PORTFOLIO COMMITTEE NO 2

INQUIRY INTO ROAD TOLLING

Supplementary questions: Mr Tony Harris

Answers are to be returned to the Committee secretariat by Thursday 18 May 2017.

1. Can you please forward any references to academic books, articles, papers, reports or research that explains the methods and analysis that can be used by governments or public authorities to examine and assess the relative merits, or otherwise, of involving the private sector in whole or in part in road infrastructure projects including toll road concession agreements?

Committee staff have been given a longish – slightly edited – version of my paper on road policies that was commissioned by an entity with interest in transport matters. At the time I was a Professorial Fellow at the University of Wollongong.

The Productivity Commission also has a number of publications, including reports from inquiries, dealing with road pricing policies.

Road Ownership and Pricing in Australia

Tony Harris

December, 2005

Introduction

The improvement in Australia's road systems in the last two decades is very much welcomed. Indeed, cost-benefit analyses suggest there is still a backlog of road developments which offer significant net benefits to the community. Delayed construction of these roads postpones important improvements in welfare.

The last two decades has also seen a good deal of confusion, in the Commonwealth government and in some state governments, about the goals which governments should address when framing their public road policies. This has led to conflicting practices and, in many cases, inferior pricing and charging policies for the use of public roads. Because these policies are inefficient, governments have imposed considerable avoidable costs on road users and have distorted the economic use of road transport.

Poor practices have mainly been caused by governments' pre-occupation with avoiding debt. This preference is not justified on economic grounds. If debt is bad so are savings: savings are the converse of debt. The aversion to debt means that governments have had to rely on private financing - with all of its attendant difficulties and inefficiencies - when public financing is available and is the economically preferred approach to funding road developments.

There is an argument that private toll roads might be economically inferior to publicly owned roads, but they are the best available option if governments insist that they will not fund needed roads. A better argument is that private roads have cost road users significantly more than roads funded by government and that governments should not capriciously add to the community's road costs.

This paper canvasses these issues and proposes in broad outline preferred approaches to the development and funding of roads. Because some optimum policies require co-operation between the Commonwealth and state governments and others might pose practical or political difficulties for governments, second-best options for the development of public roads have also been identified. An attachment discusses the recent recommendations in the Richmond Report prepared for the NSW Government.

Confusion in Policies

Since the 1990s, the NSW government has simultaneously adopted several contrasting approaches to the pricing of metropolitan and inter-city roads. From 1995, the Carr government continued the practice of the previous Greiner-Fahey governments of allowing private ownership and tolling of major roads. The M4, M5 and M2 were authorised by conservative governments and the Eastern Distributor (M1), the Western Sydney Orbital

(M7) and the Cross City and Lane Cove tunnels, approved by the Carr government, supplemented these.

Although the Carr government's actions appeared consistent with its predecessor, it contemporaneously eliminated the toll on the F6 motorway between Sydney's southern

suburbs and Wollongong. It also extended some motorways considerably (especially the M5) without imposing a toll and it established important arterials (the western approaches to the central business district, including the Anzac Bridge is one example) also without imposing a toll. At the same time, the Carr government allowed a cash-back or rebate on private NSW vehicles paying tolls on the M4 and M5.

Added to the above is the continuation of tolls for crossing the debt free Sydney Harbour Bridge in order to subsidise the costs of the Sydney Harbour Tunnel. (The government claims this tunnel is privately owned.) In the development of the most recent concessions - the M7 and the two city tunnels - the Carr government imposed a franchise fee totalling several hundred million dollars on the successful tenderers. This is effectively a tax that is recouped by the developers from the tolls paid by road users. Finally, the Carr government imposed a surcharge or tax on users of the Sydney Harbour crossings to supplement funds for road development in rural and regional NSW.

There are thus eight contemporaneously applied policies to the funding/charging arrangements for NSW public roads. And although there are multiple practices, economic criteria such as marginal pricing and congestion pricing show that none of the pricing practices used in NSW is optimal.

This confusion about pricing/charging is not limited to NSW. In October 2003, the then Commonwealth Minister for Transport and Regional Development, John Anderson, announced the withdrawal of funding of $420 million for the Mitcham Frankston (Scoresby) motorway because the Victorian government has determined that it would be a tolled privately owned motorway. This approach has been re-confirmed by the Minister for Local Government, Territories and Roads, Senator Ian Campbell.

Yet, in the early 1990s a Commonwealth government allowed NSW to incorporate the Commonwealth's bicentennial road development gift to NSW intro the M4, a motorway subject to private tolling. Moreover, the Commonwealth recently provided a $356 million grant towards the $1.5 billion privately owned, and therefore tolled, Western Sydney Orbital, due to open in mid-December 2005.

The Commonwealth has declined to identify what factors have led to these different approaches, leaving the view that they have been motivated by non-economic issues.

Other governments have not been immune from similar confusion. The Victorian government, for instance, made a pre-election promise, later revoked, that the Scoresby motorway would be toll free. The Victorian government has claimed that unexpected budgetary pressures caused this change in policy, although its budget outcomes and debt levels have been sound. The government also never established why a road toll was the best available course to meet these perceived pressures.

Aversion to Debt

One of the major causes of these conflicting approaches to road developments is the near Australian-wide aversion by governments to debt.

In the first NSW Carr government, the state treasurer, Michael Egan, introduced the General government Debt Elimination Bill with its commitment to eliminate general government net debt by 2020. Using Government Finance Statistics, NSW had no net debt as at June 2004. In the nine years from 1995, the NSW government eliminated $17 billion of debt and built up a negative net debt position of $2 billion, mostly from its operating surpluses.

In common with the experience of NSW, Victoria has also little debt. The general government net debt at 30 June this year was less than $2 billion. The Queensland government has long had no net debt and substantial deposits and advances. Clearly, none of the three eastern mainland states have budgetary pressures to explain any reliance on privately funded roads.

Data presented by the Australian Bureau of Statistics show that, together, the eight state and territory governments had no net debt at June 2003 (they had negative net debt of $7 billion). The majority of these jurisdictions have a rating of AAA because their budgetary positions are not subject to imminent stress.

The Commonwealth has had a similarly successful debt elimination campaign following the last recession in the early 1990s. The Treasury estimates that Commonwealth general government will have no net debt by June 2007. From the peak net debt position in 1997, it would have taken ten years to reduce net debt and build up deposits to a total of $110 billion, mostly funded through underlying cash budget surpluses.

Perhaps because of their aversion to debt, Australian governments have generally been reluctant investors in the future. Between 1998 and June 2005, the Commonwealth general government recorded negative net capital investment. National Accounts published by the Australian Bureau of Statistics show that since 1996-97 general government investment in gross fixed capital formation - that is before depreciation and disposals - has grown by about 5.5 per cent a year. This has barely accommodated inflation and population growth. It has not allowed capital deepening and it is much less than the nearly eight per cent annual growth recorded for private fixed capital formation.

The debt fetish has meant that the current generation has had to finance all general government investments for the future as well as retiring debt used for past investments. It has also led to an underinvestment in capital works Though some researchers suggest that there is no infrastructure crisis in Australia, there are significant opportunities for infrastructure investments. Included in these are several road proposals with high potential returns (see Allen Consulting, 'Benefits of Public Investment in the Nation's

Road Infrastructure') that have not been advanced by governments because of a so-called government finance shortage.

This underinvestment is particularly evident in NSW where, on a per capita basis, the written down replacement value of capital stock owned by the general government has measurably declined. It is also evident in Queensland where the government has recently had to embark on a considerable investment in social and economic infrastructure to compensate for recent under-investments.

Capital Shortages

Because of this aversion to debt, governments have argued for a decade or more that they did not have the funds to invest in needed infrastructure and that the private sector should fund important infrastructure investments. International and domestic airports, major metropolitan roads, prisons, public hospitals, schools, railway locomotives and police stations are some of the physical assets the responsibility for which has been passed to the private sector.

As can clearly be seen from the above discussion, arguments that the public sector had insufficient capital to fund these assets have been grossly misleading. The NSW government, for instance, could have financed all eight of the private urban roads built in that state in the last two decades and still have reduced its net debt by more than half.

The report on road infrastructure recently prepared by David Richmond for the NSW government (the Richmond Report) states that privately financed public roads in NSW over the last five years amounted to $3.3 billion. The NSW general government cash surpluses for those five years exceeded $5 billion.

The argument that states did not have the money is also false because it suggests that the private sector had the necessary capital. But published agreements relating to privately owned toll roads show that the private sector issued new securities to fund its road program, with the servicing of debt and capital to be met from tolls imposed on users of its roads. Had the governments taken the same attitude to tolling for these arterial roads - as they had done for many roads in the past - they too could have borrowed (not that that was necessary) and serviced the capital needed for these works from tolls. This used to be the practice in NSW prior to its aversion to debt.

Government User Charges

Since colonial times, Australian governments have used tolls to finance road works. In the early years, when government capital was genuinely scarce, toll roads were private ventures although governments received payments from toll companies to fund community roads. As

capital markets and government tax bases strengthened, governments assumed the funding role.

In modern times, NSW governments have imposed a toll for the Sydney Harbour Bridge. It also tolled the F3 motorway between Sydney and Newcastle and its counterpart, the F6 motorway from Sydney to Wollongong. But because of a reluctance to incur debt, they have chosen to pass this responsibility to the private sector.

Governments might also believe that private tolls are politically more acceptable to the electorate than government tolls. This position is based on the view that state residents who are accustomed to paying for privately provided services would accommodate private toll roads rather better than public road tolls.

Although there might be merit in this political argument, the economics of road charging suggest that allowing episodically placed privately-owned toll roads in a complex road network is poor policy and leads to a reduction in welfare for state residents.

Cost of Capital and Risks

There are important micro-economic issues at stake in the development of public roads by the private sector because private debt is more expensive than public debt for road developments.

There is a respectable argument (advanced by Professor John Quiggin and others) that the range of investments made by states lowers their risk profile and allows governments to access capital at rates which are cheaper than those available to the private sector. The advantage allowed by this spread of risks can be seen, it is argued, in the lower cost of finance available to the public sector.

It is certainly clear that states - even those that are not AAA rated - have access to cheaper debt than the private sector. But this might come about mainly because the taxing powers of governments give lenders assurances that they do not have when providing loans to the private sector. While the weighted cost of capital (debt and equity) in the private sector is readily ascertainable, the cost of raising revenue through taxes is difficult to measure.

Some economists suggest that poorly designed taxes might impose an additional cost on the community of up to 15 per cent because of the inefficiencies and distortions caused by taxation. Administration costs can add another one or two percentage points to these distortion costs. Because the economic cost of taxation is substantial, its omission when focusing on the cost of debt capital borne by the state can lead to an underestimate of real finance costs incurred by governments.

To calculate the real cost of capital, it is necessary to recognise that real economic risks belong to the project being financed. Project finance - debt instruments that are only secured by the proceeds of the project - is different from entity financing. Project risks are thus likely to be higher than the risks that a purchaser of government securities might face. This

distinction means that a government road developer would typically have higher capital costs than those facing the government as a whole.

But it is also a truism that the entity that can best manage the risks of a project has, prima facie, the lowest real capital costs. And, as discussed below, the government is best able to manage the traffic risks inherent in road developments, the main risk affecting the cost of finance.

This does not mean that government agencies should design, construct, maintain and administer road works. These activities give rise to different risks that can be mitigated in a competitive tender process. But the correct allocation of risks means that governments should own arterial roads.

Because road developments are merely one part of a complex and large network, state governments have the better capacity to manage the key financial risk - the risk of traffic flows - inherent in financing a road development. Indeed, a private road only has value because it is linked to the wider government owned network.

If a new publicly owned road is underused, governments can direct additional patronage onto the road by the adroit manipulation of road controls several kilometres from the new development. Conversely, because private sector developers have no control over the approaches to their road development, they tend to compensate for the traffic or commercial risks they to which they are exposed by requiring higher tolls or guarantees, either explicit or implicit to mitigate risks.

Mitigating Private Financial Risk at Public Expense

In all privately financed public roads, developers have obtained an array of guarantees relating to government action. These clauses prohibit governments from taking action (unless specified in the agreement) that would threaten the economic viability of privately owned roads. They prohibit the development of unspecified public transport, unless compensation is provided. And they require governments to funnel traffic into the tolled roads

In an extreme form, these clauses required a state government to compensate the developer if any government state or national or international acted to reduce the competitiveness of their roads. They thus allow a company to sue the NSW government for the imposition of an increased petrol tax by the Commonwealth.

In addition, private developers of public roads include provisions in their deed of arrangement with the government imposing a general obligation on the government to treat the proposed road as a major part of the metropolitan roadwork. Such clauses are intended to place an obligation on the government not to disadvantage the private road business and to act to ensure that traffic flowed along these private roads. While it was not an explicit guarantee of profits, there was an implicit undertaking that the government would endeavour to ensure the profitability of these roads.

Furthermore, private road developers negotiated toll rates to help ensure, in virtually all circumstances, that the traffic risks they faced would not lead to unprofitable roads.

Conversely, deeds of arrangement with governments do not allow governments to seek compensation for specific actions which increase the profitability of tolled roads. Though there are clauses which allow profit sharing where profits exceed specified levels, the agreements are weighted against government and the taxpayer.

Just this one criterion, the cost of capital, argues that the party that is better placed to manage traffic risk should own additions to the metropolitan road network.

If governments were determined to have roads owned by the private sector, it would be necessary to minimise financial costs to ensure that the private developer was not exposed to traffic risk. This could be achieved by the government leasing the road from the private developer for a fee sufficient to allow the developer a normal profit for providing finance to a government borrower.

However, such a lease arrangement would be treated as a financing arrangement under accounting rules. This would lead to an increase in recorded debt and recorded assets on the government's statement of financial position or balance sheet, notwithstanding that legal ownership of the road rests with the private sector. If the main driver for privately owned roads is governmental aversion to debt, this arrangement would not meet the government's aims. (Indeed, there is an argument that under the newly adopted Australian Equivalent International Finance Reporting Standards all joint ventures of the type used in privately financed road schemes would be treated as government assets and liabilities, thus frustrating the governments' aversion to debt.)

There are other issues suggesting that governments should own urban roads.

Negotiation and Documentation Costs

In addition to the financing cost issues discussed above, it is evident from the several deals already undertaken in metropolitan Sydney that there are other costs which adversely affect the efficiency of private road ownership.

A major cost not present in government ownership arrangements is the cost of negotiating and documenting private ownership deals. The complexity of the last completed development in Sydney, the Cross City Tunnel, can be gauged from the number of principals participating in the deal. An extract from the audited summary of contracts provided on the next page (taken from the NSW Treasury website on 6 December, 2005) shows the numerous parties involved as principals in the development of that facility.

A host of advisors including lawyers, accountants, financial advisers and engineers were also involved in formulating the agreements noted in the diagram.

There would be a large number of contracts, deeds and arrangements even if government had financed the road. The difficulties in constructing a tunnel under the central business district made the project particularly difficult. But it has been estimated that the typical cost of documenting agreements related to privately owned developments of this type might account for between 5 per cent and 7.5 per cent of total costs.

Imbalance in Negotiating Powers

Although government negotiators have endeavoured to limit the capacity for excess profits, it is evident that the private sector has made significant gains from their private roads which they have not had to share with governments.

The sale of the M4 provided the original owners with more than 10 times their original equity. (AIDC purchased for $7.7 million a 10 per cent share of M4 from its original developers whose original equity was reportedly $0.5 million. UTA accounts valued its 10 per cent holding at $47 million in 2000 and $19.5 million in 2003.) The recent purchase of the M2 by the Transurban Group for $2.2 billion provided equity holders with a two-fold return within a year. Securities purchased for $6.40 in April 2004 sold for $12.13 in early 2005.

Sometimes owners have received windfall benefits at the cost of state taxpayers. Because these windfalls are unexpected, they are not factored in at the time road development proposals are settled.

The toll-free western and eastern extensions of the M5 improved the cost-benefit to toll payers and thus increased the road's profitability because the government mainly funded the extension The cash-back arrangement applicable to the M5 and M4 provides an opportunity to owners of privately registered NSW vehicles to obtain a government rebate of toll payments less GST. This worked to increase toll-paying traffic and to increase profits because the cost of the rebate is entirely borne by the government.

In addition to receiving government support to offset lower than forecast traffic flows, investors in the M2 received a 100 per cent return on their investment for each of the first two years of that investment. This came about because of flaws in the taxation laws dealing with infrastructure bonds. The cost was thus borne by the Commonwealth taxpayer. But it added to the profitability of private roads and it added to the cost of the M2 borne by the public.

It is possible that the construction of the Lane Cove Tunnel, even though it will be a privately owned toll facility, will add to the value of the M2 because of the benefits provided to the network.

There are several reasons for this imbalance in negotiating power. They suggest that the imbalance is not totally mitigated by competitive pressures. One concerns the different incentives and skills present in the private and public sectors. Another reason is the political pressure faced by government negotiators. They are obliged to negotiate a completed deal. Private sector negotiators are obliged to negotiate a profitable deal. A further reason is the unwillingness of government to invest in skilled advisers. In the negotiations for the M1, RTA originally set aside $10,000 for financial advice from a leading merchant bank. Although it ultimately spent $100,000 on that advice, the amount was still insufficient for a project of its size.

Finally, we have seen that the competitive tender for private road developments is merely the start of a complex process. It is common that negotiations will continue for many months following the selection of a preferred proponent following a tender.

Network Considerations

The relevance of networks for traffic risk was discussed earlier. But there are other network issues bearing on the issue of ownership of public roads. When calculating the cost-benefit of an addition or improvement to the network, all of the network issues must be taken into account, not just the revenue and costs of the addition. However, when episodic parts of the network are privatised, the private owner is indifferent to these network issues. The only issue relevant to the private sector is the costs of the development to be borne by the developer and the benefits to be garnered by the developer.

It follows that the private development and pricing of roads in a network could be distorted if there are important difference between the costs and benefits of a proposed development and the costs and benefits on the wider network. In other words, segmenting ownership of a network is likely to lead to an increase in externalities that distort decision-making.

This issue was also touched on in the Richmond Report. It concluded, perhaps too coyly, "… most new motorways will be even more greatly influenced by network characteristics and changes." Richmond went on to say, "In most cases it will therefore become inappropriate to finance future motorways as if they were stand-alone projects." However, because important network issues were evident for these earlier developments, the same conclusion could be extended to past motorways. It follows that the stand-alone approach to their financing has been grossly flawed.

Richmond seems to believe that traffic predictions and thus traffic risks will be more readily ascertainable in future, allowing an economically efficient allocation of benefits and costs than has occurred in the past. This view is optimistic. Changes in public transport conditions and requirements extending out thirty to forty years, the life of most arrangements for privately owned public roads, are not easily foreseen Moreover, it is difficult to value let alone allocate network benefits between different owners of parts of the network.

There are likely to be substantial changes in population patterns and traffic needs over that period, as there has been in the past period of similar time lengths, which argue against long-term inflexible arrangements constraining government action. The development of the Sydney Cross City Tunnel impinged on the M1 in physical and financial terms and M1 executives were well placed to negotiate the changes necessary to accommodate the Tunnel with the view to maximising benefits flowing to shareholders.

Coupled with these problems is the short-term vision of governments. The planning horizon of NSW's Roads and Traffic Authority were so short that it was able officially to claim when the M2 was completed in the early 1990's that it had no opinion on the need for or the characteristics of the missing link between it and the Gore Hill Freeway leading to the Sydney Harbour Bridge. That missing link - now called the Lane Cove Tunnel - is near completion.

Pricing Issues

An issue affecting the network characteristics of urban roads is the correct pricing for motorists using roads.

Where a roadway has spare capacity, the price imposed on an additional vehicle should be close to zero, especially if the vehicles are motorcars, which impose little maintenance costs on roads. This pricing reflects the theoretical optimum approach to pricing: the application of marginal pricing that reflects capacity constraints or congestion costs.

Where there is an alternative motorway, as there often is in a complex road network such as exists in metropolitan areas, pricing should also ensure, all else equal, that there is no imbalance in relative use of equivalent, available roadways. Where there is over-use of one roadway and under-use of the alternative, imperfect pricing may be present.

This optimum basis for pricing is frustrated when there are tolled roads (whether or not owned by governments) providing alternative opportunities to untolled public roads. As is evident, tolled roads in Sydney and Melbourne often have significant spare capacity at a time when use of the untolled alternative is at or in excess of capacity.

In particular, we have seen that many motorists prefer to use un-tolled roads because the price for doing so (the price is additional transport time, other congestion costs and increased variable costs) is perceived to be lower that tolls. In other words, the differential in price between the tolled and untolled roads exceeds the value that many users obtain from using the tolled route with its faster journey times.

This means that toll roads are underused - and resources wasted - while the alternative route is overused. The imbalance in use represents another source of welfare loss for state residents.

The pattern of under-use of tolled roads and overuse of untolled roads seems present for most periods. The exceptions are peak periods - when use of all relevant roads exceeds capacity - and when traffic is so minimal that use of all relevant roads is significantly less than the capacity of a single road.

It is also true that all is not equal between a toll road and its equivalent un-tolled public road. There are reasons relating to the environment and amenity to suggest that traffic should be encouraged to use tolled roads. This encouragement should not be provided by closing or restricting alternative routes - that would constitute a loss of public assets - but by the use of efficient pricing techniques.

The preferred means to remedy this sub-optimal outcome is to bring the prices of using tolled and untolled roads closer together, to reduce the incentive to prefer the latter because of the large price differential. A former head of NSW's Department of Main Roads recently described the dilemma thus: motorists should be able to use new motorways for no cost while a charge should be applied for their using the old, alternative route. This is further explored below.

Congestion Pricing

Partly because of technology and collection costs, there is no evidence that congestion pricing will soon be introduced in Australia. In part, this is because mechanical coin collection devices - used on most NSW tollways, but not in Victoria or for Sydney's Cross City and Lane Cove Tunnels and the M7 - require significant manual adjustment to collect different tolls. It is thus not currently practical on these motorways to change toll rates to reflect traffic use and congestion costs.

There also seems to be a political reluctance to allow congestion-based tolling even where electronic collection, which can accommodate changing prices, is used as the sole method for collecting tolls. Trials of electronic toll collection congestion-based pricing have commenced in the USA and variants of congestion pricing have been used in Singapore (and cordon pricing in London) but there seems to be no initiative to introduce congestion pricing in Australia.

To be effective, congestion pricing should not be limited to currently tolled roads. Comprehensive electronic tolling would be required to ensure that users of alternative roads are not able to avoid the costs of congestion that they impose on other users.

This implies the widespread installation of electronic tollgates on all major arterial roads and their alternatives, and a requirement for all vehicles to be equipped with e-tags or to have a video account which enables invoices to be generated through the electronic capture of registration plates as vehicles pass through toll gates.

Although Victoria's experience with electronically tolled roads has been generally positive, owners of the Sydney Cross City Tunnel have been unable to require users to acquire transponders. At the same time, this company has had to cancel the additional charge which it announced would be imposed on tunnel users without transponders.

Developers of the M7 have offered incentives to induce users of its motorway to acquire e-tags. It remains to be seen whether this company will be able to impose an administrative charge although it has announced that an unspecified "handling fee" will be imposed on owners of vehicles using the M7 who have failed to make arrangements to pay the toll through e-tags or a video tolling account.

Thus, while a former NSW Premier, Nick Greiner, has suggested that all vehicles be equipped with transponders, there is no evidence of political support for the notion. And the failure of the owners of the Cross City Tunnel to sustain a policy of higher pricing for customers without e-tags suggests that congestion-based pricing is not imminent.

Episodic Tolling of a Network

It seems logical to support tolled roads. The argument is: Australian cities have needed significant investments in roads to support economic activity. Governments have declined to fund these new roads. Governments have invited the private sector to undertake the necessary investment. The private sector needs an appropriate return to justify its investment in these roads.

However, as has been seen, this approach has involved differential pricing between tolled and untolled roads that has led to large welfare losses. Moreover, there are equity issues in requiring users of some roads to bear costs that are not present for users of equivalent roads.

It is not enough to respond by saying that those who do not pay the price of tolled roads must pay the congestion costs from their use of untolled roads. For a start, many of those congestion costs are imposed even when there is under-use of tolled roads; that occurs because toll roads are over-priced for many users. Moreover, there are many road users who are not asked to pay tolls because there are no tolled roads in their districts or on their routes. In other words, the episodic presence of tolled roads raises equity issues.

The experience in Sydney shows that the population growth area of northwest Sydney has been particularly burdened with toll roads. The M2, the Lane Cove Tunnel and the Sydney Harbour crossings form an expensive route to the central business district. The tolls on that route total $14.60 a day or $73 a week of which none is subject to cash-back. Those travelling from the western suburbs to the city face tolls amounting to $22 a week. Of this, $20 is refundable through cash-back.

Other road users, whether from the north-west or western suburbs, may choose roads which bear no tolls and which, depending on the time of journey, may have little congestion costs.

There is no economic justification for this differential in costs. Equivalent roads represent equivalent investments and serve equivalent needs, no matter when they were last constructed or who paid for them.

To overcome the equity problems caused by episodic toll roads, the prices of tolled and non-tolled roads needs to be brought closer together.

The Design Problems of Toll Roads

In addition to welfare losses and equity issues discussed above, there are inherent problems with the design of toll roads which depend on mechanical or human toll collectors.

The use of traditional tollgates reduces the value of motorways because of the need for vehicles to stop to pay the toll. But more importantly, the need for these tollgates requires road designers to minimise the number of exit points from motorways in order to reduce the number and costs of collection points.

For the same reason, the need for tollgates reduces the number of points for traffic to enter the tollway.

This limitation means that toll roads are not designed to optimise traffic flows but to optimize toll collections. This is evident in the design of the M5 in NSW as it passes under the Hume Highway. Although there is capacity for a slipway to take traffic off the M5 onto the Hume before the tollgates, the exit has never been completed because of concerns that it would reduce toll revenues.

The universal application of electronic collections - either through the use of transponders or video accounts allowed by the operators of Victoria's CityLink and NSW's M7 - would overcome these design problems. It would also facilitate more efficient pricing across the network. Similarly, electronic tolling would allow congestion pricing.

Loss of Road Control

The Richmond Report comments on the road closures that have been introduced to funnel traffic onto tolled roads. The NSW government has a policy of maintaining non-tolled roads as an alternative to tolled roads. But this policy can interfere with the profitability of tolled roads. Accordingly, the NSW government - as the Victorian government did for

CityLink - agreed to limit access and use of untolled roads to improve the attractiveness of tolled roads. Where this is the only or main motivation, such road closures or restrictions cause a significant waste of public resources.

In response to complaints about agreed and impending road restrictions associated with tolled roads in NSW, the Richmond Report recommends that such restrictions be avoided in the future. While this is an economically sensible recommendation – one that the government has announced it has accepted – it can pose problems for the financial viability of privately owned toll roads by increasing their traffic risk.

Accordingly, the recommendation increases the need to ensure that pricing policies ensure a sound distribution of traffic between currently tolled roads and their toll-free alternatives.

Advantages of Private Ownership

Although there are many disadvantages arising from private ownership of parts of an urban network, there are some advantages. These emanate from the economies that can be obtained by linking decisions on finance with those relating to design, construction time and maintenance costs.

Because there are several trade-offs involved in road development, there is some evidence that combining all relevant elements of road development allows developers to optimise decisions. The increased costs of rapid construction can be compared to the benefits allowed from an early commencement of positive cash flows. The costs of maintenance can be optimised with the costs of construction quality. Finance and hedging costs can be better controlled when decisions are integrated.

While these benefits are real, available research does not indicate that these are sufficient to offset the costs of private ownership. And benefits can still be obtained by the use of sophisticated contracts between owners and construction companies.

In any event, even the private sector does not unify all activities in the one company. When privately owned roads are developed, it is common practice to use specialists companies to undertake different parts of the road development activity. This demarcation between equity holders and construction firms and engineer firms is needed to take advantages of specialist expertise.

Moreover, contracts can ensure that important trade-offs discussed above are properly captured in decision-making. The rapid completion of Sydney airport's third runway, constructed while the airport was in government ownership, reflected the incentives provided to the construction company and the benefits to the airport of early completion.

Tolls as Taxes

The Richmond Report recommended against the use of franchise fees levied on private road developers as a source of general revenue for the development of public roads. Such fees - to the extent they exceed government costs associated with the tolled road - represent an additional economic burden to be borne by tollway users.

The policy that toll roads revert to public ownership at the expiration of the franchise period also involves a tax on users of the toll roads. Users are required to meet all of the costs of the toll road in the franchise period so that the assets can be transferred to the government free of charge, even though the transferred asset has considerable value to the government.

The imposition of a tax on Sydney Harbour crossings is another toll policy that, in its design and justification, has little economic merit.

Possible Solutions: Universal Electronic Tolling

The optimum approach to pricing would do away with episodic pricing of tollways and would eliminate the price differential between tolled and non-tolled roads. It would also facilitate congestion pricing which would fund increased capacity in the network, if motorists were willing to meet the necessary fee.

Although there are apparent political difficulties in requiring universal e-tags, advances in technology allow the electronic tracking of vehicles through their registration plates. This technology, already used on some motorways in Australia and overseas (such as in Toronto, Canada), could be used to establish an extensive tolling system throughout a metropolitan area (and on regional roads).

This approach to road pricing would require universal or near-universal use of e-tags or video accounts and a comprehensive array of electronic tollgates to ensure that all users of arterial roads or equivalent roads carried their appropriate share of the pricing burden.

The revenues collected from roads currently not tolled would subsidise reductions in the tolls raised by privately owned motorways so that each road was subject to the same price or a similar price. At the same time, owners of tollways would not be disadvantaged because they would receive sufficient revenues by way of their own collections and/or government paid shadow tolls (payments made by governments direct to developers on a per vehicle basis as determined by vehicles counts) to meet their financial requirements.

By closing the differential between prices, the problems caused by episodic tollways in an urban environment could be reduced. Under this approach no additional revenues need be collected other than to cover increased administrative costs.

Should congestion charging be introduced, no revenues additional to those spent on increasing road capacity to reduce congestion need be collected.

This approach would desirably require renegotiation of the key agreements between the government and private toll road operators. And such renegotiations would need to reflect the additional traffic that would flow on currently tolled roads as the price for using these roads falls. However, state legislatures have the constitutional power to modify agreements unilaterally, if that were necessary. There is no reason to suggest that use of these exceptional powers would be needed: private sector operators would be expected to participate in a scheme which would not disadvantage them.

Possible Solutions: Raising Revenues from Consumables

An alternative and second-best solution would be based on taxing motor vehicle inputs as a surrogate to tolling. The best surrogate for a charge for road use is an increased tax on petrol consumption. However, because of the limitations of state powers in the taxing of goods, the support of the Commonwealth is required to raise such revenues.

If the Commonwealth were agreeable, an increased levy could be imposed on the sale of petrol in metropolitan areas, with the levy decreasing as sales of petrol in the metropolitan area approached rural boundaries. (It is evident that road costs are higher in metropolitan areas and solutions to congestion problems are more urgent and more expensive in metropolitan areas.) Proceeds of the levy could be used to compensate privately owned motorways, which would reduce or eliminate their tolls pari passu with the subsidy received from state governments.

Possible solutions: Mileage Taxation

Mileage taxation is a concept canvasses in literature on road pricing. It relates to the imposition of a constant charge on motor vehicles for each mile or kilometre travelled. The idea of a mileage charge is embedded in the regulated prices for taxis. It is also used for the M7 which charges $0.2963 a kilometre, with a maximum charge of $5.93.

If the Commonwealth was unwilling to participate in solutions to the toll problems facing motorists in urban areas, state governments could use their powers over motor vehicle registration to impose an annual charge based on the annual mileage travelled by the registered vehicle. To avoid collection problems, an estimate of mileage could be used to calculate a charge, or a charge based on average mileage could be imposed, for the year in advance with a reconciliation occurring when actual travel distances are available. Charges for vehicles would vary depending on the location of the registered vehicle.

States such as NSW that subject vehicles to an annual registration check could collect the actual mileage travelled by a vehicle at the time of the registration test. Jurisdictions that have no mandatory annual test could monitor the accuracy of mileage figures submitted by vehicle owners in their random vehicle registration checks.

Clearly, this arrangement is less finely tuned than the options discussed earlier. But each would address the pricing and other problems canvassed earlier in this paper.

Likely Rates

Should user charges, or their surrogates, be imposed only on motorists using roads that are alternatives to tollways, the government should have sufficient capacity to subsidise a reduction of around half in current tolls. This assumes that traffic is evenly distributed on tolled and non-tolled roads. A more widespread imposition of user charges would allow lower rates, significantly lower than the rates charged for the M7, approximating some cents per kilometre travelled.

Regional and Inter-city Roads

Few cities in developed countries rely as much as Sydney and Melbourne do on urban toll roads. Presumably the network and pricing problems discussed earlier are seen as disincentives. Thus, most tolls in the United Kingdom are for unique crossings (such as bridges) which prevent traffic distortions encountered in urban networks or are shadow tolls. Japan has urban tollways, but this has been explained by failures in Japanese financial institutions whose lending policies are overly influenced by political bodies.

The use of tolls for regional and inter-city motorways is more common overseas, partly because there are fewer network problems and congestion issues in non-metropolitan areas. (Non-urban roads can also better cope with manual or mechanical collection of tolls because distances between tollgates can be greater in non-urban areas.)

It has been reported that for the past 20 years Beijing has relied on private capital to build 90 per cent of inter-city roads via tolled motorways. Intercity tolled roads are common in the United States where most are publicly owned. Italy has over 2000 kilometres of ‘autostrade’, tolled express regional highways owned by a publicly listed company which was once a government agency.

Typically these regional motorways are separated from existing secondary roads in order to separate local traffic from intercity traffic. This also reduces network issues and traffic risks because toll-free roads are significantly less attractive to intercity traffic.

Where regional roads have low traffic risks (because all or most revenue is expected to be collected from intercity traffic which would find secondary roads unattractive) there are fewer objections to tolls and private ownership. There are also fewer equity issues involved in some intercity roads being tolled while others are toll-free because regional roads are not meeting the needs of local traffic and toll payers are typically only occasional users. The announcement that parts of the Pacific Highway route will be developed as a toll road but that local road users would be exempted from tolls (through registration of vehicles allowing video invoicing systems to recognise registration plates which should not be charged) has also helped to alleviate equity issues.

Tolled intercity roads include the Pacific Highway between Newcastle and Brisbane (recently announced) and roads linking Brisbane with northern and western cities.

Differential Pricing

Except for the soon to be opened M7, tollway charges distinguish between motor vehicles and heavy commercial vehicles with the latter facing higher tolls. This differentiation is justified on marginal pricing grounds because trucks impose greater maintenance costs on road pavements. (The force exerted by vehicles on road surfaces is proportional to the weight carried by an axle.)

The toll costs for commercial vehicles - there is an upper limit of $5.93 for a one-way journey on the M7 - is estimated to be significantly lower than the benefits which have been estimated, in terms of time saved, at 30 minutes. There are other benefits, fuel and wear and tear, arising from sustained driving on the motorway compared to negotiating scores of traffic lights and intersections.

The summary contract for the M7 gives no explanation for the unitary pricing adopted for that motorway. Although there are significant net benefits from using the M7, there might be reasons in public policy to subsidise trucks so that they do not use alternative surface roads and give rise to environmental and amenity costs. But such subsidies should not be at the cost of other vehicle classes.

Conclusions

These discussions suggest the following:

Notwithstanding significant recent developments in Australia's road systems, there are important net benefits which are yet to be obtained from further developments.

There is no sound reason justifying the development of episodically placed tolled roads in Australia's urban environment. The potential high returns to the community from some urban road developments have been reduced, sometimes significantly, because tolls imposed

on parts of a network has led to a significant reduction in usage of new roads and an overuse of alternative roads.

Governments have had adequate financial capacity to undertake these developments without resorting to occasional tolling. Even if conventional funding sources were perceived to be inadequate, there are better ways to raise additional capital than to rely on tolled urban roads.

The community has lost substantial benefits by relying on privately-owned toll roads because the private sector is less able than government to bear important traffic risks associated with urban roads.

The private owners of urban toll roads have extracted significant planned and unplanned profits from their investments in tolled roads. Had these roads been owned by the government, these benefits would have accrued to the general community.

To achieve potential returns, including environmental and amenity improvements, tolls should not be concentrated on new motorways but should be applied to all competing roads.

To overcome equity issues, tolls should be widened further to cover major urban and non-urban roads.

A widely based charged, leading to a low per kilometre user charge for motor vehicles, with higher charges for heavy vehicles, would fund shadow tolls enabling the equilibration of tolls charged for existing tollways.

If warranted, a more comprehensive user charge could also allow congestion charging to be introduced. If warranted, comprehensive user charges could also fund pressing new developments for urban roads.

Electronic tolling, by way of e-tags or computerised tracking and monthly accounts, would be the preferable method of comprehensive tolling. Alternative methods, such as taxing consumables or mileage taxes, are second best methods.

Comprehensive user charges would add to welfare by eliminating the need for governments to close or restrict existing urban roads in order to funnel traffic into new, tolled developments.

The imposition of additional government charges and taxes, by way of franchise fees for privately developed roads and additions to tolls, is an unwarranted distortion.

The private sector, operating in a competitive environment, has an important role in designing, constructing and maintaining Australian roads. However, the sale or disposition to the private sector of parts of the urban network causes significant public losses.

The network issues evident in the urban road system have less force in the non-urban environment. Where there are low traffic risks, because of the design of regional roads and placement of tollgates, there is better scope for the private sector to fund developments. However, it is unlikely that the private sector could finance regional roads more efficiently than the government.