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BENEFITS OF PRIVATE SECTOR INVOLVEMENT IN ROAD PROVISION: A LOOK AT THE EVIDENCE

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FOREWORD

Private sector involvement in traditionally public infrastructure has increased markedly in Australia in recent years. Private investment in infrastructure has increased, as has the use of private contractors for work on public facilities.

Other recent Australian reports have examined the economic case for private involvement in 'public' infrastructure (EPAC 1995a; IC 1996; AUSTROADS forthcoming). The contribution of this paper is that it focuses on the evidence for roads and investigates both forms of private involvement - contracted work on public roads and private toll roads. Omitted from discussion are many claims for which little evidence exists and which are peripheral to the debate over private involvement. The EPAC and IC reports discuss some of these claims in their responses to public submissions.

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ABSTRACT

What role should the private sector play in road provision? Private contractors already perform a fair amount of the design, construction and maintenance of Australia's publicly owned roads. The evidence reviewed in this paper indicates benefits from further contracting out of road work to the private sector. In many cases, contracting out of road maintenance has reduced costs by 15 per cent or more. The evidence is less conclusive on the benefits of private investment in roads. Whether private toll roads are more efficient than other arrangements for road provision needs to be carefully examined case by case. Public ownership could be a better option than private ownership for some toll roads.

AT A GLANCE:

- Governments in Australia could reduce costs by contracting out more road work to the private sector.
- Contracting out can reduce road maintenance costs by 15 per cent or more in many cases, even when the contract goes to a government business unit rather than the private sector. Government providers of road maintenance become more efficient when exposed to private sector competition.
- The savings from contracting out road maintenance stem in large part from improved efficiency, particularly more flexible use of labour. Only 27 per cent of maintenance on public roads was contracted to the private sector in 1994-95, but the proportion has been increasing.
- Contracting out road maintenance has sometimes failed to reduce costs, or even increased them, when governments impose too many restrictions on the contractors, such as having to employ ex-government workers or to meet community development objectives.
- Contracting out has often improved the specification and monitoring of road maintenance work, which has contributed to quality outcomes. Declines in quality have sometimes occurred but are not typical.
- Private contractors already perform much of the construction of public roads (42 per cent in 1994-95). The limited evidence on the benefits from their involvement includes cases where contractors suggested design improvements that reduced costs significantly.
- Evidence on the benefits of private investment in roads is very limited. Private toll roads appear to be built with fewer delays and at lower cost, compared to public untolled roads. But private toll roads require agreements between public and private sectors that can be costly to negotiate and that impose other social costs through loss of government flexibility. An alternative to is for governments to consider public toll roads.

CHAPTER 1 THE CURRENT SITUATION

In Australia, contract work on publicly owned roads is the most common form of private sector involvement in road provision. In 1994–95, private sector contractors performed 80 per cent of construction (including reconstruction) and 50 per cent of maintenance on the National Highway. The proportions of private sector work on the entire public road network were much lower: 42 per cent of construction and 27 per cent of maintenance (DoTRD 1997a). The proportions vary across States and Territories, from Queensland, with the smallest, to the Northern Territory where private contractors perform all road work.

The private sector's share of public road work has increased appreciably during the 1990s and would now exceed the above estimates for 1994–95. The Commonwealth has required competitive tendering for National Highway maintenance since 1994, except for small contracts for routine tasks (such as grass cutting or line marking).[1] The requirement has been progressively gaining effect, with the expiration of contracts that had been reserved for local councils or other government agencies. (Queensland in particular has let State road work to local councils.) Private contractors have also been winning more of the work on State roads, due to recent initiatives such as the introduction of competitive tendering for road maintenance in South Australia.

Another trend in road work is toward broader contracts. Road agencies are contracting out more design aspects and are experimenting with combined contracts for construction and maintenance. An example is the Design, Construct and Maintain (DCM) contract for the Bulahdelah–Coolongolook deviation on the Pacific Highway in New South Wales, under which the contractor maintains the road for 10 years. The uncertainty of future funding for road agencies usually discourages such long-term commitments.

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[1] Contract value less than $2 million. In addition, State and Territory roadworks agencies may apply for an exemption on the following grounds: emergency needs; preparation of adequate tender specifications is impracticable; task is too minor to make competitive tendering cost-effective; or competitive tenders are unlikely to be received (e.g. in remote areas). In 1995–96, nine such exemptions were granted for roadworks in Queensland and New South Wales. They had a combined value of $6 million—less than 2 per cent of total National Highway expenditure in that year.

Australia has little experience of shadow tolling on public roads, a system more common in the United Kingdom. A shadow toll arrangement resembles a DCM contract, except that government payments to the developer increase with the volume of traffic rather than being a fixed sum. The additional payment for each vehicle is a ‘shadow’ toll paid out of general government revenue, rather than an actual toll that is charged to the road users. The new tolling arrangements for the M4 and M5 motorways in Sydney resemble shadow tolls; the government reimburses tolls paid for non-business vehicles that are registered in-State.

The Build, Own, Operate and Transfer (BOOT-type) arrangements for several urban motorways such as Melbourne’s City-Link are the farthest Australia has gone toward privatising the road network. The arrangements provide private funding for motorways for which public funds are hard to raise.

CHAPTER 2 ILLUSTRATIVE CALCULATIONS OF BENEFITS

A hypothetical project provides the framework in this paper for illustrating the benefits of private involvement in road provision. The project entails construction and maintenance of a major highway, for which realistic cost parameters have been assumed.

BASE CASE

Options for increased private involvement are to be compared with a base case that approximates the status quo. The base case is assumed to feature public ownership, privately contracted construction, and in-house maintenance (without competitive tendering). Construction is assumed to be already contracted out partly because of the evidence on how contracting out affects construction costs is quite limited. In addition, contracting out construction, but not maintenance, to the private sector is a fairly common pattern of private involvement in Australian highways.

The highway has an assumed economic life of 30 years and, in the base case, takes four years to build. Other base case assumptions are listed in table 2.1. The discount rate is 10 per cent, within the range of real discount rates that have been used in recent evaluations of Australian transport projects (BTCE 1996, p. 47). The choice is somewhat arbitrary as there is no single discount rate that is 'correct'. AUSTROADS (1996) recommends a discount rate of 7 per cent without explanation.

Maintenance costs are a minor element in the whole-of-life costs of the highway — in present value, only 4 per cent. The dominance of construction costs accords with evidence for actual highways. Maintenance plus operating costs have typically accounted for only 5 to 7 per cent of total costs on recent BOOT-type road projects in Australia, according to anecdotal evidence.

The benefit-cost ratio (BCR) in the base case is about 8 (table 2.2). An estimate this large sometimes occurs in evaluations of urban road projects in Australia, as the BTCE has found from canvassing other organisations' estimates. Estimated BCRs for rural road projects tend to be lower, although they can also be quite large (BTCE 1995, pp. 46–49).

TABLE 2.1 ASSUMED PARAMETER VALUES FOR EVALUATION OF HYPOTHETICAL HIGHWAY IN BASE CASE OF LIMITED PRIVATE INVOLVEMENT

Variable	*Assumed value*[a]
Construction period	4 years
Economic life	30 years
Total construction costs (undiscounted)	$150 million
Annual maintenance costs (undiscounted)	$0.6 million
Average daily traffic in first year	40,000 vehicles
Traffic growth rate	5 per cent annual
Benefit per vehicle trip[b]	$5
Discount rate	10 per cent annual

Note The assumed parameter values are illustrative and do not collectively describe any actual project. 'Limited private involvement' means that private contractors undertake the construction, while the government undertakes the maintenance using an in-house team (without competitive tendering).

a $ variables are measured in real terms—in constant prices as of, say, 1996–97.

b Benefits from savings in operating cost or travel time, or from improved road safety.

OPTIONS FOR INCREASED PRIVATE INVOLVEMENT

Contracting maintenance (separately from construction)

Putting maintenance to competitive tender would increase private sector participation. The costs of maintenance to society might decline by 15 per cent or more, judging from case study evidence reviewed in chapter 3. However, because maintenance costs are small relative to construction costs, reducing them even by a large proportion would change the whole-of-life costs in far smaller proportion. A 15 per cent reduction in maintenance costs on the hypothetical highway would reduce whole-of-life costs by about $480,000, or under 1 per cent (table 2.2).

Maintenance costs are nevertheless important in efforts to contain the overall costs of road provision. Despite their typically small contribution to whole-of-life costs for an individual road, maintenance costs account for a large share of total road expenditure in Australia — about 37 per cent based on limited evidence.[2] A 15 per cent saving in maintenance expenditure would thus reduce total road expenditure by about 5.5 per cent.

[2] The maintenance share of total road expenditure was about 37 per cent in 1990–91, the last year for which such an estimate is available (AUSTROADS 1994, p. 35). For more recent years, the maintenance share has been estimated for arterial road expenditure only. In 1994–95, the estimate for arterial roads was 36 per cent; the maintenance share of all-road expenditure would have been similar, since most road-related expenditure went for arterials (about 70 per cent; AUSTROADS 1997, pp. 39–40 and NRTC 1996, p. 18)

TABLE 2.2 BTCE ESTIMATES OF BENEFITS AND COSTS OF HYPOTHETICAL HIGHWAY PROJECT UNDER ALTERNATIVE ARRANGEMENTS FOR PRIVATE SECTOR INVOLVEMENT

($ million)

Scenario:	*Present value of*[a]*:*			
	Construction costs	*Maintenance costs*	*Benefits*[b]	*Net benefits*[c]
1. Base case (construction contracted out but not maintenance)[d]	118.9	3.9	1005.4	882.6
2. Construction and maintenance contracted out separarately	118.9	3.2	1005.4	883.3
3. Design, Construct and Maintain Contract	107.0	3.0	1005.4	895.4
4. Shadow tolling arrangement	111.3	3.6	1103.4	988.5
5. BOOT-type arrangement, with project brought forward:				
(a) 5 years	179.2	5.8	1392.3	1207.3
(b) 8 years	238.6	7.7	1600.9	1354.6

Note The highway is publicly owned in all scenarios except for the BOOT-type arrangement (scenario 5). The numerical differences across scenarios omit certain effects of increased private involvement (see text).

a Measured as of the year before commencement of construction in the base case.

b Benefits from savings in operating cost or travel time, or from improved road safety.

c Net benefits = benefits - (construction costs + maintenance costs). Numbers shown may not exactly satisfy this equation due to rounding.

d Maintenance assigned to government in-house team without competitive tendering. See table 2.1.

Design, Construct and Maintain contracts

DCM contracts encourage design innovations that minimise whole-of-life costs. In their pure form, the government sets the performance standards for the road and leaves design to the contractor. Presumably, the contractors attempt to minimise costs when deciding on design tradeoffs between construction and maintenance. In conventional contracting arrangements, responsibility for design rests more heavily with the public roadwork agencies, which may take less account of whole-of-life costs. A widespread view is that the public

agencies build to too high a standard, partly to avoid maintenance tasks for which future funding is uncertain. A DCM contract reduces this uncertainty by committing maintenance funds for the contract period.[3]

Increased accountability for design shortcomings is another claimed advantage of DCM contracts. The builder is on-site and directly accountable for road performance for an extended period. Shoddy construction would mean higher maintenance costs for them. In addition, DCM contracts avoid the possibility of blame for road defects being passed between construction and maintenance contractors.

BTCE has found no estimates of the potential cost savings from DCM contracts relative to separate contracts for construction and maintenance. Based on some scant related evidence (discussed below), a 10 per cent cost saving has been assumed for an illustrative calculation (table 2.2). The calculation indicates that use of DCM contracts in place of separate contracts increases the Net Present Value (NPV) by 1.4 per cent.

Shadow toll arrangements

Shadow tolling gives the developer a sharp incentive to expedite construction, since toll revenue starts to accrue only after completion. Where there are no tolling arrangements, other incentives for early completion are possible. For example, the government can agree to provide the final payment upon completion of the work rather than at a fixed date, as occurred with the quickly completed third runway at Sydney airport. However, in practice, the budget allocation process often means that early completion does not advance payment (EPAC 1995b, p. 80).

As well, there is a view that governments tend to schedule a generous amount of time for construction, for political gain. Although projects may proceed more slowly, there will be a larger number of projects on the books at any given time, enabling the government to be seen as doing something for many different areas. (The strategy can of course backfire if taken too far.) Shadow tolling arrangements reduce the likelihood of projects being thus ‘drip-fed’, since the developers will desire early completion.

The incentive for early completion would be much the same for a shadow toll arrangement as for a BOOT project. Recent BOOT projects in Australia have been mostly completed ahead of schedule. The Sydney M5 Motorway took two years to build, not four years as scheduled by the Roads and Traffic Authority, New South Wales (RTA). Correspondingly, the construction period is reduced

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[3] In practice, the maintenance period for some DCM road contracts in Australia has been only 10 years, much shorter than the economic life of the road. A short contract period reduces the incentives for the contractor to take account of long-term maintenance costs, but also reduces the risks to the government of being stuck with a poorly performing contractor.

from four to two years in the illustrative calculation of benefits from shadow tolling, in table 2.2.

In addition, the increased pace of construction reduces the sum of undiscounted construction costs by an assumed 5 per cent. The increased pace could reduce construction costs through more intensive utilisation of capital and scale economies from larger contracts. Although it could also increase some cost elements, such as overtime pay and express delivery premiums, there is anecdotal evidence of overall reductions in costs resulting from faster construction. That said, the assumed 5 per cent cost reduction is speculative.

Shadow tolling arrangements and DCM contracts give similar incentives to minimise whole-of-life costs. Both give the developer combined responsibility for design, construction and extended maintenance. The resulting cost savings, relative to separate contracting (scenario 2, table 2.2), are assumed to be 10 per cent in the illustrative calculations.

The assumed cost savings are broadly consistent with the very limited evidence available. The United Kingdom has built eight motorways recently under shadow tolling arrangements, termed there Design, Build, Finance and Operate (DBFO). The estimated cost savings from the use of DBFO averaged 34 per cent for construction and 19 per cent for operating and maintenance costs, as reported by Perry (1996). Cost savings were estimated relative to 'traditional procurement approaches' (probably, separate contracting for construction and maintenance with heavy government involvement in design).

The estimates are tenuous for two reasons. First, they are based on expected costs at the time of tender rather than realised costs. Second, some of the cost savings attributed to DBFO may have actually stemmed from depressed conditions in the UK construction industry (which would have lowered bid prices even under traditional procurement approaches).[4] Even if the UK estimates were reliable, they may not apply to Australia. A more conservative cost saving of 10 per cent has thus been used for the illustrative calculation in table 2.2.

The assumed shortening of the construction period from shadow tolling, and the associated 5 per cent cost saving, would together increase the NPV of the hypothetical highway by about 10 per cent relative to the DCM contract.

Table 2.2 makes no allowance for possible benefits from shifting the demand risk to the private sector under shadow tolling. The linkage between the developer's revenue and the amount of traffic strengthens the incentives for the developer to build and maintain the road to high standards. Corner-cutting that

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[4] This possible bias was alluded to by Perry (1996, p. 28) and more explicitly acknowledged in conversations between representatives of the UK Government and of Invest Australia.

would reduce standards and, hence, demand for use of the road will be less tempting than under a DCM contract.

Shifting demand risk to the private sector also has its drawbacks. Developers will normally require guarantees against loss of revenue due to unforeseen government initiatives (for example, the future construction of another road that diverts traffic from the developer's road). The guarantees can be costly to negotiate and impose other costs on society through loss of government flexibility. A government that provides only weak guarantees will have to pay larger shadow tolls to attract investors.

BOOT-type projects

The main appeal of BOOT-type projects, compared with shadow tolling arrangements, is the reduced need for public finance. Advocates of BOOT-type projects say that many would face great delays or not proceed if they were publicly financed. To illustrate the benefit of BOOT-type projects in table 2.2, construction of the hypothetical highway is assumed to start five years earlier than in the other scenarios and, alternatively, eight years earlier. Duration of construction is assumed to be the same as under shadow tolling arrangements, as are the undiscounted costs.

Tax concessions for private infrastructure projects will affect the profitability of BOOT-type road projects, but the focus of this paper is on the benefits to society rather than profits. The amount of the tax concession represents a benefit to the developer that is exactly offset in a social accounting framework by a disbenefit to the taxpayers. Accordingly, no adjustment for tax concessions has entered the calculations of NPV.[5]

An earlier start to highway construction is beneficial (table 2.2), increasing the project's NPV by 22 per cent and 37 per cent (five and eight years earlier). For some highways, an earlier start could be counterproductive, even when the highway is worthwhile. If the optimal time to invest is still in the future, moving the project forward will reduce the NPV.[6] The merits of BOOT-type projects will

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[5] In any case, the main tax concession for private infrastructure projects, the borrowing tax rebate, will be restricted to a $37.5 million in 1997–98 (the inaugural year), increasing thereafter to a maximum of $75 million (including administration costs). These amounts are modest compared to the costs of some private road projects—about $2 billion for the recently commenced City-Link in Melbourne (AUSTROADS forthcoming). Moreover, only a portion of rebate will go toward new road projects.

[6] For illustration, one could vary the assumptions about the hypothetical highway (table 2.1). Assume that the traffic growth and discount rates are both 7 per cent and that the average daily traffic level in the first year equals 15,000. The NPV would then be greater under shadow tolling ($801 million) than under the BOOT-type arrangements (under $750 million), and largest for DCM contracts. The superiority of the DCM contracts to shadow tolling reflects that the project is commencing pre-optimally. Shortening the construction period can then be counterproductive, since it brings forward the opening of the highway.

depend partly on whether the urgency of the project is real or imagined. A BOOT-type project might commence pre-optimally for various reasons: forecasting errors, divergences between profit objectives and societal welfare, and government preferences (the projects often receive government support). Benefit-cost analyses of toll roads in Norway provides examples of where delaying the project would have been beneficial (Braathen et al. 1996).

Relative to shadow tolling, BOOT-type arrangements have various effects that have been omitted from table 2.2. The costs of toll collection have been omitted but can be significant. Based on limited information, DoTRD (1997b) assumed that toll collection costs would be 10 per cent of revenues if certain stretches of the National Highway were tolled (without taking account of the additional inconvenience costs to motorists if the tolls were collected manually). In Norway, toll collection costs have averaged about 17 per cent of toll revenues (Braathen et al. 1996), but it is not reported whether their estimate included the inconvenience costs. The costs of determining the developer's revenue under shadow tolling would be small in comparison, since it would require only the measurement of total traffic flows (without identifying and charging the motorists).

Another drawback of BOOT-type arrangements compared with shadow tolling is the increased potential risk to the private sector of unforeseen government initiatives. Suppose that the Government subsequently built an untolled road that provided an alternative route to the developer's toll road. The diversion of traffic toward the new road would be larger than if the developer's road were also untolled, as it would be under shadow tolling. The greater potential risk means that BOOT-type arrangements will normally have to offer stronger inducements for private investment than will shadow tolling arrangements. The inducements could be tighter guarantees against risk, which would entail costs in negotiation and reduced government flexibility; or an increase in the expected returns from investment, which would entail larger contributions from taxpayers or motorists. Taxes and road tolls both create costs to society, or 'deadweight losses', that reduce the net benefit from an investment.

Deadweight losses from taxes and tolls

Absent from the present calculations are the deadweight losses—or costs to society from disincentives—which can result from governments raising funds for a highway. Tolls, for example, would discourage motorists from using the highway, while taxes could discourage investment, work effort, and other economic activity. The deadweight losses are hard to quantify, and whether they are smaller for BOOT-type or shadow toll arrangements will vary from case to case.

The deadweight losses from the tax funding of roads are a matter for conjecture. A benefit-cost analysis of Norwegian toll roads assumed that funding the roads through taxes would create deadweight losses equal to 25 per cent of the tax revenue (Braathen et al. 1996). The figure of 25 per cent was considered conservative relative to the range of estimates that had been derived for Norwegian taxes (20 to 80 per cent). Estimates of deadweight

losses from Australian taxes also vary widely, even for a given type of tax. Han (1996) found the estimates to be sensitive to the data period and to moderate changes in assumptions about consumer preferences and the economic environment. Freebairn (1995) also emphasised the difficulty of quantifying the deadweight losses from taxes in Australia and elsewhere, and Department of Finance (1991) judged the evidence to be inadequate for use in benefit-cost analysis.

The deadweight losses from levying road tolls are also hard to estimate. Much depends on the level of traffic congestion and the availability of alternative routes. Suppose that there are effectively no alternative routes and that without tolling, a highway would have severe peak period congestion. Limiting the use of the highway by imposing tolls could then benefit society, particularly if the tolls vary by time of day and week. That is, the deadweight loss could be negative. But suppose instead that the tolls divert a lot of traffic to alternative untolled routes. In that case, the tolls transfer congestion between roads and may do little to relieve congestion overall. At the same time, there would be a loss to society from people shifting to a less convenient route simply to escape the toll.[7] The overall effect of the tolls on societal welfare could well turn out negative in these and other circumstances.

Public or Private Tollways?

In some cases, a public tollway could be a better option than a BOOT-type project. Toll payments by motorists would provide the revenue for the project, just as with the BOOT-type arrangement. In both cases, this additional source of revenue permits the project to proceed earlier than if funding has to come from existing government revenue. On the other hand, public ownership obviates the problem of dealing with the risk to private investors of unforeseen government initiatives.

A common and dubious argument for public ownership is that public enterprises have lower borrowing costs. True, public enterprises can often borrow at lower interest rates than can private companies because of their lower default risk. But the default risk is lower because taxpayers are implicitly expected to rescue an ailing public enterprise. The transfer of financial risk from lenders to taxpayers provides no obvious benefit to society. The interest rate differential is therefore no indication that public ownership reduces the cost of capital to society.

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[7] The diversion of traffic to untolled roads could have costs besides inconvenience, assuming that only the tolled road is a freeway. Cox mentions several benefits from 'traffic moving at a uniform speed of 70–90 km / h [freeway conditions] compared to stop–start operations at 20–50 km / h on our traditional urban arterial street system'. These are: 'the 50–70% reduction of accidents, the 20–30% reduction in petrol consumption and the 50–100% reduction in pollutants' (Cox 1994, p. 102).

Another common and dubious argument for public ownership is that it spreads the risks of ownership among the community, ensuring that nobody bears an inordinate amount of risk. The argument is dubious because private investors in infrastructure can limit their risks by diversifying their own portfolio of assets. For example, someone could include in their portfolio of share holdings shares in a corporation specialising in infrastructure investment.[8] Naturally, some risk remains, and even a broad portfolio can give poor returns in a stock market downturn. But public ownership is unlikely to apportion the risks from infrastructure investments any better than does private ownership. Public ownership is akin to a system of forced investment in infrastructure, where the investors are the taxpayers. In contrast, private ownership gives people the freedom of choice to invest in amounts that suit their financial circumstances, their judgement of the likely returns and their willingness to bear risk. Moreover, as EPAC observed, the risk spreading capacity of some large multi-national corporations may well exceed that of some small governments (1995a, p. 43). Quiggin (1996a) sees the 'equity premium puzzle' as evidence of risk-spreading advantages from public ownership of infrastructure, but the inference is tenuous (see appendix I).

The comparative efficiency of the public and private sectors in performing ownership tasks is another consideration. Public tollways confer on the government sector certain planning and administration tasks, even when construction and operation is contracted privately. Evidence is lacking on whether private firms perform these tasks better than government business units. In the broader infrastructure context, including industries such as airlines and telecommunications, reviews of the evidence have produced no consensus on the comparative efficiency of private and public owners. Domberger (1995) concludes that whichever sector has ownership, a key determinant of efficiency is exposure to competition.

On the competition criterion, the case for private ownership of tollways is weak. Public tollways will often face competition from alternative routes and, to a lesser extent, from other modes of transportation. The threat from such competition will encourage corporatised administrators of public tollways to be efficient. Indeed, the stimulus from competition could be greater for public than for private tollways, given that BOOT-type contracts often carry protection against competition from other routes.

Domberger also cites evidence to argue that even with competition, private owners will often out-perform public owners. He attributes this to private owners

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[8] In Australia, recent moves toward private investment in traditionally public infrastructure raised concerns about the ability of financial markets to 'securitise' the investments—that is, to parcel the investments into small shares that are reasonably liquid. Strong investor interest in new infrastructure investment vehicles on the Australian stock market has shown the concerns to be exaggerated (Jeanes and Maley 1996; Moodle 1997).

being disciplined by bankruptcy risks that do not apply to public owners, and to the 'commercial management culture' that privatisation instils into public enterprises (p. 46). This is where he disagrees with Quiggin (1995), who cites examples of reforms to public enterprises achieving the same sorts of efficiency gains as privatisation.

Australian evidence

The costs of BOOT-type road projects in Australia are sometimes compared with crude estimates of what the projects would have cost under public ownership. For example, according to one RTA source, the BOOT-type arrangements used for the M5 tollway reduced construction costs by 30 per cent.

Such comparisons are affected by much the same problems as the UK evidence for shadow tolling. The estimates of what the project would cost under public ownership arrangements are conjectural and are made before construction or even before tendering. Unforeseen developments, including changes to the performance specification of the road, can make the estimates inaccurate. For example, after the initial estimates were made for the M5 tollway, interest rates dropped and the economy went into recession, both of which would have lowered construction costs. Comparing the realised costs of the project with the initial RTA estimates would thus confound the effects of the macroeconomic developments with the effects of BOOT-type arrangements versus conventional public ownership. RTA staff urged BTCE to view the cost comparisons cautiously, including the one for the M5 tollway.

The Australian evidence on BOOT projects is further limited in that it relates to construction costs only. Some of the savings in construction costs may be offset by higher costs later on. On the M4 tollway, the use of asphalt rather than concrete paving reduced the costs of construction, but brought forward the date when reconstruction of the road will be needed. The RTA might have chosen concrete had it built the road. The developer's concession period, 17 years, was too short for reconstruction costs to affect the choice of paving material under the BOOT-type arrangements in place. Transfer of infrastructure to the government at the end of a BOOT-type arrangement normally takes place free of charge, giving the developer no incentive to pass on a concrete rather than an asphalt road. EPAC (1995a, p. 46) suggested that developers be paid the full economic value on transfer to provide the best incentives.[9] Another

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[9] The provision of incentives to undertake maintenance was one of the justifications EPAC offered for its recommendation. The other was the avoidance of 'front-loading' of user charges, which arises when the concession period is shorter than the economic life of the project and the asset is transferred to the government at zero cost. Under those conditions, the private financiers need to 'front-load' user charges to recover their costs within the short concession period (EPAC 1995b, p. 83).

remedy, which RTA indicated it would pursue, is to more tightly specify the conditions of the asset on transfer.

The M5 tollway provides another example of the possible pitfalls in cost comparisons. The tollway was built in just two years compared to the four years scheduled by the RTA. According to the RTA, the largest saving in construction time and cost resulted from a change in the design of the Georges River bridge, which was needed to haul materials to the M5 site. RTA designers would have opted for relatively few piers and longer spans, to increase the bridge's aesthetic appeal and to minimise the obstacles to recreational users of the river. The developer's design was less satisfactory in these respects but took much less time to build.

Differing estimates of construction costs have been reported for Sydney's M2 tollway, which opened in May 1997. DAA (1997) reported that costs were $100 million below the RTA initial estimate of what construction would have cost ($556 million) had the M2 been a conventional public sector owned and operated project. The BTCE has since obtained other estimates from the RTA that suggest considerably smaller cost savings.

The Australian evidence for BOOT projects, such as it is, generally supports the proposition that increased private involvement in road provision reduces construction costs.

In addition to transfer at less than economic value, there are other ways in which private ownership could distort the choice of paving material. Allen Consulting Group (1994) has pointed to lack of neutrality in the tax treatment of investment and maintenance. Taxation regulations allow the maintenance expenditures on roads to be written off in the year in which they occur, although they have the characteristics of investments (the effects of the maintenance produce benefits for many years). The consultants argued that this tax provision favours asphalt pavements, which require more maintenance but lower construction costs than does concrete.

CHAPTER 3 CONTRACTS FOR PUBLIC ROAD WORK WITH COMPETITIVE TENDERING

Road work contracts that are awarded through competitive tendering usually go to the private sector. However, public in-house teams sometimes bid for and win these contracts. The benefits from competition exist whichever sector wins, assuming the 'playing field' was truly level. As discussed below, the threat of private sector competition has sometimes coaxed large efficiency gains out of public roadwork agencies. Thus, the focus of the following discussion is really on the benefits from competitive tendering, rather than the benefits of contracting to the private sector as such. When the government decides to leave road work to the private sector and abolish its in-house capability, as happened with road maintenance in British Columbia, the distinction is academic, since total privatisation occurs.

EVIDENCE OF COST SAVINGS TO GOVERNMENT

Estimates of cost savings from contracting out government services need to be viewed cautiously. The sources for the estimates often fail to report accounting details. The costing of government in-house provision poses particular problems, such as the costing of capital.

Sydney experience—road maintenance

In Sydney's Liverpool region, a private contractor (Boral) replaced the in-house RTA maintenance team during 1991 and 1992. The costs to the RTA of maintaining the region's roads, excluding managerial and administrative costs, fell by about 40 per cent as a result (Frost and Lithgow 1995, p. 7).

The private contractor, engaged under a schedule-of-rates approach, reduced costs mainly through more flexible employment practices (Dixon and Jensen 1995). The RTA had faced the problem of keeping workers occupied during peak traffic periods, when key maintenance tasks could not be performed without greatly disrupting traffic, and during other slack periods. The private contractor dealt with the variability in workload in two ways: firstly, it relied more on part-time and casual labour (including subcontractors); secondly, it performed road maintenance work for a local council during peak traffic

periods. Traffic volumes on local roads are smaller, so repairs can be done during peak traffic periods without causing intolerable disruptions to traffic.

The changes to employment practices led to an improvement in the mix of road maintenance activities as well as a reduction in cost. During peak traffic periods, the RTA had employed many of their workers on off-road activities such as sign painting. However, the RTA considered that too many resources went into these activities at the expense of safety and structural maintenance. The employment practices of the private contractor permitted the RTA to achieve a better balance.

During the transition to private contracting the RTA continued to use its in-house team to maintain the roads within parts of the Liverpool region. The threat of competition jolted the in-house team into lifting its efficiency enough to reduce costs by 22 per cent within six months (Dixon and Jensen 1995, p. 163). Even so, the cost of using the in-house team ended up higher than the cost of using the private contractor.

Following the successful outcome in the Liverpool region, the RTA extended road maintenance contracting into other parts of Sydney using a performance specification of contract rather than the schedule-of-rates approach.

South Australian experience

The Clare District Council in rural South Australia divided its road grading work between council employees and private contractors as a pilot test. The cost per kilometre graded was $30 under contracting and $60 doing the work in-house. In addition, the contractors graded about twice as many kilometres per day as the council employees, apparently due in part to a longer work day with fewer breaks (Jensen and Fernandez 1995, p. 131).

South Australia has recently introduced competitive tendering for maintenance of State roads, whereby the maintenance business units of the Department of Transport bid against private contractors. South Australia's larger State-based contractors were reluctant to bid because of heavy workloads on other projects at the time. The decision to contract separately for 28 areas and to call the contracts at different times may also have deterred some companies from bidding, since this would have made it more difficult to realise scale economies by winning a large share of the total business. (It is difficult to say, however, whether larger contracts would be better, as they could deter some small companies from bidding.) In addition, the tender evaluation committees considered the whole-of-government costs associated with the contract, including those arising from separation packages and impacts on local communities, should the public sector team lose. Consideration of these additional costs would have reduced the chance of a private bid succeeding, although reportedly not by much in most cases, as private sector contractors

often employ ex-public workers (Cherrington 1996). By September 1996, 13 contracts had been let, 5 to private contractors and 8 to the department's own business units.

Other Australian experiences

National Highway: Queensland and Northern Territory

Maintenance work on the Barkly Highway is performed by private contractors on the Northern Territory side and by a local council on the Queensland stretch to Cloncurry. In 1994–95, the Queensland Government paid the local council $3,356 per kilometre of road maintained, far more than the $690 paid to the private contractor on the other side of the border. The difference in costs may reflect in large part the difference in contracting regimes. The local council is the sole invitee for the maintenance contract in Queensland, whereas the Northern Territory uses competitive tendering. However, other factors, such as the type and amount of maintenance work performed, would also need to be considered.

Tasmania: local roads

The Glenorchy City Council reduced its costs for road cleaning by 15 per cent by contracting to the private sector, according to Rimmer (1991). Fuller utilisation of equipment was one of the sources of cost savings noted. The contractor employed the equipment elsewhere when it was not being used in Glenorchy. Elimination of unspecified work practices that had lowered the efficiency of the in-house operation was also mentioned.

Road design and contracting

Contractors often suggest beneficial changes in road design, even when the contracting agency largely assumes design responsibility. In South Australia, a contractor submitted an alternative tender to design and build a steel bridge instead of a concrete one, with a cost saving of 9 per cent (evidence submitted by the Civil Contractors Federation to the Industry Commission, IC 1996, pp. 132, 144). For the Mittagong Bypass in New South Wales, a private firm proposed a design for one bridge structure that was 20 per cent cheaper than the original RTA design, according to a senior RTA official. The alternative bridge design resulted in a saving of around 1 per cent of the total project cost.

Experience outside the Australian road sector

New Zealand and the United Kingdom

Transit New Zealand has procured all professional services and highway maintenance through competitive tendering since 1991. Government business units compete with the private sector for contracts. The move to competition has reduced the costs of maintenance (physical works) by an average of 15 per cent, according to van Barneveld (1997, para. 30). The reductions in cost are attributed to changed work practices and to the opportunities for contractors to realise 'economies of scope' by switching between work for Transit New Zealand and other types of work. (Basically the same factors that were found to have generated cost savings in Sydney's Liverpool region, where the road maintenance contractor balanced work for the RTA with work for the local councils.) The agency which previously maintained the national highways in New Zealand, the former Ministry of Works, had been unable to diversify to the same extent because of political boundaries on the scope of its work.

The cost savings from contracting out government services can vary greatly over time. In New Zealand, contract prices for consecutive packages of identical road maintenance work has varied by as much as 50 per cent. In the UK, cost savings from contracting out government services have been reported to diminish over time. The limited Australian evidence appears to be consistent with this pattern of diminishing savings (IC 1996).

The Tasmanian Government has reported that cost savings from contracting out government services are typically between 25 and 40 per cent at the start, falling to a sustainable level of around 20–25 per cent (IC 1996, p. 137). This would be consistent with contractors attempting to secure a place in the market by initially bidding low, then raising their bids once they have established a reputation and can ward off competition. The opposite pattern is also possible — say, contractors improve their efficiency as they gain experience and then lower their bids. Whatever the pattern, the estimate of cost savings in Sydney's Liverpool, being based on early experience with contracting out, may differ from the savings realised later on.

UK experience appears to confirm that government providers of road maintenance services become more efficient after being exposed to competition. Madelin (1994, p. 70) reports that about 80 per cent of the road maintenance work is subject to competition and that the gain in the public provider efficiency has been 15 per cent. The basis for the estimate of efficiency gain is not explained, however.

Los Angeles

Contracting out work on local roads greatly reduces the costs to municipalities within the Los Angeles metropolitan region, according to Berenyi and Stevens

(1988). The authors compared the costs of asphalt overlay construction across municipalities, after controlling for differences in the tons of asphalt laid and the proportion of jobs with reinforcing material. They estimated that municipalities performing the work in-house had costs 96 per cent higher than did municipalities contracting out to the private sector. The authors likewise estimated that doing the work in-house adds to the cost of street tree maintenance (37 per cent), street cleaning (43 per cent) and traffic signal maintenance (57 per cent).

Berenyi and Stevens identified several factors that may have contributed to the cost differences. Private sector managers generally controlled the equipment they used, and used different equipment from their public sector counterparts, who lacked such discretion. For example, contractors tended to use wider and heavier asphalt pavers than found in the public sector, and could thus pave roads faster. Labour practices also differed. Supervisors had the power to hire and fire in most of the private firms but in only 16 per cent of the in-house municipal teams. In addition, private firms were more likely to employ incentive systems and generally had flatter organisational structures.

Although the basis for these estimates is well explained, their reliability is open to question. Contracting out could be just one manifestation of a generally more innovative and efficient government. In that case, the municipalities that contract out would probably have below-average costs for road work even if they performed the work in-house. Cost differences between these municipalities and those that actually do the work in-house could then overstate the cost savings from contracting out. Because of other factors that are not controlled for, under-estimation is also possible in such comparisons. Put simply, there is an apples versus oranges problem.

British Columbia

In British Columbia, privatisation of highway maintenance failed to save money for the provincial government and might well have done the opposite, according to the tentative evidence available.

The provincial government did most of the highway maintenance work in-house until 1988–89 and contracted out to competing private firms thereafter. The government abolished its in-house maintenance team, although some ex-members formed associations that won a few of the contracts. The government commissioned an independent review of the privatisation experience through December 1993, which found ‘strong indications’ that privatisation had increased costs to the government overall (Burton et al. 1994, p. 3). The review team formed a rough estimate that in 1992–93 privatisation had increased annual costs by $19 million, an increase of about 7 per cent. The estimate reflects a strong element of judgement as to how much road maintenance would have cost had in-house provision continued. Adding to the difficulty of

judging were other changes that occurred around the same time as privatisation, including a reorganisation of the government transportation bureaucracy and changes in accounting procedures.

The review team found that the government had given scant consideration to in-house reform before proceeding with a cost-ineffective privatisation of road maintenance. It admonished that 'if as much effort and financial resources had been invested in simply improving the Ministry's original program instead of "privatising" it in its current form, it is very likely that significantly different outcomes and costs would have been the result' (Burton et al. 1994, p. 3).

The apparent failure of privatisation to reduce road maintenance costs in British Columbia may have stemmed, in part, from restrictions placed on the contractors.

The contractors had to absorb all workers from the government road maintenance crew; they had to observe the same terms and conditions of employment as before; and they had to maintain specified levels of subcontracting to meet local employment and community development objectives. In view of such restrictions, the review team considered that less than 'full' privatisation had occurred: 'One is left wondering what exactly the contractors can do besides make equipment lease decisions and set staff schedules' (Burton et al. 1994, p. 58). Although not mentioned by the review team, contract size may also have limited the success of privatisation. The maintenance task was divided rather finely between 28 regional contracts, with individual contractors holding no more than three at a time. As in South Australia, scale economies could have resulted from a greater concentration of business.

Hard to measure costs

The British Columbia experience illustrates the difficulty in measuring capital costs for government in-house operation. Capital costs for road maintenance in the year before privatisation were initially estimated at $11 million, based on a $100 million valuation of road maintenance assets and an 11 per cent annual interest rate. The estimate was formed before the sale of the assets to the private sector, which fetched significantly less than $100 million, suggesting that the assets had been overvalued. The estimated capital costs in the year before privatisation was accordingly reduced to $7.4 million (Burton et al. 1994, pp. 46–48).

Estimates of the cost savings from contracting out often exclude the costs of administering contracts, for which data may be unavailable. This has led to widespread claims that cost savings from contracting out have been over-estimated. However, data have also been lacking for the administrative costs of in-house provision. For example, the above estimate of cost savings in

Sydney's Liverpool excludes administrative costs generally. Whether the exclusion biased the estimate up or down would depend on whether administrative costs were larger with in-house provision or with contracting out.

Administrative costs were taken into account in the estimates of the cost savings from road maintenance in the Los Angeles metropolitan area (Berenyi and Stevens 1988). Contract administration costs are reported to have averaged 6.6 per cent of the contract price, though it was not specified whether this included the costs of negotiating contracts. Some administrative costs of in-house provision, such as personnel services, were also included.

The evaluation of British Columbia's experience also included administrative costs (Burton et al. 1994, p. 60). It found that the costs of administering contract maintenance work accounted for more than half of the estimated increase in total costs due to privatisation. Costs of negotiating contracts do not appear to have been included.

BTCE has found no evidence of the extent to which ongoing cost savings from contracting out road maintenance are offset by transitional costs, such as redundancy payments and costs of reorganisation. The Industry Commission found some meagre evidence on transition costs, in canvassing the evidence on cost savings from contracting out government services generally, not just road work (IC 1996, pp. 541–542). It concluded that transition costs are unlikely to be large enough to alter the conclusion that, in most cases, contracting out reduces the costs of service provision for government agencies.

BENEFITS TO SOCIETY

Contracting government services produces a net benefit to society, that is the sum of net benefits to individuals. Some benefits arise from the cost savings to the government, which, in the current push toward small government, should bring tax relief. Additional benefits (or costs) arise through other effects of contracting out, such as changes in the pay of workers performing government services. Critics of contracting out, such as Quiggin (1996b), emphasise that these broader effects impose costs on some individuals that cancel out some of the cost savings to the government.

Quality of government services

Some have argued that cost savings from contracting out government services come at the expense of lower quality service. A common fear is that contractors will cut corners, particularly when the quality or extent of work is difficult to monitor. In British Columbia, for example, there were assertions that road maintenance contractors were neglecting less visible but essential preventive work, such as proper patching and culvert cleaning.

The counter arguments are that contracting raises quality through access to external expertise, better specification of the service by the purchaser and improvements in monitoring. In the road sector, contracting has clearly improved service specification and monitoring in many cases. Indeed, in at least one case, it was hard to measure quality prior to contracting because no quality management system existed (Dixon and Jensen 1995, p. 162).

The Industry Commission found no evidence that the standard of work normally improves or suffers under contracting out (IC 1996). Available evidence for road maintenance is similarly mixed. The Melbourne City Council reported that quality suffered when a contractor lacked the necessary equipment for road verge and median strip mowing (IC 1996, p. 8). On the other hand, contracting produced no observable change in the standard of road maintenance work in Sydney (Frost and Lithgow 1995, p. 5), and no deterioration in New Zealand (van Barneveld 1997, para. 18). In British Columbia, the review team heard conflicting claims about the change in quality, but was unable to assess them.

Workers' pay and conditions

Another fear is that contracting out government services reduces wages, undermines conditions of employment, and increases work loads. When this happens, the value of the workers' losses should be deducted from the cost savings to the government, in calculating the net benefit to society.[10]

Based on the limited evidence available, the Industry Commission concluded that contracting government services often does reduce wage levels and worsen conditions from the employees' perspective. This has sometimes occurred even when a government in-house team won the contract. The introduction of competitive tendering for aged services in the City of Melbourne, for example, caused the in-house employees to accept 20 per cent less pay in order to win a contract (IC 1996, pp. 170–171).

The industrial award system has protected contractors' employees to some extent. Road work contractors in Sydney appear to have offered generally similar pay and conditions to those received by the RTA workforce. The RTA requires contractors to sign statutory declarations that they are observing the relevant award wages and conditions in New South Wales. In the road maintenance contract in Liverpool, the workers were covered by the same union and award as covered the RTA workforce. Some weakening of terms and

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[10]This is not to deny that cutbacks in pay or conditions will sometimes benefit society as a whole. The assertion is simply that the net benefit to society will depend on the benefits or losses to all parties. To illustrate, elimination of a perquisite such as tea service will reduce costs to the employer. If the workers do not value the service all that much—as measured by how much extra pay would be needed to compensate them for its loss—there can easily be a net benefit to society. The benefit to the employer exceeds the value of the loss to workers.

conditions for the Liverpool workers may have occurred through the casualisation of employment, a common outcome of contracting that has worried the ACTU. The ACTU's concern is that casual workers lack some of the entitlements of permanent workers, such as annual leave, sick leave and maternity leave (IC 1996, p. 176). However, after-tax wages and hours worked would also need to be compared to determine whether casualisation reduces compensation overall.

The protection from awards has proved fairly limited in some cases, and will probably diminish in the future, now that awards are to contain minimum standards only. Skilled Engineering observed that:

> For people moving to contractor employment, Skilled's experience is that they are employed at standard award conditions and thus lose many of the additional benefits which may have been achieved over the years. These added benefits can be industry specific and tend to be an additional cost to the business. In many cases employers tended to regard such benefits as rorts which had been progressively forced upon the employers through industrial activity (IC 1996, p. 174).

Violations of award provisions diminish protection somewhat further. Unions have complained of some violations of awards on RTA contract work, particularly by subcontractors.

Limited award coverage is another factor. In particular, the awards do not cover contractors and other self-employed workers. On some small contracts, as may be given by local councils, many or all of the workers may be contractors or subcontractors. Conceivably, some of these workers receive less than award conditions.

How much of the cost savings from contracting government services come at the expense of workers' pay and conditions will vary from case to case. An important determinant will be the value the in-house workers were placing on their pay and conditions before contracting. Pay and conditions that are generous by private sector standards tend to be at risk from contracting. If, on the other hand, public servants receive no better a deal than their private sector counterparts, then contracting out would probably not undermine pay and conditions to any significant degree. (Otherwise, contractors could begin to have problems attracting and keeping good workers.) Borland and Lye (1995) obtained evidence suggesting that public and private workers in Australia have similar weekly earnings, after standardising for worker skills, industry, occupation and hours worked. The standardisation was fairly broadbrush — for example, there is more to skill than educational qualification and years of experience — and aspects of the job package other than wages, such as superannuation and job security, were not considered.

Contracting government services may improve workers' pay or conditions in some cases. A few participants in the Industry Commission inquiry, including the Department of Defence, cited their own experience of this. The Civil

Contractors Association (formerly the Australian Earthmovers and Road Contractors Federation) stated:

> Local government has a lower award wage system than the award under which private enterprise operates. This can lead to the situation where unions become disturbed when local government carries out work which may have been available to private enterprise (IC 1996, p. 175).

In British Columbia, privatisation of road maintenance raised pay levels by about 10 per cent, although workers reported greater anxiety about job security.

The Industry Commission has asserted that deterioration in pay or conditions, while a common outcome of contracting out government services, usually accounts for a small proportion of the cost savings (IC 1996, p. 15). The BTCE considers that the Commission has presented insufficient evidence to be able to generalise with any degree of confidence. Moreover, what may be true of contracting out in the main may not be not true of road work.

Job losses

Frequently, contracting out government services results in fewer workers performing these services more efficiently. (For example, a source in Transit New Zealand judged that contracting out had probably reduced road maintenance employment by 15–20 per cent.) This does not mean that contracting out will aggravate Australia's unemployment problem. In some cases, the government redeploys the surplus workers in other public operations. Even when this is not done, contracting out is likely to create new employment outside the contracted services.

For example, if cost savings to the government bring tax relief, taxpayers are likely to increase their demand for a broad range of goods and services. Indeed, contracting out a government service could even increase aggregate employment, particularly in the longer run, once the effects of redundancies subside. Thus, there are no solid grounds for assuming that reduced employment is a cost to society from contracting out government services.

The Industry Commission estimated the long-run effects of contracting out government services on aggregate employment and other variables, based on the ORANI model of the Australian economy. In the ORANI simulations, governments realise the potential to reduce their recurrent expenditures through further contracting out. The simulations indicate that the expansion of contracting out would, in the long run, increase aggregate employment by between 500 and 4400 full-time workers (or the equivalent thereof in part-time and full-time workers).

The Industry Commission obtained so small an estimate of the increase in aggregate employment partly because it assumed that contracting out would, in

the long run, leave the unemployment rate unchanged. Under this assumption, aggregate employment must increase in proportion to the labour force (the number of people who want to work). In the simulations, the productivity gains from contracting out lead to an increase in average real wages, which attracts more people into the labour force. But the expansion is small, consistent with evidence for Australia and other countries that changes in real wages have little effect on the size of the labour force (see Luskin 1990).

The possibility remains that contracting out could reduce the unemployment rate in the long run. The Industry Commission offers an unconvincing rationale for excluding this possibility from its ORANI simulations — that it wanted to exclude 'business cycle effects' (IC 1996 p. 582. The finding that contracting out increases average real wages reflects that labour demand has increased overall. In reality, the increased labour demand could show up partly in higher real wages and partly in a lower unemployment rate (regardless of the stage of the business cycle).[11]

Other considerations

Third party costs

Road work entails various third party costs, such as environmental damage, noise and disruptions to traffic. Contracting of road work might affect these costs in some cases. Contract labour will sometimes have more flexible hours of work that allow road maintenance to be performed in the evenings or other times when the inconvenience to motorists is least. Contract provisions can encourage such flexibility.

Gains to contractors

Some of the efficiency gains from contracting may show up in private contractor profits rather than in cost savings to the government. If competition among contractors is keen, the gains are likely to accrue to the government. If, on the other hand, competition is limited, some portion of the efficiency gains may accrue to the private contractors and this will need to be added to the cost savings to the government, to calculate the total gain to society.

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[11] That said, it may not be possible to reliably estimate the unemployment rate effect, given the limited knowledge of how Australian labour markets work. To estimate the unemployment rate effect requires an ability to model wage determination, always a hard task and particularly so now, when major reforms to wage setting arrangements are underway. Conventional practice in ORANI simulations is to determine long-run effects on wages by adopting fairly arbitrary assumptions — usually, that the unemployment rate will not change.

Private contractors usually must overcome a fair amount of competition to win road work contracts, according to the limited evidence obtained by the BTCE. For example, the RTA received tenders from eight companies for its pilot road maintenance contract in the Liverpool region (Dixon and Jensen 1995, p. 161). Even for road work in remote areas of Australia, calls for tenders can spark considerable interest. The Northern Territory Department of Works said it seldom experienced problems in getting an adequate number of private sector bids for road work contracts (DoTRD 1997a, p. 32). Similarly, the Clare District Council in rural South Australia received many responses to its calls for tenders for road construction and maintenance work, from as far as 500 kilometres away (Jensen and Fernandez 1995, p. 135).

Private contractors occasionally face little or no competition for road work. In some cases, the contract is awarded to them without competitive tendering. In addition, governments can sometimes discourage competition (deliberately or inadvertently) with the way they choose to structure the tendering process, as was discussed above in connection with South Australia.

ASSESSMENT

The evidence establishes that contracting road work can save the government large amounts of money in some cases. It also shows that contracting can lead to identifiable and significant improvements in the efficiency of road work operations. The improved efficiency benefits society as a whole.

As far as road maintenance is concerned, there probably remains a considerable amount of work for which competitive contracting could reduce the cost to society by 15 per cent or more. Evidence on the cost savings from contracting road construction is simply too limited for even cautious generalisations about magnitudes.

The BTCE does not claim that contracting is always the best option for work on public roads. It may not be under some circumstances: a shortage of potential bidders; high costs of transitional arrangements and of negotiating and administering contracts; and an existing in-house operation that is relatively efficient. Granted, the relevance of these circumstances is often exaggerated — for example, some local councils maintain that their road work tasks are mostly too small to attract bidder interest, even though a number of small tasks could be bundled into a contract of reasonable size.[12] Even so, the best mode of delivering road work can only be determined case by case. Reform of in-house arrangements may sometimes be preferable to the introduction of competitive tendering, as the independent review team suggested may have been the case with road maintenance in British Columbia.

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[12] The potential for competition for road work will be examined in DoTRD 1997a.

APPENDIX I THE EQUITY PREMIUM PUZZLE

Over the long run, stocks average a higher rate of return than does short-term government debt. For example, in the United States over the period 1889–1978 the average annual yield on the Standard and Poor's 500 index was 7 per cent real, while the average yield on short-term debt was less than 1 per cent (Quiggin 1996a, p. 54). That stocks typically earn a premium over short-term government debt is natural; otherwise, most people would be unwilling to assume the greater risks that stocks entail. The puzzle is that the observed premium is so large. In theory, investors can eliminate much of the risk associated with stocks by sufficiently diversifying their portfolios. That leaves the risk of fluctuations in the overall performance of the stock market, as indicated by measures like the Standard and Poor's 500 — what is termed 'market risk'. But the framers of the equity puzzle showed, within a simple model, that market risk is too modest to explain much of the observed equity premium, unless investors are far more risk averse than economists generally believe them to be. Kocherlakota (1996) formally sets out the puzzle and reviews the various attempts to explain it. He finds little evidence bearing on the two explanations that he deems most plausible: that investors are more risk averse than economists have assumed; or that transaction costs are higher for trading stocks than for trading short-term government debt.

Quiggin (1996a) invokes yet another explanation of the equity premium puzzle. The explanation proceeds from the fact that markets provide only limited opportunities for sharing of financial risks — in economic jargon, that markets are 'incomplete'. This is particularly true of the risks associated with labour income. Although workers can buy disability insurance, similar risk-sharing arrangements are lacking for many other earnings risks that are specific to individuals, such as the possibility of skill obsolescence. The specific risks that cannot be shared are absent from the original model revealing the equity premium puzzle (Mehra and Prescott 1985) and from the explanations that Kocherlakota favours. (All markets are assumed to be 'complete'.)

The existence of incomplete markets increases the amount of risk that each person bears individually, and this may help to explain the equity premium puzzle. Intuitively, people worry about having to consume parsimoniously in the event of unexpectedly low earnings, and this disinclines them to assume still

more risk by investing in stocks. It inclines to save more in relatively safe assets, such as short-term government bonds. But this reduces the returns on such assets relative to equity, contributing to the observed equity premium. This intuition has been formalised in stylised models of people planning their consumption over a two-period horizon, including the model to which Quiggin refers (Mankiw 1986).

However, more realistic models, in which people plan over many periods, have cast doubt over the ability of incomplete markets to explain much of the observed equity premium (Kocherlakota 1996, pp. 62–63). The averaging out over many periods of bad and good luck with earnings, combined with the ability to borrow or save, reduces the threat to consumption patterns from bad luck in any one period. For the multi-period models to explain much of the equity premium puzzle requires that many people have extremely persistent spells of bad or good luck.

Even supposing that the observed equity premium stems in large part from incomplete markets, what is the relevance of this to the debate over private versus public infrastructure? As already argued, markets for private infrastructure seem reasonably complete in that risks can be widely shared through portfolio diversification. Public ownership of infrastructure will thus not mitigate the problem of incomplete markets. The problem relates to other risks that cannot be readily shared, such as the risks of labour income mentioned above. Quiggin's inference from the equity premium puzzle — 'the public sector mechanism of spreading risk through the tax system may be less costly than the use of private equity' (Quiggin 1996a, p. 54) — is thus not well founded. EPAC also examined Quiggin's argument and likewise concluded:

> [The] equity premium paradox raises some interesting issues but is not a sufficiently well understood phenomenon to be a basis for arguing that the cost of bearing risk is lower for public than for comparable private investments (1995b, p. 73).

GLOSSARY

Contracting out 'The use of external suppliers under contract to deliver goods or services to, or on behalf of, government or government owned entities. Contracts are usually selected on the basis of competitive tendering' (EPAC 1995a, p. 109). 'External' may be interpreted broadly, to include suppliers that are business units of the organisation contracting out, provided that contracts are awarded impartially (an 'arms length' relationship between the business unit and the broader organisation).

Design, Construct and Maintain (DCM) contract A single contract for the design and construction of a facility, plus maintenance for a predetermined period. The design must meet stipulated performance standards.

Shadow tolling arrangements A shadow toll arrangement resembles a DCM contract, except that government payments to the developer increase with the volume of traffic rather than being a fixed sum. The additional payment for each vehicle is a 'shadow' toll paid out of general government revenue, rather than an actual toll that is charged to the road users.

Build-Own-Operate-Transfer (BOOT) 'An arrangement in which the private sector builds a facility at its own expense in return for the right to operate the facility and charge users a (typically government regulated) fee. The private sector owns the facility for a predetermined period after which ownership reverts to the public sector' (EPAC 1995a, p. 109).

BOOT-type arrangement—includes BOOT plus similar arrangements such as BTO (Build-Transfer- Operate); see EPAC 1995a, pp. 5–7.

REFERENCES

ABBREVIATIONS

BTCE	Bureau of Transport and Communications Economics
DAA	Development Allowance Authority
DoF	Department of Finance
DoTRD	Department of Transport and Regional Development
EPAC	Economic Planning and Advisory Commission
IC	Industry Commission
NRTC	National Road Transport Commission

Allen Consulting Group, The 1994, *Neutral Evaluation of Infrastructure Projects: Alternative Road Investments*, report for the Steel Reinforcement Institute of Australia, Melbourne.

AUSTROADS (forthcoming), *Private Sector Involvement: Review of Public / Private Partnership Arrangements*, Sydney.

AUSTROADS 1994, *Road Facts: An Overview of Australia's Road System and its Use*, AUSTROADS, Sydney.

AUSTROADS 1996, *Benefit Cost Analysis Manual*, AUSTROADS, Sydney.

AUSTROADS 1997, *Road Facts '96*, AUSTROADS, Sydney.

Berenyi, E. and Stevens, B. 1988, 'Does privatization work?': a study of the delivery of eight Local Government services*' State and Local Government Review*, Winter, pp. 11–20.

Borland, J. and Lye, J. 1995, (unpublished) Employee income relationship between the public sector and private sector in Australia, Report prepared for the Commonwealth Grants Commission, Canberra.

Braathen, S., Hervik, A. and Nesset, E. 1996, 'Is it a good deal?—cost-benefit analysis for tolled crossings', in *Roads: Finance, Provision and Operation: Proceedings of Seminar G held at the PTRC European Transport Forum,*

Brunel University, England, 2–6 September 1996, PTRC Education and Research Services Ltd, London.

BTCE 1995, *Adequacy of Transport Infrastructure: Urban Roads*, Working Paper 14.5, BTCE, Canberra.

BTCE 1996, *Economic Effects of a Brisbane–Melbourne Inland Railway*, Working Paper 18, BTCE, Canberra.

Burton, P., Parks, R., McCulloch, K., and Harvey, R.G. 1994, The operational human resource and financial implications of the privatised highway maintenance program of the province of British Columbia: A preliminary report, (submitted to the Ministry of Transportation and Highways of British Columbia, Victoria).

Cherrington, M. 1996, 'JVs and road maintenance: are they viable?'*, The Earthmover & Civil Contractor*, August, pp. 38–44.

Cox, J. 1994, *Refocussing Road Reform*, report to the Business Council of Australia, Melbourne.

DAA 1997, 'BOOT and BOO schemes and private sector infrastructure provision', *Develop Australia Bonds Briefing*, no. 12, Invest Australia, Canberra.

Dixon, R. and Jensen, P. 1995, 'Revolutionising road maintenance', in *The Contracting Casebook: Competitive Tendering in Action*, eds S. Domberger and C. Hall, AGPS, Canberra, pp. 155–168.

DoF 1991, *Handbook of Benefit-Cost Analysis*, AGPS, Canberra.

Domberger, S. 1995, 'What does privatisation achieve? — A comment on Quiggin', *Australian Economic Review*, 2nd quarter, pp. 43–47.

DoTRD 1997a, *Competition in the Supply of Road Works to Government*, Information Paper, DoTRD, Canberra.

DoTRD 1997b, Submission to the inquiry into federal road funding, DoTRD, Canberra.

EPAC 1995a, *EPAC Private Infrastructure Task Force Final Report,* AGPS, Canberra.

EPAC 1995b, *EPAC Private Infrastructure Task Force Interim Report*, AGPS, Canberra.

Freebairn, J. 1995 'Reconsidering the marginal welfare cost of taxation', *Economic Record*, vol. 71 (June), pp. 121–131.

Frost, M. and Lithgow, D. 1995, 'Road maintenance contract experience in New South Wales', Roads and Traffic Authority NSW, Sydney.

Han, S. 1996, 'The deadweight costs of taxes in Australia', paper presented to the 25th Annual Conference of Economists, Australian National University, Canberra, 22–26 September 1996.

IC 1996, *Competitive Tendering and Contracting Out by Public Sector Agencies*, report no. 48, AGPS, Melbourne.

Jeanes, M. and Maley, K. 1996, 'Infrastructure trust debuts at 40pc premium', *Financial Review*, 17 December, pp. 1, 7.

Jensen, P. and Fernandez, P. 1995, 'Competitive tendering and contracting in local government', in *The Contracting Casebook: Competitive Tendering in Action*, eds S. Domberger and C. Hall, AGPS, Canberra, pp. 127–154.

Kocherlakota, N. R. 1996, 'The equity premium: It's still a puzzle', *Journal of Economic Literature*, vol. 34 (March), pp. 42–71.

Luskin, D. 1990, *Preliminary Estimates of Labour Supply Elasticities in the SALTER Model*, Industry Commission Research Memorandum.

Madelin, K. 1994, 'Maintenance by private contractor or direct labour' *Routes/Roads*, no.282, 1-1994, pp.61-70.

Mankiw, N. G. 1986, 'The equity premium and the concentration of aggregate shocks' *Journal of Financial Economics*, vol. 17, no. 1, pp. 211-219

Mehra, R. and Prescott, E. C. 1985, 'The equity premium: a puzzle', *Journal of Monetary Economics*, vol. 15, no. 2, pp. 145–161.

Moodle, P. 1997, 'Infrastructure and utilities index performs well', *Financial Review*, 27 February, p. 29.

NRTC 1996, *Annual Report 1994/95*, NRTC, Melbourne.

Perry, M. 1996, Presentation to the New Traffic Review Committee on the financing of the Sydney Harbour Tunnel and other developments in privately developed road infrastructure, unpublished paper presented in Tokyo, April 1996. (The author is with Hambros Australia Ltd.)

Quiggin. J. 1995a, 'Does privatisation pay?', *Australian Economic Review*, 2nd quarter, pp. 23–42.

Quiggin, J. 1995b, 'Does privatisation pay? — A reply to Domberger', *Australian Economic Review*, 2nd quarter, pp. 48–49.

Quiggin, J. 1996a, 'Private sector involvement in infrastructure projects' *Australian Economic Review*, 1st quater, pp. 51–64.

Quiggin, J. 1996b, 'Competitive tendering and contracting in Australia', *Australian Journal of Public Administration*, vol. 55, September, pp. 49–58.

Rimmer, S. 1991, 'A case study in competitive tendering and its implementation: Australia', in *Privatisation and Public Enterprise: The Asia–Pacific Experience,* ed. G. Gouri, Oxford & IBH Publishing, New Dehli, pp. 315–323.

van Barneveld, J. H. 1997, 'Procurement systems for outsourced road operations in New Zealand', paper prepared for presentation at the Roads/Transport and the Economy Session of the 1997 XIIIth International Road Federation World Meeting, Toronto, Ontario, June.

ABBREVIATIONS

ACTU	Australian Council of Trade Unions
BCR	Benefit-Cost Ratio
BOOT	Build, Own, Operate and Transfer
BTCE	Bureau of Transport and Communications Economics
DCM	Design, Construct and Maintain
DBFO	Design, Build, Finance and Operate
RTA	Roads and Traffic Authority, New South Wales
NPV	Net Present Value

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