The role of taxation in addressing the externalities of road transport: a critical analysis of Australian tax policy

Philip Lignier*

Abstract

Taxation of road transport has traditionally been used as a means of raising revenue to finance public road infrastructure. However, over the last 20 years there has been a gradual shift towards using taxation as an incentive on road users to modify their behaviour and redress the externalities of road traffic. In Australia as in many developed countries, the increasing traffic volume is generating externalities in the form of environmental costs and social costs borne by society. Studies conducted overseas and in Australia indicate that these costs are significant and are likely to grow in the near future. This paper analyses the various externalities associated with road transport and discusses the role of various forms of taxation in addressing these externalities. The paper finds that the current Australian road transport tax policies will not help to challenge the problems posed by an increasing road transport demand. Recommendations and proposed reforms for the Australian road transport tax regime are examined in the context of two examples of reform implementation in the UK and Singapore. The paper concludes by discussing the challenges that need to be overcome before a successful implementation of environmental tax reform involving road transport.

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1 Introduction

Australians like Americans\(^1\) seem to have a love affair with their cars. As of 31 March 2009, Australia laid claim to 12 million passenger cars, but if campervans, buses, light and heavy trucks were included, the fleet added up to 15.7 million vehicles, an increase of 400,000 vehicles from 2008.\(^2\) With one passenger car for every 1.8 persons, Australia has one of the highest ratios of car ownership in the world. Passenger cars and light commercial trucks recorded an estimated 192 billion Vehicle Kilometres Travelled (VKT), an average of 14,800 VKT per year per vehicle.\(^3\) By comparison, the average car in the United Kingdom (UK) travelled less than 5,600 VKT in 2008.\(^4\) This high degree of reliance on road transport in Australia has been attributed to the long distances between cities and to the inadequate public transport systems within metropolitan areas.\(^5\)

This heavy dependence on \textit{private} road transport may also be explained by the fact that only a fraction of the costs associated with car ownership and driving are borne directly by users. In addition to private costs, road transport typically involves external social and environmental costs (externalities) which are shared by the community at large. With the dramatic increase in motor vehicle usage over the last twenty years, the traditional societal problems associated with road transportation (air pollution, noise, congestion) have become more acute.\(^6\) In addition to the impacts on the local environment, global greenhouse gas (GHG) emissions from road transport are growing at a significant pace and contribute to the global challenge posed by climate change.\(^7\)

As in many countries, road transport in Australia is highly taxed, generating total revenue in excess of $27 billion to both levels of government (Federal and State).\(^8\) The rationale for imposing significant taxation on road transport is that it involves substantial public capital expenditures. However, since the proceeds are no longer


\(^4\) Department for Transport, ‘National Travel Survey 2008’ (Department of transport (UK), 2009).


\(^7\) Mortimore, above n 5, 875.

hypothesized, road taxation is also an important source of general revenue. Beside their revenue raising objective, road taxes may also be effectively used to internalize external costs, i.e. to charge private users for the social and environmental costs caused by the operation of the vehicles. The use of tax instruments as a means of internalizing environmental costs was first advocated by Pigou. Pigou suggested that damages caused by air pollution could be reduced if a tax representing the abatement cost to reduce pollution was imposed on polluters.

This paper examines the externalities associated with road transport and discusses the role of tax policy in managing transport demand and addressing these externalities. The paper is structured as follows. Following this short introduction, Section 2 examines the different externalities of road transport; Section 3 discusses the role of taxation as an instrument for managing transport demand and addressing external costs; Section 4 critically reviews the Australian tax regime applying to road transport; Section 5 discusses the implementation of road tax reform in two foreign jurisdictions: the UK and Singapore before examining reform proposals for Australia. Finally, Section 6 concludes on the challenges faced in implementing environmental tax reform of road transport.

2 The externalities of road transport

2.1 Overview

The European Environment Agency (EEA) identifies four major social and environmental costs of transport: climate change, air pollution, traffic noise pollution and traffic accidents. In addition to these major impacts, other direct externalities of road transport include: water pollution, habitat and wildlife destruction, loss of landscape and time lost in traffic congestion. This paper only considers the direct impacts of road transport on the environment; hence indirect effects such as nuisance associated with energy production, vehicle production, maintenance and construction of infrastructure, and geopolitical costs linked to energy dependency are not discussed.

In addition to the externalities mentioned above, the operation of private motor vehicles generates social costs in the form of wear and tear caused to the public infrastructure. These costs are social costs as they are not directly charged to the private user, but will instead be met by public spending in the form of capital expenditure and maintenance costs financed from revenue raised by taxes. However,
road wear and tear costs are not strictly externalities inasmuch as they only affect road users collectively and do not impact on external parties who did not agree to the action causing the cost.14

The valuation of externalities is a contentious issue, essentially because many external costs are uncertain and difficult to quantify. The cost estimates reported in this section are generally based on a contingent valuation approach which in the neoclassical tradition only considers individual utility approach preferences; however the limitations of these valuations are consistently highlighted.15

2.2 Global impact: road transport GHG emissions

According to the submission to the United Nations Framework Convention on Climate Change (UNFCC), Australia’s emissions from the transport sector in 2010 were 80 million tonnes CO$_2$-e, accounting for about 15 per cent of total GHG emissions. The increase in transport emissions over the 1990 baseline (28.8 per cent) was slightly less than the 30 per cent net increase in total emissions. The latest available analysis of transport emissions by source reveals that the bulk of GHG emissions from transport (87 per cent) was caused by road transport. Passenger cars and light commercial vehicles accounted for more than three quarters of all road transport emissions, while the remaining quarter was mostly attributable to trucks and buses (Table 1).

The increase in emissions over the period 1990-2008 was most significant for light commercial vehicles (49 per cent) and trucks (42 per cent). The rise in emissions was entirely explained by the growing number of vehicles, with relatively few gains in fuel efficiency compensating for increased traffic volumes.16 As a matter of international comparison, during the period 1990-2005, road transport GHG emissions rose by 13 per cent in the UK, 26 per cent in the EU 15, 33 per cent in the US and 41 percent in Canada.17


15 Ibid. The valuation of social and environmental costs should not just include individual utility preferences but also social costs in the form of damage to human health, destruction and deterioration of property values, premature depletion of nature wealth and cultural value.


The role of taxation in addressing the externalities of road transport

Table 1: Breakdown of transport emissions by source

<table>
<thead>
<tr>
<th>Sectors</th>
<th>Emissions Mt CO₂-e</th>
<th>% change 1990-2008</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1990</td>
<td>2008</td>
</tr>
<tr>
<td>Passenger cars</td>
<td>35.3</td>
<td>41.6</td>
</tr>
<tr>
<td>Light commercial vehicles</td>
<td>7.3</td>
<td>10.9</td>
</tr>
<tr>
<td>Truck, buses</td>
<td>11.5</td>
<td>16.3</td>
</tr>
<tr>
<td>Motorcycles/other</td>
<td>0.2</td>
<td>0.4</td>
</tr>
<tr>
<td>Total road transport</td>
<td>54.3</td>
<td>69.2</td>
</tr>
<tr>
<td>Rail</td>
<td>1.7</td>
<td>2</td>
</tr>
<tr>
<td>Domestic air</td>
<td>2.9</td>
<td>6</td>
</tr>
<tr>
<td>Domestic shipping</td>
<td>3.1</td>
<td>2.9</td>
</tr>
<tr>
<td>Total Transport *</td>
<td>62.1</td>
<td>80.1</td>
</tr>
</tbody>
</table>

*Total may not add up because of rounding

Source: Department of Climate Change, National Greenhouse Gas Inventory, May 2010, p 9.

The costs of climate change can be represented by the cost of the potential damages to the environment and people’s welfare that would result from the effects of global warming in the absence of emission mitigation. These damages have been described in the Garnaut Climate Change Review and include among others the loss of agricultural production, flooding of low lying coastal areas, increased exposure to tropical diseases such as Dengue fever and threat to water supplies.18 Garnaut argues that only the market impacts of climate change can be measured in monetary values.19 Some of these market impacts are currently measurable in terms of reduction of GDP growth and consumption, others are too uncertain to be readily subject to modelling (for instance the potential impact on the cost of infrastructure of the increased intensity of tropical cyclones).20 However, some potential costs of climate change are more difficult to conceptualise, let alone quantify. These include the loss in the value that Australians as a community place in environmental amenities such as the Great Barrier reef or other features of the Australian or international landscape.21

In view of the fact that the costs of climate change are so difficult to evaluate, many transport studies use the cost of mitigation, i.e. the avoidance costs of bringing CO₂ emissions to a level where the effects of climate change on society would be significantly reduced, to value externalities.22 There is considerable debate about the

19 Ibid, 247.
20 Ibid, 249.
21 Garnaut, above n 18, 249.
value that should be allocated to carbon to estimate mitigation costs.\textsuperscript{23} The Garnaut review recommends a transitional price of $20 per tonne of CO$_2$-e, while Infras in their European studies used a base price of €20 (A$29).\textsuperscript{24} On the basis of this mitigation costs approach, the external costs of GHG emissions from the road transport sector in Australia can be estimated between $1.4 billion and $2 billion per year.\textsuperscript{25}

2.3 Local externalities

2.3.1 Air pollution

Besides contributing to global warming, emissions by road vehicles have additional harmful air pollution effects. The pollution is caused by exhaust particles other than CO$_2$ such as carbon monoxide (CO), Nitrogen Oxides (NO) and Hydrocarbons (HC).\textsuperscript{26} Epidemiological studies carried out in European countries suggest that human health is more sensitive to vehicle exhaust pollutants than previously believed and that these pollutants may cause as many deaths as traffic accidents. The effects of traffic pollution include a rise in long term mortality, respiratory and cardiovascular problems, increased chronic bronchitis incidence, and additional cases of asthma attacks for asthmatics.\textsuperscript{27}

In spite of the overall growth in VKT, improvements in average emission performance should lead to decreased levels of pollution due to the introduction of particle filters.\textsuperscript{28} In Australia, CO emissions are expected to decrease by 38 per cent from 2000 to 2020, NO emissions by 23 per cent and HC emissions by 21 per cent.\textsuperscript{29}

The valuation of health costs due to vehicular air pollution in Australia has been estimated at $2.7 billion for 2005. This includes a premature mortality cost of 1.8 billion and an estimated morbidity cost of a $0.8 billion.\textsuperscript{30}

\textsuperscript{23} Garnaut, above n 18, 250. The price of carbon will be a function of the global CO2 concentration target in the Earth atmosphere (450 ppm or 550 ppm) and of Australia’s emissions entitlements.

\textsuperscript{24} Infras, above n 22.

\textsuperscript{25} All monetary values are expressed in Australian dollars except where otherwise stated. Conversion rates used to translate foreign amounts are the average rate for December 2010 as published by the Reserve Bank of Australia.

\textsuperscript{26} L Parry, M Wells and W Harrington, ‘Automobile externalities and policies’ (2007) 45(2) Journal of Economic Literature 373, 374.


\textsuperscript{28} Ibid.

\textsuperscript{29} Clarke and Prentice, above n 8, 49.

\textsuperscript{30} Bureau of Transport and Regional Economics (BTRE), Health impacts of Transport Emissions in Australia: Economic costs, Working Paper 63, Canberra. Mortality cost estimate is based on a value of an individual life of $1.3 m. Morbidity cost which evaluates the cost of illness and disability is valued at $50,000 for each healthy year of life lost.
2.3.2 Traffic noise

Exposure to high levels of noise and vibration generated by road traffic can have detrimental effects on the physical and mental health of humans. Noise levels in excess of 85 db (A) on a continuous basis may cause hearing problems.\textsuperscript{31} There is also evidence from a study of transport noise impacts in the UK and Germany that noise levels above 75 db (A) are correlated with increased risks of cardiac infarctions.\textsuperscript{32}

External costs of traffic noise include the loss of value of land located next to a major source of traffic noise and damage to human health.\textsuperscript{33} The valuation approach used to estimate these external costs is based on the inhabitants’ Willingness to Pay (WTP) for reduction of noise pollution and an estimate of health costs.\textsuperscript{34} The difficulty in estimating these costs lies in the fact that the marginal cost associated with traffic noise pollution is dependent on variables such as the area (urban, suburban or rural), the traffic conditions (thin or dense) and the time of day.\textsuperscript{35} Extrapolating from a study of noise pollution undertaken for the Melbourne metropolitan area, the cost of traffic noise pollution for all urban areas in Australia has been estimated within a range of $200 to $400 million.\textsuperscript{36}

2.3.3 Traffic accidents

Traffic accidents are an externality associated with driving or being a passenger in a road vehicle. Other potential traffic accident impacts include the risks to pedestrians and cyclists. When traffic intensity increases, the accident probabilities for all motorists in the traffic increase.\textsuperscript{37}

Traffic accidents are the source of significant private costs for drivers and passengers, some of which will be covered by the driver’s insurance policy. However, traffic accidents also generate social costs. The social costs of traffic accidents correspond to the risk value of fatalities or injuries, the cost of the loss of human capital to the economy, the medical costs not covered by insurance, the administrative costs such as police and justice and damages to property not covered by insurance.\textsuperscript{38} The risk value of fatalities and injuries is estimated on the basis of the loss of welfare associated with the shortening of the lifetime of the victim as well as the pain and suffering of

\textsuperscript{31} Clarke and Prentice above n 8, 50.
\textsuperscript{32} Ibid, 37.
\textsuperscript{34} Ibid 35.
\textsuperscript{35} Ibid, 96.
\textsuperscript{36} Victorian Transport Externalities Studies by Nain and partners, see L Segal, ‘Review of Health Costs of Road Vehicle Emissions’ (Centre for Health Program Evaluation, 1999), 36.
\textsuperscript{37} Parry, Wells & Harrington, above n 26, 381. It can also be argued that while the number of accidents increases with traffic density, the seriousness of accidents decreases as traffic is slower.
\textsuperscript{38} Infras, above n 22, 30 ABS above n 33, 102.
relatives in the case of fatalities, and the pain and suffering of the victim in the case of injuries.\textsuperscript{39}

A study by Connelly and Supangan estimated the total cost of road traffic accidents in Australia for 2003 at $17.2 billion representing 2.3 per cent of GDP.\textsuperscript{40} This included a cost of fatalities of $2.96 billion, a cost of injuries of $11.5 billion and property damages of $2.8 billion. These figures are for the total costs of road accidents, a significant proportion of which are internalised. However, Parry et al argue that a large proportion of property damages in single and multi-vehicle accidents should be treated as external costs as insurance premiums are generally levied as a lump sum rather than on a VKT basis. Similarly, medical costs are mostly external as they are borne by external parties.\textsuperscript{41} Small and Verhoef estimate net accident externality costs at 52-74 per cent of private costs.\textsuperscript{42}

\textbf{2.3.4 Traffic congestion}

Traffic congestion imposes significant social costs in two respects. Firstly, longer average journeys generate extra actual travel time. Secondly, travel time variability leads travellers to allow for a greater travel time than the average journey time to avoid being late at their destination. In addition to these social costs, congestion is a source of private costs in the form of increased vehicle operation costs.\textsuperscript{43} Parry et al estimate that congestion costs constitute about 50 per cent of all distance related externality costs.\textsuperscript{44}

The Bureau of Transport and Regional Economics (BTRE) assessed the social costs of congestion in Australian cities at $9.4 billion in 2005.\textsuperscript{45} This amount is based on the deadweight loss to the Australian economy.\textsuperscript{46} However, costs associated with traffic congestion other than extra time costs, such as additional costs of operating the vehicle should not be taken into account when measuring external costs as they are borne by the traveller. Similarly, the additional air pollution and climate change costs caused by congestion are already accounted for in the computation of costs relating to these externalities. After eliminating these components, the net cost of traffic congestion

\textsuperscript{39} Ibid, InfraS, 22.
\textsuperscript{40} L Connelly and R Supangan, ‘The economic costs of road traffic crashes: Australia, states and territories’ (2006) 38(6) Accident Analysis and Prevention 1087, 1091.
\textsuperscript{41} Parry, Wells & Harrington, above n 26, 382.
\textsuperscript{42} K Small and E Verhoef, The Economics of Urban Transportation (2007), 102.
\textsuperscript{43} BTRE, ‘Estimating urban traffic and congestion cost trends for Australian cities’ (Department of Transport and Regional Services, 2007), 10.
\textsuperscript{44} Parry, Wells & Harrington, above n 26, 382.
\textsuperscript{45} Ibid, 12. This figure excludes additional vehicle operating costs and additional air pollution costs.
\textsuperscript{46} Ibid, 10 A deadweight loss cost is equivalent to the net benefit that would accrue to society if appropriate measures to manage traffic were introduced and optimal traffic flows were obtained.
in Australian cities was valued at $7.1 billion. The same study estimated that the avoidable costs of urban congestion may grow to around $20 billion by 2020.47

2.4 Summary: the social and environmental costs of road transport in Australia are significant

Beside the externalities of road transport already described, other social and environmental costs identified by the literature include the loss of habitat and wildlife destruction from traffic and road construction,48 time losses for pedestrians in urban areas and loss of space availability for bicycles.49 The valuation of the costs associated with the loss of wildlife and habitat is controversial, depending on whether the valuation is based on the WTP to preserve human enjoyment of specific species or landscape (anthropocentric approach) or a biocentric approach that recognises the value of non-human life in nature.50

Bearing in mind the subjectivity and controversy associated with the valuation of externalities, the external costs of road transport in Australia could be estimated at an amount between $19.5 billion and $22.4 billion per year, representing a cost of 10 cents to 11.7 cents per VKT (Table 2). It should be noted that this estimate ignores the impact on nature and landscape and indirect effects. This valuation is based on average costs even though it is arguable that the marginal cost of externalities would be more useful to determine the optimal tax rate that should apply to an environmental tax.51 All things considered, average costs are probably a more reliable measure. A recent paper published by the Australian Conservation Foundation shows that there is a significant level of uncertainty regarding the computation of marginal costs as these are very dependent on the local environmental conditions.52

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47 K Henry (chair), ‘Australia’s future tax system: Report to the Treasurer’ (The Treasury, 2009), 53.
48 Hamilton, Denniss & Turton, above n 13, 13.
49 Infras, above n 22, 58.
50 Ibid, 54. Some philosophical frameworks such as environmental ethics advocate a biocentric approach to valuation which appraises the value of the components of nature on the basis of their ecological role in the overall ecosystem rather than their utility to humans. A biocentric valuation of external costs would consider the costs incurred to restore the landscape to its previous conditions.
### Table 2: Annual cost of transport externalities in Australia

<table>
<thead>
<tr>
<th>Externalities</th>
<th>Lower bound ($ billion)</th>
<th>Upper bound ($ billion)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Climate Change impact</td>
<td>1.4</td>
<td>2</td>
</tr>
<tr>
<td>Air pollution</td>
<td>2.7</td>
<td>2.7</td>
</tr>
<tr>
<td>Traffic noise</td>
<td>0.2</td>
<td>0.4</td>
</tr>
<tr>
<td>Traffic accidents*</td>
<td>8.1</td>
<td>10.2</td>
</tr>
<tr>
<td>Traffic congestion</td>
<td>7.1</td>
<td>7.1</td>
</tr>
<tr>
<td><strong>Total Cost of externalities</strong></td>
<td><strong>19.5</strong></td>
<td><strong>22.4</strong></td>
</tr>
</tbody>
</table>

*Value of externality costs of accidents based on estimates by Small & Verhoef; total costs 2.3% of GDP.

### 3  Tax instruments and transport externalities

#### 3.1 Introduction: typology of environmental policy Instruments

It is not the purpose of this paper to reproduce the theoretical argument about the merits of economic instruments and regulation as environmental policy tools as this has been abundantly covered in the literature.\(^{53}\) Similarly, the advantages of the Pigovian taxation approach over the Coasian property rights approach\(^ {54}\) are not discussed. Instead, this paper identifies the different types of instruments available to policy makers in order to address externalities related to road transport. These instruments may be substitutes or complements of one another and can broadly be classified as regulatory instruments and economic instruments.\(^ {55}\)

Regulatory instruments intend to influence the environmental performance of polluters by regulating processes and products and limiting certain activities.\(^ {56}\) Examples of regulatory instruments applying to road transport include fuel consumption standards imposed on car manufacturers or pedestrian zoning in inner city areas. In contrast to regulations that can be described as “command and control” instruments, economic instruments seek to affect the costs and benefits of alternative actions by economic agents. Economic instruments used in environmental

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\(^{54}\) The Coasian approach postulates that externalities can be controlled by transacting parties without state intervention if property rights are well defined and transaction costs are small enough. K Maatta, *Environmental taxes: an introductory analysis* (2006), 4.

\(^{55}\) Maatta ibid, 7.

\(^{56}\) Ibid, Opschoor and Voss 1989 cited.
policy include environmental taxes, tradable permits and subsidies. While there is an ongoing debate in the literature about the effectiveness, efficiency and equity of these different approaches, in practice environmental policies are likely to use a combination of taxes, subsidies and regulations.57

In theory, environmental taxes are contrasted to fiscal taxes which are primarily designed to raise revenue; in reality, many environmental taxes have a mixed purpose, acting as an incentive on polluters to modify their behaviour but also with a revenue raising purpose.58 Typical examples of such hybrid taxes are fuel duties: they were rarely designed as environmental taxes (their original purpose was often to raise revenue to finance infrastructure), but they have an undeniable effect on polluter behaviour.

Although there is wide support from economists towards the use of environmental taxes or other economic incentives such as “cap and trade” rather than regulatory instruments, there is little empirical evidence supporting their actual effectiveness.59 Maatta explains this lack of evidence by the practical difficulties surrounding the collection of data necessary for the evaluation of these taxes. Many environmental taxes are applied in conjunction with other instruments and their effects may be difficult to isolate. Also, economic fluctuations, such as variations in the price of fuel introduce noise in the analysis.60 This being said, some empirical evidence available from Europe tends to support the effectiveness of environmental taxes. For instance, a tax on the sulphur content of vehicle fuels introduced in Sweden in 1991 resulted in an 80% reduction in the sulphur content of fuel.61

The idea that taxation can be used as an effective environmental policy instrument seems to have gathered more support in recent years at least in European countries.62 The European Commission recently put forward a package of “Greening transport” initiatives which adopts the key principle that costs incurred but not paid for (external costs) should be charged to the individual user.63 Tax instruments aiming at controlling or managing the demand for road transport can be positioned at three crucial points: a tax on the initial purchase of the vehicle; a tax on the ownership of the vehicle; a tax on the usage of the vehicle.64

57 For a discussion of taxes versus cap and trade policies see for instance Aldy et al, A Tax Based Approach to Slowing Global Climate Change, National tax Journal, LXI,3,493.
58 Maatta, above n 54, 18.
59 Faure & Ubachs, above n 51, 301.
60 Maatta, above n 54, 43.
62 The idea of “carbon taxation” was still vigorously opposed by large sections of the political arena in Australia at the time of the 2010 Federal election.
3.2 Tax on the Initial purchase of the vehicle

Beside its revenue raising objectives, a purchase tax on a vehicle may influence vehicle choice by applying concessional rates on environmentally friendly or fuel-efficient vehicles. Most European Union (EU) states, with the notable exception of the UK and Germany, have a specific car purchase tax in addition to the Value Added Tax (VAT).65 A few countries like the Netherlands and Belgium have introduced green incentives for the purchase of a low CO₂ emitting vehicle in the form of banded tax rates which offer the vehicle acquirer a rebate based on the fuel efficiency or the emission performance of the vehicle.66

Another form of environmental tax incentive affecting the purchase of the vehicle is the availability of tax credit or tax deduction for the purchase of vehicles using alternative sources of energy. For example, the United States (US) Federal Tax Code contains a measure granting a 10% tax credit (up to $4,000) on the cost of a vehicle primarily powered by electric motors that get their energy from portable sources.67 An original traffic management policy is found in Singapore which operates a capping scheme where the acquirer of a new vehicle needs to bid for a Certificate of Entitlement (COE) before being able to own and use the vehicle.68 A finite number of COE is issued each month, and the current system only allows for a 0.5 per cent annual increase for the next 15 years.69

3.3 Tax on vehicle ownership

Most countries or regional governments in federal jurisdictions have enacted a circulation tax also called “registration” or “licence” tax. Although this tax was originally a fiscal tax designed mainly to finance the construction of road infrastructure, a number of EU countries have recently “greened up” their circulation tax in order to encourage the purchase of carbon efficient cars.70 The UK and Germany have car ownership taxes linked to the vehicle’s CO₂ emissions efficiency.71 The UK also has a selective form of circulation tax that applies to cars purchased by companies and available to private use.72

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65 Green Fiscal Commission, above n 61, 33.
66 Potter, above n 64, 42.
67 Milne, above n 1, 105; As of 2009, the tax credit available for the purchase of certain type of electric can be up to $7,500; IRC Section 30 and 30D.
69 Ibid, 212. The Singapore road transport policies are discussed in details in Section 5.1.2 below.
71 Potter, above n 64, 43.
72 The UK company car tax and excise tax are discussed in Section 5.1.1 below.
An annual tax circulation tax on car ownership can only have an indirect impact on the type of vehicle acquired, and as an environmental policy instrument it is not as efficient as a purchase tax.73 This being said, a high purchase tax and circulation taxes can be used as complementary incentive measures to influence the type of vehicles purchased. Denmark for example, charges a very high purchase tax on new vehicles with attached rebates based on the type of fuel used by the car. It also has a circulation tax that varies with fuel consumption.74 The result of this policy is that Denmark has a car fleet with a 20 percent better fuel economy than the UK and Germany.75

3.4 Tax on vehicle usage

3.4.1 Fuel taxation

Taxes based on vehicle usage will allow the management of transport demand by affecting decisions about the amount of travel and the mode of transport. In Australia, the EU countries and many other developed nations, fuel taxation is the main form of taxation affecting road usage.76

Since the development of motorized road transport in the early twentieth century, fuel taxation has been adopted by governments as a useful fiscal instrument, either as a tax dedicated to financing road construction and maintenance (in the USA and New Zealand) or as a source of general revenue (in Europe and Australia). In federal countries, fuel taxation may also be imposed at the state or regional level.77 Fuel taxes, duties or excises are generally charged at a rate per unit of volume, although standard ad valorem sales taxes such as VAT in the EU or GST in Canada and Australia are often charged in addition to the fuel tax.78 Fuel taxation rates vary considerably across jurisdictions, from high rates in EU countries to comparatively low rates in the US (Table 3).
Table 3: Comparison of fuel taxation on unleaded petrol in selected countries

<table>
<thead>
<tr>
<th>Country</th>
<th>Charge per litre (Australian cents equivalent)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Netherlands</td>
<td>89.4</td>
<td>Additional 19% VAT applies</td>
</tr>
<tr>
<td>UK</td>
<td>88.36</td>
<td>Additional 15% VAT applies</td>
</tr>
<tr>
<td>Australia</td>
<td>38.14</td>
<td>Levied by the Federal government. GST of 10% also applies</td>
</tr>
<tr>
<td>Singapore</td>
<td>33.6</td>
<td></td>
</tr>
<tr>
<td>Canada</td>
<td>16.2-30.5</td>
<td>Levied by both Federal and Provincial authorities. An additional 1.5 c is levied by municipal government in Vancouver and Montreal</td>
</tr>
<tr>
<td>US</td>
<td>8.3-16.25</td>
<td>Federal tax of US$0.184 per US Gallon + state tax ; lowest Wyoming, highest New York</td>
</tr>
</tbody>
</table>

Sources by country: Department of Resources, Energy and Tourism, Petroleum statistics (December 2009), (Australia, UK and Netherlands); Land Transport Authority, Vehicle ownership (Singapore); American Petroleum Institute, Motor fuel taxes (US); Petro-Canada, Gasoline taxes across Canada (Canada).

As a fiscal instrument, fuel taxation has many advantages: it can raise large amounts of reliable and predictable income; it is also simple to administer, easy to enforce and evasion is difficult.79 Fuel taxation can also be used as an incentive to reduce the overall volume of travel and promote the adoption of fuel efficient vehicles, reducing thereby the volume of CO₂ emissions as well as air pollution. Many countries, particularly European countries, have in recent years used fuel taxation to promote fuel efficiency and the use of cleaner types of fuel such as unleaded petrol and low sulphur fuel.80 The example of the Fuel Duty Escalator (FDE) in UK shows that higher fuel taxation does impact on traffic volume.81 However, it is arguable that the effect of fuel taxation has been somewhat blunted by oil price volatility in recent years. The low elasticity of fuel demand relative to price, at least in the short run, may also limit the impact of tax increases on demand.82

The significant role that fuel taxation has had in transport demand management in the past is likely to change in the medium term future, with road user charges likely to become a major part of the taxation system in countries like the Netherlands and the UK. There is a strong argument in the literature that fuel taxation may be an imperfect tool for correcting some negative externalities. Taxing fuel on the basis of energy content will address global greenhouse emissions, but it may not effectively reduce local externalities such as air pollution, congestion and accidents which

79 Green Fiscal Commission, above n 61, 36.
80 Potter and Parhurst, above n 74, 174.
81 Ibid. The impact of the FDE is discussed further in Section 5.1.1 below.
depend on traffic levels rather than distance travelled.\textsuperscript{83} An additional argument against the sole use of fuel taxation as an environmental policy instrument is that the shift to alternative fuels such as electric cars would raise problems about the stability of revenue from fuel taxes.\textsuperscript{84} Finally, despite their administrative advantages and strong support from economists, high fuel taxes are probably the most hated of all environmental taxes as demonstrated by the fuel duty protests seen in the UK in 2000 and other European nations in 2007-8.\textsuperscript{85}

3.4.2 Congestion charging and road pricing

The second category of tax instruments directly affecting vehicle usage includes different forms of road user charges such as cordon pricing, electronic road pricing, tolls, and generalized road-user charges. Cordon pricing involves the levy of a fixed or variable charge as the motorists enter a designated geographic area, typically a congested inner-city area. Cordon pricing has been pioneered by a number of cities including London, Singapore and Rome. Electronic road pricing relies on a technology involving a combination of radio frequency, optical detection and smart cards to charge users a fixed or variable price whenever they are using particular roads. Generalized road user charges schemes are being implemented in a few countries, with road freight transport being implemented first. The Netherlands is proposing the introduction of a generalized road user charges schemes for trucks in 2011 and phased in for cars between 2012 and 2016.\textsuperscript{86} Finally, parking fees could be added to this list of charging instruments. As a spillover of traffic congestion, street parking generates social and environmental costs which can be addressed by adequate parking policies.\textsuperscript{87}

Compared to fuel taxation, road charges have the significant advantage of being able to be targeted at the places and times where externalities of road traffic (such as congestion and local pollution) are severe. Many theoretical arguments support road pricing, however there are also many design and practical problems associated with this form of taxation.\textsuperscript{88} The implementation of road pricing involves significant fixed costs and may be technically difficult even though technological developments make it increasingly efficient to collect charges.\textsuperscript{89} While road pricing can have a direct and indirect role in many transport policy areas, its effectiveness will vary depending

\textsuperscript{83} Clarke and Prentice, above n 8, 16; J Freebairn, Environmental Taxation and its Possible Application in Australia in Australia's Future Tax and Transfer Policy Conference, Melbourne Institute (2010), 161,171.

\textsuperscript{84} Green Fiscal Commission, above n 61, 37.


\textsuperscript{86} Potter, above n 64, 52.

\textsuperscript{87} Clarke and Prentice, above n 8, 43.


\textsuperscript{89} Ibid.
on what type of externalities are addressed.\textsuperscript{90} Road pricing may be an adequate policy tool to address congestion; however congestion charging is more amenable to local initiatives than national solutions. The effectiveness of road pricing in dealing with such externalities such as air pollution, and noise is more controversial as it is difficult to design suitable charging instruments.\textsuperscript{91} Finally, while there is a strong case for comprehensive road pricing in urban areas, the merits of generalised road user pricing schemes such as those envisaged in the UK or the Netherlands are still debated in the literature.\textsuperscript{92}

4 The taxation of road transport in Australia

4.1 Overview

Road transport is arguably highly taxed in Australia under a combination of excises, levies, taxes and duties raised at both federal and state levels. The Commonwealth and the states raised $24.4 billion in motor vehicle taxes and charges in the 2008 fiscal year. For the 2007 fiscal year, fuel taxation represented 56 per cent of all motor vehicle taxes, and taxes on vehicle purchase and ownership 36 per cent (Figure 1).\textsuperscript{93} Whilst these taxes may have a corrective effect on negative externalities, their primary objective is to raise revenue.\textsuperscript{94}

\textsuperscript{90} National Road Transport Commission and National Transport Secretariat, ‘Candidate actions to progress road pricing initiatives’ (2003), 8-13.

\textsuperscript{91} Ibid, 11-13.


\textsuperscript{94} Clarke and Prentice, above n 8, 14.
Under Australia’s constitutional arrangements, transport regulation, environmental protection, planning and resource management is largely the responsibility of the states, while local governments are in charge of the design and development of their own policies and programmes relating to pollution control and traffic management. At the federal level, the Department of Infrastructure and Transport (DIT) has the responsibility for raising the fuel excise and for funding road related expenditures, while the Department of Climate Change and Energy Efficiency (DCCEE) is responsible for reporting and monitoring carbon emissions including vehicle emissions. Although a number of initiatives launched by successive Australian governments such as the Green Car Innovation Fund may have a significant influence on carbon emissions and other externalities, this section focuses on the role of taxation in the management of transport externalities. The following tax instruments will be examined: taxes on vehicle purchase and ownership, fuel excise, road tolls and charges.

### 4.2 Taxes on vehicle purchase and ownership

All states and territories impose a tax on the purchase of the vehicle in the form of a stamp duty payable on the transfer of registration, as well as a registration fee imposed every year or every six months. The stamp duty is charged at ad valorem rates with different rates applying for different dutiable value brackets. However in

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95 Ashiabor and Blazey, above n 6, 150.
Queensland, stamp duty rates are determined by the number of cylinders or rotors. Hybrid vehicles and electric vehicles are charged a lower duty in Queensland, and Western Australia. These are the only two states where the stamp duty charged may influence the size and the type of vehicle purchased. In contrast to purchase taxes in place in many EU countries, the environmental performance of the vehicle will have no effect on the amount of duty charged with the recent exception of the Australian Capital Territory (ACT) where from 2009 stamp duty is imposed according to the environmental performance score of the vehicle. It should also be noted that stamp duties are charged at very low rates (around 3 per cent of market values) compared to the base rates applying in some overseas jurisdictions (45 per cent in the Netherlands, 105 per cent in Denmark).

Similarly, circulation taxes (registration fees) are not linked with CO₂ emissions. Registration fees are based either on the number of cylinders (Queensland, South Australia, Tasmania) or the weight of the vehicle (NSW, ACT, Western Australia). In Victoria, the annual registration for private motor vehicles is a flat fee of $187; however hybrid motor vehicles get an annual discount of $50.

In addition to these state raised taxes, the Commonwealth government imposes a GST of 10 per cent on the sale of any new motor vehicle or any used vehicle sold by a GST registered entity. A Luxury Car Tax (LCT) of 33 per cent also applies to the GST inclusive value of a luxury car above the LCT threshold of $57,180. A higher threshold of $75,000 applies for fuel efficient cars. Finally, a 5 per cent tariff applies on imported passenger vehicles, light commercial and four-wheel drive vehicles. However preferential trade agreements and exporters credits may effectively reduce the import tariff.

4.3 Fuel excise

Fuel taxation was first introduced in Australia in the early 1900s to fund the development and maintenance of Australia’s road network. The link between fuel taxation and

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98 F Van Ewijk, ‘Submission on the fuel efficiency discussion paper’ (Tourism & Transport Forum, 2008), 9
101 A fuel efficient car is defined as a car that has a fuel consumption not exceeding seven litres per 100 km. Fuel consumption is determined using the standards in force under Section 7 of the Motor Vehicle Standards Act 1989 (Cth) 189; Section 25-1 (4) of ANTS (Luxury Car Tax) Act 1999.
102 Clarke and Prentice, above n 8, 25.
road funding was reinforced by the granting of a fuel tax exemption or rebate for off-road use or uses other than for transportation. However, since the 1960s revenue hypothecation was formally abandoned as fuel taxation had evolved as a general source of government revenue. The first environmental measure concerning fuel taxation came in 1994 with the introduction of a differentiated rate on leaded petrol.

Currently, a fuel excise of $0.38143 per litre is levied on petrol and diesel. Biofuel such as ethanol, methanol and biodiesel is subject to the same excise at the bowser, however a subsidy equivalent to the fuel excise is granted to domestic biofuel producers until 30 June 2011. This subsidy will be gradually phased out by 30 June 2015. There is currently no excise on Liquefied Petroleum Gas (LPG) used as transportation fuel; but excise on this type of fuel will be gradually introduced from 1 July 2011 to reach $0.125 by 30 July 2015. While excises on fuel used to be indexed to inflation, indexation was selectively abolished on petrol, diesel, aviation fuel and bio-fuel in March 2001.

The fuel taxation regime in Australia is made more complex by the existence of various fuel tax credit schemes which operate alongside the excise regime. The mainstay of these schemes is a credit regime which allows eligible businesses to claim a credit for the fuel excise when the fuel is used in certain activities (Table 4). The new fuel credit regime was adopted primarily for economic reasons with few eligibility criteria linked to environmental performance. The only requirement is that owners of heavy trucks and buses manufactured before 1 January 1996 and used on public road, must demonstrate that the vehicle is part of an accredited maintenance programme.

The main comment that can be made about the Australian fuel taxation regime is that the rate is relatively low, and unlike many overseas jurisdictions it is not indexed, which means that in real terms, the tax burden is decreasing. A recent study shows that fuel consumption in Australia is relatively inelastic in the short term with a price elasticity of -0.13 compared to a mean of -0.24 for OECD countries. According to the Ramsey analysis on efficient commodity tax design, this low elasticity makes the...
fuel excise a good candidate as a fiscal instrument. The second comment is that the differential taxation regime that existed between different types of fuels is gradually being phased out and by 2015 all types of fuels will be taxed at the same rate.

Table 4: Fuel credit regime for Australian businesses

<table>
<thead>
<tr>
<th>Eligible activities</th>
<th>Eligible fuel</th>
<th>credit (cents per litre)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vehicle with a GVM greater than 4.5 tonnes travelling on a public road</td>
<td>All taxable fuels</td>
<td>16.443**</td>
</tr>
<tr>
<td>Emergency vehicles with a GVM greater than 4.5 tonnes travelling on a public road</td>
<td>All taxable fuels</td>
<td>16.443**</td>
</tr>
<tr>
<td>Off-road use in eligible activities:</td>
<td>All taxable fuels</td>
<td>38.143</td>
</tr>
<tr>
<td>• Agriculture, Forestry</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Fishing, marine transport</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Rail transport</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Mining</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Nursing and medical (non transport)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-fuel uses</td>
<td>All taxable fuels</td>
<td>38.143</td>
</tr>
<tr>
<td>Other activities including plant and machinery</td>
<td>All taxable fuels</td>
<td>19.0715</td>
</tr>
</tbody>
</table>

* As of 1 July 2009.
**Net of the road user charge. The full tax credit is 38.143 minus a road user charge of 21.7 cents per litre.

Source: ATO (NAT 14584).

4.4 Road tolls and charges

Compared to other developed countries, the use of road pricing as a transport externalities management instrument is fairly limited in Australia. The only nationwide levy on road usage is the heavy vehicle road charge (applying to vehicles with a GVM over 4.5 tonnes) which is currently raised at a rate of 21.7 cents per litre of fuel. As discussed previously, the road charge is not directly levied from users but collected by way of a reduction to the fuel credit to which those users are entitled. This form of user charge was primarily designed with the objective of financing road infrastructure rather than tackling transport externalities. However, since the amount of charge paid is linked to fuel consumption the road charge has a potential effect on fuel efficiency and carbon emissions, even though there is no differential charge targeting heavily polluting vehicles.

111 Clarke and Prentice, above n 8, 22-23.
112 Road Charges Legislation Repeal and Amendment Bill 2008. The road user charge was first introduced on 1 July 2006 by the Fuel Tax Act 2006.
113 Ibid.
Localised road pricing schemes in Australia are essentially geared towards achieving cost recovery and are not designed to address externalities such as traffic congestion. Extensive road pricing is mostly limited to Melbourne and Sydney. The City Link and East Link schemes in Melbourne is a privately operated network that charges tolls on 22 km of toll roads between the airport, the city and major industrial centres. The system uses an electronically operated cashless system where users either open an account with the operator or buy a day pass. A study by the Royal Automobile Club of Victoria (RACV) in 2001 indicated major improvements in traffic congestion on the road network across the North and West of Melbourne. However, the tolls do not increase at peak travel times and therefore fail to act as an incentive to travel outside peak hours.

Similarly, Sydney uses a cashless eTag system to charge motorists using the Harbour Tunnel or the Harbour Bridge into the city. Motorists using the Orbital Motorway Network to and around the city are also charged a toll. The introduction of “time of the day” pricing for the use of the Harbour Bridge and Harbour Tunnel in early 2009 should provide useful evidence on the effectiveness of time differential pricing. Implementation of cordon pricing already in place in London, Singapore and Stockholm has so far been resisted by state governments.

4.5 Environmental tax disincentives

While tax measures can potentially reduce the negative externalities of road transport, a number of tax regimes in place in Australia may act as environmental disincentives in so far as they actually encourage the acquisition and/ or use of motor vehicles. The distortionary taxes examined here include the fuel rebate and the car FBT regimes.

The fuel tax credit reform introduced on 1 July 2006 had a largely economic objective. It aimed to substantially lower the fuel tax burden on businesses and households. The package that is to be fully implemented by 1 July 2015 will ultimately limit the application of the fuel excise to on-road use by light vehicles. The scheme has resulted in a rise of the number of claimants from around 185,000 before the reform was implemented to nearly 700,000 in 2008/9. The scheme is also costing the taxpayer

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114 Clarke and Prentice, above n 8, 39.
115 In Brisbane, tolls are charged on motorists using the Clem Tunnel, the Gateway Bridge and one section of the motorway network.
117 Ibid.
120 Clarke, above n 118.
121 Australian Government, above n 106, 2.
122 Ibid.
over $5 billion in reduced fuel excise collection. In addition, the exemption from fuel excise applying to alternative fuels such as biofuel and LPG is estimated at $710 million in 2008/9.

Unfortunately there is no evidence available about the impact of these measures on vehicle usage by business taxpayers. But, in view of the evidence from overseas indicating that higher fuel taxation results in reduced traffic volume, one can intuitively conclude that effectively reducing fuel taxation for certain categories of vehicles and certain categories of taxpayers may lead to a higher rate of usage, or at the very least will not be an incentive to restrain usage. This trend may be reinforced by the removal of the requirement for large fuel credit recipients to monitor their emissions and develop options for abatement.

The role of the current car Fringe Benefits Tax (FBT) regime in encouraging excessive private car use has been abundantly discussed in several papers and therefore does not need to be described here in full detail. Broadly, the statutory formula used to determine the value of the taxable car benefit provides that the amount of the taxable benefit will be lower when the number of total kilometres travelled by the vehicle is higher. It therefore represents an incentive to travel more kilometres rather than less. Kraal et al provide evidence that the statutory formula creates a moral hazard problem. Mortimore argues that the influence of the local car manufacturing industry is the main reason for not amending the tax. The adverse incentive of the statutory formula was explicitly recognised by the Henry Tax Review which recommends the replacement of the statutory formula by a single statutory rate of 20 per cent. A year after the Henry Review reported its conclusions to the Government, there is no sign that this recommendation will be followed up by any concrete policy initiative.

5 Environmental tax reform of road transport

5.1 Lessons from abroad

The previous discussion supports the proposition that current Australian tax policies are not designed to deal effectively with the social and environmental costs of road transport. In this respect, Australia lags behind other jurisdictions that have implemented tax policies with the explicit purpose of tackling transport externalities.

125 See Hamilton, Denniss & Turton, above n 13, 21, Ashiabor & Blazey, above n 6, 157, Mortimore, above n 5, 889.
127 Mortimore, above n 5, 891.
128 Henry, above n 47, 82.
This section will first discuss two examples of road transport tax reforms undertaken in the UK and in Singapore before examining the reforms envisaged or recommended in Australia.

In the UK and in Singapore, the need for road transport taxation reform has been brought about by the increasing problems related to traffic demand and traffic externalities. Singapore and to a lesser extent the UK are physically very different from Australia (both countries have high population densities over comparatively small geographical areas); nevertheless the comparison is still highly relevant as traffic externalities present in these two countries: pollution, congestion, accidents and destruction of natural habitat are also a hallmark of Australian metropolitan areas. In the UK, taxation reforms affecting road transport were mainly targeted at the taxation of fuel and car ownership while in Singapore, fiscal measures have been combined with other transport management policies as part of a holistic approach aimed at controlling the number of private vehicles and discouraging driving.

5.1.1 The UK: taxation as a road transport policy instrument

Since the 1990s, transport policy in the UK has shifted from enlarging road capacity towards managing demand. The new policy strategy involves the promotion of alternative transport modes such as public transport, walking and cycling coupled with the use of fiscal instruments. Apart from raising revenue, the purpose of taxation of road transport was to discourage growth in car use and promote the purchase of cleaner and more fuel efficient cars.\textsuperscript{129} The four most important road taxation measures were the increase in fuel duties, the use of discounted duty rates for alternative road fuels, the introduction of a differentiated circulation tax: the Vehicle Excise Duty (VED) based on emissions and a reform of the Company Car Tax to reflect vehicle emissions.\textsuperscript{130}

The implementation of higher fuel duties is illustrated by the adoption of the Fuel Duty Escalator (FDE) which was in operation between 1993 and 1998. While this experiment carries evidence of the impact that higher fuel taxes may have on traffic volume, it also demonstrates the intense public opinion hurdle that confronts effective fuel taxation.\textsuperscript{131} The FDE was introduced in 1993 by the Conservative government to replace the existing 10 per cent car purchase tax. It was also part of a general tax reform which included a gradual cut to the income tax rate.\textsuperscript{132} Under the FDE scheme, the fuel duty was to be increased above the rate of inflation by three per cent per annum in 1993/94, four per cent per annum from 1994/95 to 1997/98 and five per cent per annum from 1998/99.\textsuperscript{133} The FDE was abandoned by the Labour government in November 1999 in the face of public discontent over fuel price rises. However this

\textsuperscript{129} Potter and Parkhurst, above n 74, 175.
\textsuperscript{130} Potter and Parkhurst, above n 74, 175.
\textsuperscript{131} Shi-Ling Hsu, above n 85.
\textsuperscript{132} Green Fiscal Commission, above n 61, 27.
\textsuperscript{133} Z Smith, ‘The Petrol Tax Debate’ (The Institute For Fiscal Studies, 2000), 2.
change of policy did not prevent the 2000 fuel protests which were triggered by the rise in oil costs but also focussed on the taxation of fuel.134

The Department of Transport statistics show that during the six years before the introduction of the FDE (1987 to 1993), UK road traffic grew by 18 per cent, while the increase was only 13 per cent for the six years when the tax was in operation (1993-1999).135 Many factors including the strength of the economy affect traffic growth. However, on the basis of fuel demand elasticity studies undertaken in different countries, Potter concludes that the fuel demand in 2000 was likely to be 10 per cent lower than if fuel duty rates had increased at inflation rates.136

The preferential fuel duty rates applying to bio-ethanol and biodiesel have been phased out and from 2010 these types of fuel are taxed at the rate of £0.5619 ($0.8533) applying to unleaded petrol. The duty rate differential for LNG and LPG (currently £0.3413 ($0.518) for LNG and £0.2852 ($0.433) for LPG) has been reduced and will be phased out completely by 2013.137

The CO₂ emission based VED was adopted in 2001. Initially designed with four bands, the VED is currently charged differentially across 13 bands of CO₂ emissions efficiency. The annual tax varies from Nil for vehicles in the A band (up to 100 g CO₂/km) to £950 ($1,442) for petrol and diesel cars in the M band (over 255 g CO₂/km).138

The Company Car Tax is a specific tax that applies to cars purchased by commercial organisations and made available to employees for private use. Until 2002, a flat charge equal to 35 per cent of the vehicle’s value was subject to income tax with discounts for high business travel.139 As in Australia, this taxation method had the perverse effect of encouraging employees to drive to reduce their personal tax bill. From 2002, discounts for high business mileage were abolished and the tax charge was linked to the car CO₂ emissions. The current charge varies from 15 per cent for a vehicle emitting 125 g CO₂ per km to 35 per cent for a vehicle emitting 235 g CO₂ per km or more. A supplement of three per cent applies to diesel cars that do not meet European emission standards; on the other hand a reduction of three per cent applies to hybrid fuel cars and a reduction of six per cent to electric only cars.140 A report

136 Potter above n 66, 47.
139 The charge was reduced to 25 per cent if 2,500 business miles were travelled during the year and 15 per cent if 18,000 or more business miles were travelled. HMRC, Report on the evaluation of The Company Car Tax reform: Stage 2 (2006), http://www.hmrc.gov.uk/budget2006/company-car-evaluation.pdf.
The role of taxation in addressing the externalities of road transport on the evaluation of the Company Car Tax reform published in 2006 indicates that the number of company cars had decreased from 1.6 million in 2001 to 1.2 million in 2005. Furthermore, the reduction in CO₂ emissions from cars was estimated to be around 0.3 to 0.5 million tonnes CO₂-e for 2005.\(^\text{141}\)

More recently, the UK government is considering a radical shift of its road taxation policy in the form of a gradual move to a national road pricing system similar to the system envisaged for the Netherlands.\(^\text{142}\) The VED and the fuel duty would be abolished and be replaced by a mileage charge. The mileage charge would vary according to the area where the vehicle travels, which would require the adoption of GPS technology. Alternatively, drivers could be charged a simple distance fee based on the CO₂ efficiency as for the existing VED.\(^\text{143}\)

Overall, it seems that the various fiscal initiatives adopted by the UK government had an effect on the number of private vehicles and transport greenhouse gas emissions. The greenhouse gas emissions report published by the Department of Environment and Climate Change confirms that the decrease in greenhouse gas emissions during the period 2000 to 2008 was more significant for passenger cars than for road transport overall.\(^\text{144}\) It is arguable that the exclusion of road transport from the scope of the Climate Change Levy and the European Emission Trading Scheme represents a missed opportunity to address this growing source of GHG emissions. However, unlike Australia, UK policy initiatives over the last 20 years demonstrate a willingness to integrate the use of taxation instruments into a transport demand management strategy that takes into account environmental issues.

### 5.1.2 Singapore: taxation and traffic demand management

As a tiny island country of 710 km\(^2\) with a population of 4.8 million and nearly 900,000 road vehicles, Singapore is confronted with singular traffic externality problems.\(^\text{145}\) To tackle these problems, the Singaporean government has adopted a holistic approach involving the use of taxation instruments affecting car ownership, road usage and fuel taxation.\(^\text{146}\)

Beside the COE measures implemented to control the overall number of vehicles,\(^\text{147}\) Singapore imposes a number of taxes and registration fees linked to the purchase of the vehicle. These include a 10 per cent import tax, a seven per cent GST on new vehicles as well as a S$140 ($107) fixed registration fee and an Additional Registration

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141 Ibid.
142 Potter and Parkhurst, n 74, 176.
143 Ibid, 176-177.
146 Lin-Heng Lye, above n 68.
147 See Section 3.3 above.
Fee (ARF) based on the value of the vehicle. The ARF is set at a very high rate (varying from 110 to 130 per cent of the value of the vehicle), but rebates of up to 40 per cent of the ARF are available for vehicles using alternative fuel. Also, private owners who decide to de-register their vehicle before the COE expires are given a rebate on the initial ARF paid.\(^{148}\)

In addition to registration fees, all car owners are required to pay an annual road tax without which the vehicle cannot be used. The collection of the road tax is coordinated with the renewal of the vehicle insurance policy. Road tax is charged on the basis of the capacity of the vehicle varying from S$200 ($153) per 6-month period for vehicle with an engine capacity under 600cc to more than S$1,525 ($1,150) for an engine capacity of 3,000 cc and over.\(^{149}\) The road tax for electric vehicles is determined by the kilowatt hour rating specified by the manufacturer. Hybrid cars will be charged a road tax corresponding to the higher rate between the electric car rate and the conventional car rate.\(^{150}\)

Singapore has also implemented one of the most sophisticated and comprehensive road pricing system in the world. The first Area licensing Scheme (ALS) was introduced in 1975 to restrict access to the Central Business District (CBD) to licensed vehicles. The scheme initially applied during peak hours but was extended to the whole day in 1994. The introduction and extension of the ALS had significant favourable effects on traffic volume in the CBD.\(^{151}\) In 1995, Singapore introduced a linear version of the ALS to a section of the Highway system. This road pricing scheme was generalised in 1998 in the form of the Electronic Road Pricing system (ERP). The ERP operates on a pay-as-you-use principle. The ERP uses a dedicated short wave radio system, optical detection and smart card technology to charge motorists every time they pass through a gantry where the system is in operation.\(^{152}\) The price charged at the gantry depends on the location and the time of day. Access in and out of the CBD is typically charged at rates varying from S$2.50 to S$ 3.00 ($1.91 to $2.30) during peak hours. The Transport Authority reviews the traffic conditions on the highways where ERP is used and adjusts pricing rates quarterly.\(^{153}\)

The final fiscal instrument in Singapore’s traffic management panoply is the imposition of a fuel tax of S$0.44 ($0.34) on 97 octane petrol. There is no levy on diesel.

Rigorous traffic management in Singapore was made necessary by local conditions. The result is that Singapore which has a higher GDP per capita than Australia and the US\(^{154}\) has a much lower rate of car ownership (one car for every 5.3 persons,

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\(^{149}\) Lin-Heng Lye, above n 68, 214

\(^{150}\) Land Transport Authority, above n 145.

\(^{151}\) Ling-Heng Lye, above n 68, 220.

\(^{152}\) Ibid.

\(^{153}\) Land Transport Authority, above n 145.

\(^{154}\) IMF 2009.
compared with one for 1.8 persons in Australia). Also, Singapore reported an amount of GHG emissions per capita of 9.2 tonnes CO₂-e in 2008, 1.44 tonnes of which were related to road transport. In comparison for the same year, the road transport related CO₂-e emissions per capita for Australia and the US were 3.08 tonnes and 4.77 tonnes respectively.¹⁵⁵ Admittedly, Singapore is confronted by singular traffic management conditions because of its restricted space. However the Sydney metropolitan area has a similar population over a comparable area. It would then be conceivable to adopt some of the above initiatives such as capping the number of private vehicles and selective road pricing if those measures were accompanied with the promotion of convenient and affordable public transport.

5.2 Tax reform agenda in Australia

Following the defeat of the Howard government in the 2007 election, the new Labor government acting on its election promise to tackle climate change introduced an Emission Trading Scheme (ETS) (Carbon Pollution Reduction Scheme) legislation including measures relating to road transport. Another Labor government tax reform initiative was the establishment of the Review of Australia’s Future Tax System chaired by the Head of Treasury, Ken Henry (Henry Review). The mission of the Henry Review was to examine Australian and State Government taxes, including taxes on road transport, and to make recommendations for reform.¹⁵⁶ These two proposed tax reforms are now examined.

5.2.1 Transport in the proposed Carbon Pollution Reduction scheme

Unlike its EU counterpart, the proposed Carbon Pollution Reduction Scheme (CPRS) covers emissions from transport.¹⁵⁷ According to the White Paper, the inclusion of transport emissions in the Scheme will lead to rises in fuel prices which will in turn encourage users to reduce their demand for fuel and choose alternative modes of transport. It should also contribute to the development of new vehicle technology and fuel alternatives.¹⁵⁸ Treasury modelling quoted by the White Paper indicates that the introduction of a carbon price could potentially reduce total road use fuel consumption by 20 per cent by 2050.¹⁵⁹

¹⁵⁷ The CPRS Bill has been rejected twice by the Australian Senate and at the time of writing (February 2011) it seemed that the minority Labor government would introduce a carbon tax regime to be implemented by 1 July 2012. However the details of the proposed legislation have not been made public.
¹⁵⁹ Ibid, 6-12.
The scheme obligations would apply to the transport energy sector at appropriate points upstream from the final users. An administrative mechanism known as “netting out” would ensure that there is no double counting of emissions. The way the “netting out” system would work is illustrated by the diagram in Figure 2. Entities such as oil refiners or large transport users would apply to the regulator for an Obligation Transfer Number (OTN). The entity would quote its OTN to the upstream supplier when purchasing fuel, the upstream supplier would report volumes of fuel supplied to entities that have quoted an OTN and would only be liable for emissions from combustion of fuels supplied to entities that have not quoted an OTN and any direct production emissions. Entities would also report volumes of fuel supplied to them under the OTN and directly manage permit liabilities associated with the use of this fuel after netting out fuel supplied to other OTN holders.160

As a transitional measure, the government would reduce the fuel excise on a cent for cent basis to offset the impact on fuel price associated with the introduction of the scheme. As different types of fuels emit different quantities of carbon, their prices would increase according to the volume of their carbon emissions. However, to minimise compliance costs, the fuel excise reduction will be based on the increase of the most polluting fuel (diesel). As the majority of motorists use petrol and not diesel, the fuel excise reduction would therefore be more than “cent for cent”. Where there is currently no “fuel tax” as in the case of off-road usage in agriculture and fishing industries, users would receive a new CPRS tax credit equivalent to the fuel

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161 Ibid, 17-16.
tax cut. Similarly heavy on-road vehicle users would benefit from the CPRS tax credit before application of the road user charge.162

The inclusion of transport emissions in the scheme addresses the GHG externality but this would theoretically result in an impact of five cents per litre of fuel, which is negligible considering the low elasticity of fuel prices.163 Moreover, environmental groups argue that the inclusion of transport in the CPRS would be effectively negated by the proposed fuel tax reduction as this removes any price incentive for behavioural change.164 The Australian Conservation Foundation works out that based on a $20 per tonne carbon price, the proposed fuel tax reduction would result in a subsidy of 0.8 cent per litre for petrol users.165 The government’s response to this criticism is that the aim of this particular measure is to give households and businesses time to adjust to the impact of carbon pricing on fuel prices. It must be noted however, that the draft legislation does not include any sunset clause for phasing out fuel tax credits.

5.2.2 Recommendations of the Henry Tax Review

The Henry Tax Review makes an explicit reference to the increasing fragility of Australia’s natural environment and the fact that increasing population and continued economic growth will put further pressure on those fragile ecosystems.166 It also explicitly acknowledges the role that tax policy can play in influencing environmental policy outcomes, and takes the view that the current road transport tax arrangements will not help address Australia future’s transport challenges, mainly because various taxes imposed by the states and the Federal government do not lead to the most efficient usage of roads.167 The Henry Review advocates a mix of general taxation and user charging measures and makes four key recommendations for reform of the current road taxation regime.168

Firstly, governments should extend the road pricing technology across all heavily congested parts of the road network. Beyond that, as new technologies become more effective a wider application of road pricing applying to all vehicles should be envisaged.169 Secondly, mass-distance-location pricing for heavy vehicles should be developed to ensure that heavy vehicles pay for their specific marginal road wear costs. Where road freight is in direct competition with rail, heavy road vehicles should be charged an additional charge to reflect the fact that rail freight is required to recover

162 Ibid, 17-17.
163 Clarke and Prentice, above n 92, 401.
165 Ibid.
166 Henry above n 47, 9.
167 Henry, above n 47, 10.
168 Henry, above n 47, 92.
169 Ibid.
its capital costs. Thirdly, revenue from fuel taxation imposed for revenue purposes should be replaced by broad taxes linked to the cost of efficiently financing the road network, less the amount charged to users through road pricing. Fuel taxation should apply to all types of fuel on the basis of energy content and be indexed to the Consumer Price Index (CPI). Heavy road vehicles that are charged full user costs should be exempt from fuel tax. Fourthly, all taxes raised by state governments on motor vehicles should over time only be used to recover the costs related to road provisions.

The general thrust of these recommendations is that over time, road user charges should replace the fuel excise and fixed charges affecting road transport, such as stamp duty, registration and car luxury tax. This is consistent with the overall approach adopted by the Review which is that taxes aimed at correcting externalities and market failures should not be used to raise general revenue. This also echoes the general shift towards national road pricing proposed in the UK in other Northern European countries. These propositions should be evaluated with regards to their potential effectiveness in internalizing the costs of the various transport externalities identified in Section 2 of this paper.

The GHG externality would be partly addressed if carbon was taxed upstream by an ETS, however in the absence of such a scheme, fuel taxation is well suited for taxing greenhouse gases as its impact is not dependent on local conditions. However, while it is proposed to tax fuel on the basis of energy content, there is no suggestion of linking other forms of car taxation (for instance the Car Fringe Benefit tax) to environmental performance criteria such as vehicle emissions. Submissions recommending the phasing out of most elements of the fuel credit schemes, including the tax credits for on-road transport and off-road mining, which may act as a disincentive to reduce car usage were not taken on board by the Review.

There is definitely a strong case for using road charges to address urban externalities such as traffic congestion. Since comprehensive road pricing may be impractical and too costly to implement, the best solution may be to introduce incremental road pricing schemes in the most congested urban areas. Previous studies suggest that at this stage distance based pricing on interurban roads may be un-economic and that congestion costs there may be better captured by existing fuel taxes.

The costs of other local externalities such as air pollution and noise are not well captured by fuel taxes or road charges because they are related to the age and type of...
the vehicle and they tend to be higher in specific areas. Clarke and Prentice argue that regulation is probably better adapted to tackle this type of externalities.178

The external costs of traffic accidents could represent as much as 40 per cent of all road transport externalities. While Pigovian taxes based on distance travelled or fuel might capture some of these costs, the risk of traffic accidents is also related to personal characteristics such as age and gender of the driver.179 In view of this, a fixed charge attached to the registration may be the best way to internalise these costs. In their submission to the Review, Clarke and Practice suggested that distance related insurance premiums would link the marginal cost of driving with distance travelled and would provide people with an incentive to cut insurance costs by driving less.180 Unfortunately, this recommendation was not taken up by the Review.

Overall, the proposed reform agenda for road transport taxation in the Henry Review appears to focus primarily on cost recovery and internalisation of road wear costs and fiscal issues, and falls short of measures that would really address environmental and social issues. Admittedly unlike the UK and Singapore, the division of legislative power between federal and state governments in Australia represents a major hurdle to a holistic approach on transport demand management.

6 Conclusion

This paper reviewed the literature on transport externalities and provided evidence that the externalities of road transport may be significant. These externalities are likely to grow further in Australia in the next few decades due to the projected increase in traffic volume. Prima facie, road transport appears to be highly taxed in Australia, but in comparison to other jurisdictions, such as the EU countries or Singapore, the tax burden on road users is relatively low. More significantly, the current Australian tax measures have not been designed with the purpose of tackling road transport externalities; moreover the availability of fuel credits and the Fringe Benefits Tax regime may actually represent a disincentive to reduce car usage. While the proposed Australian ETS would internalize some of the external costs of GHG emissions, the recommendations of the Henry Review may not be the appropriate response to tackle local externalities such as traffic accidents, urban pollution and urban congestion.

The recent report published by the Green Fiscal Commission in the UK makes the case for a bold green fiscal reform which would include road transport taxes. Based on evidence from different EU countries, the Commission recommends the control of transport externalities through a mixture of tax measures applying to the purchase, ownership and usage of the vehicle.181 Regardless of the strong economic arguments supporting the use of environmental taxes, two main hurdles make their

178 Ibid, 408.
179 Ibid, 405.
180 Clarke and Prentice, above n 8, 56.
181 Green Fiscal Commission, above n 61, 32.
The role of taxation in addressing the externalities of road transport. The first is the potential distributional effect of such taxes and the second is the psychological barrier to fuel taxation.

There is some evidence that environmentally related taxation could have some undesirable distribution effects. Specific taxes such as fuel taxation may actually be progressive as high income households will tend to purchase bigger cars and consume more private travel. On the other hand, rural households may suffer disproportionately from higher taxes on road usage because of their high demand for travel and the non-availability of public transport. This argument is particularly relevant to Australia where distances in the bush can be considerable. In addition, high fuel taxes may have indirect distributional effects by increasing the costs of prime necessity goods and therefore disproportionately affecting low income households in isolated communities.

There are corrective measures than can be adopted to mitigate these effects. These measures include reduced tax rates for specific segments of the population (for example reduced fuel taxes in rural areas) or ex-post compensation. The main problem with these types of corrective measures is that they are very difficult to administer, lead to tax complexity and potentially offer avenues for tax evasion and avoidance. A third type of corrective measure is to incorporate a reform of road transport taxation in a general tax shift where the taxation burden is shifted from economic “goods” such as labour to environmental “bads”. Such a tax shift is generally described in the literature as Environmental Tax Reform (ETR). A major argument advanced by ETR advocates is the double dividend argument which posits that as tax revenues from environmental taxes can be used to cut other taxes, this can generate a second dividend (in addition to the environmental dividend) by reducing the distortion due to other taxes. However, the reduction in other taxes (payroll tax and income tax for example) will have to be targeted towards low income households to eliminate any regressive effects.

“Tax fatigue” is widespread in the general public and has been exploited by various political groups in the US but also in Australia and Canada to generate opposition to environmental taxes. Some of the resistance to environmental taxation is linked to the popular suspicion that government will “waste” the proceeds from those taxes. In addition, there are concerns from particular groups or industries that they will...
be unfairly affected by the new tax.\(^{188}\) According to Shi-Ling Hsu, this pathological opposition to fuel taxation may be attributed to the reluctance that people have to part with objects within their possession.\(^{189}\) This phenomenon is particularly significant in the case of petrol because every driver will be aware of the impact of the tax by paying a higher price at the bowser while there is uncertainty about whether environmental benefits will actually result.\(^{190}\) This aversion to fuel taxation seems to be supported by the results of polling conducted in the UK in 2006 and 2007 where about two thirds of respondents were opposed to higher fuel duties even if the proceeds were used to reduce public transport prices.\(^{191}\) There seems to be similar problems with the acceptability of road pricing, in particular with high road user fees. However, researchers in the Netherlands noted that the level of acceptability was increased when the revenue from road pricing was used to decrease fuel taxes or other car ownership taxes.\(^{192}\)

Experiments conducted in the UK also indicate that public perception about increases of road related taxes changed after deliberative events on the topic of ETR.\(^{193}\) This suggests that an active campaign describing the potential harmful effects of transport externalities and the benefits of environmental tax reform could modify public attitude. The literature on political acceptability has emphasised the importance of acceptance building for the successful implementation strategy of environmental taxes. Better acceptability of the new tax will be achieved by explaining the purpose of the tax and by actively involving stakeholders.\(^{194}\) In the case of road transport taxation, stakeholders include representatives of local councils and citizen groups, environmental groups and representatives of concerned industries. Another important success factor is the gradual implementation of these taxes: the tax is initially introduced at a low rate with a narrow scope and then the scope is widened and rates are increased gradually.\(^{195}\)

In conclusion, there are clear signs that the externalities of road transport in Australia are damaging for the environment and society and that if these externalities are not addressed, the problems are likely to become worse. In spite of the growing evidence, politicians, the public and a large section of the media remain to be convinced of the need for tax reform to address these externalities. Further research is required in the area to support the case for environmental tax reform. More evidence is needed about

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\(^{188}\) Shi-Ling Hsu, above n 85, 334.

\(^{189}\) Ibid, 340.

\(^{190}\) Ibid, 341.

\(^{191}\) Green Fiscal Commission, above n 61, 42.


\(^{193}\) Ibid 44.


\(^{195}\) Ibid, Thalamann and Baranzani.
individual road user behaviour and about how environmental benefits will effectively result from imposing specific tax instruments such as fuel taxation or road charges. More research also needs to be carried out about the most effective way to implement tax reform, including how to redress unwanted distributional effects of a new tax and how to overcome the psychological resistance to new taxes.