Stuck in Traffic and Stuck for Solutions: Brisbane's Congestion Crisis

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1. Introduction

Brisbane faces a looming traffic congestion crisis. Congestion is worsening inexorably and is now a matter of great concern to road-users and governments.

The Queensland Government's 2005 south-east Queensland transport policy green paper explained that if congestion is not better managed, there will be serious adverse effects on the economy and lifestyles.[1] Past and present Brisbane City Council (BCC) administrations have warned that, without early, appropriate action, Brisbane will experience extreme congestion within a decade, imposing substantial costs on the community.[2] The Commonwealth Government's 2004 *AusLink White Paper* on land transport commented that the economic cost of congestion in major capital cities was substantial and projected to increase greatly, particularly in Brisbane.[3]

The Bureau of Transport and Regional Economics (BTRE) recently predicted that, in the next 15 years, as much traffic will be added to roads in Australia's capital cities as was added in the previous 15 years, but the additional congestion in the next 15 years will be three times the congestion added in the last 15 years. BTRE predicted that the social cost of congestion that it is economic to avoid in Australia's capital cities could more than double from a total of about $9,400 million in 2005 to around $21,000 million in 2020. These predictions assume capacity increases of one to two per cent per annum based on historical trends and planned enhancements.[4]

Other metropolitan areas around the world are also plagued by traffic congestion. So ubiquitous is the problem that it has been enshrined in modern popular music.

> *"You're out of luck*
> *And the reason you had to care,*
> *The traffic is stuck*
> *And you're not moving anywhere"*[5]
> Bono, U2 (2000), *Beautiful Day*

Failed anti-congestion strategies are as common as traffic congestion. For decades, governments everywhere saw road building as the solution to congestion, but now most perceive such activity to be futile and too costly. So, governments switched resources from roads to public transport. But, massive public transport subsidies have made little impact on congestion. Many governments have buttressed this approach with plans to increase residential and commercial density, and "demand management" instruments, such as measures to increase parking costs, and information programs

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[1] Queensland, *Smart Travel Choices for South East Queensland: A Transport Green Paper*, Brisbane: Queensland Transport, December 2005, pp. 12, 14-15, 31-34.
[2] Brisbane City Council, *TransApex Prefeasibility Report*, Brisbane, March 2005, pp i, viii, 1; Brisbane City Council, *Transport Plan for Brisbane 2002-2016*, Brisbane, September 2003, p. 3.
[3] Commonwealth of Australia, *AusLink White Paper: Building Our National Transport Future*, Canberra: Department of Transport and Regional Services, June 2004, pp. 10-11.
[4] Gargett, David, *Estimating Urban Traffic and Congestion Cost Trends for Australian Cities*, Canberra: Commonwealth of Australia, Bureau of Transport and Regional Economics, presentation to "Smart Traffic 2006" Conference, Brisbane 22 August 2006, pp. 13, 16-23.
[5] Hewson, Paul (Bono), *Beautiful Day*, U2, Universal International Music, 2000.

about public transport. But, congestion persists and continues to worsen in most of the world's major cities, even those growing significantly slower than Brisbane.

Economists have advocated congestion pricing for 50 years, particularly over the past decade. During the latter period, they have been joined by increasing numbers of transport engineers and urban planners. But, governments, with very few exceptions, have relegated congestion pricing to the "too hard basket". Most politicians perceive congestion pricing to be political poison.

The paper explains that road users are stuck in traffic too often, too long and in too many locations in Brisbane, and the problem is worsening, because of poor policy choices in the context of growing demand for road space. It suggests explanations for governments being stuck for effective remedies for excessive congestion.

The paper assesses our governments' anti-congestion policies and alternative devices, including congestion pricing. It explains that efficient congestion relief in Brisbane would require a package of complementary measures satisfying widely accepted economic efficiency and equity criteria. The package includes a comprehensive by-pass/ring road network, selected upgrading of other roads, better public transport facilities with lower subsidies, and congestion pricing with offsetting federal tax cuts.

2. Causes of Congestion

Traffic congestion has multiple interacting causes. An outline follows.

For many years, population has been growing faster in south-east Queensland than in most other parts of Australia.[6] This has led to relatively rapid growth of demand for road-space in Brisbane.

Falling real car prices, and improving fuel efficiency, comfort, quality, and reliability of cars have added to usage. Consumers have shown strong preferences for comfort, time saving, convenience, flexibility, reliability, privacy, and refuge from harassment attributes of single-occupant vehicles. So, demand for cars and hence road-space has risen with incomes and value of time.[7] But, the rate of growth appears to be slowing.[8]

Cars offer a substantial time saving advantage over public transport because of the fixed time penalty of 15-20 minutes associated with public transport, regardless of the distance travelled. The passenger must get to a pick-up point, wait for a bus or train, and then walk from the drop-off point to the destination.[9]

As a result of preference and service value considerations, car numbers have increased faster than south-east Queensland's relatively quickly growing population.

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[6] Queensland, *Smart Travel Choices for SEQ*, op cit, p. 20.
[7] Ibid, pp. 28-29; Gargett, David, op cit, p. 9.
[8] Gargett, David, op cit, p. 9.
[9] Glaeser, Edward and Kahn, Matthew, *Sprawl and Urban Growth*, Discussion Paper 2004, Harvard Institute of Economic Research, May 2003, pp. 21-22; and Glaeser, Edward and Gottlieb, Joshua, *Urban Resurgence and the Consumer City*, Discussion Paper 2109, Harvard Institute of Economic Research, February 2006, p. 9.

> *"Except for walking, travelling by car is the most democratic and socially equitable form of transport ever seen in history as it allows more than 90 per cent of adults to go where and whenever they want to travel……In particular, because the car allows chained or multi-purpose trips to work, schools, shopping and friends, it has been a potent force in the struggle for gender equality. The car has allowed women the freedom to do what they want to do in today's society and is the reason why surveys have found that women are more pro-car than men nowadays."*[10]
>
> John Cox (2003), Australian transport economist

Road freight vehicle activity has added to demand for urban road space. Such activity has been rising faster than population, car use and gross domestic product.[11] This appears to be attributable to the growing complexity of metropolitan economies and increasing integration of regional, national and international economies.[12]

Rising population and car-based mobility, preferences for detached houses on large land lots, and land-use regulations have yielded sprawling, low-density suburbia. The same factors have induced decentralisation of employment and activity centres. Low-density residential and activity areas have, in turn, induced more car-use. These interdependent occurrences have combined to undermine the viability of public transport. This has meant poor service availability, which has reinforced the trend to car-use, particularly cross-town driving. But, low-density, decentralised land uses tend to disperse car-use, meaning lower overall vehicle density. While greater car-use and less public transport patronage tend to mean more congestion, lower vehicle density tends to work the other way.[13]

The decentralisation of employment and business centres potentially could reduce pressure on roads in and around the central business district (cbd) and other dense activity centres. However, this does not apply to the extent that cars and trucks have to use roads serving dense commercial/employment centres, like the cbd, to access decentralised centres. This is a major deficiency of Brisbane's arterial road network.

So, in metropolitan Brisbane, there are various explanations for past and expected strong growth of demand for road capacity connecting suburban residential areas with activity centres, and linking dispersed activity centres.

The demand for road space is heavily concentrated in early morning and late afternoon peak-periods, because of the desire of business enterprises, governments and educational institutions to have participants involved during much the same hours

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[10] Cox, John, "Labor stops 'common people' people from moving around", *The Australian Financial Review*, 20 June 2003, p. 83.
[11] Commonwealth of Australia, *AusLink White Paper*, op cit, pp. 1, 6; Gargett, David, op cit, p. 10.
[12] Downs, Anthony, *Still Stuck in Traffic: Coping with Peak-Hour Traffic Congestion*, Washington DC: Brookings, 2004, p. 38.
[13] Taylor, Brian, "Rethinking Traffic Congestion", *Access*, No. 21, Fall 2002, p. 16; Glaeser, Edward and Kahn, Matthew, op cit, p. 35.

of the day for to facilitate efficient interaction and operation. Many arterial roads that are heavily congested in peak periods, have substantial excess capacity at other times.

> *"There is little wrong with the roads in Sydney or Brisbane – it is just that there are too many cars on them."*[14]
>
> Barnaby Joyce (2005), Queensland Senator

Increases in road capacity in Brisbane have lagged far behind peak demand growth. This is not a new phenomenon. In 1954, the Royal Automobile Club of Queensland (RACQ) warned that rapidly increasing traffic volumes would "strangle" Brisbane if governments did not provide adequate increases in road capacity, particularly more river crossings and a complete system of inner, outer and intermediate ring-roads.[15]

> *"The big question is: shall Brisbane's rapidly increasing traffic develop from a tangle to a strangle? In other words, shall Brisbane choke itself to death?"*[16]
>
> RACQ (August 1954), *The Road Ahead*

From the late 1960s to the late 1980s, there was a burst of arterial road construction in metropolitan Brisbane. This included the Western Freeway, second Centenary Bridge, Captain Cook Bridge, Riverside Expressway, South East Freeway, Gateway Bridge (tolled), Gateway Arterial, and Logan Motorway (tolled).

But, by the end of the 1980s, transport and urban planners' views on anti-congestion strategies were changing. The emerging new orthodoxy was that "you can't build your way out of congestion". It was based on the "induced demand" theory, which suggested more road capacity attracts more usage, cancelling out the congestion-alleviating effect of costly capacity increases.[17]

Subsequently, successive Queensland Governments chose not to increase road capacity to keep pace with peak demand growth. Instead, they re-allocated funds to capital and operating subsidies for public transport. But, the number and proportion of trips by motor vehicle continued to increase during the 1990s. In the current millennium, motor vehicle trips have continued their upward trend and motor vehicles' trip share has remained at levels attained in the late 1990s.[18]

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[14] Joyce, Barnaby, "First Speech to Senate of the Commonwealth of Australia", *Hansard*, 16 August 2005, p. 50.
[15] RACQ, "Brisbane's Ring Roads of Tomorrow", *The Road Ahead*, April 1954, p. 9; RACQ, "Will Brisbane Continue to Suffer Traffic Strangulation?", *The Road Ahead*, August 1954, p.14.
[16] RACQ, "Will Brisbane Continue to Suffer Traffic Strangulation?", op cit, p.14.
[17] Goodwin, P. B., *Solving Congestion*, Inaugural Lecture for the Professorship of Transport Policy, Centre for Transport Studies, University College London, 23 October 1997, pp. 3-4.
[18] Queensland, *Smart Travel Choices for SEQ Transport Green Paper*, op cit, p. 25; Gargett, David, op cit, p. 8.

So, peak-period excess demand for road space emerged and increased at the typically zero access price. First-come-first-served access to limited road space has been rationed by the formation of queues and their extension. Peak periods have broadened and sitting and crawling in traffic have become more common. In other words, traffic congestion has appeared and worsened.

> *"An iron law of economics states that demand always expands beyond supply of free goods to cause congestion and queues. Drivers caught in traffic jams on the freeways in and around major cities of the world regularly run afoul of this law."* [19]
>
> Gary Becker (1998), Nobel Laureate in Economic Sciences

Traditionally, governments have allowed free access to roads funded by various taxes. The economic rationale is that an un-congested road displays a characteristic of a pure public good, "non-rival consumption". This means allowing an extra user does not detract from benefits enjoyed by others. Consequently, the social cost of adding each extra road-user (marginal social cost) is approximately zero, while each additional user collects benefits (marginal social benefit is positive). Then, excluding an extra user through pricing would be economically inefficient.[20]

Roads do not have the other characteristic of a pure public good, "non-excludability". It is feasible to use prices to exclude some potential users of a road, although a system to exclude non-paying cars involves costs.[21]

But, the case for not charging is invalidated in congested conditions.[22] Then, each road-user imposes costs on others (external costs) by delaying freight and people, causing additional stress and frustration, increasing fuel consumption and emissions in stop-start conditions, and adding to accident risks. These costs vary according to vehicle type, as well as time and location. Then, roads become more like private goods and less like public goods, with access by one detracting from the benefits enjoyed by others.

When making decisions on road-use, each party considers only costs and benefits individually experienced in congested conditions. Each ignores his/her contribution to congestion costs imposed on others. Because governments have chosen not to apply differential pricing to require road-users to confront the varying costs they impose on others, it is clear that from a social/economic perspective, all vehicle types over-use parts of the urban road system at peak times. Consequently, resources are used inefficiently.

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[19] Becker, Gary, "Good-Bye Tollbooths and Traffic Jams", *Business Week*, Industrial/Technology Edition, 18 May 1998, p. 26.

[20] Walters, Alan, *The Economics of Road User Charges*, World Bank Staff Occasional Paper, No. 5, Baltimore: Johns Hopkins Press, 1968, pp. 15-21; Stiglitz, Joseph, *Economics of the Public Sector*, Third Edition, New York: Norton, 2000, pp. 128-130;

[21] Stiglitz, Joseph, op cit, pp. 130-132.

[22] The condition is also violated when road users impose costs on other vehicle owners and taxpayers by causing pavement damage (another type of external costs). Heavy vehicles are responsible for most road damage, which rises exponentially with weight per axle. Further discussion of that issue is beyond the scope of this paper.

It should not be presumed that it would be socially/economically optimal to eliminate congestion completely in Brisbane. While a substantial part of congestion costs is economic waste, some degree of congestion is consistent with economic efficiency and therefore, not wasteful. Costs involved in reducing congestion below some level through expansion of road capacity and/or measures to cut driving would eventually outweigh the extra benefits from less congestion.

> *"While it may be efficient to have some congestion on the highway, the fact that the motorist is not required to pay for the congestion he causes will induce too many motorists to use the road and there will be too much congestion. These conditions are probably typical of large conurbations throughout the world. Rarely do user charges reflect adequately the congestion in large cities – traffic jams and snail like speeds are the consequence. These are the wastes of user charges that are too low."* [23]
>
> Sir Alan Walters (1968), prominent British economist, seminal contributor to theory of congestion pricing

Indirect road-use charges such as fuel taxes and vehicle registration fees do not sufficiently ration access to crowded roads to reduce congestion to the socially optimal level. There is only a vague, remote link between fuel purchase decisions and choices between driving times and routes and travel modes. Other vehicle taxes are independent of time and location of vehicle-use.

So, Brisbane suffers too much congestion and the problem is worsening, because of poor government policy choices in the context of growing demand for road space. Current government policies will leave us stuck in traffic.

3. Outline of Government Anti-Congestion Policies for Brisbane

Commonwealth Government

The Commonwealth Government does not have constitutional responsibility for roads. But, it has attained an important role in road funding through section 96 of the Australian Constitution, which states, "…the Parliament may grant financial assistance to any State on such terms and conditions as the Parliament thinks fit."

The Commonwealth has been providing financial assistance grants for road works since 1922. Numerous Commonwealth road-funding programs have been introduced, revised, withdrawn and replaced over the past 80 years. Motivations for these programs have included some or all of political advantage, compensation for fiscal flaws in the federal system of government, and inter-jurisdictional benefit spill-overs.

[23] Walters, Alan, *The Economics of Road User Charges*, op cit, pp. 11-12.

Current Commonwealth road funding programs under its *AusLink* land transport policy[24] include tied grants for the National Network (state governments), Black Spots (state or local governments), and Roads to Recovery (local governments), and untied grants for Identified Local Roads (local governments, for any purpose, not just roads).

Under its *AusLink* policy, the Commonwealth Government wants to shift more road funding responsibility to sub-national governments, particularly in major urban areas. The Commonwealth expects those governments to bear most of the responsibility for tackling traffic congestion.

The Commonwealth's record in respect of heavily congested National Network roads in greater Brisbane has been consistent with this position. It has been very tardy in funding the Ipswich Motorway upgrade, provided no funding for the Griffith Arterial (Brisbane Urban Corridor), insisted that the Gateway Bridge/Motorway upgrade be toll-funded, and refused to contribute funds to investigate a Brisbane western by-pass.

The Commonwealth has advised sub-national governments to use their own tax and grant revenues to provide urban transport facilities, arrange public or private sector toll-roads, or apply congestion pricing to enhance efficiency and revenue.[25]

Queensland Government

The states have constitutional responsibility for roads. Long ago, they legislated to establish local governments and gave them various functions, including "local roads".

The Queensland Government's anti-congestion strategy has multiple interrelated elements. These were outlined in four policy documents released during 2005.[26]

The state government currently has a policy of deliberately restricting capacity of general traffic lanes on roads serving major activity centres like Brisbane's central business district (cbd). As well as not building such capacity,[27] the government wants to convert general traffic lanes to bus/high occupancy vehicle (hov) lanes on radial roads, particularly after provision of by-pass road capacity.[28]

The Queensland Government said it favours by-pass/ring-roads to divert cross-city traffic from radial roads,[29] but it intends to do little. The few links the government

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[24] Commonwealth of Australia, *AusLink White Paper*, op cit.
[25] Ibid, pp. 9, 11, 13-14, 22-23, 33; Commonwealth of Australia, *Budget Strategy and Outlook 2005-06*, 2005-06 Budget Paper No. 1, Canberra, 10 May 2005, p. 4-15.
[26] Queensland, *Draft TransLink Network Plan South East Queensland, 10 Year Plan, 3 Year Program 2004-05 to 2006-07*, Brisbane: Queensland Transport, 23 March 2005; Queensland, *South East Queensland Infrastructure Plan and Program 2005-2026*, Brisbane: Office of Urban Management, April 2005; Queensland, *South East Queensland Regional Plan 2005-2026*, Brisbane: Office of Urban Management, June 2005; Queensland, *Smart Travel Choices for SEQ*, op cit.
[27] This is clearly evident from the content of *SEQIPP*. This position has been carried over from Queensland, *Integrated Regional Transport Plan for South East Queensland*, Brisbane: Queensland Transport, 1997, pp. ix, 58, 60-61, 103 and Queensland, *Transport 2007: An Action Plan for South East Queensland*, Brisbane: Queensland Transport, April 2001, pp. 6, 13, 20, 24, 74.
[28] Queensland, *Draft TransLink Plan*, op cit, pp. 39, 85.
[29] Queensland, *SEQIPP*, op cit, p. 13, 40-41; Queensland, *SEQ Regional Plan*, op cit, pp. 109, 115-117.

plans to build, support or investigate will be tolled, because it won't allocate its tax and GST grant revenues to them, and the Commonwealth won't provide funding.

The Queensland Government prefers to allocate resources to subsidies for public transport. It is making large investments in railway upgrades and bus-ways, hoping to boost public transport's current 8 per cent share of Brisbane journeys. These outlays and conversions of general lanes to bus/hov lanes are capital subsidies. The state government also provides public transport with large operating subsidies.

Figures extracted from the state government's *South East Queensland Infrastructure Plan and Program* and budget papers indicate that public transport's share of all government allocations for arterial land transport in greater Brisbane over the next 20 years could be more than 80 per cent of the total. The Queensland Government described this as a "balanced program of investment between transport modes."[30]

The *South East Queensland Regional Plan* proposed to support public transport with urban planning measures as well as higher subsidies. The planning approach included higher commercial and residential densities around existing and new "regional activity centres", and public transport nodes and corridors, facilitating "transit oriented development". The plan also included densities that support public transport services in new residential areas.[31]

The Queensland Government intends to expand existing information programmes to induce car drivers to change transport modes.[32]

However, the Queensland Government's *South-East Queensland Transport Green Paper* argued that ***"the key"*** to managing traffic growth issues, like congestion and growing demand for transport infrastructure, was to induce users of various transport modes to recognise the full community costs of that use.[33] Despite this, the green paper did not recommend or even discuss congestion pricing, which would require road-users to recognise fully the congestion costs they impose on others in the community, and thereby facilitate management of congestion and infrastructure costs.

Earlier Queensland transport policy documents acknowledged that congestion pricing would be an effective anti-congestion device. However, its adoption was deferred because of concerns it could be unacceptable to the community. Congestion pricing was to be re-considered if other measures failed to achieve targets.[34]

The Queensland Government's 2005 transport policy documents discussed three alternative pricing instruments. They made it clear that government would continue to underprice/subsidise public transport. The *South East Queensland Transport Green Paper* suggested developer-contributions for state-provided public transport

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[30] Queensland, *SEQIPP*, op cit, p. 9. Queensland, *South-East Queensland Infrastructure Plan and Program, 2006-2026*, Brisbane: Office of Urban Management, May 2006, p. 17.
[31] Queensland, *SEQ Regional Plan*, op cit, pp.12, 65, 71, 75, 107-108.
[32] Ibid, pp. 65-70.
[33] Ibid, pp. 12-13.
[34] Queensland, *Integrated Regional Transport Plan for South East Queensland*, Brisbane: Queensland Transport, 1997, p. 55; Queensland, *Transport 2007*, op cit, pp. 42-43.

and cycling infrastructure, but not roads.[35] It also suggested that parking costs be increased via levies and other means in areas well-served by public transport, with levy proceeds allocated to public transport subsidies.[36]

Brisbane City Council

The best-known feature of current BCC anti-congestion policy is *TransApex*, a package of five toll-funded, inner-suburban by-pass, river crossing and activity centre links. *TransApex* was designed to address a dearth of inner-city by-pass/ring-roads, which was considered to be serious deficiency of the transport system. The links are to be tolled because Commonwealth and Queensland Governments won't fund them.

BCC policy also emphasises public transport subsidies. The Council is increasing the size and quality of Brisbane Transport's bus fleet. BCC supports the state government's plans to provide a bus-way network in metropolitan Brisbane. It is building a Dutton Park-St Lucia bus bridge to tie in with that network, and has relinquished part of King George Square car park to allow the state government to construct a tunnel extending the Inner Northern Bus-Way.

Until May 2006, BCC proposed, on completion of each *TransApex* link, to reserve a traffic lane each way on competing radials for buses/hovs.[37] But, following pressure from RACQ and the media, BCC dropped the bus/hov proposal for Story Bridge following completion of the North-South By-Pass. Council policy is now unclear in respect of bus/hov lane conversions following completion of other *TransApex* links.

The former Labor administration of BCC planned to investigate congestion pricing "to balance demand and supply for transport infrastructure and reflect the true costs of congestion". It proposed to pursue this measure beyond 2011, if strategies in its transport plan were unable to deliver adequate shifts in travel behaviour.[38] However, the current Liberal Lord Mayor has stridently opposed congestion pricing.

Council of Australian Governments

At the February 2006 meeting of the Council of Australian Governments (COAG), federal and state governments recognised traffic congestion as an important national economic policy issue to be addressed in a new round of microeconomic and public sector reform. COAG members committed to reducing congestion, within current jurisdictional responsibilities, and to a joint review, with local government, of the main causes, trends, impacts, and options for managing the impact of the problem in major cities. Congestion pricing was one of the options to be considered. COAG expects to consider results of the review early in 2007.[39] The inclusion of this issue

[35] Queensland, *Smart Travel Choices for SEQ*, op cit, p. 58.
[36] Ibid, pp. 62-63.
[37] SKM Connell Wagner Joint Venture, *North-South By-Pass Tunnel Draft Environmental Impact Statement…In Brief*, Brisbane City Council, February 2005, p. 13; *TransApex Prefeasibility Report*, op cit, pp. 26, 40.
[38] Brisbane City Council, *Transport Plan for Brisbane 2002-2016*, Brisbane, September 2003, p. 32.
[39] Council of Australian Governments, *Communiqué following Meeting of 10 February 2006*, pp. 6, Attachment B, p. 4, Appendix D.

within the National Competition Policy Reform framework meant agreed actions might attract future Commonwealth funding.[40]

4. Congestion-Pricing

4.1 Relevant Views on Congestion-Pricing

Over the past 50 years, numerous economists around the world have advocated congestion pricing. This has become increasingly prevalent over the past decade, prompted by failure of other strategies, and the advent of electronic tolling. Transport engineers and urban planners have also joined the chorus in increasing numbers.

The Commonwealth Government has suggested that states apply congestion pricing. The Queensland Government has acknowledged congestion pricing would be effective, and implicitly observed recently it was **"the key"** to tackling congestion. COAG's current congestion review will consider, inter alia, congestion pricing.

Brisbane's Liberal Lord Mayor has opposed the previous Labor administration's plan to investigate congestion pricing and possibly implement it after 2011. But, Labor Councillors still dominate BCC.

In this context, it is appropriate to assess congestion pricing as a complement or alternative to anti-congestion measures favoured by the state government and BCC.

4.2 Economic Literature on Congestion Pricing

Arthur Pigou introduced the concept of congestion pricing to the economics literature in *The Economics of Welfare* in 1920.[41] But, after Frank Knight challenged aspects of this analysis,[42] Arthur Pigou deleted it from later editions of his book.

William Vickrey triggered serious investigation of congestion pricing in the mid- to late-1950s.[43] Analysis of the topic gathered pace in the 1960s, with notable work by Alan Walters, William Vickrey, Herbert Mohring, and the Smeed Committee (including Alan Walters) established by the United Kingdom Ministry of Transport.[44]

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[40] Ibid, p. 9.
[41] Pigou, Arthur, *The Economics of Welfare*, London: Macmillan, 1920, p. 124.
[42] Knight, Frank, "Some Fallacies in the Interpretation of Social Costs", *Quarterly Journal of Economics*, Vol. 38, August, 1924, pp. 582-606.
[43] Vickrey, William, "Some Implications of Marginal Cost Pricing for Public Utilities", *The American Economic Review*, Vol. 45, No. 2, May 1955, p. 605-620; Vickrey, William, "Statement on the Pricing of Urban Car Use", *U.S. Congress Joint Committee on Metropolitan Washington Problems*, November 1959, pp. 454-477, reprinted in *Journal of Urban Economics*, Vol. 36, 1994, pp. 42-65.
[44] Walters, Alan, "The Theory and Measurement of Private and Social Cost of Highway Congestion", *Econometrica*, Vol. 29, No. 4, October 1961, pp. 676-699; Vickrey, William, "Pricing and Resource Allocation in Transportation and Public Utilities", *The American Economic Review*, Vol. 53, No. 2, May 1963, pp. 452-465; Smeed, R.J. and others, op cit; Mohring, Herbert, "Urban Highway Investments" in Dorfman, Robert (ed.), *Measuring Benefits of Government Investments*, Washington DC: Brookings Institution, 1965, pp. 231-291; Walters, Alan, *The Economics of Road User Charges*, 1968, op cit; Vickrey, William, "Congestion Theory and Transport Investment", *The American Economic Review*, Vol. 59, No. 2, May 1969, pp. 251-260.

> *"Prices charged for using the road generally have the effect of restraining the amount of use that people make of the roads. Two questions that immediately arise are: how far should use be restrained, and should some traffic be restrained more than other traffic? A useful guiding principle is that journeys should not be made if they are valued at less than the costs or losses they cause to other people; similarly, journeys should not be restrained if they are valued at more than the costs they cause. If this underlying principle is neglected, a waste of resources is likely to result."*[45]
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> R.J. Smeed, A.A. Walters, G.J. Roth and others (1964),
> pioneering report to U.K. government on congestion pricing

Subsequent work by various economists refined the concept of congestion pricing, assessed its economic efficiency and distributional implications, and compared it with other anti-congestion measures. While the literature on the topic is substantial, several useful summaries are readily accessible.[46]

4.3 Concept of Congestion Pricing

> *"The theory of marginal cost pricing suggests that taxes (congestion charges) be levied to reduce demand until traffic flow is at a level where private unit cost (with tax) is equal to marginal social cost."*[47]
>
> Sir Alan Walters (1961), prominent British economist,
> seminal contributor to theory of congestion pricing

In this paper, congestion pricing (charging) refers to a network-wide, variable pricing regime designed to alleviate congestion by charging for road-use whenever and wherever congestion occurs. Congestion charges would be designed to make drivers confront congestion costs they impose on others, inducing them to change travel behaviour. Charges would vary according to the degree of congestion and

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[45] Smeed, R. J. and others, op cit, p. 2.

[46] Downs, Anthony, op cit; Mohring, Herbert, "Congestion" in Gomez-Ibanez, Jose, Tye, William and Winston, Clifford, *Essays in Transportation Economics and Policy: A Handbook in Honour of John Meyer*, Washington, DC: Brookings Institution, 1999, chapter 6; Gomez-Ibanez, Jose, "Pricing" in Gomez-Ibanez, Jose, Tye, William and Winston, Clifford, op cit, chapter 4; Hau, Timothy, *Economic Fundamentals of Road Pricing: A Diagrammatic Analysis*, World Bank Policy Research Working Paper Series WPS 1070, Washington D.C.: The World Bank, December 1992; Hau, Timothy, "Congestion Pricing and Road Investment" in Button, Kenneth and Verhoef, Erik (Eds), *Road Pricing, Traffic Congestion and the Environment*, Cheltenham : Edward Elgar, 1998, pp. 39-78; Harvey, Mark and Martin, Lyn, *Road Pricing, Tolls, and Anti-Congestion Strategies*, Canberra: Bureau of Transport and Regional Economics, paper presented to "Australian Roads Summit", Sydney, 25 February 2004; Button, Kenneth, "The Rationale for Road Pricing: Standard Theory and Latest Advances", in Santos, Georgina (ed.), *Road Pricing: Theory and Evidence*, Research in Transportation Economics, Volume 9, Oxford: Elsevier, 2004, pp. 3-25; Lindsey, Robin, "Do Economists Reach a Conclusion on road Pricing? The Intellectual History of an Idea", *Econ Journal Watch*, Vol. 3, No. 2, May 2006, pp. 292-379.

[47] Walters, Alan, "The Theory and Measurement of Private and Social Cost of Highway Congestion", op cit, p. 680.

approximate to the difference between short-run marginal social cost and average variable cost of road-use.

Considerable congestion price variability would prevail. The charge would be zero in free-flow conditions and rise with congestion. At any time, charges would vary between locations according to the severity of congestion. At any location, charges would change over time, according to variations in congestion between peak, shoulder and off-peak periods.

A properly designed congestion-pricing regime would not target elimination of congestion. Instead, it would seek to reduce congestion to the optimal level in the short-term, given available transport infrastructure. Extra social benefits (lower congestion costs) added by further reductions in congestion would be less than additional social costs (driving benefits foregone and regime management costs).

The purpose and structure of congestion pricing differ greatly from those of tolls, which are applied to discrete facilities to pay for their provision, and usually do not vary in magnitude with the degree of congestion or time of day.

Behavioural changes induced by congestion pricing would include alterations to travel times, routes and modes in the short-term. In the longer-term, changes in behaviour could include workplace and residential re-location.

Congestion charges reduce travel delays, fuel-use, vehicle emissions and crash-risks. They facilitate better transport system investments and use. This includes efficient management of "induced demand" generated by new transport facilities in congested areas, as explained in sub-section 4.4. As a result, the efficiency of use of human, capital and natural resources is improved.

The better (poorer) are the alternatives to priced, clogged roads when congestion pricing is applied, the greater (smaller) would be the cut in congestion, the larger (lower) the net social gain, and the smaller (greater) the revenue yield. Good alternatives include toll-free by-pass/ring-roads and suitable public transport. Of course, high revenues linked to poor alternatives could fund better facilities.

Revenue from congestion charges, and savings from lower public transport subsidies justifiable in the context of congestion pricing provide resources to attain economic gains additional to those arising from direct alleviation of congestion. First, cuts could be made to taxes, which adversely affect the efficiency of use of resources. Second, investments should be made in by-pass/ring roads and public transport facilities with high benefit/cost ratios to complement congestion charges by facilitating changes in travel behaviour.

4.4 Congestion Pricing, Road Capacity and "Induced Demand"

The "induced demand" theory suggests that adding road capacity in congested areas would attract more traffic, wiping out congestion-relieving effects of costly capacity increases. So, such investment has been portrayed as self-defeating and wasteful.

The theory has various flaws outlined in section 5. However, many governments around the world, including the Queensland Government, have been seduced by it.

These governments have responded by shifting resources from roads, particularly roads serving major activity centres, to major public transport projects, such as busways, bus-lanes, and rail upgrades. But, they missed the point that when capital and operating subsidies for such projects attract passengers from cars, freed-up capacity on competing roads attracts other traffic to those roads in the same manner that new road capacity attracts more usage. Therefore, the "induced demand" issue has to be faced in respect of public transport as well as road investments in congested areas.[48]

Similarly, the "induced demand" theory is applicable to most demand management devices, including education programs to induce people to drive less, and parking levies in the cbd.[49] But, congestion pricing is one demand management instrument that would not be undermined or frustrated by "induced demand" restoring congestion. Indeed, congestion pricing would counteract "induced demand".

Congestion pricing would require road-users to take into account costs they impose on others, as well as costs and benefits individually experienced in congested conditions. Therefore, traffic potentially attracted by more road capacity or less crowded roads would be realised only if marginal social benefits exceeded marginal social costs, including costs of congestion internalised by charges. So, congestion pricing would frustrate "induced demand", instead of being frustrated by it like other anti-congestion measures.

Economic efficiency would be enhanced by a combination of congestion charges and appropriate investment. Congestion charges would target reduction of congestion to the optimal level in the short-term, with existing transport facilities. Investment in transport infrastructure over the long-run in the context of congestion pricing would target provision of optimal capacity.

Growing demand for space on existing roads would require rising optimal congestion charges on roads already priced and application of charges on some others previously unpriced. Traffic would be further redistributed and deterred. Revenues would rise.

High revenues relative to capital invested in existing roads would act as a surrogate market signal that expansion of capacity may be warranted.[50] But, a decision to invest in a road subject to congestion charges or an existing or new unpriced alternative, like by-pass or ring-road capacity, should be based on detailed social cost/benefit analysis. Ideally, this should ensure that the new investment would provide the optimal capacity at which the incremental or marginal investment cost matches the marginal external congestion cost (the incremental saving in travel time value and fuel cost).[51]

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[48] Small, Kenneth and Verhoef, Erik, *Urban Transportation Economics*, draft of forthcoming book, pp. 5-17 to 5-18; Downs, Anthony, op cit, p. 85.
[49] Small, Kenneth and Verhoef, Erik, op cit, pp. 5-17 to 5-18; Smeed and others, op cit, p. 11.
[50] Hau, Timothy, *Economic Fundamentals of Road Pricing*, op cit, p. 31.
[51] Harvey, Mark and Martin, Lyn, op cit, p. 6; Hau, Timothy, *Economic Fundamentals of Road Pricing*, op cit, pp. 28-29, 57.

Provision of more capacity reduces congestion, congestion charges, and revenue, initially. Because road investment is typically "lumpy", excess capacity may exist initially. Then, optimal congestion charges would be zero, but would become positive when traffic growth leads to congestion, and would rise with the degree of congestion.

> *"In considering road pricing as a means of regulating traffic congestion, the panel have made the point that pricing by itself cannot produce a 'cure' for congestion. The proposal to charge for use of congested roads should not be regarded as an alternative to new and better roads; it is rather a means of obtaining better value from the roads that already exist and from those that are yet to be built."*[52]
>
> R.J. Smeed, A.A. Walters, G.J. Roth and others (1964),
> pioneering report to U.K. government on congestion pricing

It is often assumed that congestion pricing would enable deferment of, and lower investment in new capacity.[53] But, there are complicating factors. Traffic flows more freely with congestion pricing, with and without extra investment. Also, investment benefits should be measured differently with and without congestion charges. Other factors include the initial optimal short-term level of congestion, project size, and possible variability of price sensitivity of demand for road space.[54]

To clarify this matter, the Bureau of Transport and Regional Economics undertook quantitative analysis under a range of realistic assumptions regarding extent and growth of demand, sensitivity of demand to price, and average variable and social marginal costs. The findings implied that optimal future investment would be lower and later when congestion pricing was in place, but such a result was not guaranteed.

4.5 Congestion Pricing and Public Transport

Congestion charges trigger a "virtuous cycle" of higher demand for, better services, and improved economic performance of public transport.[55] There are short term and longer term aspects of this cycle.

The initial shift to public transport induced by congestion pricing facilitates better spatial coverage of and more frequent public transport services. Less congestion means faster on-road public transport services and lower operating costs. The improved services further increase demand for public transport. These effects allow increased capture of economies of scale/density, allowing lower fares, which attract further patronage. Improving viability arising from greater patronage and lower unit costs means public transport services can be expanded and subsidies reduced.

Meanwhile, the tendency of freed-up road space to attract public transport passengers back to cars ("induced demand") is managed by congestion pricing of the urban road

[52] Smeed, R. J. and others, op cit, p. ii.
[53] Harvey, Mark and Martin, Lyn, op cit, p. 7; Mohring, Herbert, "Congestion", op cit, p. 191.
[54] Harvey, Mark and Martin, Lyn, op cit, p. 9.
[55] Small, Kenneth, "Road Pricing and Public Transit: Unnoticed Lessons from London", op cit, p. 12; Small, Kenneth, *Road Pricing and Public Transport*, in Santos, Georgina (ed.), op cit, pp. 134, 151.

network. So, the cycle of improving demand for, and performance of public transport persists.

The higher costs of driving in busy locations at peak times resulting from congestion charges increase the attraction of residential and business location in areas that are well-served by public transport. Therefore, land values increase in those areas, urban density increases (land-use regulations permitting), and demand for public transport rises, triggering a further cycle of higher demand for public transport, better services, and improved financial performance, allowing further cuts in subsidies.

A form of congestion pricing applying in Singapore triggered such a "virtuous cycle" of higher demand for, better services, and improved economic performance of public transport. Public transport in Singapore is now profitable and the government continues to make unsubsidised improvements to infrastructure and services.[56]

> *"Rather than mass transit (public transport) being the solution to congestion, perhaps congestion pricing – a measure often viewed as an alternative to transit – could be transit's saviour."*[57]
>
> Kenneth Small (2005), Professor of Economics, University of California, Irvine (transport, urban and environmental economics specialist)

With congestion pricing, there is no justification for subsidising public transport to alleviate congestion, but subsidies may still be justifiable to allow social marginal cost pricing in the context of economies of scale/density (see sub-section 8.2). Pricing all transport at the relevant social marginal cost will yield an efficient modal split.[58].

> *"Policy makers often do not appreciate that the introduction of road (congestion) pricing may be an opportunity to correct public transport prices (and subsidies) as well."*[59]
>
> Stef Proost and Kurt Van Dender (2004), economists, Katholieke Universitiet Leuven, Belgium and Univerity of California, Irvine, respectively

4.6 Political and Ideological Obstacles to Congestion Pricing

The main obstacles to adoption of congestion pricing are political and ideological, rather than technical. Politicians are concerned about re-distributional effects. Many transport and urban planners have a strong ideological preference for "command and control" over pricing instruments, and a similarly strong bias against car-use.

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[56] Santos, Georgina and others, "Transport Policies in Singapore", in Santos, Georgina (ed.), op cit, p. 231.
[57] Small, Kenneth, "Road Pricing and Public Transit: Unnoticed Lessons from London", op cit, p. 10.
[58] Proost, Stef and Van Dender, Kurt, "Marginal Social Cost Pricing for All Transport Modes and the Effects of Modal Budget Constraints" in Santos, Georgina (ed.), op cit, pp. 171-172, 176 (fn 15); Small, Kenneth and Verhoef, Erik, op cit, p. 4-49.
[59] Ibid, p. 167.

There are two typical distributional concerns. First, most road-users could be opposed to paying to use roads to which access was previously free. Second, low-income road-users might be disadvantaged disproportionately.

The economics literature has demonstrated that congestion pricing yields net social gains. This means net winners' gains are more than large enough to compensate net losers. The implementing government is the key winner. Revenue from congestion charges ensures the government has adequate capacity to resolve distributional issues.

Timothy Hau demonstrated that when congestion is so severe that extra road-users reduce vehicles per hour, congestion charges provide net benefits to all commuters before any recycling of government revenue. He observed that such congestion occurs fairly often, although it is usually limited to the "peak of the peak-period".[60]

Net losers from charges before revenue recycling in less severe congestion would be:

- car users who are priced-off to another time, route or mode because their willingness to pay is less than the charge;
- unpriced travellers, who previously used other routes, times, or modes, but encounter crowding when joined by some of the priced-off group;
- the component of the priced group (those staying on the priced roads), who pay more to meet congestion charges than they save in time value and fuel.[61]

In these circumstances, the only winners are:

- members of the priced category with high time values who save more in time and fuel than they pay in congestion charges;
- the government that collects the revenue from congestion charges.[62]

The key to countering political concerns regarding re-distributional consequences of congestion charges is astute application of revenue. But, it is important to apply it in a way that does not encourage reversion to the same congested roads and travel times.

> *"Since everyone pays the same charge regardless of income, there are concerns that low-income motorists will suffer disproportionately. Compensation of potential losers, by appropriate spending or other recycling of toll revenues, may critically determine the overall political feasibility of congestion pricing. This has been confirmed by various surveys, where support for congestion pricing increased with explicit proposals for using the revenues in, for example, other tax reductions or investment in roads or public transport……a sufficiently progressive recycling of toll (congestion charge) revenues could ensure that all income groups benefit overall."*[63]
>
> Elena Safirova, Ian Parry and others (2004), Resources for the Future

[60] Hau, Timothy, *Economic Fundamentals of Road Pricing*, op cit, pp. 12-13, 16-17, 56.
[61] Ibid, pp. 13-14, 56.
[62] Ibid.
[63] Safirova, Elena, Parry, Ian, and others, "Welfare and Distributional Effects of Road Pricing Schemes for Metropolitan Washington DC" in Santos, Georgina (ed.), op cit, p. 180.

Proceeds of congestion charges should be applied to servicing loans to provide high benefit/cost ratio road system improvements, particularly ring-roads and other by-pass roads. It is also essential to provide extra public transport capacity before applying congestion pricing. Public transport improvements could be funded by borrowings serviced through revenues from higher patronage and lower unit costs yielded by congestion pricing. Debt funding is important because it allows provision of better transport facilities, prior to commencement of congestion pricing.

Provision of these alternatives to driving on congested and subsequently priced radials would increase public acceptance of congestion charges in the priced-off and unpriced groups. It would also cut payments by the priced group and further reduce vehicles they encounter on radial roads.

> *A survey of Queenslanders regarding transport-funding options, undertaken for LGAQ in 2002, revealed, inter alia, that only 31 per cent of respondents and 33 per cent in the metropolitan area were opposed to congestion-pricing, assuming the funds obtained were used to improve public transport.*[64]
>
> Market Facts Queensland (2002)

Borrowing to improve transport facilities in advance of congestion pricing would ensure that politicians do not appropriate the revenue for other purposes, because the debt has to be serviced. But, there is risk that future governments may exercise their monopoly power to over-charge for road-access, and may defer provision of other transport facilities justifiable in future as population and economic activity grow.

Tax cuts to make room for congestion charges would be an alternative method of compensating groups adversely affected by congestion charges. But, if state and local governments provide tax cuts, their capacity to provide complementary transport infrastructure would be diminished, particularly in the context of the serious vertical intergovernmental fiscal imbalance (vifi) problem afflicting the Australian federal system of government. This would be undesirable on economic efficiency grounds.

Commonwealth Government tax cuts to make room for state/local government congestion charges would be avoid this problem. It would provide state/local governments with additional fiscal capacity to provide complementary transport facilities, without increasing the overall burden of taxes and charges on road-users. This could be the clincher in ensuring acceptability of congestion pricing to the community and to politicians having to take responsibility for its application.

Fuel tax cuts to compensate vehicle owners for payment of congestion charges would particularly help those with low-incomes. Because they typically can afford real estate only on city fringes, they are more likely to travel further to work and less

[64] See Layton Allan, *Public Inquiry on Mechanisms to Fund Queensland's Roads and Transport Infrastructure: Final Report*, Brisbane: Local Government Association of Queensland, May 2002, p. 32.

likely to have access to good public transport services. Also, they are more likely to drive across town than to the cbd to work, and to own older, less fuel-efficient cars.

While lower fuel tax could induce more driving, it probably would not significantly impact on driving on busy roads at peak times, just as existing high fuel taxes have been ineffective in dealing with congestion. The reason is that there is only a vague and remote link between fuel purchase decisions and choices between driving on busy roads at peak times and the alternatives of other times, routes, and modes.

> *A survey of RACQ members regarding fuel taxation, fuel subsidy, road pricing and road provision matters in November 2005 revealed that 66 per cent of Brisbane respondents supported application of congestion charges to reduce traffic congestion, if governments provide new by-pass and ring-roads and upgraded public transport as alternatives to paying to drive on busy roads, and if the Commonwealth Government reduces fuel tax.*[65]
>
> Market & Communications Research Pty Ltd (2005)

A cut in income tax would be an alternative to fuel tax cuts as a compensation or revenue recycling measure. Reductions in income tax could be oriented to assist those on lower incomes, who are most disadvantaged by existing fuel taxes, less likely to have a high time vale, and more likely to be priced-off by congestion charges.

Commonwealth Government tax cuts to make-room for, and ensure public and political acceptance of state or local government congestion charges would facilitate improvements in the efficiency of resource-use in four ways. First, congestion pricing would directly cut congestion. Second, economically damaging, high tax rates would be partly displaced by efficiency-enhancing charges. Third, in effect, resources would be transferred to sub-national governments for urban transport infrastructure with high benefit/cost ratios, correcting Commonwealth neglect of urban congestion. Fourth, the transfer of revenue raising capacity would help redress vertical intergovernmental fiscal imbalance (vifi) and its attendant inefficiencies in the Australian federal system of government. Issues relating to vifi are addressed in section 13.

Substitution of state/local government road-use charges for federal fuel or income tax would be a bold, intelligent economic reform of transport, tax/charging, and federal systems that would deliver large economic benefits without adverse effects on equity.

The combination of "enabling" Commonwealth tax cuts and earmarking of state/local government congestion pricing revenues for servicing road infrastructure loans might seem like double compensation for congestion charges. However, the benefits of the tax cuts would be widespread, not narrowly focused on major urban areas.

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[65] Market & Communications Research Pty Ltd, *Key Areas of Advocacy Member Feedback*, prepared for RACQ, Brisbane, November 2005.

Bureaucratic opposition to congestion pricing appears to be based on the ideological biases of some urban and transport planners. They strongly prefer "command and control" actions to pricing, and tend to be biased against car-use, at least by other people. Congestion pricing would let commuters choose how, when and on which route they travel, and where they live and work. It would also help guide investment decisions. However, planners prefer to control these choices, starting with two unsubstantiated premises. One is that public transport is "desirable" and cars are "undesirable". The other is that high-density living is "good" and low-density urban form is "bad".

The key to overcoming planners' resistance to congestion pricing is to explain how congestion charges provide incentives that are consistent with their preferences. Specifically, congestion charges induce commuters to switch from cars to other transport modes in peak periods. This improves public transport usage and viability, and facilitates higher densities (land-use regulations permitting) around regional activity centres and access points to public transport corridors. These effects have been discussed in more detail in sub-section 4.5 above and section 9 below.

4.7 Practical Issues

When William Vickrey proposed congestion pricing about 50 years ago, it was basically a theoretical concept that would have been practical to implement only in crude form. Now, technology has caught up with the theory, and technological advances continue unabated.

A discussion of the available technologies and their application is beyond the scope of this paper. But, the key point is that a sophisticated version of congestion pricing is now a practical policy instrument.

> *"The most efficient price system might appear to be one in which price varied with cost on every road at every moment of the day. But this presupposes that road users are able and willing to take account of such a highly complicated system. In practice, of course, they are not. If the price system is complicated, road users will probably find simple 'rule of thumb' methods to tell them approximately what the average prices are and roughly what the prices of particular journeys are likely to be, and they will act accordingly. If this is so, the complicated system may be no more efficient than a simpler system."*[66]
>
> R.J. Smeed, A.A. Walters, G.J. Roth and others (1964),
> pioneering report to UK government on congestion pricing

Of course, greater technical sophistication yielding precise information that changes promptly with changing conditions can mean greater cost, although technological advances are continually reducing these costs. Perhaps more important is the point that usefulness of greater sophistication can be limited by the capacity of drivers to

[66] Smeed, R. J. and others, op cit, p. 42.

absorb price information that varies quickly with changing conditions. Therefore, compromises may be necessary between economic gains from greater sophistication, and economic costs of technologies and information overload for drivers.

> *"The more important source of constraints is not technology, but rather the kind of complexity that users and political representatives will tolerate."*[67]
>
> Kenneth Small and Erik Verhoef (2006), leading transport economists from U.S.A. and Netherlands, respectively

The nuts and bolts of practical implementation of congestion pricing are beyond the scope of this paper. However, guidelines on practical issues are available.[68]

4.8 Operating Congestion Charging Schemes

Congestion charging schemes are currently in operation in Singapore and London. A congestion charging trial was recently conducted in Stockholm.

It is beyond the scope of this paper to discuss and assess these regimes in detail. But, detailed descriptions and assessments are available from various sources.[69] A very brief outline follows.

The Singapore scheme known as "Electronic Road Pricing" (ERP) has been in place since 1998. It replaced less sophisticated paper based systems dating back to 1975. Singapore applies vehicle ownership taxes as well as ERP.

The London scheme known as "Congestion Charging" started in February 2003. It applies in Central London.

A seven-month trial of a "Congestion Tax" arrangement was conducted from January to July 2006 in Stockholm. Citizens of Stockholm were scheduled to decide in a referendum this month whether or not the scheme should continue.

Each of these schemes has been complemented by substantial improvements to public transport facilities and services.

In each case, congestion has been reduced substantially.

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[67] Small, Kenneth and Verhoef, Erik, op cit, p. 4-45.

[68] For example, see Vickrey, William, *Principles of Efficient Congestion Pricing*, Colombia University, June 1992 at http://www.vtpi.org/vickrey.htm.

[69] For example, see Santos, Georgina and others, "Transport Policies in Singapore", in Santos, Georgina (ed.), op cit, pp. 209-235; Christainsen, Gregory, "Road Pricing in Singapore after 30 Years", *Cato Journal*, Vol. 26, No. 1, Winter 2006, pp. 71-88; Santos, Georgina, "Urban Road Pricing in the U.K.", in Santos, Georgina (ed.), op cit, pp. 251-282; Armelius, Hanna and Hultkrantz, Lars, "The Politico-Economic Link between Public Transport and Road Pricing: An Ex-Ante study of the Stockholm Road-Pricing Trial", *Transport Policy*, Vol. 13, 2006, pp, 162-172; Mitchell, Alan, "How to Make Tolls Work", *The Australian Financial Review*, 6 September 2006, p. 62.

None of these schemes is anywhere near as economically correct and sophisticated as the regime labelled "congestion pricing" and outlined in sub-section 4.3 above. In this respect, the London scheme is the least attractive of the three.

Also, none of these schemes was accompanied by compensation mechanisms as extensive as those proposed in sub-section 4.6 above.

5. Strategy of Restricting Radial Road Capacity

The Queensland Government's strategy of restricting radial road capacity serving major activity centres, particularly the cbd, is based on an extreme version of the induced demand theory indicating that increasing radial road capacity would not alleviate congestion. The induced demand theory has spawned clichés such as, "Build it and they will come" and "You can't build your way out of congestion".[70]

The state government's strategy has been buttressed by the assumption the converse also applies. That is, the view that not increasing capacity would reduce congestion.[71]

The induced demand theory neglects benefits from additional capacity. More use of an expanded road means benefits have accrued to those accommodated by the extra capacity, including drivers shifting from less convenient travel options and others representing additions to population. Benefits have also accrued to travellers on other routes and modes or at other times that have become less crowded. Consequently, to the extent that congestion levels are restored, it should not be interpreted as failure.[72]

The induced demand theory ignores the distinction between redistribution of travel movements within an area in the short term, and increases in travel demand in the long-term, such as those arising from attraction of businesses and people to the area. Road users attracted to an expanded road from an alternative route, other travel times, and other transport modes represent redistribution of existing demand in the short term, not additional regional demand. Therefore, users of the expanded road at peak times and those persisting with other routes, times and modes must all be better-off or at least no worse-off than before the road was improved.[73]

Only attraction of new people and businesses and extra travel by existing residents because of greater mobility facilitated by the road expansion can properly be labelled "induced demand". Only such long-term effects could conceivably lead to congestion on the expanded road or network as bad as or worse than before the addition to road capacity.[74] However, recent available research indicates that this is highly unlikely.

Robert Cervero analysed effects of 24 freeway expansion projects in California between 1980 and 1994. He found that, 6-8 years after motorway expansion, 20 per

[70] Queensland, *IRTP*, op cit, pp. ix, 58, 60-61, 103; Queensland, *Transport 2007*, op cit,, pp. 6, 13, 20, 24, 74; Queensland, *Smart Travel Choices for SEQ*, op cit, p. 13.
[71] Queensland, *Transport 2007*, op cit, p. 6.
[72] Harvey, Mark and Martin, Lyn, op cit, fn 1, p. 2; Downs, Anthony, op cit, pp 106-107; Taylor, Brian, "Rethinking Traffic Congestion", *Access*, No. 21, Fall 2002, p. 13.
[73] Downs, Anthony, op cit, pp. 82-84, 104.
[74] Ibid, pp.84, 104-107.

cent of the added capacity had been preserved, 40 per cent had been absorbed by traffic growth arising from population and income growth, 31 per cent had been taken-up as a result of behavioural shifts (redistribution of demand), and 9 per cent because of land-use shifts (genuine "induced demand").[75]

> *"Many induced demand studies have suffered from methodological problems that, I believe, have distorted their findings…I contend that most have...typically overstated induced demand effects."*[76]
>
> Robert Cervero, Professor of City and Regional Planning, University of California, Berkeley

As explained in sub-section 4.4, the induced demand theory ignores the option of linking congestion pricing with capacity provision. A properly designed congestion-pricing regime would efficiently manage "induced demand" and the wider congestion problem, while providing funds for capacity increases.

The assumption that restricting radial road capacity would relieve congestion is bizarre. The assumption's apparent rationale is that making driving less attractive by allowing congestion to worsen will frustrate commuters into switching to other travel modes and times.[77] Undoubtedly, as congestion worsens, some would change their travel behaviour, but nowhere near enough would switch to avoid worse congestion. It simply defies logic to suggest that letting congestion worsen would reduce it.

> *"Quixotic endeavours by…governments to delay the building of freeways and limit the mobility of motorists in order to push them onto public transport reminds me of the opposition of the Duke of Wellington to the introduction of railways. He was opposed to railways, he said, because they would 'only encourage the common people to move around needlessly'."*[78]
>
> John Cox (2003), Australian transport economist

Unfortunately, flawed theory and assumptions have so far prevailed over logical analysis, leading to abandonment of radial road capacity enhancement as an anti-congestion weapon. While radial road improvements by themselves cannot solve the congestion problem, such improvements can play an important role in optimal congestion alleviation, as part of a package of measures including network-wide congestion pricing. Selective increases in road capacity serving major activity centres that satisfy careful comparative social benefit/cost analyses must be part of the anti-congestion policy mix.

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[75] Cervero, Robert, "Are Induced-Travel Studies Inducing Bad Investments?", *Access*, No. 22, Spring 2003, pp 22-27.
[76] Ibid, p. 22.
[77] Queensland, *Transport 2007*, op cit, p. 6.
[78] Cox, John, "Labor stops 'common people' people from moving around", op cit, p. 83.

6. By-Pass and Ring Roads

A comprehensive system of inner, intermediate and outer ring-roads/by-passes is a key component of an effective anti-congestion strategy for Brisbane, because it would take substantial traffic off radial roads serving major activity centres, such as the cbd. That's why RACQ proposed such a ring-road network more than 50 years ago.[79]

> *"The RACQ contends that a system of 'ring' roads ranks as one of the most important features of a modern town plan. It is doubted if any city's network could be adequate without such a system. Although conscious of the attendant difficulties of superimposing a system like that on a city already largely developed, it is emphasised that the necessity and urgency of its provision should be realised before it is too late."*[80]
>
> RACQ (1954), *The Road Ahead*

RACQ and its members still hold this view. A recent survey of RACQ members in Brisbane revealed that 97 per cent of respondents believed that by-pass and ring-roads are important for reducing traffic congestion in Brisbane.[81]

In 1989, a major, BCC commissioned *Brisbane Traffic Stud*y stressed the importance of providing inner and outer ring-roads/by-passes to alleviate congestion.[82] The state government's 1997 *Integrated Regional Transport Plan for South East Queensland* recognised the important congestion- relieving role of by-pass and ring-roads.[83]

Through-traffic represents a substantial proportion of vehicles on radial roads serving Brisbane's cbd. But, conflicting estimates have been made over the past three years. In May 2003, the Liberal Party's *Moving Brisbane* policy said that 43 percent of traffic on roads to and from the cbd was through-traffic.[84] A traffic and transport technical paper completed in January 2005 for the North-South By-Pass draft EIS said, "approximately 40 percent of trips on the inner-city river crossings are through-trips, without either an origin or destination in the inner city."[85] In March 2005, BCC's *TransApex Prefeasibility Report* claimed that two-thirds of trips fell into this category.[86] In June 2006, the private sector owner of the North-South By-Pass said 75 per cent of trips via cbd bridges did not end in or originate from the cbd.[87]

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[79] RACQ, "Brisbane's Ring Roads of Tomorrow", op cit, p. 9; RACQ, "Will Brisbane Continue to Suffer Traffic Strangulation?", op cit, p. 14.
[80] RACQ, "Will Brisbane Continue to Suffer Traffic Strangulation?", op cit, p. 14.
[81] Market and Communications Research Pty Ltd, op cit.
[82] Brisbane City Council, Lord Mayor's Steering Committee, *Brisbane Traffic: Principal Report*, August 1989, pp. i, ii, v, viii, 28, 44-50, 61-63.
[83] Queensland, *IRTP*, op cit, pp. ix, 56.
[84] Liberal Party, op cit, p. 5.
[85] Maunsell Australia Pty Ltd, *North-South By-Pass Tunnel Traffic and Transport: Technical Paper*, prepared for Brisbane City Council for draft Environmental Impact Statement, January 2005, p. 122.
[86] Brisbane City Council, *TransApex Prefeasibility Report*, op cit, pp. viii, 1, 7, 16.
[87] Rivercity Motorway Management Limited, *Rivercity Motorway Product Disclosure Statement*, Brisbane June 2006, pp. 4, 32.

Both current and preceding BCC administrations have proposed inner-suburban by-pass capacity to deal with congestion. BCC built the toll-free Inner City By-Pass. BCC's *TransApex* package involves up to four inner-city tunnels and a bridge to extend the Inner City By-Pass, involving provision of a mixture of by-pass and radial capacity. All *TransApex* links are to be tolled.

TransApex will not provide Brisbane with a full inner ring-road system, as some components double as radial capacity. Also, *TransApex* roads must be accessed from already heavily congested radial roads, exacerbating congestion on those access roads.

Queensland Government's *SEQIPP* listed three Brisbane "strategic transport needs", one of which was "orbital road networks that link centres outside the inner-city, reduce traffic congestion, and provide a sound basis for future traffic management."[88] The government's *SEQ Regional Plan* stated, "orbital road networks and new links that connect centres are needed to reduce traffic congestion and manage growth."[89] It advocated investigation of "quality orbital road systems to by-pass major road congestion points" and to "support connectivity" of activity centres in Brisbane.[90]

But, these plans specify actions that would fall far short of identified needs. This is a major deficiency of state policy for tackling Brisbane's looming congestion crisis.

The only firm Queensland Government by-pass project in Brisbane is a partial upgrade of the Gateway Motorway (an eastern outer by-pass). The only other firm by-pass project is the inner-suburban North-South By-Pass, a BCC *TransApex* link.

Other references to genuine orbital/by-pass links in the *SEQ Regional Plan* and *SEQIPP* related to "investigations to improve orbital and by-pass road networks in western Brisbane" and "further *TransApex* investigations." The former included a Western By-Pass, which would complete an outer ring-road system, if properly located. The other investigations related to BCC's Airport Link (an extension of the North-South By-Pass) and Hale Street Link (an extension of the Inner City By-Pass).

The Commonwealth Government should fund a complete toll-free outer ring-road, as it would be totally consistent with the National Network concept. Such a road consisting of the Gateway and Logan Motorways and Western By-Pass would create a hub for the airport road and existing National Network roads, viz, the Port of Brisbane Motorway, Bruce Highway, Pacific Motorway, Griffith Arterial (Brisbane Urban Corridor), Ipswich Motorway and hence the Warrego and Cunningham Highways.

Although the heavily congested Gateway Motorway is part of the National Network, the Commonwealth Government has refused funding. The upgrade planned by the state is to be funded by ongoing tolls on the existing bridge and tolling of a duplicate bridge. The Logan Motorway was identified in the *AusLink White Pape*r as a possible future National Network link, but remains a toll-road. A Western By-Pass is under investigation by the state government and if built, is likely to be tolled, according to Queensland's Minister for Transport and Main Roads

[88] Queensland, *SEQIPP 2005-2026*, op cit, p. 13.
[89] Queensland, *SEQ Regional Plan*, op cit, p. 109.
[90] Ibid, p. 115.

The Queensland Government should fund toll-free intermediate and inner ring-roads for Brisbane, as "main roads" of state importance serving a much wider community than Brisbane's citizens. But, BCC is pushing on with segments of tolled inner ring-road because of state neglect. Meanwhile, neither the Queensland Government nor BCC has shown serious interest in an intermediate orbital road system for Brisbane.

Tolling arrangements for the few ring- or by-pass road segments planned or proposed for the Brisbane metropolitan area will create inequities and serious economic inefficiencies. This is explained in the next section of this paper.

7. Toll-Roads

New road capacity in major urban areas typically has a congestion-alleviating purpose. But, tolls on new facilities typically have a different purpose: to cover or contribute to costs of provision, including a target rate of return on investment.

Tolls typically vary with vehicle-type. They may vary with traffic volume or time of day, but usually do not.

The trend towards making new arterial road capacity in greater Brisbane subject to tolls appears to be based on:

- the Commonwealth Government's determination to minimise its level of responsibility for urban traffic congestion;
- Queensland Government's and BCC's resolve to allocate government funds to public transport subsidies, rather than arterial road capacity, because of concern about "induced demand";
- the notion that tolls on new capacity will offset the "induced demand" effect of that capacity; and
- the view that tolls allow provision of roads to be brought forward.

Meek acceptance of the Commonwealth Government's avoidance of responsibility for congestion has increased the political difficulty of tackling the problem at the sub-national level. The Commonwealth's policy is inconsistent with economic logic and efficient, viable fiscal federalism, as explained in section 13.

The extraordinary bias of the Queensland Government, and to a lesser extent, BCC towards public transport is based on flawed reasoning and ideology, as shown in analyses of radial/by-pass road policies and congestion pricing above and public transport subsidies below.

Tolls on new road segments deal with "induced demand" very imperfectly. They discourage use of the new tolled facility. Consequently, the new facility is under-used and existing toll-free roads continue to be over-used. In contrast, a properly designed network-wide, variable congestion-pricing regime would ensure that all road segments are used efficiently, that is, neither under- nor over-used.

The argument that tolls allow earlier provision of roads is misleading and naïve. Tolls simply make resources available for roads. But, resources could be made available in three alternative ways to bring forward economically justifiable road investments.

One option is to re-allocate expenditures from other government programs on the basis of comparative social cost/benefit analysis. Roads with high benefit/cost ratios would displace government activities with low benefit/cost ratios with a resulting improvement in resource allocation efficiency. An obvious starting point would be comparative analysis of by-pass roads and public transport subsidies, as those subsidies appear to have been based on ideology, rather than economic assessment.

A second option is tax increases. These would avoid the problem of tolls impeding the congestion-cutting purpose of roads. But, higher tax rates could cause other adverse effects.

A third option is network-wide, variable congestion pricing, which was discussed in section 4. This would provide resources for road network expansion in a way that improved the efficiency of resource-use, instead of reducing it.

Our governments have ignored equity and economic efficiency effects of toll-funding of roads and allocation of government funds to substantial public transport subsidies. This section analyses tolls. Public transport subsidies are analysed in the section 8.

> A 2005 survey of RACQ members revealed that 58 per cent of respondents in Brisbane and 60 per cent elsewhere in the state opposed toll funding of new roads.[91]
>
> Market and Communications Research (2005)

Tolls are often perceived to be inequitable. There are several reasons for this.

Various motoring taxes more than cover costs of road-provision. Overall, they also cover external costs of road-use, such as congestion and vehicle emissions. But, tax revenue is inadequate in congested areas and excessive elsewhere.[92]

Tolls ration access to new premium-service road network segments that provide alternatives to existing clogged, free-access roads. This favours wealthier road-users.

Tolls apply to road-users not fortunate to be able to drive in areas with adequate un-tolled roads. Therefore, tolls discriminate on the basis of geography and history.

A pertinent, important ethical point is that tolls apply to drivers who reduce costs on others by staying off existing congested roads, and are avoided by those who stay on existing busy roads, adding to congestion and thereby imposing costs on others.

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[91] Market and Communications Research Pty Ltd, op cit, p. 52.

[92] Cox, John, *Refocusing Road Reform*, Melbourne: Business Council of Australia, 1994, p. 150; Pender, Howard, *Taxing Cars: Fleecing the Fleet or Subsidising Smog?*, Sydney: Australian Tax Research Foundation, 1999, p. 48.

These various equity/ethical objections to tolls on selected new arterial road segments could not be easily resolved.

Tolls discourage efficient use of resources. This occurs at off-peak and peak times.

At off-peak times, when the social cost of an additional vehicle using a link is zero, a toll will induce some drivers to choose a less convenient alternative, as Jules Dupuit observed in 1844.[93] The efficiency of use of the road system is thereby reduced. The higher is the toll, the greater is the resulting welfare loss to the community.[94]

> Modelling in respect of the North South By-Pass indicated that a toll of $3.30 (2002 prices) would cut usage of the tunnel by about 53 per cent compared to no toll.[95]
>
> Maunsell Australia Pty Ltd (2005)

A toll on a new road encourages drivers to stay on existing unpriced, congested roads. The toll undermines the congestion-alleviating potential of the new road, and the efficiency of use of new and existing roads. The higher the toll, the greater is the community welfare loss. Therefore, if a new road is aimed at alleviating congestion, any toll should not be based solely on the cost of providing the road. Specification of a toll should have regard to benefits of reducing congestion on clogged, unpriced, alternative roads and avoiding under- and over-use of the new road.[96]

But, new segments of toll-road in major urban areas are typically aimed at making available a priced premium service as an alternative to competing congested roads on the unpriced network, while covering full costs (including a target rate of return on capital). As prominent transport economists have explained, a fundamental flaw in this approach to road provision and pricing is that it won't even get close to optimal congestion alleviation. For tolled roads or lanes to be attractive to potential users, a significant speed difference must be maintained between priced and free substitutes. This means the free roads/lanes must remain congested. It is only such congestion that creates a market for a priced option. Cutting congestion substantially on existing free lanes, through provision of new tolled links or extra free lanes, would eliminate the incentive to pay to use the priced roads/lanes. Toll road projects can "work" or cover their full costs only if governments fail to make significant progress towards reducing congestion on the network overall.[97]

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[93] Dupuit, Jules, "On the Measurement of the Utility of Public Works", *Annales des Ponts et Chaussées*, 2nd series, Vol. 8, 1844. translated from French to English and published in *International Economic Papers*, No. 2, 1952, p. 105.

[94] Walters, Alan, *The Economics of Road User Charges*, op cit, pp. 15-21.

[95] Maunsell Australia Pty Ltd, *North South Bypass Tunnel Traffic and Transport Technical Paper*, report for Brisbane City Council, January 2005, p. 127.

[96] Button, Kenneth, "The Rationale for Road Pricing: Standard Theory and Latest Advances" in Santos, Georgina (ed.), op cit, p. 13; Rouwendal, Jan and Verhoef, Erik, "Second-Best Pricing for Imperfect Substitutes in Urban Networks", in Santos, Georgina (ed.), op cit, p. 31.

[97] Small, Kenneth, "The Value of Value Pricing", *Access*, No. 18, Spring 2001, pp. 17-20; Small, Kenneth, and Winston, Clifford, "Making HOT Lanes Sizzle", *The Washington Examiner*, 4 July 2005; Downs, Anthony, op cit, pp. 167-168.

Simulation studies by Kenneth Small, Erik Verhoef, Jan Rouwendal and Ian Parry have demonstrated that tolling of selected individual roads would yield no more than 24 per cent of the net community benefits of network wide congestion-pricing. This result was based on assumptions particularly favourable to toll-roads, including the tolling strategy being properly designed to target congestion alleviation.[98] But, in reality, tolls are typically set to target recovery of costs or maximisation of profits, rather than alleviation of congestion.

Other simulations have shown that if policy makers can freely set the toll and capacity of a new road, in the context of zero tolls on alternatives, maximisation of net social benefits would involve the new road having greater capacity than if it was toll-free, and the toll increasing with the degree of substitutability of new and existing roads. When the new road is only a partial substitute for existing roads (eg existing roads provide access to the cbd and other destinations, but the new road is best suited only to by-passing the cbd), the net welfare maximising toll could be low, perhaps zero or negative (motorists would be paid to use the new road).[99] This would conflict with a cost recovery or profit maximising target.

> *"…in most cases, tolls are a perverse method of financing new road projects. The central aim of such projects is to shift traffic away from existing congested roads and onto the new roads.…..…The effect of a toll is to divert cars from the new roads to the old, congested routes. This is exactly the opposite of economically sound road pricing policy…in which charges are based on congestion, not on the historical accident that the government was short of money when the road was commissioned. Motorists may object to paying for something they previously got 'free', but the central lesson of economics is that 'there ain't no such thing as a free lunch.' What you avoid in explicit charges, you pay for in time spent in traffic jams."*[100]
>
> John Quiggin (2005), Research Fellow, Economics and Political Science, University of Queensland

The shortcomings of toll-roads are greater when they are privately owned and operated, as proposed for at least two of the first three *TransApex* links. The causes are inappropriate allocation of risk bearing, and conflict between the congestion-alleviation goal of governments and the profit maximising objective of private operators. Both adversely affect the efficiency of resource-use.

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[98] Parry, Ian, "Comparing the Efficiency of Alternative Policies for Reducing Traffic Congestion", RFF Discussion Paper 00-28, Washington, DC: Resources for the Future, June 2000, subsequently published in *Journal of Public Economics*, Vol. 85, 2002, pp. 333-362; Verhoef, Erik and Small, Kenneth, "Product Differentiation on Roads: Constrained Congestion Pricing with Heterogeneous Users", *Journal of Transport Economics and Policy*, Vol. 38, No. 1, January 2004, pp. 127-156; Rouwendal, Jan and Verhoef, Erik, op cit, pp 31, 57.

[99] Rouwendal, Jan and Verhoef, Erik, op cit, pp. 45-46, 58.

[100] Quiggin, John, "Bring in congestion tax", *The Australian Financial Review*, 29 Sept. 2005, p. 62.

The main argument supporting privately owned road segments is that they allow an optimal allocation of activities and associated risks between the public and private sectors in accordance with capacity to manage them, with resulting social gains. The argument is dubious in the case of toll-roads for three reasons.

Responsibility for road design, construction and resulting performance could be shifted to private groups through a design and construct contract that includes performance guarantees. A private ownership arrangement is not required.

Governments are much better equipped than private sector operators to manage road demand risk. Governments control road and public transport networks, and land-use regulation. Their decisions regarding these functions critically influence demand.

In any event, private entities take on road ownership only if adequately protected from and/or compensated for risk. They seek to shift construction and performance risk to contractors. They don't want their roads subjected to competition or undermined by government activities to alleviate congestion, as profitability depends on continuing congestion on competing parts of the transport network. To the extent that such protection is not guaranteed, they expect government contributions or returns to capital that are sufficiently above normal. Consistent with this analysis, Manchester Business School researchers found that private sector design, build, finance and operate road projects in the United Kingdom, yielded rates of return that were extraordinarily high relative to net risk shifted from government to private entities.[101]

So, government efforts to shift risks typically rebound on taxpayers or increase costs to road-users, as private operators pursue protection from or reward for risk-bearing. Protection of private operators means more congestion on existing roads. It also facilitates higher tolls. Setting tolls higher to compensate for risk encourages road-users to stay on existing roads, meaning more congestion on those roads. So, road-users face more congestion on existing roads, and higher tolls on new roads, than if government owned and tolled the new roads.

But, governments retain the responsibility of protecting and advancing the public interest and the political risk of not doing so. They have to bear the political odium of tolls and activities designed to protect private operators, as the New South Wales Government learned to its chagrin recently. Also, governments bear risks of network disruption and political criticism if a private operator fails. Finally, they bear the high risk that promises of congestion relief via private sector toll-roads won't be realised.

Agreements with private sector road operators may impede transition to economically efficient congestion charges and infrastructure provision in ways such as specification of long-term tolling rights and systems, restriction of government anti-congestion activities, and variations in operating arrangements between segments and entities.

Such impediments are not conducive to establishment of an efficient, network-wide congestion-pricing regime and alternative congestion-alleviating infrastructure. The

[101] Shaoul, Jean, Stafford, Anne, and Stapleton, Pamela, *Highway Robbery? A Financial analysis of Design, Build Finance and Operate in UK Roads*, University of Manchester Business School, presentation to seminar at Institute of Transport and Logistics Studies, Faculty of Economics and Business, University of Sydney, 1 March 2005, p. 17.

transition to efficient anti-congestion strategies would be more difficult and prolonged the more private toll-roads and operators there are in the network.

Modelling by Kenneth Small and Erik Verhoef indicated that if tolls on selected individual roads were set to maximise profits, as would be expected under a private funding, ownership and tolling model, the community would be very much worse-off than if tolls were set to alleviate congestion, bearing in mind that even the latter case would yield no more than 24 per cent of the net community gains from network wide congestion-pricing. Similarly, provision of capacity with profit maximising tolls is greatly inferior from a community perspective than provision of unpriced roads funded by other means. In all comparisons, the inferiority of profit maximising tolls worsens with the proportion of capacity that is tolled up to at least 75 per cent.[102]

Because of conflict between private operators' profit maximising objective and governments' congestion alleviation objective, privately owned toll-roads and efficient congestion-alleviation are incompatible. If toll-roads are government owned, congestion-alleviation could take precedence over high returns on capital.[103]

Over fifty years ago, Nobel Laureate in economics, William Vickrey argued that applying tolls to roads built to alleviate congestion, while allowing free access to congested roads, was an "outstanding absurdity" of public policy. It still is, especially when private ownership and tolling are involved. Vickrey explained that applying congestion charges on busy roads at peak times and using the money to provide toll-free by-pass roads was the appropriate policy.[104] Many highly respected economists, engineers and urban planners have subsequently endorsed Vickrey's prescription.

> *"Perhaps some indication of the outstanding absurdities that occur in present utility rate (public facility pricing) structures may be worth while in conclusion. For example, in New York a vehicular tunnel was opened a few years ago from the Battery to Brooklyn. Since it is a new facility and undoubtedly much more easy and pleasant to use than the old East River Bridges, it must, forsooth, be made to pay for itself by the imposition of tolls starting at 35 cents, the practical consequence of which is to encourage continued heavy use of the Manhattan Bridge for all trips for which the route is shorter than the tunnel, with the result that the streets near the Manhattan end of the bridge are the scene of some of the worst traffic in the city. Marginal cost considerations would call for the collection of a substantial toll (congestion charge) on the old East River bridges, at least during hours of heavy congestion, and a smaller toll or none at all for the tunnel, even though this might mean that the users of the bridges might be 'paying for' the tunnel."*[105]
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> William Vickrey (1955), Nobel Laureate in Economic Sciences

[102] Verhoef, Erik and Small, Kenneth, op cit, section 3.3; Small, Kenneth and Verhoef, Erik, op cit, pp. 4-60, 6-10.
[103] Downs, Anthony, op cit, pp. 168-169.
[104] Vickrey, William, "Some Implications of Marginal Cost Pricing for Public Utilities", op cit, p. 619.
[105] Ibid.

8. Public Transport Subsidies

8.1 Brisbane Subsidies

Public transport subsidies are central to the Queensland Government's anti-congestion policy and an important aspect of BCC's policy. The subsidies take three forms:

- operating subsidies for bus and train operators servicing the Brisbane metropolitan area;
- capital expenditure on buses, bus-ways, bus lanes, railway lines, and railway rolling stock; and
- capital transfers via re-allocation of general road space to buses and other high occupancy vehicles.

The capital items should be treated as subsidies, because the cost is not recovered from users and access is not open. In contrast, motoring taxes fully cover social costs of road-provision and use overall,[106] and public roads are accessible by all.

Figures in the *South East Queensland Infrastructure Plan and Program* and other relevant documents indicated that 60 per cent of proposed government (federal, state and local) capital expenditure on arterial land transport serving metropolitan Brisbane over the next 20 years represented capital subsidies for public transport. Public transport's share of government resources for arterial land transport is understated, because it excludes proposed re-allocation of road space to bus/hov lanes, particularly following provision of new by-pass and ring-roads. But, the appropriate adjustment is uncertain now that BCC has backed away from a policy of reallocating existing general traffic lanes to bus/hov lanes on completion of the North South By-Pass.

Capital Subsidies for Public Transport – Two Examples

The capital subsidy per additional peak-period bus passenger carried as a result of construction of the South East Bus-Way is estimated to be around $103,500.[107]

The capital subsidy per additional peak-period passenger on the Gold Coast-Brisbane railway line as a result of a $370 million upgrade announced in stages in November 2003 and March 2005 is estimated to be about $274,000.[108]

[106] As explained when discussing toll-roads, motoring taxes more than cover the full costs of road-provision, and overall, they also cover external costs of road-use, such as congestion and vehicle emissions. However, tax revenue is less than adequate to do so in congested areas and excessive in other areas. See Cox, John, *Refocusing Road Reform*, op cit, p. 150; Pender, Howard, op cit, p. 48.

[107] The *Green Paper* (pp. 26, 48) claimed that the South East Bus-Way provided by the Queensland Government had generated an extra 2.67 million bus passenger trips per year. Assuming that these trips are by passengers commuting to and from work each day, the capital subsidy per additional peak-period passenger can be estimated as follows. Twice a day ay travel for 5 days a week for 46 weeks (52 weeks less 4 weeks annual leave and 2 weeks of public holidays) indicates 460 trips a year for each

The state government described the strong bias towards capital subsidies for public transport as a "balanced program of investment between transport modes."[109] But, public transport currently caters for just 8 per cent of trips in greater Brisbane.[110]

Queensland Government and BCC budget papers for 2006-07 revealed substantial operating subsidies for public transport. The state government operating subsidies alone are 31 cents per passenger kilometre for *Citytrain* and 12 cents per passenger kilometre for buses in the Brisbane metropolitan area. State operating subsidies for public transport are in the range of $585 million to $768 million per year.[111]

Combined capital and operating subsidies for public transport (bottom of the range) over the next 20 years represent at least 80 per cent of government allocations for arterial land transport in the Brisbane metropolitan area during that period. However, the calculation excluded the capital value of general road lanes to be re-allocated to bus/hov lanes.

Provision of heavy subsidies to public transport is common around the world. In most United States and many European cities, public transport fares currently cover less than half of operating costs and make no contribution to capital costs associated with public transport. Government subsidies cover the very large gap.[112]

Are public transport subsidies economically justifiable? Pertinent arguments follow.

8.2 Subsidies and Economies of Scale

Economies of scale in public transport have been cited as a justification for subsidies. Efficient allocation of resources requires pricing equal to marginal social costs in all markets, but economies of scale mean that marginal cost is lower than average cost, with the result that losses are incurred if marginal cost pricing is adopted. Therefore, subsidies are required to permit marginal cost pricing.[113]

While economies of scale associated with fleet operation are exhausted with just a few vehicles,[114] they could derive from large fixed costs and spare capacity associated with lumpy investments in exclusive facilities like railway lines, bus-ways and bus

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commuter and 5804 extra passengers. Dividing the capital cost of the bus-way, $600 million, by 5804 extra passengers yields a bus-way capital cost per extra passenger of around $103,500.

[108] A $370 million upgrade, including additional rolling stock, was included in *SEQIPP*. According to Queensland Rail it will add an extra 1350 seats in each peak period. See Beattie, Peter and Bredhauer, Steve, *Slashed waiting times and more trains in $247 million Gold Coast rail upgrade*, media release, 6 November 2003, and Queensland Rail, *Brisbane to Gold Coast Rail Upgrade* at www.citytrain.com.au/about/initiatives/upgrade/overview.asp.

[109] Queensland, *SEQIPP2005-2026*, op cit, p. 9; Queensland, *SEQIPP2006-2026*, op cit, p. 17.

[110] Queensland, *Smart Travel Choices for SEQ*, op cit, p. 25.

[111] Queensland, *Ministerial Portfolio Statement: Minister for Transport and Main Roads*, 2006-07 State Budget, Brisbane, May 2006, pp. 1-35-1-37; Brisbane City Council, *Program 8 – Accessible Brisbane, 2006-07 Brisbane City Council Budget*, Brisbane, 14 June 2006, pp. 114-125.

[112] Gomez-Ibanez, Jose, "Pricing", op cit, p. 111; Downs, Anthony, op cit, p. 144.

[113] Gomez-Ibanez, Jose, op cit, pp. 99-100, 112; Downs, Anthony, op cit, p. 144; Centre for International Economics, *Subsidies and the Social Costs and Benefits of Public Transport*, Canberra: Centre for International Economics, March 2001, pp. 35-36.

[114] Mohring, Herbert, "Congestion", op cit, p. 188.

lanes.[115] But, after analysing various studies of bus and passenger-rail systems, Jose Gomez-Ibanez concluded that such economies of scale are insufficient to justify large subsidies to public transport.[116]

Herbert Mohring identified another source of economies of scale in public transport, which he called "economies of density". He explained that an increase in demand for service that leads to full capacity induces provision of additional services, which reduces waiting times between services. This reduces the effective marginal cost of public transport use for all passengers. The declining marginal social cost of public transport use associated with these "density economies" justifies subsidies, which according to Herbert Mohring would be "substantial".[117] However, the magnitude of subsidies based on economies of density is subject to debate.[118]

On balance, economies of scale/density may justify subsidies for public transport, but it seems unlikely that large subsidies would be warranted. The application of congestion pricing would reinforce that view,[119] because it would trigger a cycle of higher demand for, and better economic performance of public transport, allowing lower subsidies, as explained in sub-section 4.5.

8.3 Subsidies as a "Second Best" Anti-Congestion Measure

An argument derived from the economic theory of the "second-best" has been suggested as a justification for additional subsidies for public transport. It starts with the observation that car-driving in congested conditions is priced below marginal social cost. This occurs because fuel and other motoring taxes are not closely linked to use of busy roads at peak times and associated congestion costs. The argument explains that if it is not possible to implement "first-best" pricing equal to marginal social cost, including congestion costs, the efficiency of resource allocation might still be improved, but to a lesser extent, by subsidising public transport, which is a substitute for driving. The idea is to lower the effective price of public transport patronage relative to car use and thereby induce less road-use at congested locations and times. The size of the "second-best" subsidy would depend on the relative sensitivity of car and public transport use to the effective price of public transport services, the extent of underpricing of car use compared to marginal social cost, and the relative magnitude of car and public transport usage.[120]

One reason why subsidising public transport is only "second-best" is that it increases the attraction of public transport relative to all alternatives. Some increase in public transport patronage will be at the expense of walking, cycling, driving off-peak, and driving on less congested routes. Another reason is that subsidies tend to increase the overall demand for travel, including peak period trips. These effects reduce the efficiency of resource-use.

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[115] Gomez-Ibanez, Jose, op cit, pp. 100, 112; Centre for International Economics, op cit, pp. 35-36.
[116] Gomez-Ibanez, Jose, op cit, pp. 112-113.
[117] Mohring, Herbert, op cit, pp. 188-189; Mohring, Herbert, "Optimisation and Scale Economies in Urban Bus Transportation", *The American Economic Review*, Vol. 62, No. 4, Sept. 1972, pp. 591-604.
[118] Gomez-Ibanez, Jose, op cit, pp. 113-114.
[119] Small, Kenneth and Verhoef, Erik, op cit, p. 4-53.
[120] Gomez-Ibanez, Jose, op cit, p. 114; Centre for International Economics, op cit, pp. 15, 33-34.

A second reason for public transport subsidies being a "second best" strategy is that the induced demand theory is just as applicable to public transport subsidies as to increases in road capacity serving major activity centres. Attracting patronage to public transport temporarily eases congestion on radial roads. This lures passengers back from public transport to driving on these roads, and attracts travellers from alternative routes, travel times and modes. Consistent application of induced demand theory reasoning indicates that congestion would tend to be restored despite more subsidies to public transport.[121]

It seems the oft-repeated cliché used against road-building, "You can't build your way out of congestion", applies with equal force to provision of public transport facilities. But, its companion anti-road cliché, "Build it and they will come" does not apply to public transport infrastructure. Heavily subsidised public transport facilities have not attracted sufficient numbers from cars to make a significant dent in congestion anywhere.

> *"Observers of city life have long looked to mass transit to create urban vitality. Transit is supposed to promote a healthy high-density street life within economically vital business and retail districts, and to concentrate new developments into attractive patterns. Above all, it's supposed to limit road congestion without resorting to ugly high-volume roads everywhere.*
> *These goals have been frustrated by the limited ability of mass transit to attract travellers out of automobiles and by the enormous expense of building and operating mass transit. While many recently built transit systems have achieved some desirable effects, none have seriously lessened traffic congestion. Furthermore, few cities have been able to afford a system extensive enough to make more than a small change in urban form; and the share of trips by mass transit continues to fall virtually everywhere."*[122]
>
> Kenneth Small (2005), Professor of Economics, University of California, Irvine (transport, urban and environmental economics specialist)

The available evidence suggests that in a medium-sized metropolitan area, such as Brisbane, where the sensitivity of car-use to the effective price of public transport services appears to be very low, and car use is relatively high, significant subsidies to public transport to compensate for underpricing of car use are not justified by "second-best" considerations.[123]

Economic analysis has shown that subsidising public transport is an inefficient anti-congestion device. Modelling at Resources for the Future revealed that subsidising public transport provides only a tenth to a quarter of the gains to the community from a properly designed system of congestion charges.[124]

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[121] Downs, Anthony, op cit, p. 121; Taylor, Brian, op cit, p. 13.
[122] Small, Kenneth, "Road Pricing and Public Transit: Unnoticed Lessons from London", op cit, p. 10.
[123] Gomez-Ibanez, Jose, op cit , pp. 114-117.
[124] Parry, Ian, op cit, pp. 16-17.

Overseas experience has provided substantial evidence that public transport subsidies are relatively ineffective and expensive. A detailed study in the United States of capital costs to governments (as distinct from social costs) of moving people by freeway, bus and rail found that freeways on average are 14 times more cost-effective than rail and 8 times more cost-effective than bus transport.[125]

Enormous public transport subsidies in other countries have not been able to obtain significant cuts in the proportion of peak period trips by car.[126] To achieve this, governments might need to cover all of the operating and capital costs of public transport and pay people an appreciable amount to use the service.[127]

Forecasts prepared for Brisbane's *Airport Link Environmental Impact Statement* indicated that despite allocation of huge capital and operating subsidies for public transport over the next 20 years (more than 80 per cent of the arterial land transport budget of all governments in greater Brisbane), public transport's trip share would increase from 8 per cent to 11 per cent between 2005 and 2026.[128]

Another problem is that bigger public transport subsidies mean higher taxes, and cuts in government programs. Higher taxes mean greater economic damage from taxation. This varies with the type of tax, but is typically substantial. Cuts in highly valued government programs mean less efficient use of resources.

A recent economic study of 25 rail transit systems in United States' cities found that in all but one case, social costs of those systems exceeded the social benefits they provided. This conclusion held under various restructures of networks and prices.[129]

In any event, the "second-best" argument for public transport subsidies depends critically on the premise that it is not possible to implement the superior option of congestion pricing. But, a reasonable approximation to such pricing is now feasible. Therefore, pursuit of a "second-best" solution does not make economic sense.

Public transport subsidies tend to benefit middle and higher income groups.[130] They favour those who can afford to live in close proximity to the better public transport services and work in the cbd. Subsidised improvements to facilities and services deliver windfall gains to residents near train and bus stations. Others have to pay through higher taxes and fewer government services.

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[125] O'Toole, Randall, *Great Rail Disasters: the Impact of Rail Transit on Urban Liveability*, Denver: Independence Institute and Reason Public Policy Institute, February 2004, pp. 7, 15.
[126] Hensher, David, *Urban Public Transport Delivery in Australia: Issues and Challenges in Retaining and Growing Patronage*, Bureau of Transport and Regional Economics Transport Policy Colloquium, Canberra, 3 October 2002, pp.1-3; Downs, Anthony, op cit, pp. 120-122, 138-141, 345-346.
[127] Mohring, Herbert, "Congestion", op cit, p. 192; Small, Kenneth and Verhoef, Erik, op cit, p. 4-51.
[128] SKM Connell Wagner Joint Venture, *Airport Link Environmental Impact Statement, Technical Paper No. 1, Traffic and Transport*, October 2006, pp. vii, viii, 8-107, 8-108.
[129] Winston, Clifford and Vikram Maheshri, "On the Social Desirability of Urban Rail Transit Systems", forthcoming in *Journal of Urban Economics* 2006, reported in Winston, Clifford, *Government Failure Versus Market Failure*, AEI-Brookings Joint Centre for Regulatory Studies, Washington, DC, 2006, p. 70.
[130] Ibid; Cox, John, Galloping technology drives public transport demand off the rails, *The Age*, 24 January 2006, p. 8; Cox, John, "Labor stops 'common people' people from moving around", op cit, p. p. 83; Gomez-Ibanez, Jose, op cit, p. 117; Centre for International Economics, op cit, p. 52.

8.4 More Services, Less Subsidies

Public transport subsidies perform poorly in respect of economic efficiency and equity criteria. But, public transport infrastructure and services, as distinct from subsidies, remain an important component of a complementary package of measures to tackle congestion. Just as by-pass and ring-roads provide through-traffic with an alternative to use of radial roads to the major activity centres, public transport services provide an alternative to driving to those centres, particularly the Brisbane cbd.

A network-wide congestion-pricing regime would trigger a "virtuous cycle" of higher demand for and greater viability of public transport, as occurred in Singapore. This would allow better services, lower fares and lower subsidies for public transport. An explanation of this phenomenon has been provided in sub-section 4.5.

Congestion pricing would also effectively manage "induced demand" for road space arising from provision of additional road and public transport capacity. The influence of the "induced demand" theory and fear of congestion charges have greatly helped governments, including the Queensland Government, to maintain their zeal for public transport subsidies. But, both the induced demand theory, when applied consistently, and congestion charges undermine the case for such subsidies.

9. Regulatory Changes to Increase Densities

Increase residential and commercial density in greater Brisbane is a key state government anti-congestion measure. The *SEQ Regional Plan* envisaged that higher density would reduce congestion directly by reducing travel demands and indirectly by supporting public transport, but emphasised the indirect mechanism.[131]

As well as arguing for higher density to support public transport, the document sought to justify higher subsidies for public transport on the grounds that those subsidies would support higher density.[132] In effect, two potential strategies (means to an end) were converted into objectives (ends) and justified by circular reasoning.

The regional plan did not indicate how effective higher density and subsidies might be in combating congestion in greater Brisbane.

> *"Metropolitan and even coastal planning since the turn of the century has steered policy in favour of urban consolidation……But neither the planning nor any other community has actually completed a study that measures the real or notional savings achieved by the implementation of urban consolidation over the continuation of urban sprawl……The consolidationists, of course, claim that no such study is needed. They don't need facts to prove what they already know and believe."*[133]
>
> Bernard Salt (2006), demographer, Partner, KPMG

[131] Queensland, *SEQ Regional Plan*, op cit, pp. 8, 12, 65, 71, 75, 107-108.
[132] Ibid, pp.12, 65, 71, 75, 107-108.
[133] Salt, Bernard, "Plot to destroy a sacred site: the backyard", *The Australian*, 15 June 2006, p. 26.

Various studies have confirmed that clustering high-density housing near access points to good public transport services (transit oriented development) and raising the commercial density of central business districts and other major activity centres (regional activity centres) are likely to increase public transport usage. Also, increases in commercial density seem to be more important than higher residential densities. The studies also reveal that improving public transport serving residential areas and major activity centres encourages increases in density in both locations.[134]

Increased demand for public transport arising from higher densities would allow operators to capture economies of scale/density with the result that fares could be lowered or subsidies reduced. Better public transport services would improve the viability of transit oriented developments and regional activity centres.

However, there are important provisos regarding the support and economies that transit oriented developments and public transport facilities can provide to each other. These problems help explain why few effective transit oriented developments have been built elsewhere.[135]

First, political problems may arise because of local resistance to higher density development in existing residential areas, particularly because density has to be very high to provide a substantial boost to public transport use.[136]

Second, transit oriented developments must include substantial public car parking to provide a viable market catchment for public transport and other on-site facilities. To avoid detracting from the residential appeal of the development and its attraction to those wishing to walk to its facilities, car parking has to be provided above or below street-level. However, this would substantially raise the cost of establishing transit oriented developments.[137]

Third, the cost of upgrading or replacing infrastructure in established areas could be higher than the cost of providing new infrastructure in "green-field" areas.[138]

Fourth, the issue of who bears the cost of upgrading infrastructure in existing residential areas to cope with substantial increases in density at transit oriented development sites would need to be addressed.

Similar problems might be encountered with high-density regional activity centres in established areas.

Even more problematical is the effect of higher densities on traffic congestion. Key issues are the timing of effects and the amount and location of car-use.

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[134] Downs, Anthony, op cit, pp. 210-213, 227
[135] Ibid, p. 212.
[136] Ibid, pp. 203, 212, 226.
[137] Ibid, pp. 203, 211-212.
[138] O'Toole, Randall, "The Folly of 'Smart Growth'", *Regulation*, Fall 2001, p. 25; Commonwealth of Australia, Productivity Commission, *First Home Ownership*, Inquiry Report No. 28, 31 March 2004, p. 136; Wood, Alan, "We're urban sprawlers, so don't cramp our style", *The Australian*, 27 April 2004.

Anthony Downs and Brian Taylor explained that significant metropolitan-wide effects are achievable only in the long-term, because population growth and new residential development and redevelopment occur only incrementally.[139]

> *"In short, it is extremely difficult to increase substantially the average density of an entire metropolitan area – including existing settlements – through marginal growth or new in-fill development"*[140]
> Anthony Downs (2004), Senior Fellow, Economic Studies, Brookings Institution, transportation and metropolitan policy specialist

If governments want significant medium-term effects they will need to force the pace of re-development to establish transit oriented developments and expand or establish regional activity centres. Significant short-term effects are not possible.

The high density of transit oriented developments and regional activity centres and travel leakages from public transport to cars could mean vehicles on the roads nearby could increase significantly. Therefore, local traffic congestion could intensify.[141]

Anthony Downs' analysis and his survey of other United States studies indicated that the proportion of residents of transit oriented development sites who choose to use public transport is likely to be less than 25 per cent and may be less than 20 per cent. If so, congestion in the vicinity of these sites would certainly intensify.[142]

Moderate density metropolitan-fringe residential developments supported by public transport subsidies could be expected to suffer higher leakages from public transport to cars, than in the case of transit oriented developments. It is inevitable that such developments will need to be supported by good road links to major activity centres and by-pass road capacity.

On the basis of superficial analysis, one might expect an increase in the proportion of public transport usage associated with high density transit oriented developments and regional activity centres to reduce regional congestion. However, Brian Taylor, Anthony Downs, Edward Glaeser and Matthew Kahn have expressed strong doubt.[143] Their analyses of density and congestion in United States cities indicated that higher residential and commercial density means more congestion, whether in older, central city areas, or in newer outlying areas. Brian Taylor explained that increases in urban density added to traffic density and therefore, congestion. This makes walking, cycling and public transport more attractive, but the extent of switching to other modes is not enough to offset the increase in traffic density. A net increase in congestion is the result.[144]

[139] Downs, Anthony, op cit, pp. 201-203; Taylor, Brian, op cit, p. 14.
[140] Downs, Anthony, op cit, p. 203.
[141] Ibid, pp. 399-401.
[142] Ibid.
[143] Ibid, p. 14; Downs, Anthony, op cit, p. 401; Glaeser, Edward and Kahn, Matthew, op cit, p. 35.
[144] Taylor, Brian, op cit, pp. 14-15; Glaeser, Edward and Kahn, Matthew, op cit, p. 35.

The Queensland Government's intention to increase residential and commercial densities won't solve Brisbane's congestion problem, even when combined with heavily subsidised public transport. Indeed, the plan could increase congestion.

Policies to increase residential and commercial densities are very poor alternatives to congestion pricing. But, allowing higher densities would help congestion pricing to alleviate congestion, improve public transport's services and viability, and reduce the burden of funding high public transport subsidies.

Congestion pricing would increase the value of land close to regional activity centres, transport oriented development sites, train stations and bus stations/stops. This would encourage development or redevelopment of such land at higher densities, land-use regulations permitting. These changes in land-use density would increase density of demand for public transport, facilitating better services, and improved financial performance, allowing cuts in public transport subsidies. These effects represent part of a cycle of higher demand for, and better economic performance of public transport triggered by congestion pricing.[145] This cycle was discussed in more detail in sub-section 4.5.

10. Parking Measures

Queensland Government's transport policy green paper suggested parking levies and restrictions in "areas well-served by public transport". Proceeds of levies would be allocated to provision of higher public transport subsidies.[146] The government made similar suggestions in transport policy documents in 1997 and 2001.[147]

The former BCC Labor administration's transport plan proposed restrictions on supply of on- and off-street parking in inner-city areas, and levies on off-street parking. Levy proceeds were to be allocated to public transport, cycling and pedestrian facilities.[148]

The aim of these measures was to discourage driving to inner city areas. But, parking measures are highly imperfect decongestants for several reasons.

First, parking measures would have no effect on through-traffic. Through-traffic already contributes greatly to congestion. Recent traffic studies revealed that vehicles travelling across the city represent between 40 per cent and 75 per cent of traffic on radial roads to and from the cbd.[149]

Second, through-traffic may actually be encouraged by reduction of traffic that parks in inner-city areas.[150] So, parking measures are susceptible to "induced demand", like all demand management measures except congestion pricing.

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[145] Small, Kenneth, *Road Pricing and Public Transport*, in Santos, Georgina (ed.), op cit, p. 134.
[146] Queensland, *Smart Travel Choices for SEQ*, op cit, pp. 62-63.
[147] Queensland, *IRTP*, op cit, p. 54; Queensland, *Transport 2007*, op cit, pp. 42-43.
[148] Brisbane City Council, *Transport Plan for Brisbane 2002-2016*, op cit, pp. 31-32.
[149] Liberal Party, op cit, p. 5; Brisbane City Council, *TransApex Prefeasibility Report*, op cit, pp. viii, 1, 7, 16. Maunsell Australia Pty Ltd, op cit, p. 122; Rivercity Motorway Management, op cit, pp. 4, 32.
[150] Smeed, R.J. and others, op cit, p. 11.

Third, parking measures would not apply to buses and other commercial vehicles delivering and collecting people and goods. Buses and trucks contribute to congestion not only because of their presence, but also because of their size, acceleration characteristics, and loading/unloading activities.

Fourth, a vehicle contributing to congestion throughout a long trip would pay the same via parking measures as one contributing to congestion over a short distance.[151]

Fifth, the proposed parking measures would not alter the price of parking to reflect the timing of entry to and exit from parking spaces and the consequent effects on timing of traffic volume. Such discriminatory pricing is likely to be possible only in the case of parking spaces owned by the Queensland Government or BCC.

Sixth, measures designed to reduce the future supply of parking spaces in inner-city areas will provide windfall gains to owners of existing parking spaces.

A "second-best" argument for parking measures might be mounted, if it is impossible to implement the vastly superior option of congestion pricing. Then, improvement to the efficiency of resource-use might be achieved by limiting parking, which is complementary to car-use. But, it is feasible to implement sophisticated congestion pricing. In that context, "second-best" measures do not make economic sense.

> *"A well-considered policy to reduce congestion in the cbd would target congestion at its source and vary according to the amount of congestion caused. Congestion is related to the time of day, is location-specific, travel route-specific and type of vehicle-specific……electronic road (congestion) pricing…can be directly targeted to alleviate congestion by adjusting charges according to time, location, and traffic levels……the proposed (Melbourne) parking levy is a poorly targeted and ineffective policy instrument for managing congestion, especially compared to a properly designed road (congestion) pricing regime."*[152]
>
> Access Economics (2005), assessment of Melbourne car parking levy proposal

11. Developer Contributions

The Queensland Government's transport green paper for south-east Queensland floated the concept of "encouraging developers to contribute to state-provided cycling and public transport infrastructure that supports urban growth."[153] The aim was to relieve pressure from new developments on existing roads.

[151] Ibid; Button, Kenneth, op cit, p. 13.
[152] Access Economics, *Melbourne Car Parking Levy – Good Policy or Revenue-Grab?* report for Property Council of Australia, Melbourne, July 2005.
[153] Queensland, *Smart Travel Choices for SEQ*, op cit, p. 58.

The exclusion of contributions towards arterial road improvements was a glaring omission, apparently linked to anti-car ideology. In addition, it is not clear why developer contributions would be "encouraged" rather than mandated.

Some of these contributions would be shifted, through land prices, to occupants of new land developments, who would use existing and new transport infrastructure. The remaining part would be borne by developers and reflected in lower windfall gains from regulatory approvals to transform bush and fields into residential and industrial blocks or to re-develop existing urban areas to increase density.

It is extremely unlikely that the share of developer contributions borne by each occupant would reflect usage, and more importantly, peak-period usage of transport infrastructure attributable to the corresponding occupant. Also, "sunk" contributions would have no restraining influence on decisions regarding peak period usage of transport infrastructure. Improvements funded by developer contributions may even have "induced demand" effects on peak period road use.

An additional issue is that developer contributions for transport in respect of new developments would create inequities between current home owners and those aspiring to home ownership. Developer contributions would drive up the price of developed land in new developments, which would tend to increase prices in established areas. So, wealth would be redistributed from those aspiring to home ownership to those already owning houses.

12. Information Programs to Change Travel Behaviour

The Queensland Government supports various schemes to improve the flow of information to car drivers to allow them to make more informed choices between transport modes, inducing car drivers to change transport modes. In the transport green paper for south-east Queensland, the government proposed to do more.[154]

Such programs are susceptible to "induced demand", as explained in sub-section 4.5.

Information programs and congestion pricing would be mutually reinforcing anti-congestion instruments. Information programs would facilitate changes in travel behaviour encouraged by congestion pricing. Meanwhile, congestion pricing would manage "induced demand" arising from information programs. In this context, better information regarding economic alternatives would improve the efficiency of resource-use, provided that social benefits exceed social costs of these programs.

13. Intergovernmental Issues Affecting Policies on Congestion

There are two powerful reasons why the Commonwealth must take a major role in tackling city congestion.

[154] Ibid, pp. 65-70.

First, congestion chokes economic activity, as well as roads, in large urban areas, which contribute much of Australia's economic activity. Congestion raises costs of transporting people and goods, reduces productivity and stunts economic growth. Tackling congestion would provide economy-wide benefits.

Second, the Australian federal system of government is characterised by severe vertical intergovernmental fiscal imbalance (vifi). This term refers to a mismatch between expenditure responsibilities and revenue raising capacity of different levels of government. The Commonwealth Government collects revenues far in excess of (about 1.5 times in 2004-05) expenditures required to meet its constitutional responsibilities, while state and local government non-grant revenues fall far short (about 0.55 in 2004-05) of expenditures required to address their responsibilities, such as roads, health and education. Vifi is much more severe in the Australian federal system than in those of Canada, Germany, Switzerland and the United States.[155]

Vifi in the Australian federation, and governments' neglect of urban traffic congestion are linked. The Commonwealth Government controls the major tax bases, and won't cut fuel or income tax to make room for, and improve the political palatability of congestion charges that would help tackle congestion, reduce vifi and improve the efficiency of resource-use. Moreover, the Commonwealth won't increase grants to sub-national governments to help tackle congestion and close the vifi funding gap.

The Commonwealth Government has made misleading claims regarding allocation of net GST proceeds to the states in place of general-purpose grants. First, it suggested vifi had been solved. Second, it argued the states had gained enormous revenue windfalls that could fix all state infrastructure problems, including congested roads.

Vifi increased after implementation of GST.[156] GST is a Commonwealth tax of a type that cannot be levied by states under the Australian constitution. Also, GST was accompanied or followed by removal of some state taxes. So, the proportion of tax revenues raised by states has fallen and the Commonwealth share has risen. But, the inefficiencies of greater vifi have been partly offset by replacement of some narrowly-based, inefficient taxes by the more efficient, broadly-based tax, GST.[157]

Rather than directly tackle the causes and consequences of vifi, the Commonwealth has chosen partly to cover the gap between revenue raising capacity and expenditure responsibilities of sub-national governments by providing:

- general-purpose (untied) grants, like GST Revenue Grants, and before that, Financial Assistance Grants; and
- specific-purpose (tied) grants, like *AusLink* road grants.

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[155] Warren, Neil, *Benchmarking Australia's Intergovernmental Fiscal Arrangements, Final Report*, Sydney: Treasury, New South Wales, May 2006, pp. 50-58; Nahan, Mike, *The Death of Federalism*, Melbourne: Institute of Public Affairs, Hal Clough Lecture, Perth, 25 October 2005, pp. 5-8.
[156] Collins, David, *The GST and Federal-State Financial Relations: A Personal Assessment after Four Years Operation of the Intergovernmental Agreement*, Australian Tax Research Foundation, August 2004, p. 20; Quiggin, John, *Untangling the Web of Commonwealth/State/Local Government Funding – What Did Your GST Buy?*, address to Infrastructure First plenary session, HIA Home and Building Expo, 26 May 2005, p. 3; Stone, John, "Howard's Great Betrayal", *The Australian*, 18 April 2005; Warren,Neil, op cit, p. 51; Nahan, Mike, op cit, pp. 6-7.
[157] Collins, David, op cit, pp. 19-20.

Consequently, various consequences of vifi remain unresolved. They include:

- over-allocation of resources to Commonwealth functions, priorities, and pork-barrelling and under-allocation to sub-national government responsibilities and priorities;
- economic waste arising from administrative duplication and overlaps;
- over-reliance by states on taxes that are narrowly-based, volatile sources of revenue, more likely to cause economic inefficiencies, or unable to maintain revenue as a proportion of gross domestic product without tax rate increases;
- sub-national governments bleating for Commonwealth grants, but not fully exploiting the most efficient revenue bases available to them, particularly those relating to land, mineral, energy and water resources, and payrolls;
- further misallocation of resources because recipients of intergovernmental grants do not bear the odium of levying taxes to fund those grants, and are not fully accountable to taxpayers for spending of grants received;
- discouragement of diversity and innovation; and
- attempts to shift responsibility and blame between governments.

Net GST receipts for all states except New South Wales are expected to exceed the minimum amounts guaranteed by the Commonwealth for the next four years.[158] But, guaranteed minimums were based on foregone financial assistance grants and state tax revenues, with a reduction for any state tax revenue growth dividend deemed to have resulted from the Commonwealth's taxation reforms.[159] It is clear the guaranteed minimums were <u>not</u> designed to make a serious effort to address the under-funding of state functions. They implied a continuing decline of state revenue relative to GDP.[160]

Analysis of tax data and GST Revenue Grants to states from 2000-01 revealed that Commonwealth revenue less GST has grown more strongly than GST Revenue Grants and those grants plus state taxation revenue. Growth of Commonwealth income tax revenue has been particularly strong. The Commonwealth has benefited substantially more than the states from the tax "bonanza" of recent years.

> *"There are at least four facts missing from the current debate on federalism. First, the 'massive windfall' the states are said to have gained as a result of the shift to the GST is actually tiny in the general scheme of things. At $1.2 billion in 2005-06, or 0.1 per cent of GDP, it's a rounding error in the federal budget. Second, Canberra's 'tax take' as a share of GDP is at a multi-decade high on several measures ……in part reflecting its own massive revenue windfalls. Third, Canberra's earmarking of the GST as a 'state tax' has not produced a profound shift in federal-state funding. Net transfers to the states*

[158] Commonwealth of Australia, *Federal Financial Relations 2006-07*, 2006-07 Budget Paper No. 3, 9 May 2006, p. 16.
[159] Commonwealth of Australia, *A New Tax System (Commonwealth-State Financial arrangements) Act 1999*, Schedule 2 - *Intergovernmental Agreement on the Reform of Commonwealth-State Financial Relations*, 1 July 1999, p. 9.
[160] Quiggin, John, *Untangling the Web of Commonwealth/State/Local Government Funding – What Did Your GST Buy?*, op cit, p. 2.

have remained pretty steady as a share of GDP. Finally, Canberra's record-breaking immigration policy…has put greater than usual pressure on state and local governments to manage and fund extra demand for things like housing, hospitals, schools, roads, police, public transport and other services……Meanwhile, Canberra clearly is rolling in it." [161]

Rory Robertson (2006), economist and interest rate strategist, Macquarie Bank

The Commonwealth Government has applied only a miniscule part of its massive revenue windfall to additional road grants to state and local governments. In 2005-06, the Commonwealth collected $13.74 billion from fuel excise and customs duty throughout Australia and provided 15.4 per cent or $2.12 billion to state and local governments for roads, a marginal increase over the percentage previously allocated.

Capital funding of about $10 billion is required to lift National Network roads in Queensland to a reasonable capacity and standard, but Commonwealth *AusLink* funding for capital expenditure on such roads over the five-year period to 30 June 2009 is about $1.75 billion. The Commonwealth took over funding responsibility for these roads (National Highways until June 2004) in 1974.

The capital cost of upgrading National Network roads in metropolitan Brisbane to reasonable capacities/standards would be about $5.5 billion. This figure includes a Western By-Pass joining the Logan and Gateway Motorways, completing an outer Brisbane ring-road linked with the airport, seaport and National Network roads (Bruce Highway, Pacific and Ipswich Motorways and hence Cunningham and Warrego Highways) feeding traffic into Brisbane. Paying-out remaining debt on the Gateway and Logan Motorways and removing tolls would add $0.5 billion to the cost. Federal funding for the five-years to 30 June 2009 for all of these Brisbane roads is $0.65 billion.

A genuine attack on vifi and its adverse economic consequences, rather than extra grants to help offset vifi, would require the Commonwealth Government to allow the states direct access to tax bases sufficient to meet their responsibilities on an ongoing basis. The transfer of adequate taxation capacity would be accompanied by the unwinding of most Commonwealth intergovernmental grants programmes.

While the states already have constitutional power to access the rapidly growing income tax base, it has not been politically palatable to exercise that power in the past, because of Commonwealth domination of the income tax base since it took-over state income taxes during World War 2 under wartime powers. State access to the income tax base could be enabled by cuts in Commonwealth income tax rates.

While the states could not access commodity tax bases, like fuel excise/customs duty and GST, without a constitutional amendment, they could levy congestion and road-damage charges. The Commonwealth, which has advocated such charges, could make room for, and facilitate them by granting offsetting cuts in the rate of fuel excise/customs duty in any state implementing congestion and road damage pricing.

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[161] Robertson, Rory, "Why Canberra's rolling in cash", *The Australian*, 6 July 2006, p. 25.

Substitution of state road-use charges for federal fuel tax would be a bold, intelligent economic reform that would yield "multiple dividends". Economic efficiency improvements would flow from displacement of the inefficient federal fuel tax by state/local government congestion and road damage charges that directly addressed road-use inefficiencies. The consequent effective transfer of resources from the Commonwealth to sub-national governments would facilitate provision of infrastructure with high benefit/cost ratios to complement congestion charges. At the same time, the extent of vifi and associated inefficiencies would be reduced.

Regardless of Commonwealth action to correct serious vifi in the Australian federal system, the Queensland Government should take responsibility for funding inner and intermediate ring-roads and other major arterial roads in Brisbane. This is justifiable for two reasons. First, such roads would provide substantial inter-regional benefit spill-overs. Second, there is mismatch between the current road responsibilities and borrowing and taxing capacities of the Queensland Government and BCC.

Fiscal structural deficiencies of the Australian federal system and intergovernmental politics have distorted anti-congestion policy choices of our governments. BCC has opted for toll-funding of its *TransApex* inner city roads because of lack of state and federal government funding. The Queensland Government has chosen to fund segments of outer ring-road through tolls, and may have neglected other by-pass/ring-road options, because of lack of Commonwealth funding. It appears that the state government's decision to allocate government resources to public transport subsidies instead of roads would have been influenced by Commonwealth's failure to provide tax cuts to make room for the vastly superior congestion pricing instrument that it recommended the states apply.

Brisbane's looming congestion crisis is a problem of state and national economic importance. An efficient and equitable solution will require cooperation between federal, state and local governments and a simultaneous attack on vifi.

14. An Effective Package of Anti-Congestion Measures

The analysis in this paper has shown that Brisbane suffers too much congestion, because governments have made poor policy choices in the context of growing demand for road space. There are at least five reasons why strategy selection has been poor, and our governments seem stuck for effective remedies.

First, a successful attack on congestion would require participation and co-operation by all levels of government, but Australia's federal system of government has been highly dysfunctional. Second, the Commonwealth Government has been more interested in retaining fiscal dominance in the Australian federation than in tackling congestion. Third, state and federal governments have not pulled their weight in funding arterial roads in greater Brisbane. Fourth, the Queensland Government and BCC have misinterpreted and misapplied the implications of the "induced demand" theory. Fifth, BCC and the Queensland Government regard the most potent, available anti-congestion weapon, congestion pricing, as political poison.

Intelligent, decisive action is required to tackle Brisbane's worsening congestion. The Commonwealth and Queensland Governments and BCC have recognised this, but lack effective, co-operative, co-ordinated, anti-congestion policies. The critical missing links are a complete system of inner, intermediate and outer ring-roads and other by-pass roads, selected upgrades of other arterial roads, and network-wide, variable congestion pricing with offsetting cuts in Commonwealth fuel or income tax.

It is important to note that there is no single measure that is adequate by itself for the task of tackling Brisbane's congestion malaise. The key to efficient alleviation of the problem is a package of workable, complementary measures that satisfy widely accepted economic efficiency and equity criteria.

> *"Road (congestion) pricing is increasingly being seen, at least in European cities, as part of an integrated strategy in which individual policy instruments complement one another or overcome the barriers to the implementation of other instruments……integration can be achieved by reinforcing the benefits, reducing political and financial barriers, and compensating losers. It highlights road (congestion) pricing as being able, uniquely, to reinforce the benefits of all other types of policy instrument, while at the same time generating income to contribute to their costs……also…other policy instruments can help to reduce its political unacceptability and adverse distributional impacts."* [162]
> Anthony May and Agachai, Sumalee (2005), Professor , Senior Research Fellow, Transport Engineering, Institute for Transport Studies, University of Leeds

A package of measures for tackling congestion in greater Brisbane, which flows logically from the analysis in this paper, would comprise:

- a comprehensive network of outer, intermediate and inner ring-roads and by-pass roads that are not subject to tolls, to divert traffic around congested locations;
- selected improvements to roads serving major activity centres and transit oriented development sites, including removal of bottlenecks;
- more and better quality public transport services, focused particularly on the cbd and major activity centres, and peak periods;
- changes to land-use regulation to allow substantial increases in residential and commercial densities around major activity centres and access points to major public transport corridors;

[162] May, Anthony and Sumalee, Agachai, *One Step Forward, Two Steps Back? An Overview of Road Pricing Applications and Research Outside the United States*, in Committee for the International Symposium on Road Pricing, *International Perspectives on Road Pricing*, Washington, DC: Transportation Research Board, 2005, p. 87.

- implementation of congestion pricing after provision of complementary by-pass and ring-roads, other road improvements, better public transport facilities, and implementation of land-use regulation changes;

- congestion charges applying whenever and wherever roads are congested and varying with the degree of traffic congestion, to alleviate congestion and ensure efficient use of transport networks, including management of traffic attracting consequences of new transport investments;

- Commonwealth tax cuts to:
  - offset and improve acceptability of congestion charges,
  - reduce inefficiencies in government taxes and charges overall, and
  - effectively transfer resources to state and local governments for congestion-alleviating transport infrastructure;

- programs to improve the flow of information to car drivers to allow them to make more informed choices between transport routes, modes, and times on implementation of congestion charges and provision of better transport facilities;

- investments in roads and public transport to be subject to comparative social benefit/cost analyses with positive outcomes;

- scaling-down public transport subsidies as congestion charges, land regulation changes, and consequential improvements in public transport services increase the viability of the public transport system;

- road improvements to be funded via government borrowings that would be serviced by congestion pricing revenues and public transport subsidy savings; and

- public transport upgrades to be funded with debt serviced from higher revenues and lower unit costs generated by congestion pricing.

Congestion pricing is the key to success of the recommended package. It is also the potential stumbling block to political acceptance and application of the package.

> *"Economics is after all the 'Dismal Science', and it can sometimes take time before politicians realise that what superficially may appear as bad tasting medicine is actually very good for society."* [163]
>
> Kenneth Button (2004), Professor of Public Policy and Director, Centre for Transportation Policy, Operations and Logistics, George Mason University

Politicians charged with responsibility for prescribing the right medicine for society's ills seem unduly concerned that voters may see congestion pricing as a bitter pill and spit it back at politicians administering it. But, two-thirds of metropolitan Brisbane

[163] Button, Kenneth, op cit, p. 20.

voters seem more discerning than politicians give them credit for, and appear to understand that congestion pricing would be part of a package, like the one outlined above, that overall would be very beneficial to them personally and to society.

A good starting point for tackling congestion would be COAG's February 2006 commitments to reduce congestion and undertake a joint study of congestion issues and solutions. If participants could put aside their pre-existing policy biases and think beyond narrow political self-interest, they might even come-up with an affective anti-congestion plan like the one outlined in this paper, and simultaneously make a start on reducing vertical intergovernmental fiscal imbalance. We can only hope!

If our hopes are dashed, we would have to fall back on a suggestion by Anthony Downs.[164] Make the most of time stuck in traffic. Acquire a comfortable car with climate-controlled air conditioning, a good sound system, a hands-free telephone, fax and email facilities, and a microwave oven. Commute with someone whose company you really enjoy. Then, treat time stuck in traffic as part of your leisure time. You might as well enjoy it, because congestion is here to stay.

If you still can't enjoy traffic congestion, join us in taking the fight to our politicians.

[164] Downs, Anthony, op cit, p. 354.

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