

# Submission to the Productivity Commission inquiry into infrastructure costs

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The views expressed in this submission are provided in a personal capacity by the author and do not represent the views of any organisation.

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## Main points and recommendations:

Infrastructure costs have risen as a result of:

- Competition for resources arising from the investment phase of the mining boom;
- The complexity of undertaking major infrastructure work in increasingly densely populated urban environments;
- Environmental and workplace regulation which adds to that complexity and makes it more difficult to undertake infrastructure projects in a timely and efficient way;
- A tendency of governments to impose detailed input-driven specifications and standards, often set at levels of reliability and quality which have not been subjected to proper cost-benefit appraisal, and which increase costs both directly and by impeding competition among potential contractors.

There are important differences between these sources of cost pressures:

- While the cost increases associated with the mining boom are largely a movement along a supply curve for infrastructure expansion, the other factors referred to shift the entire supply curve up and to the left, increasing costs at all levels of output;
- So does poor governance of investment and implementation decisions, including:
  - An over-reliance on ‘mega projects’, which are highly vulnerable to undue optimism about costs and demands and which are rarely designed in such a way as to provide flexibility when difficulties arise;
  - Insufficient attention to optimizing the timing of maintenance, expansion and scrapping decisions, which leads to unnecessary ‘boom/bust’ cycles in infrastructure investment, compounding inherent cost pressures.

Addressing these governance issues requires reforming the structure of government, the processes used in determining and reporting on infrastructure investment and the mechanisms for financing infrastructure.

Specifically, to improve efficiency and accountability in the management of the road network, all governments should:

- At least notionally vest ownership of their road assets in an arms-length entity, managed by an independent board and responsible for a balance sheet and an income statement.
- Provide that entity with a clear Statement of Objectives, including in terms of performance indicators such as road condition and traffic flow, and subject it to appropriate reporting requirements.
- Require that entity to estimate the maintenance and expansion investment required to efficiently meet reasonable public demands on the road network, with that estimate subject to approval by an independent regulator, and to schedule maintenance and expansion efficiently (i.e. with a view to the life cycle values of costs and benefits).
- Allow that entity to impose user charges on the road network:
  - Where the benefits from doing so to the community can be shown to exceed the likely costs; and

- Where the charges themselves are subject to prior approval by an independent regulator, who must be satisfied those charges are reasonable, taking into account any other charges to which road users are subject (such as petrol excise and registration fees, as well as tolls on other roads).
- Ensure that entity has the scope to seek private funding for all or part of its network, subject to requirements of:
  - Transparency; and
  - That the entity must be satisfied that any private funding will promote the long term interests of end-users.
- Provide for disallowance by the relevant jurisdiction of the most substantial of these decisions (for instance, the decision to seek private funding for a road segment) through a transparent process.
- Mandate periodic, fully public assessment of the efficiency and effectiveness with which the entity discharges its responsibilities, as set out in the Statement of Objectives.

Even assuming corporatisation, particular attention is required to improving the quality of investment decisions.

As matters now stand, major investment decisions with respect to the road network (and the passenger rail network) are taken by State and Territory governments. In so far as those decisions rely on Commonwealth funding, they are subject to processes operated by Infrastructure Australia. Weaknesses in these decisions include:

- The incentives in political decision-making lead to an undue emphasis on ‘ribbon cutting’ opportunities, generally associated with very major (‘mega’) projects, at the expense of periodic maintenance and of small-scale ‘de-bottlenecking’ options that could postpone or even avoid the need for costly asset expansions.
- The fact that the Commonwealth provides funding for major projects, but not for ongoing improvements to asset condition, accentuates this bias. It also undermines the integrated planning of the road network, notably in urban areas, by encouraging a focus on major projects rather than on the network as a whole.
- The resulting inefficiencies are aggravated by the poor quality of project evaluation:
  - There are many technical deficiencies in project evaluation, including sloppy use of ‘wider economic benefits’ to get questionable projects over the line, and incorrect setting of discount rates.
  - To make matters worse, the discount rates used do not properly incorporate a mark-up for optimism bias and other distortions in public sector decision-making. The extent of that mark-up should reflect the option value of deferring investment, which in turn depends on the extent to which updated cost and demand information could lead to a reconsideration of the timing and extent of investment.
  - There is little quality control of project evaluations, and Infrastructure Australia has had only a modest impact in this regard.
  - Too few evaluations are made fully public, and even when they are, they are not released in a form that would facilitate third party analysis.
  - Evaluations are rarely updated in the course of the project’s progress, meaning too little attention is paid to the desirability of terminating or postponing projects should costs rise or expected demand fall.

- No Australian government has in place adequate processes for *ex post* review of cost-benefit studies, with the result that the scope to learn from experience is forgone.
- As well as major projects going ahead when they should not, the result of poor quality project evaluation is that planners rarely take proper account of uncertainty. As a consequence:
  - Project designs embody too few termination and postponement options.
  - Not enough emphasis is placed on the desirability of adopting incremental approaches in the presence of uncertainty, as those approaches allow decision-makers to ‘wait and see’ about cost and demand conditions.
  - When cost blowouts occur, as they have on any number of major projects in recent years, the projects continue, even though scaling them back may have been more efficient.
    - This was a particularly acute issue during the investment phase of the mining boom, when the cost blowouts were signaling the desirability of shifting resources from infrastructure projects to mining;
    - Instead, governments almost always pushed ahead with those projects for as long as budget constraints permitted.

Corporatising the ownership of the road network along the lines discussed above should help address these issues. However, if major projects continue to be co-funded by the states and the Commonwealth (an issue discussed below), the Commonwealth should require that all projects above a given scale of outlays are subject to appraisals that:

- Examine the scope to avoid or postpone undertaking major projects by instead undertaking more targeted ‘de-bottlenecking’;
- Examine and where efficient provide options to terminate, postpone or re-dimension projects in the face of adverse cost and demand shocks;
- Demonstrate proper integration with land-use planning, including by assessing options to instead meet transport needs by increasing the efficiency with which land is used;
- Are subject to proper quality control:
  - For consistency with Commonwealth Cost-Benefit Appraisal guidelines; and
  - By means of full *ex post* review, including during the course of the project;
- Are transparent, by requiring that:
  - All evaluations, and the data on which they are based, are fully disclosed to the public; and
  - that each year, each jurisdiction reports the projected net benefits of both the projects that it has decided to undertake and of those it has evaluated but that are not proceeding.

Finally, as noted above, Commonwealth funding has become increasingly discretionary and project-specific, accentuating a bias in infrastructure decision-making to large, politically salient, projects.

It is far from apparent that this approach to burden sharing is efficient. After all, the rising Commonwealth contribution does not mainly reflect the spillover effects between jurisdictions of their infrastructure decisions. Rather, it is primarily the result of the superior

ability of the Commonwealth to raise revenues. A better approach would be for the Commonwealth, for so long as it remains better placed to raise revenues, to:

- Provide states with infrastructure funding on a formulaic basis, with the formula-driven funding accounting for at least 80 percent of Commonwealth infrastructure spending; and
- Where there are spillover effects to state infrastructure decisions, announce a subsidy it is willing to provide for particular infrastructure outcomes to be achieved, leaving as much scope as possible for the exploration of alternative ways to achieve that outcome.

As part of such a formula-driven allocation, the Commonwealth could require the states and territories to comply with the corporatisation approach and evaluation principles discussed above.

Moving to a formula-driven allocation would allow substantial cost savings in the Commonwealth's administration of transport spending. It would also allow Infrastructure Australia to be abolished, or at least reduced in scope to:

- Monitoring compliance with the project evaluation principles; and
- Advising the Commonwealth on the small number of projects where:
  - There are significant spill-overs between jurisdictions; and
  - Those spill-overs are 'decision relevant', in the sense that in the absence of compensation for those spill-overs, the projects would not be undertaken.

However, those functions could also be undertaken by the Commonwealth's own department with portfolio responsibility for transport.

## 1. The background

1. Infrastructure literally means ‘the structure beneath’. In its common usage, it refers to the complex of physical assets on which economic and social activity relies. Most of these assets – which go from ports, roads and railways through to power, water and telecommunications networks – have natural monopoly attributes, in the sense that a single system can handle all of demand at least cost.
2. The natural monopoly attributes of infrastructure mean that deficiencies in its supply will not be self-correcting: for example, if the roads are inadequate, market forces alone will not remedy the shortfall (or if they do, may not do so at least cost). Equally, if infrastructure assets are poorly managed, competitive processes cannot be counted on to remove the existing operators and replace them with more efficient alternatives.<sup>1</sup> As a result, the task of ensuring efficiency in the supply and operation of infrastructure has fallen to a large extent on governments.
3. At the time of Federation, that task was vested almost entirely in the states, with the exception of postal and telecommunications services, which were transferred to the Commonwealth. The states, in turn, both financed and provided infrastructure assets, with the required investments being financed largely through the issue of public debt.
4. The underlying principle, adopted in both New South Wales and Victoria in the 1880s, was that infrastructure investments should only be made if the resulting rise in revenue to the state government (through taxes, charges and increases in the value of state land) exceeded the costs involved. This was an elementary, but not inaccurate, form of cost-benefit analysis.<sup>2</sup> Although there were many instances in which the principle was not respected, it was applied to some of the largest projects and did bring a degree of discipline to spending.
5. Where large projects had diffuse but very substantial and quantifiable effects on land values – such as the Sydney Harbour Bridge and the Melbourne Loop – there were attempts at capturing part of those increases through betterment levies, much as economic analysis would recommend. However, these early forms of ‘value capture’ proved subject to erosion under political pressure from local landowners and were invariably abolished before the infrastructure investments had been paid for. In practice, therefore, investments were largely funded through general revenues, with very little use of price signals to guide investment and usage decisions or impose commercial constraints on the provision and management of infrastructure.
6. The changes which have occurred since that time can be summarized as follows:
  - The only major service for which there have been large scale transfers from state government ownership to private ownership is electricity, but even there, most of the assets by value are still owned by state governments.

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<sup>1</sup> Of course, if the firm supplying the services is privately owned, profit maximization means its owners will have an incentive to replace less efficient by more efficient managers. However, the strength of that incentive will be affected by the extent to which any regulatory controls limit the return the firm’s owners obtain from greater efficiency.

<sup>2</sup> The Henry George Theorem implies the value of local public goods will be capitalized in local land values. Indeed, the Theorem suggests that (assuming other inputs are in perfectly elastic supply) the gain in land values will exactly offset the loss from marginal cost pricing of access to infrastructure.

- As far as the Commonwealth government is concerned, it has divested airports and initially privatized telecommunications (through the sale of Telstra). The Rudd government, however, effectively renationalized the reticulation part of the telecommunications network through the National Broadband Network, making Australia the only OECD country to thus cycle from privatization of telecommunications to its at least partial renationalization. The Commonwealth's infrastructure portfolio therefore now includes the NBN, Australia Post and the Australian Rail Track Corporation.
  - As a result of the national competition policy reforms, the entities managing infrastructure assets that are funded through user charges (such as electricity networks) have at least been corporatized and in most cases, subjected to independent regulation, be it by state regulators or by the ACCC.
  - Largely as a consequence of that process, user charges for the services provided by those assets have (at least in principle) moved towards full cost-recovery, with the exception of transport, where charges both for public transport and for the below-track intermodal rail freight network remain well below cost.
  - The assets that are not funded by user charges continue to be financed, provided and operated by governments directly. The largest such asset is the road network, where only a small number of toll roads are user-funded, with most of those toll roads being provided under Private-Public Partnerships.
  - The Commonwealth has played an increasing role in financing infrastructure and the nature of that role has become more intrusive. When Commonwealth grants for roads to the states began after World War I, they were largely allocated by formula and accounted for a small share of total outlays; since then, as vertical fiscal imbalance has become more pronounced, Commonwealth funding has grown to account for a larger share of infrastructure investment and become ever more discretionary. While guidelines have been used to inform the allocation of Commonwealth funds, most recently through Infrastructure Australia, the process is essentially a 'beauty contest'.
7. The structure of this submission is as follows. After this introduction, a second section considers the current pressures on infrastructure, assessing the causes of recent cost increases. While some of those causes – notably the effects of the mining boom – involve movements along a supply curve for infrastructure expansion, others – including poor governance of infrastructure assets – involve an upward shift in the supply curve, increasing costs at all levels of output. Improving governance is therefore crucial to securing better value for money in the long run.
  8. Set against that backdrop, a third section briefly considers ways of better managing user-funded assets, such as electricity networks, notably through better regulation; while this may seem peripheral to the Commission's inquiry, it is important if assets such as roads are to be user-funded (and subjected to independent regulation) in the longer term.
  9. A fourth section then focuses on the transport network specifically, and especially on roads. It examines options for improving the governance of road assets, the quality of project appraisal and the funding of roads.
  10. There are two appendices. The first deals with the integration of infrastructure and land use planning; this is an area where all Australian jurisdictions struggle, with adverse consequences for the efficiency of infrastructure decision-making. The second reviews the issues involved in congestion charging: it argues that while there is long run merit in congestion charging, it is not the panacea it is sometimes claimed to be.

## 2. Current pressures on infrastructure

11. As proxied by public sector investment per capita, recent levels of investment in infrastructure have been relatively high by historical standards, though they have declined as budget constraints become more binding. Nonetheless, pressures on infrastructure remain strong. Factors at work include:
  - Australia has experienced rapid population growth over the last decade, with much of that growth occurring in the major metropolitan centres.
  - Reductions in protection have reduced the cost of motor vehicles, while rising incomes have encouraged further increases in motor vehicle density. Increases in the freight load and in the number and usage of light commercial vehicles have aggravated the resulting rise in congestion.
  - Also contributing to the rise in infrastructure investment have been the need to renew infrastructure assets built in the 1960s and 1970s, the commitment of successive governments to the deployment of broadband telecommunications networks, policies for greenhouse gas abatement (which along with mandated increases in reliability, have required substantial investment in the electricity system) and the infrastructure spending undertaken as part of the stimulus packages.
12. Looking to the future, some of these pressures may weaken. For example, the investments in electricity networks required by mandated increases in reliability standards have now largely occurred. And there is considerable scope to reform government policies that lead to inefficient increases in infrastructure investment: the renewable energy targets, for example, will require further increases in investment in electricity transmission networks so as to connect renewable sources to the grid. Reforming or abolishing the RET would eliminate the need to undertake those investments.
13. Even so, community demands for increased infrastructure investment are likely to remain strong. Adding to the difficulties that will cause, the costs of undertaking infrastructure projects have increased rapidly in recent years.
14. In part, increases in infrastructure costs reflect the mining boom that began in 2003-04. As commodity prices rose, the opportunity cost of using capital and labour in other parts of the economy increased. All else equal, to shift factors of production into mining, costs had to rise most in those activities which compete most directly with mining for inputs. As infrastructure construction uses factors that are identical, or very close substitutes, to those used in major mining projects, infrastructure costs needed to increase sufficiently to release those inputs.<sup>3</sup>
15. As a practical matter, the dynamics of the process by which that adjustment occurred involved a near doubling in overall private investment, which bid up the prices of the inputs required for mining projects, including for those inputs that are also used for infrastructure. Naturally enough (as its economic purpose was to shift resources from other parts of the economy into mining), that increase more than outweighed the cost savings the appreciation of the Australian dollar allowed infrastructure projects to achieve in terms of reduced prices for imported materials and especially, for capital goods.

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<sup>3</sup> The income effects of the mining boom meant the private non-traded goods sector also had to expand, but as that competes less directly with infrastructure for inputs, its expansion had less effect on infrastructure costs.

16. In other words, the mining boom involved a sharp movement along the supply curve for infrastructure projects. At the same time, however, other changes – such as environmental and workplace regulation – shifted the supply curve up and to the left.
17. In principle, the price effects of the mining boom should have led governments to scale back or defer major infrastructure projects, as the opportunity cost of those projects had increased.<sup>4</sup> By and large, this did not occur. While this largely reflects the highly political character of those projects, it also reflects the fact that these projects are rarely designed in a way that allows their scale to be ‘fine tuned’ as new cost and demand information emerges.
18. In other words, the response (or lack of response) to the adverse cost shock arising from the mining boom highlights the fact that despite substantial uncertainty about costs and demands, governments usually fail to build ‘deferral options’ into their project designs. Moreover, the larger and more complex the project, the fewer such options are typically built into the design of projects. With ‘mega projects’ accounting for a substantial, though difficult to quantify, share of infrastructure spending, this makes infrastructure projects unnecessarily vulnerable to adverse cost and demand shocks. Some of the factors underpinning the dominance of ‘mega projects’ are discussed below.
19. Of course, the adverse cost shocks of recent years will be at least partially reversed as the investment phase of the mining boom peaks and then winds down. As well as reducing the demands on major input supplies, the phasing down of the mining investment boom should reduce the pressure on scarce technical resources – such as project planners and managers – and make the civil works market substantially more competitive, all the more so as the boom has led to a considerable expansion of that market’s supply side. The margins major contractors secure on large projects should therefore decline, potentially steeply.<sup>5</sup> While a weaker exchange rate will partially offset those cost savings, the net impact should still be some reduction in the cost of major infrastructure projects.
20. Further, likely substantial, cost savings could come from reviewing and rationalising the regulations that have a major impact on infrastructure, with tighter environmental standards and occupational health and safety requirements making a substantial contribution to recent infrastructure cost inflation. Obviously, the issue is that of assessing and where possible, improving, the cost-effectiveness of those regulations. And reforming labour market regulation would also help, for example, in increasing the flexibility with which labour can be used on works sites and in eliminating cost-increasing union rules. So too would revising unnecessarily prescriptive design standards, which ‘gold plate’ everything from bridges to level crossings.
21. There is also scope for greater entry by foreign prime contractors into the infrastructure construction sector. That entry could be more actively facilitated by governments, increasing competitive pressures. Streamlining tendering processes, and reconsidering ‘Australian only’ specifications, would help. Although estimates vary, such moves that

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<sup>4</sup> Of course, the mining boom also signalled an increase in Australia’s long run GDP and population, which could have required an increase in infrastructure investment. However, it would still have been sensible to reconsider the rate of infrastructure expansion as its relative cost rose. As noted below, there is no evidence of that occurring.

<sup>5</sup> Those margins are a transfer, not a resource cost, at least when firms are domestically owned. However, the deadweight losses associated with raising the taxes required to pay those margins are a cost, so the lower margins do reduce the cost of infrastructure projects.

increased the extent and effectiveness of competition could probably reduce project costs by some 5 to 10 percent.

22. But even with that, infrastructure costs in Australia are likely to remain high compared to countries such as the United States. That is not only because domestic labour costs are high but also because of our geography, which includes both vast metropolises and areas that are inherently costly to serve, thanks to their remoteness and hostile climate, but nonetheless economically crucial – such as the Pilbara and the mining areas of central Queensland. Several years ago, Max Moore-Wilton, Brian Fisher and I set out some proposals for export infrastructure in the Howard government’s export infrastructure review; as those proposals still seem sensible, I will ignore the export infrastructure issues so as to focus on the infrastructure problems of our metropolitan centres, which are perhaps the most immediate flashpoint in terms of pressures on government.
23. Those pressures in the major metropolitan centres reflect the combination of two elements. The first is the demands that rising population creates to expand roads and other facilities in brownfields contexts – such as in densely trafficked CBDs or through long established suburbs – where adding lumpy increments to infrastructure capacity is inevitably costly and disruptive, with the costs being all the higher in those cities, such as Sydney, where insufficient attention has been paid to reserving transport corridors. The result, made especially likely by community sensitivities to noise and other disamenities, is to force increased reliance on extremely expensive solutions such as tunnelling. Dramatically illustrating the effects that has is the fact that currently, building double-tracked passenger rail tunnels in Australian cities costs some \$200 million per kilometre.
24. At the same time, Australian cities are still expanding geographically as they accommodate a growing population’s demand for space. Meeting that demand requires costly investment in greenfield physical and social infrastructure, while the increased traffic generated by new outlying areas adds to congestion on major transport links.
25. Governments have, in recent years, sought to contain infrastructure costs by constraining the geographic expansion of urban areas. The economic aspects of those ‘densification’ policies are considered in Appendix A: ‘Land use and infrastructure’ below.
26. Overall, the pressures to expand infrastructure are likely to remain strong in the years ahead, while expansion costs will remain high and the supply curve for expansions steeply upward sloping. The question is whether more could be done to ensure those expansions are only undertaken when it is efficient to do so, and when they are undertaken, are implemented efficiently. In considering this question, it is useful to distinguish between those parts of the infrastructure which are funded directly by user charges and those funded primarily by governments, recognizing that the border line between these is blurred in some cases (such as public transport).

### **3. The user-funded networks**

27. These include the power, water and telecommunications networks, where investment decisions are mainly taken by the corporate entities that manage the provision of these services under regulatory supervision. Also included here are facilities subject to third party access regulation (or to the threat of that regulation), such as ports, airports, and the rail facilities that carry bulk freight.
28. At least anecdotal evidence suggests that where these facilities are privately owned, the cost over-runs have been smaller than for the transport ‘mega projects’ undertaken by

government. It would be useful for the Commission to test this proposition and examine its implications.

29. The Commission has extensively reviewed the issues that bear on these networks in other inquiries. That said, if user-funding is to be extended to wider parts of Australia's infrastructure, and presumably independent regulation of user charges with it, those issues are relevant to this inquiry. Particularly important is the effectiveness and efficiency of regulatory frameworks.
30. These issues are interrelated: the greater the extent to which economic regulation does a good job of protecting user interests, the stronger the argument for user-funding and where possible, privatization. In practice, twenty years after the Hilmer report, economic regulation remains a work in progress. The fundamental concern the Hilmer report noted – the need to reconcile the desire to promote the interests of consumers with the incentives for timely investment – is still a live issue:
  - It is, for example, arguable that the de facto renationalization of the telecommunications network could have been avoided had the regulatory framework provided clearer, more predictable and credible incentives for private sector investment in high speed broadband<sup>6</sup>.
  - Equally, the extraordinarily lengthy and costly proceedings under Part IIIA of the Australian Competition and Consumer Act involving the iron ore rail networks in the Pilbara merely introduced added sovereign risk into miners' investment decisions.
  - Finally, the failure to implement the recommendations of the Howard Government's Export Infrastructure Review – which would have moved to presumptive light-handed regulation of export infrastructure – could damage the extent and timeliness of the capacity expansion required to exploit export opportunities in the 'Asian Century'.
31. A specific issue needing attention is the gradual erosion of appeal rights against regulatory decisions. These have, for instance, been almost entirely removed in telecommunications and there are proposals for similar moves in respect of power networks. At the same time, there are proposals that would limit the procedural and substantive safeguards afforded facility owners under Part IIIA. All of these are backwards steps relative to the regime recommended in the Hilmer Report, and have the potential to deter investment.<sup>7</sup>
32. As noted above, resolving these issues is especially important if the private sector is to play a greater role in future infrastructure provision. Moreover, there is scope (discussed below) to corporatize public road networks and subject them to independent regulation, perhaps as part of attracting private investment. However, it will be difficult to do so if deficiencies in the structure and functioning of economic regulation are not properly addressed.

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<sup>6</sup> I have discussed these issues in greater detail elsewhere, and hence simply refer to that discussion. See Ergas, H. (2008), *Wrong Number: Resolving Australia's Telecommunications Impasse*, Allen & Unwin, Sydney and Ergas, H. (2009), 'Time Consistency in Regulatory Price Setting: An Australian Case Study', *The Review of Network Economics*, vol 8, Issue 2, pp. 153-163.

<sup>7</sup> I have discussed these issues in greater detail elsewhere, and hence simply refer to that discussion. See Ergas, H. (2009), 'An Excess of Access', *Agenda: A Journal of Policy Analysis and Reform*, vol 16, no 4; Ergas, H. (2013), 'Why Johnny Can't Regulate: The Case of Natural Monopoly', *Agenda, A Journal of Policy Analysis and Reform*, Vol.20, No. 1; and Ergas, H. (2009), 'Error and Design: Economics in (and some Economics of) the Australian Competition Tribunal', *Agenda: A Journal of Policy Analysis and Reform*, vol 16, no 3.

33. Overall, more needs to be done regulatory arrangements provide adequate safeguards for, and incentives to, private investment. Governments should ensure effective mechanisms are in place to:
- Limit the scope of regulation to instances where its benefits exceed its costs;
  - Require regulatory arrangements to be as light handed as possible, while meeting statutory objectives;
  - Impose accountability on regulatory decision-making.

#### **4. Largely or wholly publicly funded infrastructure**

34. Mainly at issue here are:
- Public roads; and
  - Passenger and intermodal rail.
35. For the first of these, there are no user charges (excepting on a small number of toll roads); for the second, as for public transport generally, charges are far below long run costs. As a result, prices cannot guide efficient usage and investment decisions; at the same time, the burden of financing infrastructure expansion falls on current and future taxpayers.
36. The issues that arise with respect to public roads are considered first and then those for passenger and intermodal rail.

##### **4.1. Public roads**

37. Congestion on public roads remains a major public concern. While the incidence of congestion differs substantially between and within capital cities, there is no doubt that peak time congestion levels are high on the primary links in Sydney, Brisbane and Melbourne, with congestion also becoming more severe in Perth. That results in strong pressure to expand the metropolitan road network, which inevitably involves high costs. Continued growth in the freight task, most of which is carried by truck, and in light commercial traffic, adds to those pressures.
38. Moreover, as discussed in greater detail below, there are reasons to believe that inefficiencies in the governance of these assets and in the investment decisions taken with respect to these assets unnecessarily increases the costs involved in meeting rising demand.
39. Better addressing these pressures requires:
- Improving the governance and ongoing management of road assets;
  - Enhancing the quality and implementation of investment decisions;
  - Improving the financing of investment in roads and other publicly funded infrastructure.

##### **4.2. Better managing road assets**

40. Currently, state governments do not manage their road assets on a commercial basis. The failure to do so results in persistent deficiencies in the operation, maintenance and expansion of those assets. Addressing these weaknesses could involve each jurisdiction:
- At least notionally vesting ownership of road assets in an arms-length entity, managed by an independent board and responsible for a balance sheet and an income statement.

- Providing that entity with a clear Statement of Objectives, including in terms of performance indicators such as road condition and traffic flow, and subjecting it to appropriate reporting requirements.
  - Requiring that entity to estimate the maintenance and expansion investment required to efficiently meet reasonable public demands on the road network, with that estimate subject to approval by an independent regulator, and to schedule maintenance and expansion efficiently (i.e. with a view to the life cycle values of costs and benefits).
  - Allowing that entity to impose user charges on the road network:
    - Where the benefits from doing so to the community can be shown to exceed the likely costs; and
    - Where the charges themselves are subject to prior approval by an independent regulator, who must be satisfied those charges are reasonable, taking into account any other charges to which road users are subject (such as petrol excise and registration fees, as well as tolls on other roads).
  - Ensuring that entity has the scope to seek private funding for all or part of its network, subject to requirements of:
    - Transparency; and
    - That the entity must be satisfied that any private funding will promote the long term interests of end-users.
  - Providing for disallowance by the relevant jurisdiction of the most substantial of these decisions (for instance, the decision to seek private funding for a road segment) through a transparent process.
  - Mandating periodic, fully public assessment of the efficiency and effectiveness with which the entity discharges its responsibilities, as set out in the Statement of Objectives.
41. There has been extensive discussion of the scope to improve road use, investment and financing through congestion charging. The issues involved in congestion charging are reviewed in Appendix B: 'Congestion charges' below.

#### ***4.3. Enhancing the quality and management of investment decisions***

42. Major investment decisions with respect to the road network (and the passenger rail network) are taken by State and Territory governments. In so far as those decisions rely on Commonwealth funding, they are subject to processes operated by Infrastructure Australia. Weaknesses in these decisions include:
- The incentives in political decision-making lead to an undue emphasis on 'ribbon cutting' opportunities, generally associated with very major ('mega') projects, at the expense of periodic maintenance and of small-scale 'de-bottlenecking' options that could postpone or even avoid the need for costly asset expansions. These mega-projects are especially vulnerable to unduly optimistic cost and demand estimates.
  - The fact that the Commonwealth provides funding for major projects, but not for ongoing improvements to asset condition, accentuates this bias. It also undermines the integrated planning of the road network, notably in urban areas, by encouraging a focus on major projects rather than on the network as a whole.
  - The resulting inefficiencies are aggravated by the poor quality of project evaluation:

- There are many technical deficiencies in project evaluation, including sloppy use of ‘wider economic benefits’ to get questionable projects over the line, and incorrect setting of discount rates.
  - Additionally, the discount rates used do not properly incorporate a mark-up for optimism bias and other distortions in public sector decision-making. The extent of that mark-up should reflect the option value of deferring investment, which in turn depends on the extent to which updated cost and demand information could lead to a reconsideration of the timing and extent of investment.
  - There is little quality control of project evaluations, and Infrastructure Australia has had only a modest impact in this regard.
  - Too few evaluations are made fully public, and even when they are, they are not released in a form that would facilitate third party analysis.
  - Evaluations are rarely updated in the course of the project’s progress, meaning too little attention is paid to the desirability of terminating or postponing projects should costs rise or expected demand fall.
  - No Australian government has in place adequate processes for *ex post* review of cost-benefit studies, with the result that the scope to learn from experience is forgone.
  - As well as major projects going ahead when they should not, the result of poor quality project evaluation is that planners rarely take proper account of uncertainty. As a consequence:
    - Project designs embody too few termination and postponement options.
    - Not enough emphasis is placed on the desirability of adopting incremental approaches in the presence of uncertainty, as those approaches allow decision-makers to ‘wait and see’ about cost and demand conditions.
    - When cost blowouts occur, as they have on any number of major projects in recent years, the projects continue, even though scaling them back may have been more efficient.
      - This was a particularly acute issue during the investment phase of the mining boom, when the cost blowouts were signaling the desirability of shifting resources from infrastructure projects to mining;
      - Instead, governments almost always pushed ahead with those projects for as long as budget constraints permitted.
  - Last but not least, despite some progress, land use and transport decisions remain poorly coordinated in virtually every state. They therefore end up imposing costs on each other – in some cases, inefficient land use decisions create pressures for otherwise avoidable transport investment, while in others, better targeted transport investment would help ensure fuller and more efficient use of land.
43. Corporatising the ownership of the road network along the lines discussed above should help address these issues. However, if major projects continue to be co-funded by the states and the Commonwealth (an issue discussed below), the Commonwealth should require that projects appraisals:
- Examine the scope to avoid or postpone undertaking major projects by instead undertaking more targeted ‘de-bottlenecking’;
  - Examine and where efficient provide options to terminate, postpone or re-dimension projects in the face of adverse cost and demand shocks;

- Demonstrate proper integration with land-use planning, including by assessing options to instead meet transport needs by increasing the efficiency with which land is used;
- Are subject to proper quality control:
  - For consistency with Commonwealth Cost-Benefit Appraisal guidelines; and
  - By means of full ex post review, including during the course of the project;
- Are transparent, by requiring that:
  - All evaluations, and the data on which they are based, are fully disclosed to the public; and
  - That each year, each jurisdiction reports the projected net benefits of both the projects that it has decided to undertake and of those it has evaluated but that are not proceeding (as occurs, for example, in Finland).

#### ***4.4. Improving the financing of investment in roads and other publicly funded infrastructure***

44. Where user charges are not imposed, investment must be underwritten by current and future taxpayers. Governments have sought to relax the constraint this imposes by means of Public-Private Partnerships, which are essentially concession contracts involving designated road structures. In most cases, these involve roads for which users pay tolls determined on the basis of the concession contract; overseas, there are also instances in which ‘shadow tolls’ are paid instead, with the government compensating the concessionaire on a contractual basis for carrying traffic.
45. There is little merit in the use of PPPs as a means of taking expenditure on major projects off the public balance sheet.
  - Where the project merely involves providing a private entity with the right to tax users (that tax taking the form of a toll), it may actually reduce efficiency if the resulting tolls are above efficient levels.
  - Moreover, the scope to finance major projects by imposing such hidden taxes may worsen project selection, by reducing the opportunity cost of pursuing poor quality projects. It may also induce governments to artificially reduce or restrict competition to the project, for instance by degrading competing roads or not upgrading them as and when such upgrades should occur.
  - If the government remains the primary risk-bearer, for instance because the project is effectively ‘too big to fail’, the incentives for it to be undertaken efficiently may be blunted.
  - Ultimately, any efficiency gains the PPP provides may have been obtained at less cost to the community by means of a conventional ‘design and build’ contract.
46. Instead, PPPs should be used when:
  - The requirement to enter into a contract forces the government to clearly articulate objectives and lock them in, under circumstances where doing so is efficient in terms of managing risk.
  - The relevant risks have been properly priced and any risks remaining with the government properly valued as contingent liabilities.
  - The requirement to have equity in the project is likely to induce better decision-making by the concessionaire.

- The ability to ‘bundle’ finance and operation over the project’s life creates better incentives for life-cycle management of the asset, including in terms of the timing and extent of maintenance and capacity expansion.
  - Any tolls are set on an efficient basis, taking account of:
    - The need to manage congestion;
    - The interaction between the tolls set on the road managed by the concessionaire and the road network as a whole.
47. That said, governments have become concerned that the private sector’s willingness to bear the demand risk, and to a lesser extent the cost risk, associated with major projects may have been substantially reduced by adverse experiences (for instance, with Sydney’s Cross-City Tunnel) and by the GFC. This has resulted in a shift in emphasis from PPPs to opportunities for ‘asset recycling’, in which:
- Governments sell (or convert into concessions) ‘mature’ assets, i.e. those assets whose demand and cost characteristics are reasonably predictable;
  - They use some part of the proceeds to finance investments in new infrastructure assets;
  - Those assets themselves are privatized once they become ‘mature’, allowing the cycle of construction-sale-construction to continue.
48. From a conceptual point of view, it could be argued that
- The decision about whether to privatize assets should be based on the scope for improvements in the efficiency with which they are built and managed, rather than on financing considerations.
  - If a proposed investment would pass a properly specified cost-benefit test, it should be undertaken in any event, as any addition to the public sector’s financial obligations will be offset by the increase in the value of the state’s asset base.
49. These arguments assume governments are not capital-constrained; in other words, that governments can undertake all investments that evaluated at the market cost of capital, have a positive net present value.
50. Underpinning that assumption is the separation theorem of classical finance theory. The relevance of that theorem has been questioned in the modern theory of corporate finance, which focuses on information imperfections in capital markets.<sup>8</sup> The same factors that mean firms are typically capital rationed, and that investment and financing decisions are interdependent, apply in a public finance context.
51. Thus, in practice, investors in state government debt may have considerable difficulty in assessing the quality of the state’s balance sheet and the likelihood of the state being able to increase taxes in the event of financial difficulties. As a result, state governments, like corporations, may face the risk of ‘debt overhang’, and the effective interest rate on bonds may be subject to discontinuous (and at times sudden) increases. To that extent, governments will face tighter constraints in raising funds than nominal interest rates suggest. Moreover, given those constraints, it may be desirable for governments to act as if they faced a ceiling on acceptable debt levels, which in turn constrains the size of their balance sheet.

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<sup>8</sup> See for example Tirole, Jean (2006) *The Theory of Corporate Finance*, Princeton University Press.

52. While ‘asset recycling’ can be a sensible response to those factors, it is important to note that the interest rate on public debt is not the cost of capital to the public sector. Specifically, while the ability of governments to impose taxes reduces the interest rate they must pay on debt, those taxes (or the risk of those taxes) still impose a real cost on taxpayers, and the quantum of that cost increases with the risk of the project. The mere fact of financing a risky project through public debt, rather than by relying on private capital, cannot in itself reduce the risk of the project, and may instead actually increase it.
53. Moreover, just as in the private sector, agency problems in the governance of firms mean the hurdle rate for investment may be – and typically is – substantially higher than the market cost of capital,<sup>9</sup> so optimism bias and other distortions in public sector decision-making should result in a mark-up on the discount rate used in project evaluations. As in the private sector, the extent of the mark-up should be related to the option value associated with differing investment, which in turn relates to the extent to which updated cost and demand information may alter the scale and timing of efficient investment.
54. This has important implications for the ‘asset recycling’ model. In particular, the same factors that lead private investors to be risk averse in respect of major new projects with substantial cost and demand uncertainty should lead the public sector to also be wary of those projects.
55. The mere fact that interest rates on public debt are currently very low relative to the required private sector cost of capital does not detract from that conclusion. In effect, current bond rates do not reflect an unusually low social cost of risk but rather the opposite: individual savers demand a higher than usual premium to bear risk. There is no reason to believe taxpayers differ from savers in that respect.
56. As a result, in assessing projects, it is the cost to taxpayers of making funding available, not the public sector cost of debt, that must be used. That cost to taxpayers is unlikely to be below the private sector cost of capital, except where the public sector has access to risk-pooling opportunities unavailable to the private sector. Moreover, because taxes distort economic activity, the cost of those distortions must be fully accounted for in assessing the projects that are being considered for funding.
57. In short, ‘asset recycling’ should not be used as an excuse to inefficiently shift risk on to taxpayers. If projects are inherently risky – because their cost and demand characteristics are uncertain in ways that cannot be hedged through diversification, and/or their likely net returns fluctuate with aggregate incomes – then transferring their funding to the public sector cannot in itself eliminate that risk or reduce its costs. That makes it all the more important to ensure proper project evaluation, along with the other safeguards discussed above.
58. At the same time, it would be desirable to reassess the framework for sharing the infrastructure financing burden between the Commonwealth and the states. As noted earlier, Commonwealth funding has become increasingly discretionary and project-specific, accentuating a bias in infrastructure decision-making to large, politically salient, projects.

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<sup>9</sup> See Ravi Jagannathan, Iwan Meier and Vefa Tarhan (2011), “The Cross-Section of Hurdle Rates for Capital Budgeting: An Empirical Analysis of Survey Data”, NBER Working Paper No. 16770, February 2011.

59. However, it is far from apparent that this approach to burden sharing is efficient. After all, the rising Commonwealth contribution does not mainly reflect the spillover effects between jurisdictions of their infrastructure decisions. Rather, it is primarily the result of the superior ability of the Commonwealth to raise revenues. To that extent, a better approach would be for the Commonwealth, for so long as it remained better placed to raise revenues, to:
- Provide states with infrastructure funding on a formulaic basis; and
  - Where there are spillover effects to state infrastructure decisions, announce a subsidy it is willing to provide for particular infrastructure outcomes to be achieved, leaving as much scope as possible for the exploration of alternative ways to achieve that outcome.
60. As part of such a formula-driven allocation, the Commonwealth could require the states and territories to comply with the corporatisation approach discussed at paragraph 34 above and the evaluation principles discussed at paragraph 36 above.
61. Such an approach would be consistent with moves to place fiscal federalism on a sounder basis going forward. Additionally, as the formula-based payments would be effectively lump sums, they should not distort the infrastructure decisions taken by the states. Fixing this amount at a level that reflected the Commonwealth's superior revenue-raising ability, but fell somewhat short of likely state infrastructure spending, would make that all the more likely, as the costs and benefits of decisions at the margin would remain with the states. This could help encourage the states to identify and implement more efficient ways of financing public infrastructure, such as betterment taxes.
62. Obviously, a move to a formula-driven approach would create scope to reconsider the role of Infrastructure Australia. One option would be to simply abolish it; alternatively, it could be given a role with respect to the projects with major spill-over effects.
63. As regards those spill-over effects, it is important to note that even if infrastructure projects have some inter-jurisdictional spill-overs, not all such spill-overs warrant Commonwealth intervention.
64. To begin with, in most cases where projects are genuinely justified, the spill-overs are infra-marginal, in the sense that the benefits to the jurisdiction undertaking the project are sufficient to warrant it proceeding quite independently of any consideration of spill-overs. In other words, 'internalising' the inter-jurisdictional spill-overs is not required for the correct decision to be taken.
65. Moreover, even when spill-over effects are not infra-marginal, there is ample room for jurisdictions to reach bilateral agreements, for instance, for cost-sharing. Such 'Coasian bargains' are common in other federal systems, but have tended to be displaced in Australia by Commonwealth intervention.
66. As a result, the Commonwealth's direct involvement should be limited to cases in which:
- Spill-over effects are likely to affect whether or not the project proceeds; and
  - The transactions costs involved in reaching agreement directly between the relevant jurisdictions are so high as to make such agreement infeasible.
67. A high hurdle, both in terms of evidentiary standard and in terms of process, should be set for determining such projects. Were that process to be administered by Infrastructure

Australia, the organisation should be reviewed to assess its fitness for that purpose. Alternatively, the role of administering that process could be vested in the Commonwealth's department of transport.

#### 4.5. *Passenger and intermodal rail*

68. With partial exceptions in Victoria, passenger rail remains the responsibility of state rail entities, whose form nonetheless differs from state to state. The issues in passenger rail largely reflect those in public transport more broadly, including a very low degree of cost recovery, inefficiencies in supply and service that is often of poor quality (for instance in terms of frequency and speed). Addressing these deficiencies would require substantial changes in structure and operation and may involve very substantial investment. Whether those investments are justified is contentious, and will in any event vary greatly from place to place.
69. What is clear, however, is that some of the largest projects recommended by Infrastructure Australia involve passenger rail. These include the East-West rail link in Melbourne and the Cross-River Rail project in Brisbane. In both cases, there are serious doubts about the quality of the appraisals on which these projects were based (and the new Queensland government has substantially qualified its support for Cross-River Rail).
70. As a general matter, to the extent to which public transport investment is warranted, it should be based on the efficient choice of mode, as against the preference for extremely expensive rail projects that has marked recent years. That is all the more the case as these projects have proven especially vulnerable to 'optimism bias'. As a result, before continuing with any passenger rail projects, the Commonwealth should ensure that they are consistent with the least cost development of the public transport network.
71. Over the longer term, by shifting to formula-based funding as discussed above, the Commonwealth should entirely vacate the area of defining transport modes at a metropolitan level; rather, this should be a matter for state governments, as there are no obvious externalities between jurisdictions (other than for the minor role of interstate passenger rail services).
72. In *intermodal rail*, the primary responsibility for the interstate networks vests in ARTC, which operates the below-rail network, along with the rail network that serves the Hunter coal chain. While the latter is profitable, the former falls far short of full cost recovery, and is even less likely to do so in future. In particular, both the major above-rail operators are approaching major asset replacement decisions, with current earnings not such as to justify the investments required. However, simply reducing below-rail charges would merely aggravate ARTC's deficit, imposing substantial further costs on taxpayers.
73. The rail lobby argues that the solution lies at least partly in increasing road charges, thus diverting traffic to road. From an economic perspective, this argument is difficult to sustain. In practice, marginal and even average costs on the major interstate roads are low (as high pavement thickness reduces the road damage caused by trucks), and likely fall below the fuel excise. While there is a strong case for aligning the road charges commercial vehicles face with marginal social costs, this is unlikely to shift traffic to rail, all the more so given its current costs and service quality.
74. As a result, the crucial question is whether rail costs can be reduced, and rail quality increased, to the point of being competitive with road in the long run. Were that feasible,

private sector disciplines could be introduced into the rail sector, allowing better control over costs.

75. It is difficult to see how intermodal rail can become competitive for so long as ARTC – unlike its highly efficient Canadian and North American counterparts – remains vertically separated. As a result, the Commonwealth should reconsider ARTC’s investment program, pending a full review of the scope to reintegrate above and below rail freight operations, or in other ways make those operations commercially sustainable.

## Appendix A: Land use and infrastructure

76. It is worth paying closer attention to the issue of expansion at the urban fringe, as it highlights an important, but insufficiently explored, area of analysis, which is the interdependence of infrastructure and land use policy. Two preliminary comments can be made in this respect.
77. First, at least since the development of Melbourne in the 1850s, Australian cities have always been characterised by very low population density. That reflects the combination of abundant land, high real incomes and a historically short working week. Its legacy is a settlement pattern that still today involves house spacings that are very high even by North American standards, increasing the cost of installing reticulation networks, such as water, telecommunications and power, and the required length of roads.
78. Second, from an efficiency perspective, there is nothing inherently undesirable about that ‘sprawl’, the pejorative term normally used to describe extensive land settlement. After all, land is a normal good, that is, a good whose demand rises with income. So long as households value extending the urban fringe at more than its costs, the mere fact that those extensions involve increases in social overhead capital and in travel times should be neither here nor there.
79. That is not to deny that there may be, and likely are, factors that induce an inefficiently high level of urban dispersion and with it, of required investment in infrastructure. Two such factors stand out.
80. The first are the tax preferences to owner-occupied housing. These amount to a subsidy to land use, as land is a large part of what is purchased in the purchase of housing.<sup>10</sup>
81. A second set of inducements to excessive dispersion comes from the under-pricing of goods and services that are complements to extensive land use. These include local collective goods (such as emergency services, hospitals and schools), where homeowners do not face the incremental costs arising from their settlement decisions; and the absence of congestion charges on roads, which create a wedge between the social cost of an added resident at the city fringe and the private cost that added resident bears.
82. The challenge from a policy perspective is how one responds to those incentives for excess population dispersion. Albeit to differing extents, the response of Australian governments in recent years has primarily relied on controls over land use. These have involved a combination of restrictions on the size of the urban area, the availability of land at or on the city fringe relative to the scope for ‘in fill’ development, and the level of charges imposed on developers as contributions to infrastructure costs – with all these being intended to induce denser settlement and thereby save on public investment.
83. However well-intentioned these policies may be, they are far from costless, though their costs are generally ignored – most of all by urban planners. Their most immediate impact is to artificially increase the price of land relative to the price of capital; in turn, that induces potentially inefficient substitution of capital for land. That substitution takes two forms: the first is the shift to taller structures, which increases the capital used per unit of land; the second is the tendency, strikingly visible in so-called MacMansions, to expand structures so that they cover the entire land area available. The overall result is to

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<sup>10</sup> Other taxes affecting property may also promote excess dispersion. For example, rates and land taxes, to the extent to which they fall on improvements (as is to some extent inevitable), will also make for greater dispersion as they reduce the capital/land ratio.

substitute what is likely to be quite costly private capital for what might well be cheaper public capital, while increasing the capital/land ratio in the economy as a whole.

84. To make matters worse, densification policies also affect the relative price of different qualities of housing. While this issue is analytically complex, perhaps the simplest way to explain the result is to note that under plausible assumptions, the opportunity cost of land will account for a greater share of the cost of low quality housing than of high quality housing, while capital will account for a greater share of the cost of high quality housing than of low quality housing. An increase in the price of land relative to the price of capital therefore distorts the relative price of low quality to high quality housing, reducing the supply and increasing the price of the low quality housing that is primarily demanded by low-income households. It is consequently unsurprising that Sydney, which has been particularly restrictive in terms of land release in recent years, has especially severe problems of housing affordability and that despite abundant land, our housing prices are very high by international standards.
85. In short, in an attempt to reduce infrastructure costs, state governments may have:
  - Inefficiently raised capital/land ratios in the building stock, thus replacing potentially efficient public investment in infrastructure with potentially inefficient private investment in buildings; and
  - Reduced housing affordability.
86. This highlights the need for better integration of land use and infrastructure policies. Efficiency can only be achieved through the coordination of these instruments; in practice, that coordination is far from being achieved.

## Appendix B: Congestion charges

87. Congestion charges have been recommended by the Henry Report on Australia's Future Tax System as a way of ensuring better use of, and better investment decisions with respect to, valuable road surface. Although not discussed in the Henry Report, efficient charging of roads could also help alleviate pressures to excessive dispersion in the settlement pattern, thus reducing the need for investment in extending social and physical infrastructure.
88. Seen from an efficiency perspective, congestion charges seem like a good thing, in so far as they equalise the private and social marginal cost of using scarce road surface. And it may well be that they are, as the Henry Report, and many others, argue. But they too are not costless, with the costs they impose being of three forms.
89. First, setting and enforcing congestion charges involves resource costs – such as those required for metering and collection. Those costs are still high, though they are falling over time.
90. Second, as with any other form of pricing, congestion charges can cause efficiency losses if they are not set at the right level or in the right form. For example, an inefficiently high congestion charge may be even more distorting than a zero charge, all the more so if imposing it incurs added resource costs to boot. There is also a risk of inefficiencies if the charge is unduly averaged, for example by location or time of day. That raises difficult institutional questions about who will set the charges and what protection consumers will have against monopoly (or otherwise inefficient) pricing.

91. Third and last, the efficiency impacts of congestion charges need to be assessed taking account of their interaction with other taxes. For example, taxes on labour income reduce labour supply below efficient levels. To the extent to which travel on congested roads is a complement to labour supply, a congestion charge will affect the extent of the resulting distortion. As those effects are potentially large, that further complicates the task of determining those charges' efficient level.
92. In short, congestion charges may be desirable, but that cannot be taken as necessarily so – proper policy evaluation is required. The fact that they encounter substantial community resistance makes the need for such rigorous policy evaluation all the greater.
93. It would be easy to dismiss that resistance as simply reflecting the community's lack of understanding. In reality, however, matters are more complex.
94. To begin with, a zero price, even if it leads to inefficiencies, has many attractions for consumers who face a good provided by a monopolist and for which there are few substitutes. To those consumers, accepting the imposition of even a very low price will seem like merely the first step on an unpleasant but very slippery slope. And rightly or wrongly, consumers may not draw much comfort from assurances that prices will be set by an independent regulator, especially if they do not believe they are all that badly off as matters currently stand – and that political pressure will prove effective in securing continuing investment in roads.
95. Second, it must be recognised that at least on some, not entirely implausible, assumptions, motorists are right to question claims congestion charging will make them better off. Thus, in the simple economic model in which all consumers have the same (or closely similar) values of time, and in which congestion involves an inefficiently low speed associated with an inefficiently high level of traffic flow,<sup>11</sup> congestion charging makes motorists as a class worse off. This is obvious from the fact that to achieve its objective, it must reduce demand: the result is that some motorists, who are induced to stop using the road, are worse off, which implies that those motorists who continue to use the road must be too (for otherwise, motorists would not be identical). Of course, even then, if the congestion charge is set to efficient levels, it will collect enough revenue to compensate motorists: but the first round losers may question whether, in practice, that compensation will be forthcoming.
96. Third, a shift to congestion charging can have significant effects on the distribution of wealth. These effects operate through changes in the value of the housing stock, which accounts for a very large share of most Australians' wealth.
97. To understand these effects, note that in the short-term, residential locations and jobs are relatively sticky: individuals are locked in to where they live and work. Over time, of course, locational patterns will change, which helps the congestion charges to do their work (as it makes the demand for road use more elastic, and hence more responsive to the charge, than it would be were residential locations fixed); but the very long-lived nature of the housing stock means that adjustment will be slow.
98. Rather, what will change first is the price structure of the housing stock, as the relative attractiveness of living in different places changes. These changes are complex; but in a simple model of a circular city in which households that have high incomes and a high value of time live close to or in the city centre, while those with low incomes and a low

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<sup>11</sup> In other words, we are not in a situation of hyper-congestion, where the equilibrium is in the backward sloping segment of the supply curve.

value of time live at the urban fringe, land rents and house values will fall slightly in the CBD, will rise slightly just outside the CBD and will fall materially as one approaches the urban fringe (where real incomes are reduced by the need to pay the congestion charge so as to commute into the CBD). That prospect of significant capital losses makes it even less surprising that those who own homes on or close to the urban fringe would oppose a generalised move to congestion charging.

99. All this may seem extremely negative; but economic analysis does also provide some guidance as to where congestion charges are most likely to contribute to efficiency and may be most readily accepted. Three features are relevant in that respect.
100. The first is the type and intensity of congestion. Instances of hyper-congestion are the most straightforward. Technically, these are situations where inflows and outflows on a roadway are equalised at a lower level than could be achieved: in other words, where people are literally stuck in traffic and where getting cars moving would allow a greater number of cars to use the road in each time period, so that a congestion charge could improve matters without any motorists being 'tolled off'. In those situations a congestion charge can make everyone better off, including motorists, at least if the resource costs of tolling are relatively low.
101. The gains are also likely to be large (though not as large) where there is acute congestion at a bottleneck, for instance, the queuing that occurs as motorists line up to cross a bridge or traverse a tunnel. With bottleneck congestion, congestion charges can secure an efficiency gain while making motorists as a group no worse off (as an efficient charge simply converts the time otherwise spent waiting into a monetary payment and so replaces a resource cost with a transfer).
102. The second factor is the extent to which motorists differ in the value they place on time. The greater the spread in time values, the greater are likely to be the gains from rationing through the price mechanism (which allows those with the highest willingness to pay to act on that fact) compared to rationing through congestion.
103. Finally, the third factor is the ease or difficulty of determining the appropriate level of the charges, including in terms of protecting consumers from monopoly pricing.
104. These factors mean that congestion charges make most sense on major point-to-point links that are periodically subject to very high levels of congestion potentially associated with bottlenecks. The scope to differentiate charges on those links using devices such as 'high occupancy' lanes (where motorists can choose between paying a charge and getting a reserved lane, or not doing so and using an open access lane) can make the gains greater, if they both allow users to sort themselves by value of time (with high value of time users opting to pay for an uncongested road, while low value of time users choose the lower quality of service the open access road provides) and give users some protection against monopoly pricing (as the open access road acts as a competitive constraint on the price charged for the tolled lane).
105. Conversely, the greatest difficulties in sensibly introducing those charges are likely to be in complex inner urban road networks, where congestion levels differ greatly road by road and depend on interactions between traffic flows and other features such as pedestrian movements, traffic lights and parking. These are contexts where it is difficult to determine the level of the efficient charge, there are few simple means of catering for

differences in the value of time<sup>12</sup> and where consumers will have only limited protection from monopoly pricing.

106. All this suggests congestion charges are no magic bullet. That is not to deny they can have wider benefits than simply better allocating existing road surface – for instance, if we had high quality price signals on roads, the gains from building new roads or expanding existing ones might well be greater.
107. Additionally, high quality price signals on roads might well make it easier to take sensible investment decisions. But that too involves important questions of institutional design, about how those decisions are taken, by who and with what incentives.
108. This brings me to the question of the interaction between congestion charging and infrastructure finance. In particular, it is often claimed that congestion charging will enhance the flow of finance for road projects. While there is something to this, the claims made are often greatly exaggerated.
109. Overall, for most economists, the goal of congestion charging is to ensure charges for using roads reflect social marginal cost, including both resource costs (such as damage to road surface) and the cost each road user imposes on others (such as accident and congestion externalities). If that is the goal, it is likely charges would be very low and the net revenue collected (compared to the current situation) even lower, assuming fuel excise (which acts as an inefficient tax on road use) were abolished.
110. Moreover, if there are economies of scale to the road network, as seems likely under Australian conditions, charges based on social marginal costs will be below long run average costs, and so will not fully finance the road network, even at the efficient level of capacity.<sup>13</sup> Continuing the standard economic prescription, the shortfall between marginal and average costs should be financed in the least distorting way, which is unlikely to involve substantially marking congestion charges up above short run marginal costs.<sup>14</sup> As a result, efficiently set congestion charges are unlikely to solve the problem of financing infrastructure expansion.
111. Nor, in the standard economic model, should congestion charging lead to greater subsidies for public transport – indeed, the opposite is true. If road charges fully reflect marginal social cost, there is no efficiency case for subsidising public transport, as all the externalities those subsidies are intended to capture when roads are unpriced have been corrected (‘internalised’). While there are possible exceptions to this prescription,<sup>15</sup> a focus on efficiency suggests that as congestion charges are introduced, public transport subsidies should be abolished.

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<sup>12</sup> The provision in these situations of a range of public transport options may act as a way of allowing consumers to choose their desired quality of service.

<sup>13</sup> If there are diseconomies of scope between competing uses of the road surface – for instance, as between cars and trucks – efficient charges may recover costs even in the presence of economies of scale. But there is no evidence to suggest that will be the case under Australian conditions.

<sup>14</sup> That is particularly the case for local roads, as the Henry George Theorem implies their value will be capitalized in local land values, as will also be the case for other local public goods. Indeed, the Theorem suggests that (assuming other inputs are in perfectly elastic supply) the gain in land values will exactly offset the loss from marginal cost pricing. If a non-distorting tax on land values is available, it will then finance the shortfall associated with marginal cost pricing; if it isn’t, the distorting tax and mark-ups in prices over short run marginal costs should be set at the point where marginal deadweight losses per unit of revenue raised are equalized.

<sup>15</sup> For example, a subsidy to public transport may be one way of offsetting the tax interaction problems discussed above, though it is reasonable to wonder whether it would be an efficient way of doing so.

112. All this contrasts strikingly with the views expressed by many public transport advocates. They see congestion charges as a way of deterring travel by car; and typically advocate using the revenues from those charges to increase the availability of public transport. In practice, this approach is likely to lead to two interacting distortions – excessively high congestion charges and excessively high public transport subsidies – that far from promoting efficiency, lead to a more than additive welfare loss.
113. Finally, there is a third view, typically propounded by business groups. These groups propose congestion charges primarily as a revenue source that should be hypothecated to building roads. Using some part of the revenues to fund public transport is almost invariably thrown in as a concession to secure the support of environmental groups and of the public transport lobby. Other than as part of the rhetoric of advocacy, the efficiency considerations that underpin the economic case for congestion charging play no part in this group’s arguments – nor could they, as the revenues efficient charges would raise would hardly suffice to finance the outlays these supporters of congestion charging have in mind.
114. In short, while there may well be considerable long run merit in congestion charging, it is no panacea to Australia’s transport infrastructure problems.