ELSEVIER

Accident Analysis and Prevention 38 (2006) 1087–1093

ACCIDENT ANALYSIS & PREVENTION

www.elsevier.com/locate/aap

The economic costs of road traffic crashes: Australia, states and territories

Luke B. Connelly *, Richard Supangan

Australian Centre for Economic Research on Health (ACERH) and Centre of National Research on Disability and Rehabilitation Medicine (CONROD), The University of Queensland, Mayne Medical School, Herston, Qld 4006, Australia

Received 2 November 2005; received in revised form 8 December 2005; accepted 8 April 2006

Abstract

In this paper, we obtain detailed data on road traffic crash (RTC) casualties, by severity, for each of the eight state and territory jurisdictions for Australia and use these to estimate and compare the economic impact of RTCs across these regions. We show that the annual cost of RTCs in Australia, in 2003, was approximately $17b, which is approximately 2.3% of the Gross Domestic Product (GDP). Importantly, though, there is remarkable intra-national variation in the incident rates of RTCs in Australia and costs range from approximately 0.62 to 3.63% of Gross State Product (GSP). The paper makes two fundamental contributions: (i) it provides a detailed breakdown of estimated RTC casualties, by state and territory regions in Australia, and (ii) it presents the first sub-national breakdown of RTC costs for Australia. We trust that these contributions will assist policy-makers to understand sub-national variations in the road toll better and will encourage further research on the causes of the marked differences between RTC outcomes across the states and territories of Australia.

Keywords: Australia; Economic cost; Road traffic crashes; States and territories

1. Introduction

This paper is concerned with the economic costs imposed by road traffic crashes (RTCs) in Australia and, in particular, their distribution across the eight Australian states and territories. The paper is motivated, at a fundamental level, by two obvious lacunae in the Australian literature on RTCs. First, although recent national data on RTC fatalities are readily available (e.g., via the International Road Traffic and Accident Database (IRTAD)), data on non-fatal RTC casualties, even at the national level, are not. Second, although the Bureau of Transport Economics (BTE, 2000) has estimated of the annual national cost of RTCs as at 1996, no state- and territory-level disaggregation of RTC costs exists. In this paper, we bridge these gaps using 2003 RTC data disaggregated by casualty type, and obtained from each of the eight Australian jurisdictions. We use these data to estimate the distribution of RTC costs across these eight regions of Australia using the BTE (2000) approach, with Consumer Price Index (CPI) adjustment. In addition we quantify the economic burden on each jurisdiction as a proportion of that region's Gross State Product (GSP), i.e. as a proportion of the total market value of all final goods and services produced by each state and territory in the 2003 calendar year. Thus, our work contributes to the literature by bridging the gap between national (Andreassen, 1992; BTE, 2000) and single-state estimates (Giles, 1990; Hendrie and Rosman, 1994) of the impact of RTCs in Australia.

There are several reasons to be interested about how RTC casualties and costs are distributed across regional space. First, and most obviously, national statistical aggregates can mask important intra-national variations in RTC activity. In fact, in this paper, we demonstrate that the casualty distributions and costs vary quite remarkably between the Australian jurisdictions. Second, the readily available data on fatalities are imperfect proxies—even at the national level—for the real costs imposed by RTCs. This is especially true because the available time-series data on non-fatal crashes show that hospitalisations due to RTCs, for example, have increased quite substantially in recent years (see, e.g., Queensland Transport, 2003) even though fatalities have either fallen or, more recently, plateaued. A consideration of sub-national trends in fatal and non-fatal RTCs may provide some basic insights into not only the comparative success of each jurisdiction in reducing the total costs of RTCs, but also the extent to which secondary prevention has led to a reduction in deaths but, perhaps, a concomitant increase in the number or proportion of non-fatal crashes. Third, and following from

* Corresponding author. Tel.: +61 7 3346 4838; fax: +61 7 3346 4603.
E-mail address: l.connelly@uq.edu.au (L.B. Connelly).

0001-4575/$ – see front matter © 2006 Elsevier Ltd. All rights reserved.
doi:10.1016/j.aap.2006.04.015

the preceding points, information about the spatial distribution of RTC trauma and costs may provide policy-relevant insights about an appropriate national approach to further attempts to ameliorate RTC costs.

There are several obvious limitations to the work we present here. One is that the results depend, by necessity, on state- and territory-level aggregates. The second limitation is that the data at our disposal do not permit, at this point, a detailed analysis of the causal factors that explain the substantial variations that exist. The attendant problems are that, although there are obvious differences in geography, population density, road traffic conditions, and so on, between the states and territories, these clearly are not perfectly distinguished by the geographic state-territory boundaries. The final and most important caveat concerns the policy use to which these results may reasonably be put. The relative costs of RTCs in the states and territories of Australia are not, in and of, the relevant criteria upon which to base decisions on the distribution of resources (e.g., of the distribution of preventive expenditures across the states and territories). From an economic point of view, it is the estimated marginal costs and benefits of the available interventions, in each state and territory that is the pertinent consideration. So, in this sense, the total burden imposed by RTCs in a given state or territory does not provide any definitive answer to the critical question of how resources ought to be distributed across the states and territories.[1] Thus, the results presented here would need to be combined with information about causal factors, and the levels of intervention in each jurisdiction, in order to produce clear policy conclusions.

Notwithstanding the foregoing limitations, this work sheds new light on a substantial gap in the existing literature. Our results for the states and territories of Australia reveal that there are indeed remarkable differences in the profiles of RTC costs between these regions. The differences that are rendered transparent in this paper raise a number of research questions and policy issues that, we hope, will stimulate discussion and further research.

The work we present shows that, in 2003, the annual cost of RTCs to Australia was more than $17 billion per annum, or approximately 2.3% of the Gross Domestic Product (GDP). This finding accords with those of the recent international reviews of the costs of RTCs in developed countries (Elvik, 2000; Jacobs et al., 2000) in which the mean costs of RTCs have commonly been found to be of the order of 2–3% of GDP. It also shows that there is substantial variation in the state- and territory-level casualties and costs due to RTCs. Indeed, our cost estimates fall within a range of approximately 0.62–3.63% of GSP. Our work is presented as follows: Section 2 commences with a brief discussion of the conceptual basis of economic costing exercises; Section 3 presents our methods and results and Section 4 concludes.

2. Empirical approaches for estimating the cost of RTCs

Estimates of the costs of RTCs vary considerably between and within countries, for several reasons. In this section of the paper, we provide an overview of some of the most important of these reasons, with a view to characterising the BTE methods to be employed in this paper. Given our purpose, our treatment of the key theoretical and methodological issues is not encyclopaedic; rather, it illuminates some key points of disagreement in the unresolved debate on computing the costs of RTCs to provide a context within which our methods and results may be considered.

The most obvious source of variation in the published cost estimates of RTCs is attributable to real differences in the frequency, distribution, severity, and so on, of RTCs. In addition to this 'true' source of variation, though, estimates vary due to differences in measurement, or measurement error. These two sources of difference in cost estimates are not necessarily the same. Specifically, disagreement about precisely what opportunity costs are imposed by RTCs will lead to divergent cost estimates of RTCs, even if the conceptual cost items are measured without error. Conversely, when there is agreement about those cost concepts that are to be measured, but those costs are measured with error, the resulting cost estimates may diverge. Both types of measurement problems affect the literature on RTCs.

Broadly, economic approaches to computing the costs of RTCs can be viewed as applications of conventional welfare economics (see, e.g., Cullis and Jones, 1998). Although the parlance of "perspectives" (e.g., a "consumer perspective" or a "government perspective") around such exercises is now commonplace, a full economic evaluation takes account of all of the costs and benefits that are associated with the phenomenon of interest "to whomsoever they may accrue" (Mishan, 1988).[2] This approach extends to those costs and consequences (e.g., reductions in the quality and quantity of life) to which no market value is commonly attached.[3]

While, in the spirit of welfare economics, economists generally agree that all of the opportunity costs due to RTCs are relevant in a cost computation exercise, there is no consensus about the appropriate approach for computing RTC costs (Alfaro et al., 1994; Elvik, 2000). The most controversial questions pertain to the problems of computing lost productivity and the lost quality of life. Several approaches, with different conceptual bases, exist. Although it is beyond the scope of this paper to provide a detailed account of them, it is useful to outline some of the central issues, since these are important sources of variation in the existing literature.

First, in relation to the productivity losses caused by RTCs one of two general approaches is typically employed: the human capital approach (HCA), or the friction cost method (FCM).

[1] While a discussion of the economic debate over so-called "burden of disease" studies is beyond the scope of this paper, interested readers are referred to the discussion between Williams (1999, 2000) and Murray and Lopez (2000), as well as the critique by Mooney and Wiseman (2000).

[2] The latter phrase dates to the US Flood Control Act (1939) (Mishan, 1988).

[3] Traditionally, alternative approaches in which attention is restricted exclusively to market values and financial outlays (or to a particular party's perspective) have been labelled "financial" evaluations.