Government Policy: The Accidental Effect on Road Safety

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Abstract

This paper reflects on road safety strategy and explores economic aspects which affect road safety. Contemporary road safety policies generally focus on four key issues through the Safe Systems approach. Unlike other transport effects, transport and road safety policy do not estimate future outcomes for road safety. Consequently, these perspectives do not necessarily recognise the broader issues which also influence road safety.

Macroeconomic policy issues which could influence road safety in the long term are discussed, particularly the emissions trading scheme, taxation review, automobile industry review and road pricing. It is argued that government economic policies have the potential to affect road safety, despite reductions which result from other Safe Systems road safety policy.

The participation of advocates in the development of one of the economic policies shows that there is opportunity for greater participation to improve road safety outcomes in such policies. The paper concludes that economic policy has the potential to contribute to improvements in road safety.

Keywords

Transport Policy, Safety, Planning, Economics

Introduction

Modern road safety strategies focus on the key elements of drivers, vehicles, the road environment and speed. Unlike other outcomes, future outcomes for safety in the transport system are unknown. Wider economic policy, outside typical Australian transport or safety policy has the potential to affect transport and hence road safety. Some examples of these are explored with respect to possible effects. An example of the role of advocacy in arguing for safety outcomes in such policies is described. It is concluded that economic policy has the potential for positive safety outcomes, which are not being realised.

Foundations of Road Safety Strategies

The most contemporary road safety strategies adopt the 'Safe System' principles and framework, which has a long history. The foundations for this approach developed over many decades which Guarnieri (1) traced to Gordon (2) who had applied the epidemiological approach which assesses components of injury cause as: host, agent and environment. Importantly, Gordon separated the environment component in three distinct subcomponents; physical, biologic and socio-economic. Subsequently, but apparently independently, a series of papers by Haddon in the 1960's and 70's, resulted in a very useful and widely acknowledged matrix by Haddon (3). One axis of the matrix described three *Phases*: precrash, crash and postcrash. The other axis described four *Factors*: human, vehicles and equipment, physical environment and, socio-economic environment. In addition, Haddon recognised that *Results* occurred to different outcomes: damage to people, vehicles and equipment, physical environment and society.

There are also different versions of this matrix, such as the earlier and often used one developed by Haddon (4) with three columns, one of which is environmental factors. This version arguably makes environmental factors more difficult to define and take account of, because it would need to include the road, other road facilities, land use, the natural environment, the micro and macroeconomic elements, the

socio-economic factors and more. It would appear, perhaps as a consequence, that economic and social factors are not routinely or thoroughly incorporated in contemporary road safety strategies.

The implementation of contemporary Safe Systems approach to road safety, such as the Australian Transport Council (5), generally focuses on four core areas: speed (or more correctly energy), roads and roadsides (or sometimes infrastructure), drivers and vehicles. These elements are valid, but for policy, planning, program delivery and especially research, they are incomplete as described below. While setting valid targets for road safety, these polices generally don't estimate future safety outcomes.

The Safe Systems approach represents a new way of describing much of what has been described before, but include some important guiding principles. Typical safe system strategies, such as Road Safety Council (6), include principles such as:

- focus on reducing deaths and injuries;
- setting challenging and specific targets;
- recognise that drivers make mistakes;
- recognise the limits of the human body to withstand energy;
- creating a forgiving road-transport system;
- safe use of the road system; and
- integration and collaboration between contributing parties and authorities.

Transport systems can be described as being comprised of the fundamental elements of vehicles, infrastructure and users, although these three elements exist within a much larger setting. The fundamental driver of transport demand is the activity on and for land use, and the economy which it facilitates. Besides the four core elements described above which are the typical focus, there are innumerable interventions which individuals, governments and companies can use to affect the transport system and therefore safety. Then there are many more complexities added with community expectations, regulation, funding, three levels of government (four counting international obligations), and so on.

Future Transport System Outcomes

The Bureau of Transport and Regional Economics (7) estimated that between 2010 and 2020 population will increase by 10%, vehicle travel will increase by 18%, road freight by 32%, network delays by 24% and congestion costs by 58% in Australian cities. These increases will occur, even while improvements to roads, public transport and other elements of the system continue. However, there appear to be no estimates of transport safety for the future; fatalities, injuries, crashes or costs.

In terms of transport and health, the Bureau of Transport and Regional Economics (8) estimated that approximately 1500 people die on Australian roads each year, about 31,200 are injured. Many more are adversely affected by the financial, time and other costs of crashes, even if there are no injuries. The Bureau of Transport and Regional Economics (9) also estimated that about 1500 people die due to transport emissions and another 4,500 suffer health effects.

If the cost of road crashes described by the Bureau of Infrastructure Transport and Regional Economics (8) for 2006 is updated by the Consumer Price Index (10), and the economic assessment was based on the willingness to reduce the risk of death (generally called 'Willingness to Pay'), the cost of road crashes in Australia would exceed $30bn per annum. The cost of health effects would be approx $2.3bn. However, there are no estimates of what the death and health effects from the transport might be in future. Gargett et al (11) suggested that if there are no new policies, the fatality rate (deaths per population) in Victoria will stabilise at about 4.3 deaths per billion safety weighted km. If this occurs, the number of fatalities will start to rise, due to population increases, which may be in the order of 1% per annum according to the Bureau of Transport and Regional Economics (7). Accordingly, road safety policy needs to improve the performance of the transport system by 1% every year, just to keep the number of fatalities and injuries at the same level as is occurring at present, all other things being equal.

In the most recent summary of successful workers insurance claims, Safe Work Australia (12) shows that the industry category 'Transport & Storage' is the most dangerous industry in Australia, in terms of the number of deaths, in which 68 deaths occurred, while the next largest group had only 10 fatalities.

Transport and storage also has the highest number (9945) and percentage (7.6%) of total serious claims for any occupation subcategory and the highest fatality incidence rate (15.1 compensated fatalities per 100,000 employees). Furthermore, motor vehicles were the cause of another 30 deaths in other industry sectors. Motor vehicles are recorded as the cause of more deaths than any other means during work in Australia, 42% of work fatalities (98 deaths) in 2007–08. Again, there are no estimates of the safety record expected for the future.

It is implied that limits to the effectiveness of road safety measures exist, including increasing difficulty in introducing new measures, the increasingly smaller scale of benefits of safety measures and the reduced benefits which accrue for a given level of investment. For instance, the cost of road construction and the level of difficulties in introducing new measures both continue to rise (e.g. due to land acquisition cost), while the scale of measures and the benefits which accrue for a given level of investment continue to reduce. Collectively, these influences work to continually lower the benefit cost ratio of policies and programs, making the task of reducing the road toll in quantum (the total number of deaths and injuries) ever harder. For instance, the benefits of regulating for Electronic Stability Control, as opposed to relying on natural market take up, is estimated by the Department of Infrastructure, Transport, Regional Development and Local Government (13) to be worth $139m and a saving of 128 lives over a thirty year period. While this benefit is no doubt worthwhile, it's not a substantial reduction.

Infrastructure Australia (14) suggests policies for Australia's transport future including: "*A national rail freight network development of our rail networks so that more freight can be moved by rail.*" and "*Transforming our cities increasing public transport capacity in our cities and making better use of existing transport infrastructure."* However, this report does not propose any policy or principle to improve safety directly. In fact, virtually all the references to safety in this report, seven in all, refer to reducing the cost of regulation, which is an economic issue.

The result of the trends and influences suggest that transport demand will increase and so will consequences to an even greater degree. Expected future transport demands and transport system performance have the potential to result in higher road trauma consequences, despite reductions which result from specific road safety interventions. However, the future of the transport system in terms of safety outcomes is unknown. While a certain amount about future transport outcomes are known (or at least estimated), a considerable amount is also unknown, particularly safety. Consequently, there is a substantial gap between the information about future transport outcomes and the consequences of policy to achieve the desired objectives.

Economic Policy, the Transport System and Road Safety

Economic policies affect pricing, funding supply and demand for transport components and their use, and other financial aspects. Policies which increase the cost of transport decrease the amount of transport. From a reading of available transport policy and strategy, it would appear that there is generally very little content which relates to external macroeconomic issues, especially in road safety.

Economic policy is not restricted to financial elements, but can include regulation, behaviour change (information, awareness and encouragement), and other actions. Transport policy can also be regarded as an element of economic policy, or vice versa, depending on whether the prime area of interest is economics or transport. Such policy can affect the cost of cars, the use of roads, safety equipment, fuel, driver competence and much more. So, both economic policy and transport policy can affect all of the elements of the transport system and therefore road safety.

Reflecting on both the early concepts and contemporary road safety strategies, questions arises about the significance of economic and social influences and factors. Often these elements have limited recognition as 'socio-economic' determinants, such as in the World Health Organisation (15) which states "*Social processes often lead to poorer health in less affluent people*." despite such factors being much broader than people's level of wealth. At other times, the economic factor is reduced to microeconomic benefit-cost analysis as described in the Australian Transport Council guidelines (16). Such analysis is at least both limited and inaccurate as stated in the guidelines, being subject to criticism as de Blaeij et al (17) and Hendrie (18) described with regard to the valuations of life.

Another effect occurs when a change occurs to a complementary or competitive mode. In introducing the Carbon Pollution Reduction Scheme Green Paper (an emissions trading scheme), the Department for Climate Change (19) describes changes which can occur to transport supply or demand, which result in small or large effects. Financial transactions can also affect transport. For instance, a charge on levied on cars can generate funds which are allocated to public transport, changing the price of both modes.

There are many economic influences outside the transport system which have the potential to affect road safety but take little account of the transport consequences. There is also little translation of transport safety issues to economic and other objectives, principles and policies, outside transport policy. The following examples describe recent Australian economic policies and their relevance to road safety.

Emissions Trading Schemes

There has been an enormous amount of science and policy written about climate change, and probably at least as much expressed as personal opinions. The issue rests on four key positions; climate change is occurring, change is due to greenhouse gas emissions, increases in emissions are caused by human activity, and the size of the change is large enough to cause substantial detrimental effect. If these points are true then it is appropriate for policy to be developed to manage responses to the consequences to an acceptable level. The two key responses are to reduce greenhouse gas emissions (mitigation) and to change systems to work within the new climate (adaptation).

In 2008, the Australian Government's principal policy response to climate change relied heavily on an emissions trading scheme so recent Australian Government policy development with respect to climate change includes reports by the Department of Climate Change (19) and the Australian Government (20). The government was also informed by numerous reports, papers, advice, submissions, and discussions which are too extensive to report here. There is some small recognition in these reports of the effect of these polices on transport. In fact, the understated theme is that transport is critically important to climate change. While the government response virtually exempts transport, Garnaut (21) clearly identifies the need for government economic policy with respect to oil price, emissions price, population, urban planning, rail, and public transport, especially to achieve modal shift.

In general, it would appear that the Australian Government position is typical of responses by other national governments:

- the effect of climate change on transport systems has not been assessed;
- the effect of climate change policy on transport systems has been only assessed to a limited degree;
- the potential for land use and transport (especially mode change) has been poorly accounted for in climate change policy or not at all (e.g. not in the European Union scheme).

Some exceptions exist, including the analyses of impacts by the Transportation Research Board (22), but they are rare and only represent a partial response to climate change and transport effects.

If it is accepted that transport will be affected by climate change policy, then it follows that transport safety will also be affected. The principle of emission trading schemes is that a price on carbon will reduce emissions by encouraging moves to more carbon efficient usage and reductions in demand. For transport this means travelling less and using more efficient modes of transport.

It is normally accepted that transport safety consequences are related to the amount of travel (sometimes called 'exposure'), as Gargett et al (11) used, as well as many others. This is so much a part of transport safety that rates (e.g. fatalities per million vehicle kilometre travelled) are used as a fundamental measure and exposure is implicitly accepted. Therefore, if an emission trading scheme is introduced which reduces travel, then the number of crashes, fatalities and injuries will reduce, thereby reducing the safety consequences, including cost.

An emissions trading scheme can have similar, but importantly diverse effects regarding the mode of travel. If the scheme increases the price of one mode of travel (e.g. by cars), the demand for travel will move from one mode to another (e.g. to public transport), depending on the relative cost differentials. Consequently, the exposure (and hence crashes) in one mode will reduce, but exposure (and again the number of crashes) in the other mode will increase. These changes are unlikely to be equal, since neither the shift from one mode to another, nor the relative safety of the two modes, are likely to be the same.

The total system consequences of these effects can be complex. For instance, if the price of transport fuel increases:

- smaller, more fuel efficient vehicles could be used which may have different safety ratings;
- there may be more two wheeled motorised vehicle use, which is less safe than in the vehicles being vacated;
- people can travel less, by shortening trips, combining trips or a whole variety of other trip modification;
- people can change to bus transport which will reduce the road toll due to superior safety performance;
- freight and passengers can transfer to rail transport which will reduce the road toll since it is no longer road transport and total transport system safety will improve due to rail's safety advantage.

No emissions trading scheme or climate change policy has been found which assesses any of these safety effects.

Industry Policy

The Review of the Australian Automobile Industry (RAAI) (23) was announced in February 2008. A discussion paper was released in March 2008, the Final Report in August and the Government's response in November 2008. Following the Discussion Paper there were 123 submissions which were posted on the Review website, although there are 133 listed in the RAAI Final Report.

Safety was not specified as an issue for the review, although it could have been included in a general reading of the scope, such as the sector's strengths and weaknesses, and future developments. There was however, a small section covering safety in the discussion paper. In the section on safety, the RAAI Final Report noted consumer and government demand for increased safety and government policy to harmonise safety standards. Notwithstanding the omission of safety as a specific issue, several of the submissions, including some from governments, raised the issue.

Vehicle policy offers many opportunities to improve road safety. Australian vehicle safety policy relies heavily on Australian Design Rules which are a powerful regulatory mechanism but not the only policy tool available. Various incentives can be given to manufacturers such as subsidies, or tax breaks for safety components or for manufacturing safety equipment. Industry subsidies for manufacturers, a key theme of the report as a whole, could be restricted to vehicles with higher safety features or crashworthiness, as they were for 'green' cars. Imported vehicles with lower crashworthiness or fewer safety features can have higher import duties imposed.

The RAAI Final Report (23) noted that a variety of vehicle safety issues, such as vehicle inspections and safety in older vehicles. Market issues can occur if Australian standards were out of step with international standards. ANCAP crash ratings were recognised with the implication that ANCAP labelling was acceptable as long as levels of crashworthiness were not mandatory.

The RAAI Final Report (23) concluded with seven key recommendations, predominantly regarding financial issues, industry assistance, subsidies and benefits from taxation and import costs. Conclusions regarding safety were limited to adhering to Australian Design Rules, standards uniformity and consistency with international obligations, which offer no incentive or requirement for manufacturers or consumers to improve vehicle safety. The RAAI objectives, content and outcomes contrast with the UK King Review of Low Carbon Cars (24) which considered safety as an integral component throughout, although in conclusion, even the King review made only one recommendation regarding safety.

Taxation Policy

An extensive review of the Australia taxation and transfer system was completed by the Australian Treasury (25) in December 2009 and released in May 2010, together with the Government's response. The review included conferences, discussion papers, research and two rounds of public consultation which generated over 1500 submissions. Due to the extent of the review, its process, content analysis and outcomes are much too expansive to summarise here. However one issue of detail, Fringe Benefits Tax (FBT), is described to illustrate the potential of taxation policy to improve safety.

The main themes of the review with respect to transport, were system efficiency, administrative efficiency and effectiveness of transport charges particularly road pricing. The review noted that safety,

like many other social effects are managed by 'non-tax policy tools' such as regulation and standards, or alternatively by charges, such as an emissions trading scheme.

According to Australian Treasury (26), FBT refers to "*Benefits received by employees from their employer in respect of employment that are in a different form to salary and wages, such as the use of a car for private purposes.*" Based on submissions, the Consultation Paper noted the link between FBT and both transport demand and therefore consequences: "*Many submissions raise the concern that the system of transport taxes distorts consumer decisions between public and private transport, as well as between road, rail and air travel.*"

Based on the RAAI Final Report it was noted that FBT on motor vehicles reduces with the amount of use (distance travelled). This reduction occurs at three thresholds (15,000km, 25,000km and 40,000km) at which point the FBT rate reduces stepwise. As a consequence it has been argued that FBT provides an incentive to drive further, although the main objections are environmental and in support of public transport. Figure 1, adapted from the RAAI (23), illustrates that some vehicles travel excess kilometres compared with what would be expected without an FBT. The consequences of the FBT incentive include encouragement to drive further and people are encouraged to drive in private cars instead of public transport or by other safer modes of transport, both of which increase crashes.

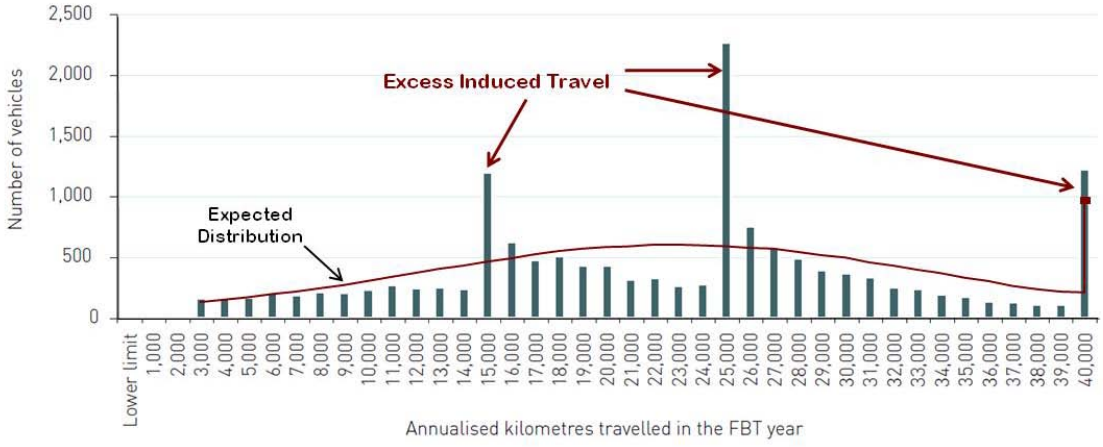

Figure 1: Vehicle Kilometres Travelled for Fringe Benefits Reporting Purposes.

In addition to FBT, there is the potential for many other taxation instruments to improve safety. As for vehicle policy discussed above, taxation policy offers many opportunities to improve road safety. These include incentives to use safer modes of travel, subsidies for safety features in vehicles, reduced costs for lower powered vehicles or those with higher crashworthiness, reduced road charges for safer travel, or tax reductions for manufacturing of safety components for manufacturers.

The taxation review by Australian Treasury (25) only recommended changes which would have reduced road transport demand and increased the amount of travel by public transport: "*The current formula for valuing car fringe benefits should be replaced with a single statutory rate of 20 per cent, regardless of the kilometres travelled.*" These changes would have reduced road trauma, however the extent that road safety would have improved is not known. The Government did not accept the recommendation.

Road Pricing and Charging Schemes

There are a wide variety of ways to charge for road use by pricing and charging mechanisms, as the Australian Transport Council (27) describes, including:

- cordon pricing (e.g. London and Singapore);
- registration charges;
- use charges (e.g. New Zealand's hub odometer system and log books for trucks);
- fuel charges (including Australia's truck charging); and
- parking charges (usage fees and charges for parking spaces).

Road user charging is a complex issue. Costs are attributable to different types of vehicles, times of day, road types, locations and externalities, amongst other things and there are many vagaries and inaccuracies. Road charges affect the cost of using roads and therefore the amount of vehicle use. If the amount of vehicle use reduces, then it would be expected that reductions in road crashes would follow.

For instance, if road charges are sufficiently high or more transparent, it could be expected that some travel would no longer occur, some car travel would transfer to buses, and some transport would transfer to trains. All these changes would be expected to lower the road toll. The last of these changes results in an increase in safety consequences in another mode, but lower transport system safety consequences as a whole due to rail's superior safety performance over road transport.

Hughes (28) describes that transfers of revenue from one source can be used to fund other outcomes, sometimes complementary. The Perth Parking Policy enables the collection of funds generated from licensing parking spaces in the Perth CBD which is applied to provide the Central Area Transit (CAT) bus service for free travel around the CBD. The users of the parking are often users of the CAT bus. Another example is the London cordon pricing scheme being used to fund public transport improvements.

New road user charging systems and other pricing mechanisms which can change travel are on several international agendas, including Australia. Therefore there are currently opportunities for safety improvements to occur as a result.

Industry Participation and Advocacy for Road Safety

Returning to the RAAI illustrates the participation of road safety advocates. Respondents to the RAAI did not demonstrate that safety was a priority, although this is mitigated to some degree by the omission of safety specifically in the terms of reference, background paper and questions to respond to. Of the 123 submissions publicly available, summarised in Table 1, only a handful mentioned safety and the largest number were from the automobile industry. None of the submissions were from road safety authorities, agencies, research institutions or entities with a predominant focus on safety. While the responses are probably as expected, there is no reason why road safety could not have been more strongly advocated.

Table 1: Summary of responses to the Review of the Australian Automobile Industry.

Submission No. and % of sector (row)	**Road safety is a major issue** (e.g. more than 20% of submission, full chapter or section, or at least 1 page with position and argument)	**Road safety is a minor issue** (e.g. full paragraph, or position and argument stated)	**Road safety is peripheral** (mentioned, but not discussed at all)	**Road safety is not mentioned** (not mentioned)	**Total** (including submissions not published)
Government	**-**	**1** 17%	**2** 33%	**3** 50%	**7**
Automobile Industry	**3** 8%	**1** 3%	**16** 44%	**16** 44%	**42**
Private	**5** 16%	**3** 10%	**2** 6%	**21** 68%	**41**
Association	**4** 18%	**2** 9%	**5** 23%	**11** 50%	**22**
Other	**3** 15%	**1** 5%	**6** 30%	**10** 50%	**21**
Total	**15**	**8**	**31**	**61**	

Notes: Respondents were not asked to respond regarding safety. 18 submissions were not published.

These submissions demonstrate that road safety is not generally regarded as an important issue by governments or industry involved in automobile manufacture in Australia. Road safety is regarded much more highly by others in the community. Advocacy groups representing general business and occupational safety did not generally participate. Unfortunately, road safety seems to be regarded as a transport problem, which is only partly true. In fact, it is a serious business problem, possibly the largest workplace safety issue based on data from Safe Work Australia (12). Sadly, the lack of participation in the RAAI by business suggests that road safety is being ignored as a workplace safety issue.

Potential for Economic Policy Contributions to Road Safety

The examples above illustrate that outcomes from economic policy have the potential to reduce travel demand, encourage one mode of transport over another, discourage particular vehicles and encourage safer vehicles. For instance, if transport policy affected transport in this way there could be potential for changes such as:

- reduced travel (trips not taken);
- travel substituted by teleworking, telecommunications, or working from home;
- trips reduced by multiuse (i.e. amalgamating purposes into a single trip);
- trips reduced by trip chaining (i.e. several trips joined into a single journey);
- car travel transferred to rail or bus public transport;
- trip lengths reduced by accessing closer facilities (e.g. shopping centres).

If each of these changes individually resulted in a 5% change in travel, the result would be a 26% reduction in road travel and therefore a 26% reduction in road trauma! At the same time, congestion in cities would be dramatically reduced, and in some cases eliminated for the medium term future. Such changes are likely to be more applicable to urban areas, although changes in rural and remote areas would also be valuable. If the average change for the transport system as a whole was 15%, approximately 225 lives would be saved and 4500 injuries would not occur, resulting in an economic saving of approximately $4.4bn per annum. Other substantial benefits would accrue to the health sector and reduced economic costs of transport and infrastructure provision. On a pro rata basis from data published by BITRE (9), reduced transport emissions could result in the saving of 475 lives and 1125 health cases per annum, representing a saving of another $700m per annum.

Seethaler and Rose (29) show these changes are achievable by travel behaviour modifications schemes. Economic incentives as described above, service improvements, and many other mechanisms are also valid to encouraging behaviour change by altering transport supply, prices, costs, transactions and quality.

Conclusion

Based on the principles and examples described in this paper, government policy and the future transport system’s demands and performance have the potential to result in higher road trauma consequences, despite reductions which result from specific road safety interventions. However, the road safety consequences of fatalities, injuries and crashes are not described for the future or by policy outcomes.

While economic policy can affect transport safety, such considerations are generally not advocated in key recent Australian economic policy development, which do not describe transport safety consequences or potential benefits. Therefore, economic policy offers the opportunity to reduce road trauma.

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