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FINANCING SCHEMES OF TRANSPORT INFRASTRUCTURE

Private Sector Finance of Transport Infrastructure: Progress and Prospects¹

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1. Introduction

Private finance came to be seen, during the 1980s and early 1990s, as the significant catalyst which would ensure the delivery of the perceived increasing needs for renewal and development of transport infrastructure. Initially the coincidence of severe constraints on public sector budgets and significant liquidity in world financial markets helped the movement towards promoting the private sector's involvement in major projects. This coincided with a widespread belief that the private sector would manage major projects much more efficiently than the public sector. Hence, the traditional concern of the public sector that private projects may cost much more because of the higher cost of finance, and that this may cause problems if projects had to be taken back into the public sector, could be overcome. The cause of infrastructure, however financed, was also boosted by the seminal paper by Aschauer (1989) which reinvigorated the debate over the wider economic benefits and boosted the case for both private and public finance. For the public finance case it suggested that any crowding out effect would be more than compensated by the contribution to productivity which the infrastructure would make. For the private finance case it suggested that there may be benefits beyond the direct user benefits, usually paid for by direct charges, for which the private sector might seek underwriting or guarantees from the public sector.

Although a number of high profile projects were commenced at this time, either as completely privately financed projects, or as various forms of public-private partnership scheme, the likelihood that private finance could achieve something as ambitious as the European Union's Trans-European Transport Networks (TETN) programme (even for the EU15 let alone the infrastructure requirements of the enlarged EU25) rapidly became to be seen as remote. In those countries where the private finance model was most advanced, experience identified a set of new issues. These centred around, on the one hand, the evidence that the private sector was not more obviously efficient than the public sector in delivering projects on time and to budget, and on the other hand contractual issues. The nature of these contracts raised questions over the allocation of risk, both between public and private sectors and between private sector parties to the typical consortium approach to such projects. Furthermore, the problem of dealing with asymmetric information in such contractual situations was likely to reduce the potential benefits seen to derive from unbundling functions from monolithic state organizations to a more transparent structure. The response of some observers has been that the real problem remains a lack of competition in private sector financing of projects; the public sector retains too great a role as the promoter of schemes and the planning authority, which tends to reduce innovation and potential returns. These questions have become more critical given the sharp reduction in the supply of funds for such projects following the Asian financial crises of the late 1990s and then the Stock Market reversals following the September 11/2001 terrorist attacks.

In this paper we address the key issues which have emerged with a particular emphasis on understanding the changing contractual and market conditions. We review the recent literature on public-private relationships, asymmetric information and incomplete contracts. Reference is made to a number of major projects with alternative contractual and funding structures to illustrate the problems which have emerged, and not least to obstacles to the

completion of the TETN in an enlarged EU. The main conclusion of the paper is that, without a more transparent way of allocating risk between public and private sectors, there is little hope for major infrastructure projects to be seen as free of public sector interference or control. At the same time the nature of most such projects is likely to require the retention of a public sector interest in both the planning and the management of such projects.

2. The theory of private finance of public infrastructure

Public infrastructure was initially provided largely by the private sector. Thus early turnpikes, which often offered a better substitute for poor public roads, were usually tolled. The early railways in many countries, especially those initially developing railways such as the UK and France, were also purely private ventures. In most of these cases the infrastructures were developed under the auspices of government which, if not taking a direct financial stake, legislated and/or regulated the providers, not least because of the monopoly power often associated with such infrastructure. Railways were indeed usually cited by economists as the classic case of natural monopoly (see for example the discussion in Pigou, 1920).

Early railway infrastructure development in Europe was often the subject of fairly wild speculative ventures. The early railways in the UK for example were associated with the names of some of the classic Victorian venture capitalists. This led both to overdevelopment as the network began to be completed it became more difficult to find new ventures which could find such a clear market. Some of the later lines to be built, often in direct competition with one another for the market between two cities, had to resort to serious cost cutting to remain viable. This resulted in lines which took circuitous routes to avoid expensive tunnels or bridges and left behind some of the problems which continue to blight operations today. Gradually the problems of an over-developed network, particularly as competition grew from roads, led to the need for state intervention. This initially took the form of consolidation into larger state approved monopolies and eventually to nationalisation.

Development in the US took a rather different path after the early private sector developments. Rail, largely given the longer haul distances, remained dominated by freight traffic and remained primarily in private sector hands. Long-distance passenger services were eventually regrouped into a public corporation Amtrak, but the infrastructure over which these services operated is still owned by the private companies.

Despite the early use of private sector development in roads, in most countries the planning and development of a road network lay primarily in the public sector. There were good reasons for this. The need for access to the network and the need to plan both local and principal networks together, required a higher degree of coordination than in the early history of rail. In many cases the embryonic network existed anyway, but required improvement. Thus in most countries we have come to expect the provision of at least a basic toll-free road network with no specific payment to enter the system and direct costs covered (in many case more than covered) by a combination of annual licence fees and fuel taxes. Mohring and Harwitz (1962) in their classic analysis of the US federal highway system demonstrated however that the nature and measurement of highway benefits were affected by the way that the highways were

financed. Some countries do have toll systems covering at least part of the network, usually major inter-city motorway standard routes, but these tolls are rarely related to marginal social cost, more likely just trying to recoup the capital cost of the road. A proposed kilometre-based charging system using GPS for trucks in Germany has been delayed for technical reasons. A rather simpler system is already in use in Austria. The UK has plans to introduce a nationwide charging system, initially by 2006 but now likely to be later. These systems would enable charging closer to marginal social cost, allowing for the external costs associated with road usage and getting closer to charging the specific costs incurred for a specific journey at a particular time of day. Urban road tolling is much less common; an area-wide congestion charging scheme has been imposed in 2003 in Central London, but only in Singapore and few Scandinavian cities is there direct charging based on use using smart cards; only that in Singapore comes close to the concept of optimal road pricing with real time variable charges.

In such a situation where it is difficult to relate revenues directly to private costs, let alone social costs, it has been difficult to introduce direct private sector provision. The concessions let to private sector firms to run Autoroutes in France have often required public sector support due to insufficient revenues. This is usually because an untolled parallel highway is available. Furthermore toll systems have not been used to reflect full social prices, e.g. tolls are constant whether or not there is congestion on the route. Only in the case of major bridges or tunnels where there is a clear monopoly situation has the private sector been able to provide new infrastructure profitably. For example the Dartford crossings in the UK were provided under maximum 20 year franchises and the operator has been able to amortise the capital cost and return the infrastructure to the public sector in less than two-thirds of the expected time. The Second Severn crossing is likely to be able to do much the same.

For private finance to be introduced effectively two basic criteria need to be fulfilled: there needs to be a price structure which conveys sufficient information to enable efficient investment decisions, and the private sector funding must be able to assess, and expect to receive adequate reward for, the risks associated with the project. We have already referred to the nature of the pricing problem. The difficulty for the private sector investor in infrastructure is that there will rarely be freedom in pricing. In most cases the public sector will wish to retain some regulatory control over prices on the basis of the monopoly power which such infrastructure is perceived to have. All too often this ignores the fact that even where a transport operator may have a monopoly within a mode, the effective competition comes from outside that mode. Such regulation can be through direct fixing of prices (e.g. as often with bridge tolls), through price cap regulation (e.g. for track access charges in rail) or through some other form of regulation such as of the rate of return.

Risks can be classified into three broad groups (see Vickerman, 2004): construction risk; revenue risk; and policy or political risk. Construction risk and revenue risk are to some extent similar whether a project is developed in the public or private sectors. We would expect the same level of expertise to be available and indeed the same companies are likely to be involved in construction either as contractors or promoters of a project. Similarly the forecasting procedures of future demand and likely revenue streams are independent of the source of funding. However, there are some critical differences. In construction the view

developed that the inflation of costs was at least in part due to the incompetence of the public sector in controlling cost overruns. The private sector was believed to be likely to be much more efficient in this respect. There is little evidence to support this view. In their review of major projects Flyvbjerg et al (2003) found that there was no significant difference on the basis of the source of the funding; though there were important differences determined by the mode of transport involved. However, there may be a difference due to the way a project is structured. Whether or not the contractor has a lasting equity stake in the project could have an important influence on the degree of cost control exerted.

Although the forecasting methodology may be same, there could still be a greater revenue risk in the private sector. Because of the need to protect against revenue risk, the private sector developer may make greater allowance for downside revenue risk (over optimistic forecasts) and this may raise the implicit cost of project to the public sector. This factor has been cited by the UK National Audit Office (NAO, 1998) in its review of DBFO road projects which it argues led to the private sector concessions demanding a higher return increasing the cost to the public sector in case the traffic forecasts (on which expected shadow tolls were calculated) turned out to be over-optimistic and actual tolls received were much lower.

Political and policy risk remains the most difficult problem for the private sector. A private sector concessionaire cannot be certain that the public sector will not allow the development of a competing infrastructure, nor that a new administration will change the policy towards transport completely. For an infrastructure which is designed to amortise over a minimum period of 20-30 years this is a serious difficulty. Similarly for the public sector the need to provide some contractual assurances against this may lead to policy becoming inflexible (e.g. the contracts for private toll lanes on Californian freeways preclude the development of new public roads within a certain distance, which could be problematic if land use changes significantly).

Further to these three risks which affect the likely return to the private sector investor in an infrastructure project there is an increasing recognition of a problem of regulatory risk. From the point of view of the private sector partner regulatory risk is the uncertainty associated with the likely future behaviour of the regulator. For example, the Rail Regulator in the UK has taken a particularly strong line. Although the remit of the regulator relates mainly to the fairness of track access and associated charges, the regulator has taken a strong line in terms of acting as guardian of the use of public money. Thus the regulator has argued that the cost of new investment had to borne by track access charges (which derive largely from continuing public subsidies to train operators) or by direct government grants. In either case there was a need to ensure that public money was being used wisely and hence the regulator should examine and reach agreement on the details, including timing, of investment, renewal and maintenance programmes (ORR, 2003; Winsor, 2004).

Regulatory risk also affects the public sector in terms of the risk of regulatory capture by the private sector which can use the regulatory framework to rent seek as we shall identify below.

3. Implementation models

Private sector finance is not delivered via a single model. In some cases there has been a direct transfer of assets from the public to the private sector, but the change of ownership is neither a necessary nor a sufficient criterion for determining the a change of outcome in the delivery of services. Three broad categories of private sector involvement can be identified in the operation of public services, including infrastructure: privatisation, public-private partnerships and the not-for profit company. We shall first introduce each of these in turn, but the main issues raised by each model overlap each other and we set these out later in this section of the paper in a typology of public-private interactions.

3.1 Privatisation

Privatisation usually implies the wholesale transfer of assets from the public sector to the private sector. In many privatisations equity in the private sector company is made available to the public through a share issue, typically with shares sold initially at a significant discount to encourage widespread ownership. There is in some sense a transfer from the consumer as elector to the consumer as shareholder, control passes from the ballot box to the annual meeting of the company. In some cases, for example during the privatisation programme in the Czech Republic, the elector becomes a shareholder directly through the direct issue of shares – voucher privatisation. In other cases a public company is simply sold to an existing private sector company, although this has been less common with major national infrastructure than with other services, for example local bus services.

Successful privatisation (see Megginson and Netter, 2001, for a survey) usually requires three conditions to be met:

- that there will be efficiency gains which will result from increased competition rather than the change of ownership in itself;
- that the outputs of the industry, in terms of quality and price, can be measured and regulated;
- that consumers are able to make choices and meet the costs of any service directly.

Privatising infrastructure thus raises serious problems because none of these conditions is typically met in full, particularly the first condition where it is usually argued that it is the competition rather than the private sector operation which leads to any increased efficiency. The natural monopoly status of most infrastructure and the high degree of asset specificity has often militated against this. However, the regulatory problem is of increasing importance and we deal with this in more detail below.

3.2 Public-Private Partnerships (PPP)

Public-Private Partnerships (PPP) cover a range of options in which there is some sharing between the two sectors. The usual mode is that the private sector is invited to contribute capital to a scheme which is then run in some form of partnership with the public

sector. This can involve contracting out, franchising or tendering some part or all of the operation or getting the private sector to provide a significant part or all of the physical capital required for an operation. The latter case has been covered by the Private Finance Initiative (PFI) scheme in the UK, which has been used quite widely in education and health care. In the case of the contracting out or tendering typically rather short contracts are required; in the case of major physical capital schemes the contracts may be quite long to cover the life of the asset.

The key to a successful PPP scheme, and particularly in the case of a PFI scheme, is first to demonstrate that the use of private sector finance is more cost effective than the equivalent scheme financed by the public sector. There is thus a need for an unbiased public sector comparator (PSC) which reflects both the accurate costs of undertaking the project in the public sector and the appropriate discount rate – neither of these are uncontroversial with the public sector being accused of optimism bias. Secondly, the public sector has to conduct an efficient competition between PFI bidders, which implies both that there is significant potential competition and that a fair and transparent selection procedure can be carried out. Unfortunately the limited number of companies competing in some sectors makes this difficult to ensure.

An alternative to the PFI approach, which has been used more widely for transport schemes in the US, is the bond issue. This is a means of retaining full control and operation in the public sector whilst accessing private funds on the money markets. Considerable controversy surrounded the PFI scheme for the London Underground where the infrastructure has been let out to private sector consortia who will maintain and invest in renewals. Several commentators argued that a bond scheme would be more cost effective in raising money whilst ensuring better control over infrastructure development (Ernst and Young, 2002; Glaister, 2002).

3.3 Not-for-Profit Companies

Not for Profit Companies (NFP) have a long history in the US as a means of delivering education and health care services. They have started to be used in the UK, but most significantly in the rescue plan following the collapse of Railtrack. NFPs use private sector money and are seen as being in the private sector from the point of view of a government's liabilities and balance sheet, but they do not make any distributed profit, have no shareholders as such – the term used in the case of Network Rail the NFP which replaced Railtrack is “members” who represent the different stakeholder groups: customers, government, clients, suppliers etc. (see Glaeser and Shleifer, 2001; François, 2003; Bennett et al., 2003).

In theory there should be no difference in performance and efficiency between a normal for profit company and an NFP if markets were perfect and there was no informational asymmetry. However, the NFP has to invest any surplus in the business and as Grout and Stevens (2003) argue, where there is a commitment to greater effort on the part of those working for the organisation because of its NFP status (commitment to the public good), this surplus could be larger than in the case of the private sector firm. This is the so-called ‘donated labour’ (Rose-Ackerman, 1996; Grout and Yong, 2003) argument where individuals become committed to the organisation – a common argument in education and health care – and thus behave differently because of the ownership of the firm (see Besley and Ghatak, 2003).

3.4 A Typology of Public-Private Interaction

We can identify a set of cases according to ownership of the physical assets relating to a service (the infrastructure) and the ownership and employment of the resources which operate the infrastructure (Grout and Stevens, 2003). Table 1 defines 5 likely cases; the remaining cells are thought to be unlikely combinations. We consider possible examples of these in turn.

Table 1: Typology of Private Sector Provision Modes

Ownership of infrastructure	Management of infrastructure: public		Management of infrastructure: private	
	Employment of inputs, e.g. labour		Employment of inputs, e.g. labour	
	Public	Private	Public	Private
Public	A	E	-	C
Private	B	F	-	D

Source: Author development from Grout and Stevens (2003)

Case A: This is the conventional public sector provision case in which the public sector owns and manages the infrastructure and directly employs labour and other inputs. Traditional state-owned railways and road networks maintained by direct labour organizations fall into this category.

Case B: This represents the situation where the private sector provides the infrastructure, and retains ownership of the physical asset, but the public sector manages it and employs the labour and other inputs. This would be a situation where the private sector is used largely to bring forward investment, but for various public policy reasons the public sector wishes to retain its control over the way the infrastructure is used. In many cases ownership is not permanent, but only for a fixed contractual period, although this is typically long enough to ensure the amortisation of the asset under a typical concession or franchise scheme. This is the case used in many Private Finance Initiative (PFI) projects in the UK. These are less common in the transport sector, but have been used in the provision of school and hospital buildings. There is no reason why they could not be used for the provision of such facilities as urban rail transit schemes, although these have more usually been provided as case F where there is some public involvement in management but the private sector actually operates the services and employs the resources used in the operation.

Case C: This represents the opposite extreme to case B, where the public sector provides the infrastructure, and retains ownership, but contracts out the management to the private sector

which employs labour and other inputs. Examples of this can be found again in education and health care where the private sector is invited to take over running an existing physical asset which the public sector retains in ownership but leases out to the private sector operator. This has some of the characteristics of the private sector involvement in the London Underground. Although in this case the overall management of the network and the operation of trains remains with the public sector, the detailed management of the infrastructure of individual groups of lines and their maintenance is contracted out to the private sector.

Case D: This is the pure private sector case, at the opposite extreme to case A in which the private sector owns and manages the infrastructure and employs all the resources used in its exploitation. The early examples of bridges, turnpikes and railways referred to in the Introduction were clearly in this category. There remain, however, relatively few pure examples of this type involving transport infrastructure since the public sector has tended to adopt and retain some residual role in most cases. Even in the case of private railroads in North America, there has been considerable involvement of the public sector. The obvious example which comes closest to the pure case D is that of the Channel Tunnel, although even here it is controlled by a concession and there is an ultimate requirement to return the infrastructure in full working order to the two governments of the UK and France, albeit after 99 years.

Case E: This is the minimal private provision case in which the public sector owns and manages the infrastructure, but contracts out the employment of inputs to the private sector. There are minor examples of this throughout the public sector in which contract staff are engaged to undertake specific functions, but the overall management remains firmly in public sector control. Obvious examples include the use of private sector contract cleaning or catering staff within a public facility. In transport, this has increasingly included the contracting out of maintenance functions, including deals in which new rolling stock is leased from the manufacturer who performs all routine maintenance.

Case F: This is a possible variant on Case E in which the public sector retains overall management control of a facility but where the physical assets are owned by the private sector and the resources used to exploit the facility are also provided by the private sector under contract. This is similar to the public-private partnership deals which can characterise urban transit developments. Whilst the public sector retains an essential planning and management role most of the assets are owned and managed by the private sector.

The remaining possibilities, in which the public sector employs the resources used in a private sector managed facility, whether owned by the private or public sectors, seem unlikely and we do not consider them further.

Grout and Stevens (2003), in a more general discussion of the use of the private sector in the delivery of public services, also identify a further set of potential variants according to whether the service produced is sold directly to the final consumer or is sold back to the public sector which arranges distribution to the final consumer. This case clearly arises in the case of some health care and education models, but could also be identified with the use of shadow tolls where the public sector in effect buys the road space on behalf of the final user who is then entitled to use of it without further payment..

Apart from the pure public and pure private cases, A and D, cases B and C appear to be the most likely and interesting cases and we examine them in more detail below. In each case we identify the likely risk factors and then the problems of asymmetric information and the provision of appropriate incentives to ensure the achievement of maximum efficiency in each case.

3.5 Private infrastructure – public management

The private ownership of the infrastructure which continues to be fully managed and operated by the public sector represents the simplest case of the introduction of private finance into public infrastructure. Essentially the private sector is asked to provide the investment funds for the asset of which it then retains ownership. The private sector owner is responsible for maintaining the facility to an agreed standard. The public sector is charged an agreed rental and manages the facility. In most cases the ownership is for a fixed contract period. This contract is set sufficiently long to enable the private sector investor to recoup the original investment and make an acceptable return.

There are usually provisions to return the asset to the public sector in full working order at the end of the contract period so that a public infrastructure which has been financed over its life by the public sector is seen to remain ultimately a public facility. This affects the way that the infrastructure is managed and maintained, however, as noted originally by Pigou (1920). Failure to maintain the infrastructure during its lifetime will reduce the level of service provided and the value of the infrastructure. Small and Winston (1988) have shown that traditional engineering approaches overestimated road surface life and underestimated lifetime costs. If traffic is greater than that forecast, or consists of a different composition, for example relatively more heavy freight traffic than expected, then the lifetime of the asset may be shorter and incur higher maintenance costs.

The main benefits of using private finance in delivering infrastructure are seen to be two-fold: earlier delivery of a project and lower long-term costs. The use of private sector funds can advance the timing of an investment whilst not entering the public sector's balance sheet. This movement of public infrastructure off the public sector's balance sheet is seen to be particularly useful when the public sector faces serious budgetary constraints. Whether a particular infrastructure can legitimately be moved off the balance sheet depends primarily on the degree of risk which is transferred. If the private sector develops the infrastructure entirely at its own risk with no guarantees then it is a legitimate move. If, however, as is frequently the case, the government agrees to underwrite the project through various guarantees of minimum revenue or minimum rate of return or of buying the asset back at a minimum value, then the asset essentially remains a public sector liability and should continue to be counted as part of the public sector.

Secondly, by committing the developer of the capital project to a long-term interest in its operation, the public sector operator is seeking to minimise the risk of poor standards of construction since the private sector would be adopting the construction and maintenance risks.

The private sector deliverer thus has an incentive to ensure greater lifetime cost effectiveness if responsible for the asset after completion (Hart, 2003). There is a long-standing belief that part of the problem for the public sector is that it has been bad at managing major construction projects. This arises both because of a series of principal-agent problems. The principal-agent problems arise first because the public sector official has insufficient knowledge of the detail of the construction to be able to manage the contractor effectively. A second set of problems arises within government because the incentive for the officials is to ensure a project determined by their political masters is completed. Since it is not their money, if it costs more to complete the project then this is less of a concern than that it should not be completed, hence there is an implicit tendency for costs to rise and/or long-term quality to be sacrificed. This is the classic principal-agent problem in bureaucracy.

The evidence is not wholly convincing. From the public sector's point of view, countering any timing or efficiency gain is the likelihood that private funding will be a more expensive way to raise the investment given the public sector's access to cheaper money on the money markets. This is often used as the reason for government guarantees. This places most of the emphasis on the greater efficiency of the private sector in managing a project. The survey by Flyvbjerg et al. (2003) does not confirm that there is any lesser tendency for cost overruns in private sector projects. There may be good reasons for this. First, most large public infrastructure projects originate in the public sector which retains ultimate responsibility for planning. Unlike the nineteenth century examples of competing railway companies, the modern approach is to develop infrastructure as part of planned networks. Secondly, projects have often reached an advanced state of design before the private sector is invited in; this may reduce innovation and produce less optimal (often given gestation periods rather old-fashioned) solutions, especially where the public sector remains the operator.

3.6 Public infrastructure – private management

Turning to the case where the public sector develops and retains ownership of the infrastructure, but introduces the private sector to manage the infrastructure, a rather different range of issues emerges. Here the public sector's retention of ownership reflects the view that public infrastructure should remain public property, but that the private sector may provide greater efficiency in its operation. The mode which is often used to effect this is that of the competitive tendering of services. This has become widespread in many facets of the public sector, often for a range of independent services such as cleaning, catering etc., but could also be applied to infrastructure, although Domberger and Jensen (1997) suggest that it is most likely to succeed where infrastructure is less specific to the activity. The advantages of such a model are that contracts can be made relatively short as little initial investment has to be made by the contractor and that by introducing competition through the tendering process costs can be reduced.

The essence of the case is that by introducing transparency through the unbundling of infrastructure and its management, transactions costs are reduced in comparison with the vertically integrated model. It has been argued previously (Vickerman, 2004b) that there are serious problems with this approach in the transport sector where the greater asset specificity can result in over-complex contracts which increase the costs by more than any competitive

reduction achieved through greater transparency. The problem arises because of the informational asymmetry which leads to rent-seeking behaviour by the contractors. Vickerman (2004c) has considered the specific case where the infrastructure owner (which could be public or private) contracts out the maintenance of the infrastructure to a private sector contractor. The infrastructure owner has to establish clear guidance on the appropriate standards which may be quite difficult when the contractor has better information about the real quality of the infrastructure than the owner and there is no simple quality indicator. For example, quality indicators for rail infrastructure can be related to either its physical condition or its impact on service. Physical condition may only be completely obvious on failure. Thus we can observe for example the incidence of broken rails, but the potential for this due to fatigue, cracking etc is only revealed through sophisticated equipment used by the contractor. The impact on service, for example the number of minutes delay due to infrastructure problems, may be difficult to disentangle from other reasons for delay and where the maintenance contractor is not responsible for service provision there is scope for shifting risk.

The problem here is how to set appropriate incentives to ensure that the contractor meets specific targets. This is a classic regulatory problem (see Laffont and Tirole, 1993, for the basic analysis; and for a discussion related specifically to transport, Helm and Thompson, 1991; Quinet and Vickerman, 2004). Whether the regulator tries to set price, rate of return or specific physical targets, these are open to manipulation by the contractor in search of rent, the concept of regulatory capture. Vickerman (2004c) shows that many transport cases involve hierarchical contracts: a public sector regulator lets a contract to an infrastructure operator who engages contract maintenance contractors to maintain the network. The regulator has a primary interest in the quality of the service which depends on maintenance but does not regulate the maintenance contractor directly. The regulator thus needs to set incentives such that the operator can let contracts to the maintenance contractors which ensure that the regulator's targets are met. Following Caillaud et al. (1996), it can be shown that any attempt by the regulator to set precise targets at each level is likely to be unsuccessful because the regulator possesses insufficient information to make a complete contract. Similarly to allow complete decentralisation is likely to produce inefficiency due to rent seeking. Thus the regulator has to set a course which gives the operator the incentive to let the most efficient contract, a situation referred to by Caillaud et al. as coordinated decentralisation. The conclusion here is that whilst traditional vertically integrated public sector provision may be inefficient, simple replacement by a fragmented structure will not necessarily achieve greater efficiency. There has to be some degree of coordination to avoid the capture of any increased surplus by lower levels of the hierarchy. This problem is compounded if there is any loss of the benefits from donated labour.

4. Conclusions and prospects

In this section we turn to draw some lessons from the discussion above and to point to areas for future development. The essential message of this paper is that the introduction of private finance highlights the informational asymmetry involved in the development and operation of most transport infrastructures and thus the risks involved in their finance. The private sector can be introduced in different places in the infrastructure production chain, but

each of these carries with it a particular set of risks for the private sector funder, for the public sector and for the final consumer.

The rationale for the use of private finance has not always been clear. For some the key driver has been the presumed inefficiency of the public sector in managing facilities: the private sector has goals which will ensure the delivery of a better service at a lower cost. For others it is the option of bringing forward investments which the public sector cannot afford at a particular time. For others it is simply a political decision which equates the public sector with bad and the private sector with good. It is difficult, however, to hold up any general theoretical principle or empirical evidence either to support or refute any of these views.

4.1 Is the private sector more efficient?

The basic argument here is that the introduction of competition coupled with private sector management practices will eliminate waste. This has usually been associated with an unbundling of infrastructure provision from final service provision to enable competition to take place. As we have argued above it is the competition element which is likely to be critical here, but the nature of most transport infrastructure services is that pure competition has become extremely difficult to introduce. Informational asymmetry and hence the scope for rent seeking is prevalent and even where attempts have been made to introduce competition it rarely meets the conditions necessary to ensure greater efficiency.

Moreover, unbundling brings new sources of inefficiency or increased cost with it. The need to write contracts for the provision of services which would be provided within a vertically integrated organization may raise costs and gives scope for further rent capture. The interests of the two parties to solve problems is no longer a mutual one as each has to protect the legitimate interests of a separate organisation, its shareholders and other financial backers. This is compounded if the move from the public to the private sector removes some of the effort associated with levering public services, that is the loss of donated labour.

Most of our information on the extent of these differences is currently anecdotal. One of the difficulties which arises when organizations move into the private sector is that commercial confidentiality reduces the amount of detailed information available on which to base analyses. This is in part due to the inherent difficulty of measuring the output of public infrastructure, whatever its ownership, because of the large fixed capital element and the problems of defining quality. This is an area where more effort is needed.

4.2 Does the private sector deliver services sooner? and more cheaply?

A common argument has been that cash limited public authorities like to move major projects off their balance sheets in order to deliver them more quickly. Whilst examples can be found of where projects have been made possible by the use of private finance, either in whole or part, which would never have been completed if they relied on the public sector, it is also clear that the political commitment to involve private sector funding has also delayed projects. The timing of investments is not just a political decision, it is also a technical decision about the

maximising of returns which will depend on the future stream of benefits, the discount rate and the initial cost of finance.

The more interesting question here is whether private finance is cheaper or more expensive than public finance. Arguments here have been put both ways, but three main issues arise here: risk, borrowing cost and contractual costs. We have to be very careful over arguments relating to risk. It is often claimed that risks are higher in the private sector thus the cost of finance will be greater, but that the use of equity finance can ensure that these risks are spread. In particular it is suggested that giving construction companies and banks an equity stake in a project will ensure that they are more committed to its efficient completion. This ignores the basic principle that the underlying risk of a project is not affected by the method of financing; the debt-equity ratio is an indicator of the health of the company, but not of the individual project (Modigliani and Miller, 1958). Jenkinson (2003) takes this argument further showing that there is always equity involved however, and by whoever, a project is financed. This is less obvious in the case of public finance, but there is an ultimate equity stake held by the taxpayer and/or the final consumer of a service. Similarly a NFP company may appear to be entirely debt financed, but there needs to be some reserves or stand-by credit facility which has the characteristics of equity. For example, Jenkinson refers to the case of Network Rail in the UK which is ultimately underwritten by the Strategic Rail Authority which is a government agency. Ultimately however the key issue is whether the effective risk in a project can be fully and accurately identified and if so what risk premium will be associated with it. We have identified above the main sources of risk, the next step is to provide more robust means of evaluating such risks.

The cost of borrowing has been a matter of contention. The main argument has been that governments can typically borrow at lower rates of interest than the private sector and thus that the private sector has to be significantly more efficient in a project to overcome its inherent disadvantages. This argument has to be treated carefully however. The relevant rate of interest is not the rate on government's own borrowings such as that on gilt-edged securities, but rather a measure of the social rate of time preference. The UK government has recently reduced the required real rates of return on government investments, but they remain above the rates earned by government securities (HM Treasury, 2003). The marginal cost of public funds should reflect the opportunities foregone by investing in a certain project. One of the problems of introducing private finance is that this may advance projects which can secure private finance at the expense of projects which find this more difficult (e.g. because of greater risks, greater uncertainties or greater difficulties in measuring returns), but still leave some element of risk which the public sector needs to cover.

Where private sector financing may also incur higher costs is in the contractual costs of arranging the finance. Comparisons of public and private finance are typically made on the assumption that there is a level playing field for the two modes. Where private finance may be at a disadvantage is in the nature of the contractual arrangements surrounding the financing. In the public sector these are typically hidden, but when brought out into the open they may become additionally costly. In part this is because of the nature of the service provided by transport infrastructure which is difficult to define and carries with it degrees of uncertainty in

terms of the expected returns. Following problems with some major projects, the Channel Tunnel is the leading good example, there have been arguments for more complex financial arrangements which attempt to structure the finance to reflect the differing levels and degrees of risk rather than a simple equity/loan split. This may help to reduce the apparent overall cost of the finance, but at the expense of even greater complexity which carries with it transactions and contractual costs. Since the cost of the finance is highly dependent on the perceived risks, not least on the political risk of state appropriation of the assets, there are significant risk premia attached at certain times which can become windfall gains when the risk recedes.

4.3 Is there ever a clear economic case for private finance?

Much of the argument over private finance has used essentially spurious arguments about cost and efficiency. These depend on an essentially unfair or biased comparison of an ideal world for private finance where all the assumptions of perfect markets hold with a notion of the public sector as inherently inefficient and incompetent. Neither of these idealised models is likely to hold completely as we have seen. In the majority of cases there is no rational debate about the appropriateness of one mode of financing or another for a particular project. Essentially a decision is made on political grounds that a particular mode will be used for a particular project and this is then justified. This raises difficult questions about the appropriate public sector comparator to be used when for example a PFI project is selected, since the PSC runs the risk of being selected in order to justify the decision rather than help make the decision.

4.4 Future directions

We have identified a number of themes which are essential for future development. Perhaps the most important of these is refining the measurement of the output of infrastructure in terms of its quality. This is an essential input to the improvement of regulation and incentive setting. This would help in determining the effective allocation of risk in projects, but also improve informational symmetry which would help in the setting of more complete contracts. There is also an implicit danger that seeking to involve private sector funding has led to the search for more complex methods of finance. What is usually implied here is a means of unbundling different aspects of a project with different risks and associating particular types of funding with each risk – so-called special purpose vehicles (SPV). Whilst it is usually possible to find some financial structure which can function to provide the funds necessary for a project, if this is at the cost of a loss of transparency and increased contractual costs it may not lead to real long term savings.

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