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Road congestion charges

An idea whose time has come

Technical Brief No.5
October 2009
ISSN 1836-9014

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TAI

Technical Brief

Acknowledgements

The author wishes to thank Richard Denniss, Howard Pender and Leigh Thomas for helpful comments and edits on the paper.

The real costs of motoring

Much is made of the price of petrol in Australian public debate but, although petrol may be one of the more visible regular expenses of car ownership, in fact it accounts for only a small percentage of the total costs involved in owning a car. Some of these are private, such as depreciation, but some are public—costs imposed by motorists on other road users.

Economists call these public costs 'external' costs and they include:

- some of the costs of accidents (studies show that accident externality costs are between 52 and 74 per cent of the private costs of accidents)[1]
- the cost of local pollution (that is, pollution apart from greenhouse gas emissions)
- carbon pollution (greenhouse gases, notably CO_2)
- congestion costs, which are heavy in big cities and almost non-existent in most country areas.

Economic theory suggests that social benefits are maximised and car-use decisions optimised when motorists pay the full marginal costs of their driving activities, including external costs. When people make a decision to drive on a busy road, they slow all other motorists down by a measurable amount, increasing their fuel consumption and the likelihood of their having an accident. Economists have attempted to measure these external costs and their estimates are quite large relative to the current private costs of motoring.

Some people struggle with the concept that their motoring imposes external costs on other road users. In particular, there is resistance to the idea of time costs but the concept is simple. If the working day is conceptualised as including the time spent getting to work, the value of an hour wasted on a congested road must be equal to the net (after tax) hourly wage rate. Without congestion, the same hour could have been spent at work, and the net hourly wage rate earned. If a motorist's use of a busy road slows 60 other users down by one minute or 3600 users by a second, it gives rise to a negative 'externality' equivalent to an hour's average wage. Congestion costs on very busy roads would be even higher than city averages. These externalities can be computed according to kilometres travelled or fuel consumed.

The total of these external costs has been estimated in Australia to be, on average, as high as 92 cents a litre in urban areas.[2] By contrast, the current fuel excise is 38 cents a litre but GST also applies, making the effective fuel tax rate in Australia 50 cents a litre. But a fuel excise is not a particularly good way to charge for road use as it can be circumvented by buying a fuel-efficient electric or LPG car. That is why explicit congestion or road-user charges need to be on the agenda. A fuel excise is best targeted at greenhouse gas externalities, as CO_2 produced is proportional to fuel burned.

There is a long list of academic literature in Australia on congestion or road-user charges,[3] which have huge advantages over other motoring taxes and charges because, unlike most taxes, they do not impose efficiency costs. Congestion charges do have administrative costs, as

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1 H Clarke and D Prentice, *A Conceptual Framework for the Reform of Taxes Related to Roads and Transport*, prepared for the Treasury, Canberra, June 2009, p. 52.

2 In fact external costs are a product of kilometres driven, location, time of use, and fuel consumption. Costs shown as cents a litre are necessarily an approximation based on average fuel consumption.

3 For a literature summary, see H Pender, *Taxing Cars: Fleecing the Fleet or Subsidising the Smog?* Australian Tax Research Foundation Study No 33, 1999.

do all taxes. Some of the obstacles to implementing congestion charges are technical, but others arise from public misunderstanding and consequent political opposition. In cities where congestion charges have been bedded down, they have become an acceptable part of the urban landscape.

What is a congestion charge?

Congestion pricing is based on the premise that in order to allocate a scarce resource, road space, to its most valuable use, road users should be charged a price based ideally on distance travelled and the degree of congestion experienced. All real-world congestion charges are approximations to this ideal. For example, a congestion charge can be approximated by levying higher fuel taxes in urban areas, but some of the benefits will be dissipated by motorists turning to more fuel-efficient cars.

Stanley suggests that the current Australian tax on fuel, at 38 to 50 cents a litre, is well below the marginal social costs imposed by urban users (84 to 92 cents a litre)[4] and too high for rural users (20 cents a litre).[5] This study indicates a high cost of congestion (60 cents a litre) relative to other external costs, but averages like this conceal the true costs of congestion as these can be quite low on many lightly-used roads and much higher on heavily-used transport routes such as major arterial roads.

For example, a study by the Department for Transport in the UK found that 900 roads in and around major towns and cities in England had a road-use externality in excess of A$1.12 a kilometre but almost 600 roads in more rural areas had costs of less than 4 cents a kilometre.[6] An earlier study, cited in Fullerton, suggested that the congestion cost of road use in central London was A$1.70 a kilometre driven.[7] At A$1 a litre, current UK fuel duties are around the highest in Europe, equating on average to 7 cents a kilometre.[8]

The current rates of fuel tax in the UK would be at the top end of calculations of motoring externalities apart from congestion, in the range of 4 to 8 cents a kilometre. To account for congestion, however, the Department for Transport argues that the tax might need to be 10 to 20 times higher.[9] Clearly, fuel excise is a very blunt instrument for addressing cost variations of this scale. An alternative is to toll congested roads or, preferably, to apply road-user charges.[10]

In Australia, the Bureau of Transport and Regional Economics (BTRE)[11] has estimated that the aggregate cost of congestion in 2005 was $9.4 billion,[12] and has forecast that it will continue to

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4 This roughly equates to 11 cents a kilometre.

5 J Stanley, 'Urban congestion', presentation to MIAESR conference, Bus Association Victoria, 2006.

6 D Fullerton, A Leicester and A Smith, 'Environmental taxes', in *Reforming the Tax System for the 21st Century*, The Mirrlees Review, Institute for Fiscal Studies, London, 2008, p. 32.

7 Fullerton et al., p. 37.

8 The average petrol consumption in the UK appears to be less than in Australia; hence conversions of cents a litre into cents a kilometre are slightly different.

9 Fullerton et al., p. 3.7

10 Parry and Small find that the optimal fuel-tax rate is halved when the substitution into more fuel-efficient vehicles is taken into account. Nonetheless, the optimal fuel tax is still much higher than the current US tax of 40 cents US a gallon, closer in fact to US$1 a gallon. See I W H Parry and K A Small, 'Does Britain or the United States Have the Right Gasoline Tax?', *The American Economic Review*, 95:4, 2005, p. 1276.

11 D Cosgrove, D Gargett, the Australian Department of Transport and Regional Services and Australian Bureau of Transport and Regional Economics, *Estimating urban traffic and congestion cost trends for Australian cities*, Bureau of Transport and Regional Economics, Canberra, 2007.

12 This is broadly consistent with the existing fuel excise, which raises $15 billion.

grow strongly, reaching $20.4 billion in 2020.[13,14] Other estimates indicate an even higher congestion cost.[15] By 2020, total annual kilometres travelled are estimated by the BTRE to rise by 38 per cent in Sydney, 33 per cent in Melbourne, 46 per cent in Brisbane, 44 per cent in Perth, and 13 per cent in Hobart. Clarke points out that in the next 20 years, city populations will grow by four million, vehicle traffic flows by 40 per cent and urban freight by more than 70 per cent.[16] There is no doubt that under such circumstances congestion will continue to escalate.

Researchers at the Institute of Transport and Logistics Studies, the University of Sydney, have suggested that Sydney's major M2 Motorway would have to be replicated 21 times within five years just to maintain congestion at today's levels.[17] Clearly, this is not sustainable; alternative approaches to managing congestion will need to be considered in the near future.

The University of Sydney report does not support a widespread rollout of new roads, instead calling for car registration fees and petrol taxes to be scrapped and replaced with a congestion tax. The report was produced by Professor David Hensher who has been an enthusiastic advocate of congestion charges. However, Eric Roozendaal, then NSW Minister for Roads, described the Institute's road pricing proposal as 'armchair advice from academics in ivory towers'.[18] This is despite the fact that a 2003 ministerial inquiry into sustainable transport in NSW had urged the government to 'consider implementing electronic road pricing (ERP) within the next 5-10 years as a means of effectively signalling to the Community the external costs of road use—congestion, pollution, road wear and tear and accidents'.[19,20]

Using taxes to 'internalise' externalities

The case for a congestion charge has been set out by researchers such as Pender,[21] Clark and Prentice in a recent paper prepared for the Henry Tax Review[22] and Hubbard in the Australian Treasury 2009 Economic Roundup.[23] Congestion charges or pollution taxes, called 'Pigouvian' taxes after the English economist Arthur Pigou, can be used to alert motorists to the full private and social costs of their activities. Pigouvian taxes are generally held to be the least-cost means of reducing externalities and Pigou's ideas are increasing in popularity as policymakers become

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13 Cosgrove et al., p. 13

14 Clark and Prentice suggest that the gains from congestion pricing are understated because gains associated with smoothing out bottleneck issues by trip re-scheduling are not considered by BTRE, and these may be as high as 50 per cent of the total gains. See Clark and Prentice, *A conceptual framework*, pp. 37–38.

15 Stanley puts the current cost at $20 billion.

16 H Clarke, 'Urban congestion and the boom', paper for Melbourne Institute conference on Making the boom pay, 2006

17 'Minister rules out congestion tax', *Herald-Sun*, 21 June 2008. The article refers to research by David Hensher.

18 'NSW says no to congestion charge', *Sydney Morning Herald*, 24 June, 2008. See Appendix 5.

19 T Parry, *Ministerial inquiry into sustainable transport in New South Wales A framework for the future*, December 2003. Ministry of Transport NSW.

20 The Australian Automobile Association (AAA) also suggests user charges covering five separate costs imposed by road users: a road-wear charge to reflect pavement damage, which would vary by axle type and load (with particular impact on heavy vehicles); a charge to cover crash costs not covered by insurance premiums; an environmental charge to cover air and noise pollution; a carbon charge to address the costs of greenhouse gas emissions; and a congestion charge levied only according to whether congestion exists at a particular time and place. See L McIntosh, *Setting the Right Framework: The Business Rules for Roads*, AAA, April 2004, p. 14.

21 Pender, H (1997). *The joy of tax*, Australian Tax Research Foundation Research Study No 26, Sydney. Chapter 6

22 Clark and Prentice.

23 P Hubbard, *Urban congestion—why 'free' roads are costly*, Treasury Economic Roundup Issue 2, 2009.

more aware of the heavy social and economic costs that modern societies are paying as a result of not recognising external costs, for example in relation to greenhouse gas emissions.

Pigou's original ideas related to pollution but they are equally applicable to congestion, which is simply another form of external cost imposed by the user of a busy road on all other users by virtue of slower trip times and increased risk of accidents. These costs also include pollution costs, since congested traffic produces high quantities of pollution relative to distance travelled. Taxing their use of busy roads can encourage individual motorists to factor all these costs into their trip decisions and, in addition, revenues from a congestion tax can be used to reduce other taxes and thus the 'excess burden' (economic efficiency) losses such taxes impose. Alternatively, congestion charges can be used to improve motoring infrastructure or public transport.

Criticisms of congestion charges

While a congestion charge has a number of theoretical benefits, its critics claim that it is not an equitable tax because it

- places an unfair burden on neighbouring communities
- has a negative effect on retail business, and
- is merely another revenue-raising device.

Conversely, economists argue that the revenue from such charges can be recycled back to assist low-income people and communities, notably through improved public transport, but also through other road infrastructure or tax cuts. In addition, they maintain that businesses are helped when traffic flow improves[24] and that taxes on externalities are much more efficient revenue-raising devices than taxes that distort economic decisions.

This paper ignores some of the practical issues peculiar to Australia, such as common and statute laws relevant to the endowment of motorists' rights and the constitutional issues these create.[25] For example, the option to replace most excise taxes with road-user charges raises issues of states' rights and fiscal compensation, issues outside the scope of this paper, which deals mainly with technical and economic issues.

A potentially significant criticism relates to the difficulty of reconciling real-world examples of congestion charges with the theoretical ideal, which varies according to location, distance travelled and time of day. Most existing charges are quite imperfect relative to this ideal; in some cases manifestly so. For example, the cordon approach used in London and Stockholm is an either-or system where a fixed charge is paid on entering (or, in the case of London, using) a designated congestion zone, thus creating an abrupt boundary that makes little theoretical sense. However, developments in technology appear to be improving the feasibility of 'textbook' congestion pricing.

Calculating optimal congestion charges is difficult but, rather than striving for perfection, it is possible to fine-tune them over time in order to meet the goals of the scheme as expressed, for example, in reductions in traffic use and improvements in trip times. A well-designed congestion charge must also address the issue of equity; the impact of such charges tends to be regressive

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[24] There have been suggestions that congestion charges reduce commercial activity within the tolled boundaries, although evaluation of this issue in London has suggested that there is no net change.

[25] See the discussion in H Pender, *Taxing Cars—Fleecing the Fleet or Subsidising the Smog*? *A tax treatment of vehicle ownership and use in Australia,* Australian Tax Research Foundation Study No 33, Sydney, 1999.

because, as with other charges on motoring, they account for a higher portion of the spending of the poor than the well-off. The well-off are more likely to go on driving after the imposition of a charge whereas the poor are likely to be forced off the roads and into less-desired time slots or imperfect public transport. However, these sorts of difficulties can be overstated, as the revenue from congestion charges can be re-cycled back into the community by reducing other equally regressive taxes and by improving public transport or road infrastructure.

For example, the Dutch road-pricing scheme proposes reductions in fixed motoring costs (registration fees and sales taxes) that impact particularly on the less well-off. The revenue raised in the London scheme is earmarked for improvements in public transport. Another option is that congestion-charge revenues can be used to fund a mobility tax credit for low- and middle-income individuals, either reimbursing some congestion charges or alternatively paying for the use of public transport.[26]

Types of congestion charges

Cordon area pricing charges motorists a fee to enter a designated area. The first implementation of this approach occurrred in Singapore in 1975 and was upgraded from manual tolls to electronic road pricing in 1998.[27] Bergen (Norway) implemented a charge in 1986, with similar schemes being introduced in Rome in 2001, Durham in 2002, London in 2003, Stockholm in 2006, Valletta (Malta) in 2007 and Milan in 2008.

The Milanese scheme is called Ecopass, and it charges differential rates according to the emissions of the particular vehicle. The London and Stockholm schemes are based on number-plate recognition using cameras, and both charge a fee when a user crosses the cordon boundary; Stockholm caps the daily charge and London charges a single daily fee irrespective of how often a user passes the boundary. The London scheme also applies charges on road use internal to the cordon area. The Bureau of Infrastructure, Transport and Regional Economics (BITRE) calls this an 'area scheme'.[28] This technology and the associated charging system are relatively expensive and can be inflexible but they are proven.

In Stockholm, for example, a bill is sent to vehicle owners at the end of the month and they have another month to pay. The fees are a deductible expense for individuals and businesses. In London, fleet owners are billed but private motorists must pay before the trip or the day after, using either a website, an SMS text message, shops equipped with PayPoint, or a telephone. Residents of the charging zone are eligible for a 90 per cent discount.

Multi-road congestion charges are based on electronic tolling triggered when motorists pass designated toll points. The whole area tolled by this system can be thought of as the cordon area. The Singapore Land Transport Authority (SLTA) has an electronic pricing system based on gantries erected across busy roads and expressways. It is possible to pass several gantries on one trip and each time a charge is deducted from the motorist's electronic account, similar to

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[26] D Lewis, America's Traffic Congestion Problem: A Proposal for Nationwide Reform, Hamilton Project discussion paper 2008–06, The Brookings Institution, July 2008. Available at: http://www.brookings.edu/papers/2008/~/media/Files/rc/papers/2008/07_congestion_lewis/07_congestion_lewis_pb.pdf.

[27] SLTA (Singapore Land Transport Authority), 'Electronic road pricing', 2009. Available at: http://www.lta.gov.sg/motoring_matters/motoring_erp.htm

[28] Bureau of Infrastructure, Transport and Regional Economics (BITRE), *Moving Urban Australia: Can Congestion Charging Unclog Our Roads?*, Working Paper 74, BITRE, Canberra, 2008. Available at: http://www.bitre.gov.au/publications/80/Files/WP74.pdf

the Sydney e-TAG system. In the Singapore scheme there are some 90 gantries, levying charges according to time and place.[29]

The SLTA suggests that the policy has successfully achieved optimal speed on expressways and arterial roads, with average road speed increasing by about 20 per cent and traffic falling by 13 per cent in the restricted zone. Traffic peaks have also reduced, with usage spreading out into off-peak periods. However, the inflexibility of the gantry system means that traffic can sometimes move elsewhere (known in Australia as 'rat running'), with bottlenecks transferred to smaller roads.

In marked contrast to schemes such as London's where pricing has essentially been at the whim of the Lord Mayor, Singapore uses a scientific system for setting road charges. Rates are reviewed every three months to maintain speeds of 20 to 30 kilometers an hour on city roads and 45 to 65 kilometres an hour on expressways, and are raised or lowered to achieve the speed targets.[30] The administrative cost of the Singapore system has been estimated at 23 per cent of revenue.[31]

Singapore's system is more sophisticated and cheaper to operate than London's but London also claims substantial benefits from the charge, with a marked reduction in traffic within the zone (see appendixes 1 and 2) and a large switch by commuters to bus travel. Similar improvements have been cited for Stockholm.[32]

The London congestion charge was initially equivalent to A$10 but is now A$16. The scheme's administrator, Transport for London, notes that a 21 per cent reduction in traffic entering the original Central London Congestion Charge Zone has been maintained (70,000 fewer cars a day) but, despite initial falls, congestion in both the original and Western Extension Congestion Charge Zone, added in 2007, has returned to pre-charging levels, partly as a result of infrastructure works and new bus and cycle lanes (see appendixes 2 and 3). However, it has been calculated that congestion is around 30 per cent less than 'business as usual' and would be significantly worse without the sustained traffic reductions brought about by the charge. It has probably not helped the London scheme that about half the traffic entering the zone is either exempted or enjoys a significant concession. Economic theory generally holds that there should be no exemptions.[33]

Implementation costs have been high in London, constituting over half of total revenues raised, double the cost in Singapore. There have been suggestions that the number-plate-recognition technology used is relatively expensive (see Appendix 1). The Central London Congestion Charging Scheme is required by law to spend the net revenue of the scheme to improve overall transportation; in 2007–08, around 80 per cent of the £137 million net revenue went towards improving the bus network, with the remainder spent on planning, upgrading roads and bridges, road safety, environmental and walking and cycling measures.[34]

Charges such as London's and Stockholm's are a long way removed from the theoretical ideal of a charge that is continually applied, per kilometre, as a driver's road usage extends, and also varies according to the hour. The imperfections of such charges lead to perceptions of inequity and may make it difficult to garner public support for this sort of policy. Fortunately, new

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29 SLTA.

30 BITRE, p. 97.

31 Pender, *Taxing cars*, p. 59.

32 Stanley, p. 12.

33 BITRE, p. 107.

34 Hubbard, p. 13.

technologies are making the implementation of pricing regimes that are closer to the theoretical ideal more feasible.

Single facility congestion charges are tolls that vary throughout the day, becoming higher when the facility is most used. The Sydney Harbour Bridge and Tunnel tolls are examples and the system has also been used in France and the US. A variant of this approach is the *high-occupancy toll* (HOT) scheme in the US and Canada, whereby motorists are able to pay extra to use a fast lane; these have been dubbed 'Lexus lanes' as they are seen as a perk for the well-off.

Road-user charges are increasingly being imposed on heavy vehicles, for example in continental Europe where there is increasing use of electronic pricing. In 2004, the Chancellor of the Exchequer in the UK suggested a move from fuel taxes to road-user charging, proposing a GNSS-based[35], nationwide, variable time, distance and place charge. Motorists would pay by the mile, depending on where and when they drove. In 2005, UK Transport Secretary Alistair Darling announced proposals to introduce road-use pricing. Every vehicle would be fitted with a satellite receiver to calculate charges, with prices to range from 4 cents a mile on uncongested roads to A$2.68 a mile on the most congested roads at peak times.

In 2006, a report to the UK Department for Transport by R Eddington[36] came out strongly in favour of a national scheme of road pricing where the charge varied by location, time and distance travelled. The scheme required vehicles to be fitted with on-board units (OBUs) that sent signals to a monitor and drivers would be sent bills in each set period. But the scheme was extremely expensive, with implementation costs in the range of $20 to $120 billion and annual running costs of $4 to $10 billion. It was estimated that congestion would be halved but urban traffic reduced by only three to four per cent.[37]

Despite the high-implementation costs, the scheme was estimated to produce net revenues of around $16 billion per annum, and gross welfare benefits in the order of $50 billion.[38] Although not prohibitively so, the costs were high in relation to the benefits and there was also likely to be considerable opposition from motorists, particularly if the new charges were to be imposed in addition to prior motoring charges. A key question, therefore, is to what extent current taxes might be reduced or replaced by a road-pricing scheme. In the UK in 2007, a campaign against road pricing was begun and attracted 1.8 million petitioners, six per cent of the driving population. UK drivers, perhaps unsurprisingly, felt that they already paid enough for motoring and were not happy about what appeared to be additional charges.

In December 2007, the Dutch Minister of Transport, Public Works and Water Management announced that a road-user charge is to be introduced, which will use the latest satellite technology to register distance driven and will be accompanied by lower fixed charges for road users. The scheme will use vehicle tracking by GPS, calculated by onboard electronic accumulating odometers, which assess travel for remote central computers capable of applying a range of charging regimes.

Under the new Dutch system (to be introduced for trucks in 2011 and for cars over the period 2012 to 2016), motorists will no longer pay road tax or sales tax on new cars, the equivalent of

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35 Global Navigation Satellite System (GNSS) or Global Positioning System (GPS). GNSS is the standard term for satellite navigation systems that provide geo-spatial positioning with global coverage. A GNSS allows small electronic receivers to determine their location to within a few meters using signals transmitted along a line of sight by radio from satellites.

36 R Eddington, *The Eddington Transport Study*, Department for Transport, London, 2007.

37 Stanley, p. 13.

38 Fullerton et al., p. 36.

registration fees and stamp duty in Australia. Instead, they will pay fees related to kilometres travelled. Tariffs per kilometre will depend on vehicle characteristics and, eventually, time and place. As it is more reflective of actual usage, the charge should lead to a fairer allocation of costs and, in addition, positive effects are expected on traffic, the economy and the environment.[39,40]

The Dutch Minister of Transport says that more than 50 per cent of motorists will actually pay less under the road-user charging scheme and only people who drive more than 18,000 kilometres a year are likely to be worse off. The Dutch Government has determined that the costs of operating the national road-user charge will not exceed five per cent of the proceeds, inexpensive relative to the UK proposals, which may indicate that the cost of the necessary technology is expected to fall.[41]

Feasibility of optimal congestion pricing

Toll roads already provide a form of congestion charging in Australia, although it is only recently that fixed-price tolls are beginning to be replaced by time-related tolls such as those on the Sydney Harbour Bridge and Tunnel. Tolls used to be a time-consuming and labour-intensive way to levy road charges but modern technology is making congestion charging much more feasible. Manual tolls have largely been replaced by transponders, pocket-sized radio transmitters mounted on windshields that communicate with toll-receiving devices installed on the roads. The device beeps once to show drivers that the toll has been deducted from their accounts, which need to have been set up previously. A similar system is used in Singapore.

In Sydney and Brisbane, e-tolls are widely used and are transferrable across most parts of the toll network, including the time-of-day tolls on the Sydney Harbour Bridge and Tunnel. Melbourne uses a similar system, called e-Tag. Much more use could be made of time-of-use toll pricing in Australia but, in some cases, this would require re-negotiating existing tollway contracts between private owners and state governments.

The need for such negotiation exposes a significant downside associated with the privatisation of the toll-road network in Australian cities. The optimal congestion charge is quite unrelated to the cost of building the road, but to a large extent this cost is what private tolls reflect. Rather, the charge should relate to the actual degree of congestion and should ideally apply to all roads within a network rather than to designated toll roads only. In some cases, reductions in tolls are needed, for example for off-peak usage. It has now become difficult for states such as NSW and Victoria to turn this particular clock back, but eventually a negotiated solution will need to be found.

In January 2009, NSW introduced time-of-day tolling for the Sydney Harbour Bridge and Tunnel at a cost of $4 for peak, $3 for shoulder, and $2.50 for off-peak periods. The peak toll is not

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39 Rapp Trans (UK) Ltd, 'Road User Charging', [2009]. Available at: www.rapp-trans.co.uk/itsa_road_user_charging.html.

40 Satellite-based road user charging will be implemented throughout the Netherlands to reduce congestion and finance future road infrastructure. The 'kilometre price' proposed is to be differentiated by location, the environmental properties of the vehicle, and the time of day. It is to be introduced for all vehicles on all roads in the entire country, starting with trucks in 2011 and phasing in a scheme for cars from 2012 to 2016. The Dutch Minister of Transport, Camiel Eurlings, states this will provide a fairer system, which taxes vehicle use rather than ownership. See D Hensher, 'Future Directions to Fund our Roads that Buses Use: Listening and Learning from Other Countries', *Food for Thought*, May 2008. Available at: http://itls.econ.usyd.edu.au/downloads/david_hensher_ABC.pdf

41 According to the BITRE, the cost of setting up the Dutch system is uncertain, with initial costs of €2.2 to €4.1 billion and operating costs of €0.5 to €1.1 billion. The five per cent target has been acknowledged as 'ambitious'. See BITRE, p. 43.

charged for weekends or public holidays. The NSW Road Traffic Authority has noted that '[m]otorists have adapted well to the changes and traffic volumes reflect a marked increase in people travelling before the peak period, with numbers falling again during the peak period between 6.30am and 9.30am on all crossings ...' The additional revenue from the peak toll is to be invested in public transport.[42]

However, an optimal congestion charge would be even higher for peak periods and lower (or nil) for the off-peak. According to the Director of the Institute of Transport and Logistics Studies, David Hensher, an optimal charge regime would also include the other arterial roads and harbour crossings to prevent route substitution, with average charges in the order of 10 to 15 cents per kilometer.[43] But this is not the intention of the NSW Government, which appears to lack a consistent objective in relation to congestion charging.

As David Hensher notes:

> Just when we thought there might be action in Sydney when the Premier Rees got headline news with his commitment to tackling traffic congestion with differential tolls by time of day (initially on the harbour bridge and tunnel crossing), we were reminded by the Treasurer that he had no intention of introducing any form of congestion charging, but believed that the initiative of differential tolling in one location on the harbour crossing would have a noticeable impact on peak-hour traffic into the CBD of Sydney. With a differential of $1 in one direction only for individuals living on the leafy north shore in liberal electorates, we are unlikely to see any noticeable reduction in traffic level …[44]

Implementation challenges

The Australian e-tag systems are supplemented by camera and number-plate-recognition technology to ensure compliance. For example, in Brisbane it is possible to be tolled using the latter method but a 40 cent surcharge applies. Number-plate recognition technology is only about 90 per cent effective and seems likely to be eventually phased out in favour of e-tags in cities where it continues to be used, such as London.

The operating cost of the Singapore scheme, which is based on transponders, has been stated to be 20 per cent of revenues,[45] much lower than the cost of the London scheme, estimated at 60 per cent in the early years.

The Central London Congestion Charging Scheme uses a network of 340 closed-circuit television cameras that read number plates to identify cars passing each cordon. Number plates are then cross-checked against a central database to ensure that charges have been paid. Charges are not payable at weekends, on public holidays or between 6 pm and 7 am.

GPS[46] devices in vehicles can monitor road-network use and congestion levels in real time. The first successful demonstration of GPS road pricing was in 1994 in Germany and applied to heavy vehicles. In 1998, the European Union proposed the wider use of GPS to charge vehicles by distance travelled.

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42 Roads and Traffic Authority (NSW), 'Time of day tolling', 27 May—last update, 2009. Available from: http://www.rta.nsw.gov.au/usingroads/motorwaysandtolling/tod_tolling/index.html.

43 J Gibson, 'Congestion tax for drivers', *Sydney Morning Herald*, 24 June 2008. Available at: http://www.smh.com.au/articles/2008/06/23/1214073151558.html.

44 D Hensher, 'The Political Interest in Doing Something about Congestion is finally surfacing?' *Food for thought* Op 14, November 2008. Available at: http://itls.econ.usyd.edu.au/downloads/david_hensher_ABC.pdf

45 BITRE, p. 43.

46 See Footnote 41.

> It is now technologically possible and economically feasible to implement electronic road charges that can reflect with reasonable accuracy the marginal costs of road use. The main technologies are microwave technology where an on board unit communicates with road side equipment and satellite positioning and navigation systems and GSM where the on board unit communicates with a satellite and mobile telephony is used to collect payment. A number of microwave based systems have been introduced on specific routes, and although CEN prestandards have been adopted further effort is needed to establish European standards for these technologies. Compared to microwave based systems, GPS and GNSS have the advantage that they demand no road side equipment and in the long run might prove less costly. Indeed technology that makes it possible to implement highly differentiated charges is already being deployed for other purposes such as fleet management and will soon be introduced in new vehicles as the electronic tachograph (to monitor driving and rest times) becomes mandatory under Community law.[47]

The feasibility of GPS to provide real-time price information to motorists has been trialled in Seattle, where it was found to be a 'mature and reliable' system.[48] David Hensher[49] recently presented his congestion and variable-user-charging proposal, which involves satellite-tracking of vehicles, to the NSW Roads and Traffic Authority (see Appendix 4). It supports the abolition of fuel excises and fixed charges like car registration in favour of road-use (congestion) charges.[50]

A fuel tax can be used as a rough proxy for congestion pricing but it applies on all roads at all times and is therefore quite ineffective in this role. Furthermore, it can be avoided by motorists running more fuel-efficient vehicles and, while this is better for the environment, it imposes the same congestion costs. Variable road-use charges based on satellite technology are definitely the ideal, but in Australia there might usefully be a transition phase based on existing e-tag technologies.

Politics of congestion charges

In Australia, the politics of introducing congestion pricing are difficult. Politicians find this issue about as easy as introducing capital gains tax on the family home, a good idea in theory, but … Motoring organisations with widespread membership and a great deal of political clout are not automatic promoters of these proposals but they might be persuaded to support such a scheme if revenues were to be earmarked for reducing other road charges or improving road infrastructure.

As noted above, the NSW Government's reaction to the idea of congestion charges has been unenthusiastic (see also Appendix 5). That said, there is some evidence of political interest in congestion charging in Australia.

At its meeting in Adelaide in November 2008 the Australian Transport Council (ATC) moved forward on tackling urban congestion. State and territory transport and roads ministers met with the Commonwealth Minister for Infrastructure, Transport, Regional Development and Local Government to discuss a national transport policy. In relation to congestion, the ATC Joint Communiqué issued on 7 November 2008 'agreed that road pricing schemes need to be carefully designed and specific to their proposed locations. Jurisdictions will cooperate in

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47 Commission of the European Communities, *Fair Payment for Infrastructure Use: A Phased Approach to a common transport infrastructure charging framework in the EU*, White paper, COM(1998) 466 final, Brussels, 1998. Available at: http://aei.pitt.edu/1136/01/transport_infra_wp_COM_98_466.pdf.

48 Hubbard, p. 9.

49 D Hensher, and S. Puckett, 'Congestion and Variable User Charging as an Effective Travel Demand Management Instrument', *Transportation Research A*, 2007.

50 BITRE, p. 139. For a discussion of available and future technologies for road pricing, see Appendix C.

modelling the congestion, network, socio-economic and emissions outcomes of various targeted pricing scenarios'.[51]

According to David Hensher:

> Ministers are now openly discussing a suite of significant and even ambitious objectives that would have been hard to imagine a year ago. Although ministers have yet to bite the bullet on road pricing, they are seriously considering a range of road pricing schemes including HOT lanes, cordon fees, distance-based fees, parking measures, [and] time-variable congestion pricing'.[52]

In other parts of the world, the introduction of congestion charges has also proved politically difficult. In New York, for example, a recent proposal by the City Council for a US$8 congestion fee was opposed by the State Assembly.[53] But 14 states, including notably California, Texas and Florida, have overcome opposition and instituted various forms of congestion pricing. In Europe, London and Stockholm began programs despite considerable resistance, which abated when traffic and air-quality improvements became apparent. Stockholm implemented a seven-month trial period followed by a successful referendum.

Uncongested roads are definitely advantageous for business investment and location, which raises the issue of inter-city competition. For Singapore, which wanted to become an internationally competitive city for doing business, this was an important motive. There is also the issue of the urban-regional divide. Regional and green politicians are affronted by what they see as excessive spending on some urban roads. If road use were properly priced, there would be less need for new roads and because existing congested roads would produce a surplus of revenues over their capital cost, a clear signal that capacity increase might be warranted. Hence the need for new investment would become much less controversial.

The BITRE suggest that the 'litmus test of political success is likely to be as simple as whether or not the introduction of a scheme brings down the government responsible'.[54] However, it also notes that 'citizens' anxiety about congestion charging projects far exceeds their actual dissatisfaction once a project is in place'. For example, in 2005 after two years of the scheme, there was apparently little resistance to the increase in the London cordon charge from the equivalent of A$10 to A$16. In fact, surveys demonstrate unexpectedly favourable attitudes towards implemented projects.[55]

In London, the decision to earmark toll revenues to improve public transport systems has helped garner political support but it has not been helpful that congestion has failed to improve relative to the start date in 2003. In some places, reform has stalled due to public opposition. For example:

- Hong Kong tested an electronic charging system in 1985 with good results, but public opposition stalled its permanent implementation.

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51 Hensher, 'The political interest', p. 3.

52 Hensher, 'The political interest', p. 3.

53 N Confessore, '$8 traffic fee for Manhattan gets nowhere', *New York Times*, 8 April 2008. Available at: http://www.nytimes.com/2008/04/08/nyregion/08congest.html?_r=1&scp=1&sq=State%20assembly%20opposes%20%248%20congestion%20pricing%20charge&st=cse

54 BITRE, p. 44.

55 BITRE, .p. 110.

- In 2002, Edinburgh conducted a referendum on congestion charging, with three-quarters of voters rejecting the idea.
- In 2007, New York City proposed a plan but it was rejected by the State Assembly.
- In 2008, councils across the West Midlands in the UK, including Birmingham and Coventry, rejected the idea despite promises of assistance from the central government.
- Manchester in the UK proposed a scheme with two cordons and two rates, but a referendum of 10 local governments decisively rejected the plan.
- A scheme for Cambridge in the UK is under consideration but surveys show that a majority of residents reject the idea.

Milan is currently trialling a scheme called Ecopass, which allows low-polluting vehicles to face lesser or nil charges because, interestingly, the principal aim is one of reducing urban pollution rather than congestion per se. The trial has been extended to December 2009 and a period of public consultation will then be conducted to decide if the charge should become permanent. The plan was watered down even before it started, with the restricted traffic zone being reduced from 60 to 8 square kilometres and the mayor forced to include discounts for local residents. Nonetheless, traffic, pollution and accidents have all fallen substantially and the apparent success of the scheme has reduced opposition. However, users have bought new vehicles to qualify for free access and while this has helped pollution, it has undermined the congestion benefits of the scheme, which some see as more important.[56]

Congestion pricing, public transport and urban form

Based on the sound notion that motorists will only change their behaviour if they have attractive alternatives, congestion-pricing revenues have sometimes been earmarked to improve public transport, as in London. However, there is no real economic case for public transport earmarking[57] and it could be argued with equal conviction that revenues should be assigned to road improvements, as in Stockholm. In Australia, there is an argument for public transport earmarking in the initial period because public-transport infrastructure is run down and needs to be dramatically improved if road pricing is to have the desired effect.

Ultimately, congestion charging should allow diminution of subsidies for public transport as one of the reasons for the subsidies, congestion reduction, would disappear. The ultimate effect is that all forms of urban transport would become more expensive, reflecting the real social costs of this activity and, in the long run, encouraging higher-density urban configurations where transport costs are less significant.

Australian cities are some of the least dense in the world measured by persons per square kilometre. Sydney registers at 2,150, Melbourne at 1,500 and Brisbane at 950 compared to, say, London at 5,100 and Paris at 3,400.[58] The BITRE argues that, 'This makes it difficult for

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[56] The former Lord Mayor of London, Ken Livingston, proposed changes to the congestion charge with a new multi-rate structure based on a car's CO_2 emissions. However, the current Lord Mayor, Boris Johnson, scrapped the proposal, arguing that the change would worsen congestion by allowing thousands of small vehicles to travel for free.

[57] There is a case for initial subsidies, although it diminishes when a reasonable public transport infrastructure is in place and motorists are paying the full costs of their driving decisions. In the short term, revenues need to be used to improve public transport infrastructure; in the long term, revenues from tolls might also be used as a signalling mechanism to indicate where new road capacity can sensibly be built.

[58] BITRE, Table 3.2

Australian cities to justify provision of the good quality public transport systems that may be necessary to bring about driver behavioural change without cripplingly high congestion charges ...'[59] The alternative argument is that it makes a clear case for beginning the necessary interactive process of charging for congestion, making public transport more financially sustainable, and raising population densities to achieve greener and more sustainable cities. It is not an argument for business as usual.

Conclusion on congestion charging

In the past, congestion charging has been inhibited by a reliance on dated technologies that have prevented the full potential of the system from being realised. High costs have meant that economic cost-benefit analysis of schemes such as that in London have not always been positive and, in other cases, economic analysis has simply not occurred.[60] Some of the schemes have demonstrated such severe deficiencies that they were never likely to be attractive to motorists, notably the city cordon schemes. For example, it has proved politically difficult to extend the cordon area in London, particularly when it began to encroach considerably on residential housing. Motorists quite naturally perceive arbitrary boundaries as unfair.

There has also been a lack of clarity attached to the objectives of congestion charging, with some governments (like Milan) conflating pollution and congestion goals and allowing many cars to travel free, thus defeating the congestion amelioration goals. The London proposals for exempting certain low-emission vehicles would have had the same effect, but were defeated by a change of government. Congestion charges should be based on road use; pollution charges are better addressed through fuel excises, which have particular application to greenhouse gas emissions, and possibly through regulation to address other (local) pollution such as particulates.

The BTRE suggests that 80 per cent of Australia's $9.4 billion congestion costs arise in Sydney, Melbourne and Brisbane[61] but political response to the idea of congestion charges has been hostile, particularly in NSW where arguably they are most needed. Nonetheless, the time-of-day charges on the Sydney Harbour Bridge and Tunnel provide a test of such charging, which could easily be extended using the e-TAG system to other harbour and river crossings and choke points on major arterial roads. If the time-of-day charges established in Sydney were to be implemented city-wide, the system would begin to resemble the Singaporean example, with the obvious similar disadvantage that in some cases motorists would use 'rat runs' to avoid charging points.

In the US, it has been estimated that as much as 30 per cent of inner city traffic is caused by cars cruising to find parking spots,[62] so there is also a need for complementary policies on parking charges. Parking prices need to be sufficiently high to create continuous empty slots and obviate the need for extensive cruising. State governments are already moving in this direction by taxing private parking slots.

In Australia, the central ABS projection is for the population to almost double to 36 million by 2056 and more than double to 45 million by 2101; these projections are now being revised

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59 BITRE, p. 54.

60 BITRE, p121.

61 D Cosgrove et al., p. xv.

62 Clarke and Prentice, p. 47.

upwards. Much of this population increase is flowing into the major cities,[63] causing growth there to be greater than the general rate. For example, Melbourne, with a current population of 3.8 million, is projected to reach 6.1 million by 2056. Forecasts indicate a 40 per cent expansion in traffic by 2020, suggesting the need for swift action to constrain this growth by appropriate charges for scarce road space. Even were state governments to possess the resources, which they clearly don't, building sufficient roads to accommodate future traffic growth is not a sensible approach. Nor is it possible to make rational decisions about building new roads when the existing and observable demand takes no account of external costs.

Ultimately, the best solution to congestion charging emulates the proposed Dutch system, which incorporates road-user charges dependent on place and time-of-day and satellite navigation (GPS) technology. However, this technology is still being developed and it may be wiser to allow overseas systems to be tested, Moreover, it is in the nature of this sort of technology to become cheaper over time. But that is not a reason for delay since considerable scope exists to address the gridlock in Australia's major cities using existing, proven and inexpensive technology, of which e-tags are currently the most promising. At the same time, public transport options must be ramped up so that those who cannot afford the new tolls are not disadvantaged.

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[63] ABS (Australian Bureau of Statistics), *Population projections Australia, 2006–2101*, Cat. 3222.0, Canberra, 2008. Available at: http://www.ausstats.abs.gov.au/Ausstats/subscriber.nsf/0/0E09CCC14E4C94F6CA2574B9001626FE/$File/32220_2006%20to%202101.pdf

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Appendix 1

D Hensher, 'Congestion Charging: What Sydney can learn from London', *Online opinion*, posted Monday, 22 September 2003 (edited version). Available at: http://www.onlineopinion.com.au/view.asp?article=735

The London Scheme

The London charging scheme which came into force on 17 February 2003 involves a £5 daily entry fee to the charge zone between 7am and 6.30pm, Monday to Friday, excluding Public Holidays. The charging zone bounded by the Inner Ring Road is a small area in the city of London in which very few people actually live. The scheme operates with a paper based system using Automatic Number Plate Recognition (ANPR) technology, via cameras located at cordon entry points or in mobile locations throughout the charging area.

Before its commencement, the charging scheme was predicted to:

- Reduce traffic volumes in the heart of the capital by between 10-15 per cent year round, i.e., to school summer-holiday levels all year round;
- Reduce congestion by 20-30 per cent, journey times shortened and delivery times made more reliable;
- raise £1.3 billion over the first 10 years for re-investment in all forms of transport in London, including roads, buses, local streets and railways; and
- pay back set up costs within 18 months of starting.

To be eligible for entry one has to register a vehicle and the number plate becomes the basis of compliance with the charge debited to an agreed account. There are a range of exemptions and discounts. Exemptions apply to certain alternative fuels, breakdown and recovery vehicles, health service workers, motorbikes and mopeds, military vehicles, emergency services, taxis, minibuses and public transport vehicles. Residents of the zone receive a 90 per cent discount (i.e., pay £0.50 or 50p). Freight vehicles pay the full daily charge.

It was initially anticipated that most registrations and payments would be made through a labour-intensive call centre; however, 38 per cent of payments to date are through retail outlets, 24 per cent over the web, 18 per cent as SMS messages with the balance of 20 per cent through a range of other sources including the call centre. Over 900,000 individuals have registered for discounts and/or exemptions. If someone enters the area without having paid then they are given until midnight on that day to pay, otherwise they are automatically issued with a fine notice for £80, reduced to £40 if paid within 14 days.

What are the major findings to date? Currently there are over 100,000 payments per day made on entry to the zone which includes 11,000 fleet vehicles. Before the introduction of the charge, the average speed of all traffic was 13 kph; it is now 17 kph. There has been a 20 per cent reduction in total vehicle trips per day throughout London with a 16 per cent reduction of traffic in the charging zone. Congestion has decreased by 31 per cent as measured by travel time. This is due to 150,000 fewer car trips into, out of and through the charging zone. 10-20 per cent of these trips have diverted around the zone with the greater percentage of the balance (50-70 per cent) switching to public transport. This adds approximately 90,000 to 130,000 passenger trips across the charging day to public transport.

The public transport switching translates into a 14 per cent increase in patronage with bus journey speeds increased by 33 per cent and a 14 per cent annual growth at the present. The

growth in motorbike use is also of interest: combined with the increased speed, motorbike use has resulted in greater exposure to the risk of driving faster.

The raising of revenue is the most controversial and unexpected outcome. One of the strong arguments for congestion charging in London promoted by the Mayor of London, Ken Livingstone, is the hypothecation of revenue raised for investments back into transportation, especially public transport. The amount of revenue raised in the first six months is nowhere close to what was projected: the charging scheme has been too successful in discouraging car use. In addition, the administrative costs of the scheme have been much higher than anticipated. 67 per cent of revenue raised has been consumed by costs of administering the scheme. Thus the net revenue is relatively small in terms of any re-investment back to public transport.

The use of number plate recognition, while supported as the easiest way of introducing the charging scheme in a setting that has not yet taken on board electronic tolling (as exists widely in Sydney with full interoperability), has resulted in a range of headaches in administration. Although it was initially argued that the presence of number plates would make it easier and less costly to link the charging process to these plates with optical identification, there is a growing view (unofficially) that electronic tagging may be the way in the future. Its rejection in London is linked to the absence of electronic tolling in the region and the increased expense in starting from scratch. This may turn out to be a bad decision.

Concluding Comments

The success of the London initiative as the first congestion charging program in a major European city is important for Australia in demonstrating the political feasibility of pricing. This strong political commitment is crucial. Sydney is well placed to benefit, especially given our advanced capability in interoperable electronic tolling and associated administrative support systems in the supply chain. What we must ensure however is that any congestion charging system is not selected for the convenience of an appealing cordon such as the CBD, but for broader system-wide efficiencies.

Appendix 2: London—the official view

The Sixth Annual Impacts Monitoring report shows:

- Traffic entering the western extension has been cut by 14 per cent (30,000 fewer cars a day)
- A 21 per cent reduction in traffic entering the original charging zone has been maintained (70,000 fewer cars a day)
- Despite initial falls, congestion in both the original and western charging zones has returned to pre-charging levels. However, congestion would be significantly worse without the sustained traffic reductions brought about by the charge
- There has been a 6 per cent increase in bus passengers during charging hours and a 12 per cent increase in cycle journeys into the western extension
- The background decline in traffic levels across central London has continued. As a result, there has been no lasting impact on overall traffic levels in the original zone because of the introduction of the western extension
- The Congestion Charge was introduced on 17 February 2003 and the western extension was launched on 19 February 2007. The charge was originally £5 and rose to £8 in July 2005.[64]

[64] Transport for London, 'Congestion Charging five years on—traffic levels still down but congestion rises back to pre-charging levels', 6 August 2008. Available at: http://www.tfl.gov.uk/corporate/media/newscentre/archive/8948.aspx

Appendix 3: London—the sceptic's view

'London Admits Congestion Charge Failure', *theNewspaper.com*, 8 July 2008, (edited version). Available at: http://www.thenewspaper.com/news/24/2495.asp

Transport for London reports congestion charging has failed to deliver congestion reduction to motorists paying $16 a day to enter the city. Motorists in London, England last year paid £268 million ($536 million) in charges and penalties imposed in the name of congestion reduction. According to the sixth annual Transport for London Impacts Monitoring report released yesterday, these massive payments have left drivers no better off than they were before the charge was implemented.

"The absolute level of congestion during 2007 was effectively identical to the representative value for conditions before the scheme was introduced in 2002," the report stated. "In other words, journey times inside the zone during 2007 were comparable to those prior to charging."

Figures show that in the first four months of this year, and in all of 2007, the primary congestion measurement -- the mean excess travel rate -- was 2.3 minutes per kilometre. This figure is identical to the rate measured in 2002, before charging began. "I have always thought that the Congestion Charge is a blunt instrument," London Mayor Boris Johnson said in a statement. "I am therefore introducing a more comprehensive approach to easing congestion in London, one that gives greater consideration to how all transport measures impact on the movement of traffic on our roads."

Johnson noted that the report showed an increase in congestion despite an overall 16 per cent reduction in the number of vehicles entering the city. The reduction in volume was offset by reductions in capacity caused by intentional and unintentional effects of policy decisions. Unintended side effects included construction projects that caused significant delays and backups. Intentional policies included "pedestrian, cyclist and bus priority measures" that Johnson's predecessor, Ken Livingstone, introduced as a means of discouraging motorists. Livingstone's goal was to make it more difficult and expensive to drive in London. In addition to taking lane space away from drivers to create bus only lanes, for example, Livingstone planned to impose a £25 ($50) CO2 tax on high-performance cars while exempting certain hybrids.

"I have scrapped the CO2 Charge that risked thousands of small cars flooding central London, and have asked Transport for London to bring forward a range of measures to turnaround the trend and halt the squeezing of road space that has continued to worsen congestion," Johnson said.

The cost to operate the complicated motorist tracking and charging system was £131 million ($262 million) last year. Drivers paid £195 million ($390 million) in congestion charges, leaving a profit of just £64 million ($128 million). On top of this amount, however, motorists paid £73 million ($146 million) in penalty tickets leaving the system with a net profit of £137 million ($274 million) on total revenues of £268 million ($536 million).

Nearly all of this profit was spent on buses, speed cameras and environmental projects. Only £13 million ($26 million) was spent strengthening bridges or resurfacing roads.[65]

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[65] Transport for London, *Central London Congestion Charging: Impacts Monitoring*, Sixth Annual Report, London, July 2008. Available at : http://www.tfl.gov.uk/assets/downloads/sixth-annual-impacts-monitoring-report-2008-07.pdf

Appendix 4: 'Charge drivers for when and where they go', *SMH.com*, 31 May 2009 (edited version)

Professor Hensher, the head of Sydney University's Institute for Transport and Logistics Studies, recently presented his "Congestion and Variable User Charging" proposal - which involves satellite-tracking vehicles - to the Roads and Traffic Authority.

He recommends charging motorists for when and where they drive, and not simply the amount of fuel they consume. Fixed charges such as registration should be abolished as they encourage driving because owners try to get their money's worth.

"The current pricing system is unfair," Professor Hensher said. "Those who contribute more to congestion and pollution are not paying their fair share. Those who avoid congestion and use more environmental friendly cars are paying more than their fair share."

He proposes abolishing the federal excise of 38 cents a litre on petrol, as well as state fuel taxes. Instead, vehicles would be fitted with a satellite tracking device.

Motorists driving in peak hours in built-up suburbs, such as Mosman or Annandale, which have public transport alternatives, would pay more than drivers who travel through Galston or Camden or regional and rural NSW, where mass transit is poor or non-existent.

Drivers would swipe a "smart card" when buying petrol to determine their levy, which would vary according to use. "Many drivers would be much better off and would end up paying no levy because they live and drive in areas outside the zone," he explained.

The Dutch Government and Oregon in the United States are introducing variable user charging.

NRMA president Wendy Machin said before introducing such a system the state would need major upgrades to public transport, including services that ran across the metropolitan area, and not just to the central business district, as well as flexible working and school hours.[66]

[66] A West, 'Charge drivers for when and where they go', *SMH.com*, 31 May 2009. Available at: http://www.smh.com.au/national/charge-drivers-for-when-and-where-they-go-20090530-br0u.html

Appendix 5: NSW says no to congestion charge

The NSW government has rejected a proposal to introduce a per-kilometre congestion tax on Sydney's roads.

Roads Minister Eric Roozendaal said such a scheme would unfairly slug families battling the high cost of living.

Transport experts at the University of Sydney have proposed the introduction of a congestion tax, which would charge motorists up to 15 cents per kilometre on the city's busiest roads.

David Hensher, from the university's Institute of Transport and Logistics Studies, said the tax would vary according to the level of congestion on a particular road, and the time of day.

Based on a system to be adopted by the Netherlands in 2011, a GPS apparatus would calculate the tax, which could reach 15 cents per kilometre.

The system would reduce congestion by eight per cent, Professor Hensher told Fairfax.

But Mr Roozendaal on Tuesday poured cold water on the suggestion, saying it was "not something the government will be part of".

"His whole theory is about taxing free roads into Sydney," the minister told reporters in Sydney.

"Sydney families already have high interest rates to deal with, high petrol prices. To face taxes on free roads into Sydney is an unacceptable burden for families in this city."

Prof Hensher's intervention follows the release of a report by the Institute last month, which called for car registration fees and petrol taxes to be scrapped and replaced with a congestion tax.

That plan was similarly rejected by Mr Roozendaal.

The introduction of a congestion tax is also opposed by the NSW opposition, which says public transport needs to be improved before such a change can be made.

"You cannot have a congestion tax without having proper public transport," opposition roads spokesman Duncan Gay told ABC radio on Tuesday.[67]

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[67] 'NSW says no to congestion charge', *Sydney Morning Herald*, 24 June 2008. Available at: http://news.smh.com.au/national/nsw-says-no-to-congestion-charge-20080624-2vwg.html