFRS governments recognise PPP assets on their balance sheets rather than PPP companies)</p> <ul style="list-style-type: none"> <li>• United Kingdom (publication of an assessment of PFI liabilities in the Whole of Government Accounts)</li> <li>• Australia</li> </ul>
<p><b>BUDGETING</b></p> <p>Medium term budget approval by legislature treating PPPs as publicly financed projects</p> <ul style="list-style-type: none"> <li>• India</li> <li>• New Zealand</li> </ul> <p>Commitment budgeting – legislative approval of future commitment appropriations</p> <ul style="list-style-type: none"> <li>• France</li> <li>• Germany</li> </ul> <p>Two stage budgeting</p> <ul style="list-style-type: none"> <li>• --</li> </ul>
<p><b>PUBLISHING SUPPLEMENTARY INFORMATION</b></p> <p>Published forecasts of cash flows associated with PPPs</p> <ul style="list-style-type: none"> <li>• Chile</li> <li>• Portugal</li> <li>• United Kingdom</li> </ul> <p>Reports on fiscal risks associated with PPPs</p> <ul style="list-style-type: none"> <li>• Chile</li> <li>• Philippines</li> <li>• Portugal</li> </ul> <p>Public disclosure of PPP contracts</p> <ul style="list-style-type: none"> <li>• Australia</li> <li>• Chile</li> </ul>
<p><b>FISCAL RULES</b></p> <p>Cap on stock of PPP assets</p> <ul style="list-style-type: none"> <li>• El Salvador</li> <li>• Hungary (but only for new commitments and excluding motorways)</li> <li>• Peru</li> </ul> <p>Cap on annual spending on PPPs</p> <ul style="list-style-type: none"> <li>• Brazil</li> </ul> <p>Cap on stock and annual spending</p> <ul style="list-style-type: none"> <li>• United Kingdom (for new PPPs - control total for all commitments arising from off balance sheet PF2 contracts signed)</li> </ul>

Source: Based on Funke, Irwin and Rial (2013).

## 8. CONCLUSIONS AND RECOMMENDATIONS

### 8.1. Conclusions

Papers prepared for the roundtable review some of the most successful examples of transport sector PPPs (Ugarte, Gutierrez and Phillips 2012) and some of the widespread failures (Shaoul, Stafford and Stapleton 2012). The latter paper concludes from overall experience in the UK that procuring transport infrastructure services through PPPs is generally far more expensive than public finance, even if a counterfactual comparison cannot be constructed ex post. It also finds that the funding earmarked for PPP projects is usually insufficient and taxpayer funding to make up the shortfall displaces other services. The evidence considered at the roundtable was far from comprehensive, with perhaps more attention given to the extremes than the average. This reflects the somewhat patchy evidence base for the performance of PPPs in the literature. Nevertheless, some conclusions can be drawn as to how PPPs might be better regulated to reduce overall costs and maximise efficiency.

Two broad views on PPP performance and design emerged in the discussions. The first holds that PPPs will deliver value for money when they are toll-financed, with a large equity holding and transfer of all demand risk to the private partners (with or without freedom to adjust tolls). There should be transfer of construction, coordination and design risk to the private partners with the consequent freedom to alter design and construction techniques. This implies that the projects need to be relatively independent of the rest of the transport network in terms of interconnection and demand.

The second view holds that the need for private finance to supplement public finance in order to achieve more optimal levels of infrastructure investment goes well beyond the volume of projects that suit the first model. PPPs will therefore have extensive recourse to debt finance, with risks for investors reduced through availability payments in place of tolls in order to lower the cost of finance and attract a bigger pool of investors.

The UK accounts for the largest share of transport PPP projects to date, with projects most often employing availability payments with a high ratio of debt to equity. The regulatory framework and assessment guidance for PPPs in the UK is mature and widely recognised as following best practise in rigour and completeness, and in risk assignment but, as Shaoul, Stafford and Stapleton (2012) report, on average PPP finance costs have largely exceeded PPP budgets. This underlines the importance of tests of affordability for PPP programs, not just individual projects.

The choice of financing approach for transport infrastructure investment between public procurement, availability based PPPs, tolled PPPs and regulated utility models is dependent on the objectives underlying public investment in the sector. Making these objectives explicit clarifies debate on the relative merits of the alternative financing approaches.

Bringing forward infrastructure investment is a major attraction of PPPs but their impact on public accounts resembles public finance more closely than privatisation. PPPs should therefore be treated as public finance in public accounts and budget decision-making procedures.

Taking investment off public balance sheets is not on its own a legitimate reason for promoting PPPs even when public spending limits fail to make a distinction between investment and non-productive expenditure.

Countering the stop-go nature of purely public infrastructure provision, and especially maintenance, is an objective that makes some share of PPP finance useful in most environments. The assumption is that by bundling operation and maintenance with project construction, and structuring tolls or availability payments to reflect quality of service, maintenance schedules can be optimised and budgets protected under contract. In practice because construction and operations are conducted by different companies, public sector procurers need to monitor contracts and performance carefully to ensure that such potential benefits are achieved in practice.

Governments also use PPPs to discipline project construction. Bundling construction and operation of the facility into a single contract creates incentives to complete construction on-time where the facility operator is an equity investor. In principle, substituting a single PPP contract for multiple contracts with suppliers transfers project coordination risk from the procuring agency to the PPP company. In practice, if there are problems with a contract the bank and even the procurer may need to step-in.

PPPs can also be used to drive cost cutting innovation in project design and construction. For this, contracts have to be designed to leave the developer free to make changes to alignments, design and construction techniques. This means much of the detailed specification employed in public procurement, and indeed many PPP contracts, that aims to reduce cost by containing construction and design risks, has to be foregone to unlock the potential for innovation. At the same time, not all projects present opportunities for large scale cost savings through innovation.

Many governments seek to substantially increase the volume of private finance for public infrastructure to benefit from these potential efficiency gains. This is the aim, for example, of the UK's New Approach to Public Private Partnerships (HMT 2012). They aim therefore to attract a wider range of investors to transport infrastructure. Regulated utility type arrangements make investment feasible by a broad range of non-specialised investors, including sovereign wealth funds. The regulated utility type model has the advantage of familiarity for stock market investors and provides for a continuous stream of returns without the initial delay during construction inherent in PPPs. Many airports are financed by private investment in this way as is Great Britain's rail infrastructure. The model could be employed for roads if a large enough part of the network or a sufficient number of projects can be bundled together to cover the costs of establishing a regulator. Utility type regulation, in place of a series of separate PPP contracts has the potential advantage of making contracts more flexible to respond to changes in external conditions (e.g. economic growth rates over the long term). A dedicated regulatory agency has the potential to improve transparency and the capacity of government for managing risk. Regulated asset base models can be applied to both tolled and un-tolled facilities.

Investment in listed utilities are not, however, a good match for all types of “patient capital”, such as insurance and pension funds. Returns on shares in listed utilities tend to vary with general trends in stock market performance. Pension funds have to provide for regular payments to pension holders regardless of the market. The infrastructure funds in their portfolios are designed to provide for this constancy and therefore invest in infrastructure bonds backed by government guarantee and in bonds issued through the securitisation of PPPs once construction is complete. Securitisation is facilitated in some jurisdictions by simplified administrative procedures, such as the 1981 Loi Dailly in France. This is the main route to broadening the range of investors in PPPs over the full project cycle.

From the perspective of maximising the volume of private finance for public infrastructure, availability payment-based PPPs have advantages over toll-based PPPs. Availability payments reduce investor risk, lowering the cost of debt finance and attracting a wider range of investors. In the current financial environment the willingness of banks to facilitate project development may depend more on their relationship with the project developer than on whether remuneration is based on availability payments or toll revenues.

Toll-based PPPs substitute user funding for taxpayer funding. Although this presents an opportunity cost for the public budget as toll revenues could accrue to government rather than a concession company, it relieves government expenditure in the short term. The public is generally somewhat less hostile to tolls when they remunerate private finance, probably because opportunity costs are not intuitively evident.

Tolls can also be used to manage demand, through peak pricing, even if examples in practice are rare. PPPs can be used to improve efficiency by facilitating the introduction of variable tolling.

Because of their higher risks, toll based PPPs generally require a higher ratio of equity to debt than availability payment-based PPPs (although low interest government loans can be made available to toll based PPPs, as with US Federal TIFIA loans). Equity investors seek to limit risks through the type of projects they invest in. Some projects are therefore more attractive than others for this type of PPP. These include roads where demand is relatively predictable and alternatives are unlikely to be built, such as estuary crossings in trunk highway networks. Tolling may not be feasible on large parts of the road network in countries with a tradition of generally toll-free highways.

Once construction of a toll project is complete, concessionaires can issue bonds backed by toll revenues. These bonds are often bought by pension funds and insurance funds, broadening access of tolled PPPs to capital markets. “Securitisation” in this way can weaken incentives for efficient coordination of project design and operation. Some jurisdictions therefore limit the proportion of debt finance that can be converted to bonds and a balance has to be struck between preserving incentives for efficiency and maximising the opportunities for patient, productive capital investment from such funds.

## **8.2. Recommendations**

A mix of financing models spreads risks. Austerity programmes that cut public investment, or a policy aversion to raising taxes for investment in infrastructure, will emphasise the place of PPPs. But the long-run costs and liabilities to public finance of PPPs suggest that they should be subject to limits in terms of absolute volume or share of public spending on investment<sup>11</sup>.



A dedicated budget for PPPs, set in relation to the rate at which future liabilities will be accumulated, can provide such a limit. It can also provide certainty in funds being available for investment.

Explicit consideration of alternative financing arrangements should be employed in determining whether to proceed with PPP projects. Governments should test whether, holding quality constant, the PPP is expected to be affordable and cheaper in net present values than publicly financed investment. Most governments examine the second of these two criteria, with tests of value for money. These tests are susceptible to manipulation when employed for pass/fail type assessment but should prove more robust when used to establish project priorities within a ring-fenced PPP budget for transport infrastructure.

It is recommended that governments also require PPP projects to pass tests of affordability and to clear the hurdle rates of return generally applied to publicly financed transport projects. Under affordability tests, the cut-off point for priorities would be determined by the volume of finance available for the pool of projects to be retained under public and private financing, and PPP projects would be subject to limits on the accumulation of liabilities for future availability payments.

The expected cost of PPP projects should take account of cost inflation resulting from the propensity for projects to be renegotiated. This could take the form of using a scenario incorporating an average uplift factor for similar projects from the historical record to test the robustness of project proposals. Monitoring of PPP performance over the full life cycle of concessions ought to be routine for all governments. Insufficient information of relevance for reviewing performance is collected or made publicly available. Assessments to date have had to rely on attempts by researchers to assemble the facts *ex post* (see for example Flyvberg, Holm and Buhl 2003).

Funke, Irwin and Rial (2012) propose a full set of tests and accounting rules to make the selection of PPP projects fiscally sustainable. These include:

- Supplementing public finance accounts with data that counts PPP companies as part of the public sector.
- Publishing forecasts of expected future spending on PPPs and incorporate these projections in fiscal forecasts and treasury debt-sustainability analysis.
- Budgeting for construction of the PPP assets as public spending:
  - subjecting PPPs to standard budgetary approval including authorization by parliament for expenditure commitments over the term of the contracts;
  - or approving PPPs first as publicly financed projects as part of medium-term expenditure plans.
- Changing underlying fiscal accounting rules to treat PPPs as creating government assets and liabilities.

These rules will avoid PPPs being used essentially as presentational budgetary tools and should contain the volume of PPP finance within prudent fiscal limits.

At the individual project level, risks should be assigned to the party best able to manage them, along with rights to make related decisions. Allocation should take into account each party's ability to influence the corresponding risk factor, to influence the sensitivity of total project value to the corresponding risk factor and to absorb the risk. Whilst appropriate allocation of risk does not remove risk it minimises the impact of risk on overall project costs.



Assigning demand risk is not straightforward and risk sharing arrangements are therefore common. In practice these often tend to transfer a disproportionate share of risk to the public budget. Forecasting demand, and thus revenues, is more difficult the longer the duration of the PPP contract. Demand forecasting is also subject to optimism bias wherever success for one or both of the partners is gauged by progressing projects and completing contracts. Reference class forecasts should be used to mitigate optimism bias and inject a dose of objectivity into project evaluation. These forecasts need to be made by an agency that has no interest in the outcome of the project proposal under examination. Opportunities for strategic misrepresentation exist, however, even in the most sophisticated regulatory environments.

Containing strategic behaviour requires considerable resources. Public administrations need to be adequately resourced to carry out the financial analysis involved in evaluating proposals. The legal process of awarding contracts creates a degree of transparency that can be absent under traditional public financing arrangements. Reference class forecasts are an important tool for countering strategic behaviour and should ideally be prepared by an independent agency to avoid planning bias. That is independent of the contracting government department and independent of any PPP unit in the ministry of finance that measures success in terms of the volume of contracts agreed, and independent of any external financial or other advisors that have incentives to encourage the progress of contracts.

Continuity of resources and expertise is essential for addressing strategic behaviour and optimism bias more generally. One of the benefits of establishing a regulator under the regulated asset base model is maintenance of a critical mass of expertise in relation to forecasting and financial modelling and protection of this function from the impact of changing imperatives that regularly affect deployment of resources in Ministerial departments.

Regulatory agencies are also well placed to ensure transparency and accountability by publishing reports on the criteria employed to make decisions and publishing contracts (if necessary after the lapse of a reasonable period to respect critical issues of commercial confidentiality). Arrangements to provide for similar levels of transparency and regulatory capacity need to be made for PPPs.

The potential of PPP contracts to counter stop-go funding for infrastructure is widely appreciated but some commentators emphasize the risks of loss of democratic accountability and control attached to PPPs and to independent utility regulation. PPP contract re-negotiation is particularly difficult to manage, whether it is the result of strategic misrepresentation in bidding for contracts, a strategy to escape financing limits on the part of the commissioning agent, project misspecification or simply a consequence of forecasting uncertainty. A framework for potential re-negotiation needs to be included in PPP contracts, including arrangements for independent arbitration in case of dispute. To date, no PPP regime has succeeded in closing all the doors to abuse of renegotiation.

Despite the regulatory challenges and the difficulty of managing renegotiation, the benefits of maintaining a share of PPPs in the overall infrastructure financing mix outweigh the costs. Rather than comparing the absolute merits of PPPs versus pure public finance it is more constructive to think in terms of identifying circumstances where toll projects, availability payment-based PPPs and regulated asset based financing models are likely to be most efficient and affordable.

The specific economic and social circumstances of different countries may lead governments to a view that despite the regulatory challenges and the difficulty of managing renegotiation, there should be a share of PPPs in the overall infrastructure financing mix. How much investment should be financed through PPPs will be determined by the kind of budgeting and accounting guidelines set out in this report.

Limiting the volume of PPPs in overall transport infrastructure investment focuses project selection for PPP financing on delivering maximum efficiency gains. This will prioritise projects susceptible to achieving major cost savings from redesign and modification of construction techniques. Such cost savings also require governments to remove the strings of detailed project specification from the projects selected as most suitable for PPPs.

## NOTES

1. Roundtable on Public Private Partnerships for Funding Transport Infrastructure: Sources of Funding, Managing Risk and Optimism Bias, see list of participants in the Annex and the discussion papers prepared for the roundtable at <http://internationaltransportforum.org/jtrc/roundtables.html>.
2. Regulated asset base models, addressed in section 5, are also susceptible to overinvestment as a result of the incentives created by regulating profit to capital ratios (Averch and Johnson 1962).
3. The reasoning is that lenders do not have direct access to the sponsor's financial resources.
4. House of Commons Select Committee on Environment, Transport and Regional Affairs, Twelfth Report 1998.
5. New rail franchises in Great Britain are using different mechanisms to share demand risk.
6. And a discount rate fixed by the government for the auction.
7. See online guidance for project appraisal from the Department for Transport and Treasury, WebTAG pages <https://www.gov.uk/transport-appraisal-and-modelling-tools>
8. Although the cost of public borrowing will in general not reflect the full cost of capital of the project (Oxera, 2012).
9. Note that the responsibilities and therefore the resources required go well beyond issues of legal interpretation of contracts. Some countries have a tradition of narrow legal regulators in place of or in parallel to economic regulators. This report is concerned with the broader economic regulatory function which requires economic expertise and judgement on issues of efficiency as well as law.
10. Subtracting management contracts and divestitures from the total figure for private participation in infrastructure investment.
11. The UK introduced such a limit for new PPPs in its December 2012 Private Finance 2 reform as "a control total for all commitments arising from off-balance sheet PF2 contracts signed" (HMT, 2012).

## **ANNEX**

### **LIST OF PARTICIPANTS**

#### **ROUNDTABLE**

#### **PUBLIC PRIVATE PARTNERSHIPS FOR FUNDING TRANSPORT INFRASTRUCTURE: SOURCES OF FUNDING, MANAGING RISK AND OPTIMISM BIAS**

**27-28 September 2012**

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