



Benevolence and the value of road safety

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ABSTRACT

This study uses the contingent valuation method to elicit individuals' preferences for their own and others' safety in road-traffic. Whereas one group is asked about a private safety device for themselves, other groups are asked about safety devices for their children, household, relatives and the public. Support is found for the hypothesis that individuals are not purely selfish when it comes the safety of others.

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1. Introduction

The scarcity of resources forces policy makers to prioritize between policies. To secure an efficient resource allocation benefit–cost analysis (BCA), in which the social benefits of a policy or investment are compared to its costs, is often used. The monetary value of reducing road mortality risk is usually (together with the monetary value of reduced travel time) one of the dominating components of the benefit side in BCA of transport investments and policies.¹ This study examines preferences for safety and in conventional BCA the monetary benefit measure of reducing mortality risk, the value of a statistical life (VSL), is based on the preferences of purely self-interested individuals. In many cases, as pointed out by, e.g., Becker (1976) and Sen (1987), it is clear that people do not act only as self-interested individuals but in a context of social interaction, and if individuals are not purely self-interested but also concerned about the safety of others, it would seem reasonable, and has been argued, that the value of safety should be augmented by an amount that reflects this

altruistic component (Mishan, 1971; Jones-Lee, 1976; Needleman, 1976).

Bergstrom (1982) showed, however, that when individuals can be characterized as pure (or non-paternalistic) altruists, their VSL will be identical to the VSL derived under pure self-interest.² Hence, he showed that it will be inappropriate to include an altruistic component in the VSL, and willingness to pay (WTP) for others' safety should be ignored in BCA.³ Jones-Lee (1991, 1992) extended the analysis and proved that Bergstrom's result is also valid when preferences are purely paternalistic, but when preferences are safety-paternalistic (cares only about the safety argument in the utility function of others) benevolence should be considered in BCA. Since whether VSL should be augmented or not depends on the form of altruism, and the benefits of reducing the risk can be decisive for the outcome of a BCA, it is important not only to study the magnitude of non-selfishness, but also the form it takes.

Several studies have empirically examined individuals' WTP for others' safety (health). For instance, there is empirical evidence

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¹ Persson and Lindqvist (2003) showed for Sweden that approximately half of the benefits to society of road projects can be attributable to increased traffic safety.

² Non-paternalistic preferences require that “each individual respect the tastes of others, no matter what he thinks of them” (Archibald and Donaldson, 1976, p. 494). A pure paternalist, on the other hand, is concerned about others but ignores their preferences.

³ The argument that pure altruistic preferences can be ignored in BCA was generalized in Bergstrom (2006).

which implies that individuals are safety-paternalistic (Vázquez Rodríguez and León, 2004; Jacobsson et al., 2007; Holmes, 1990). Moreover, Liu et al. (2000), Dickie and Messman (2004) and Chanel and Luchini (2005) found that mothers and parents were willing to pay more for the safety of their children than for their own safety, Dickie and Gerking (2007) that parents were paternalistic altruists towards their children, and Bateman and Brouwer (2006) and Chanel and Luchini (2005) that WTP for the entire household is larger than individual WTP.⁴ However, Leung and Guria (2006) found the opposite for household WTP, with single household having the highest WTP and inconclusive results regarding WTP for child safety. It also seems that most of the empirical evidence shows that individuals are not prepared to pay as much for a public safety measure as for a private measure, even though there is also evidence of the opposite (Viscusi et al., 1988; Johannesson et al., 1996; Araña and León, 2002; de Blaeij et al., 2003; Hultkrantz et al., 2006). Hence, the overall evidence regarding altruism seems inconclusive.

The aim of this study is to further contribute to the empirical analysis of altruism and safety. We explore the domain of selfish and non-selfish safety preferences in a set of questions on road safety, and the safety impact of our good extends from purely private impacts, to impacts on children, the whole household, to relatives and friends and is finally defined as a public good. In order to elicit the preferences for reducing road risk we use the contingent valuation method (CVM) on a Swedish sample.⁵ Due to the public good characteristic of many public safety programmes and the fact that traffic safety may be achieved through both public programmes and private provision, it is interesting to examine safety both as a private and a public good. By examining respondents' WTP for different devices (public/private) and for own and others' safety, we may draw conclusions regarding individuals' altruistic preferences.

In Sections 2–4 we describe the theoretical framework, how the survey was conducted, the design of the questionnaire, and the empirical models. Section 5 contains the results. Our results indicate that the respondents of our survey are not purely selfish, but are prepared to pay for the safety of children, relatives and friends. Given that people show strong concern for their relatives' and friends' safety, we may expect that safety for a public safety measure is valued higher than a private safety device. We find, however, that WTP for the public good is significantly lower compared with the private good. We discuss our findings and draw some conclusions in Section 6.

2. The theoretical framework

The theoretical model in this section, due to Jones-Lee (1991, 1992) and Johannesson et al. (1996), is a single-period model in which individuals face two possible outcomes; staying alive or being dead. Let $V_{ij}(\cdot)$, π_{ij} , and y_{ij} denote a well-behaved utility function (see, e.g., Varian, 1992), survival probabilities, and wealth, respectively. For simplicity we assume a model with only two individuals and the subscript $i = \{1, 2\}$ refers to the individuals with 1 defining the considered individual. The second subscript $j = \{0, 1\}$ refers to before (0) and with (1) the safety project, with $\pi_{i0} < \pi_{i1}$. Our utility function can now be written as follows:

$$V_{10} = V_{10}(\pi_{10}, y_{10}, \pi_{20}, y_{20}), \quad (1)$$

⁴ Depending on elicitation format, Bateman and Brouwer (2006) only found weak support for their hypothesis. See also Bateman and Brouwer (2006) for references to other studies that have found a higher value of WTP for child safety.

⁵ In the CVM respondents are asked to state their WTP for a non-marked good, e.g. wildlife protection, increased air quality, or as in this study a reduction in mortality risk. The CVM is a stated-preference technique, i.e. respondents' preferences are elicited in a hypothetical setting. For a description of CVM see, e.g., Mitchell and Carson (1989) or Bateman et al. (2002).

which is assumed to be strictly increasing in π_{1j} and y_{1j} , and non-decreasing in π_{2j} and y_{2j} . We consider the following cases where the considered individual is: (i) purely selfish if $\partial V_{1j}/\partial \pi_{2j} = 0$ and $\partial V_{1j}/\partial y_{2j} = 0$, (ii) a pure altruist if both are strictly positive and the preference of others are respected,⁶ (iii) a pure paternalist if again both are strictly positive but others' preferences are disregarded, and (iv) a safety paternalist if $\partial V_{1j}/\partial \pi_{2j} > 0$ and $\partial V_{1j}/\partial y_{2j} = 0$. In the last case the individual only cares about one aspect regarding others' well-being, i.e. safety. If, on the other hand, the individual only cares about others' wealth levels, he/she would be wealth paternalistic.

We start by deriving WTP for a private and a public safety measure following the analysis in Johannesson et al. (1996). Both safety measures affect individuals in the same way, the difference being the characteristic of the good and the way it is financed. The private good is paid for by the individual, whereas the public good is financed through a lump-sum tax. The optimization problems can be written as follows:

$$V_{11}(\pi_{11}, y_{10} - p_1, \pi_{20}, y_{20}) = V_{10}, \quad (2)$$

$$V_{11}(\pi_{11}, y_{10} - t_1, \pi_{21}, y_{20} - t_1) = V_{10}, \quad (3)$$

where p_1 in Eq. (2) refers to WTP for the private risk reduction and t_1 in Eq. (3) is the WTP for the public safety measure. A selfish and a safety paternalistic individual would report $t_1 = p_1$ and $t_1 > p_1$, respectively. Whereas a pure altruist who believes that t_1 approximates the WTP of the other individual would report $t_1 = p_1$ (since $i = 2$ remains at his/her initial utility), if he/she believes that the project will increase (reduce) the other person's overall wellbeing he/she would state $t_1 > (<) p_1$.

We now turn to different scenarios where we examine an individual's WTP for a private good safety device that will increase the survival probability of someone else. Let p_2 denote our considered individual's WTP for a safety device for $i = 2$, and the optimization problem may now be written as:

$$V_{11}(\pi_{10}, y_{10} - p_2, \pi_{21}, y_{20}) = V_{10}. \quad (4)$$

It can be shown that $p_2 > 0$ when individual 1 is a safety paternalist, a pure altruist or paternalist.

Using Eq. (4) we can also examine intra-household WTP, where we assume that the second individual is a child with zero wealth, i.e. $y_2 = 0$. Thus, in this scenario y_1 is the household's wealth level and we assume that the child's consumption comes from the wealth of the parent and that expenditures for the child's risk reduction will be borne by the parent. Unless the parent is wealth paternalistic, $p_2 > 0$. It can also be shown that p_2 is the largest when the parent is safety paternalistic. Whether $p_2 \geq p_1$ depends on the parent's preferences for the safety of his/her child. Finally, let p_h define household WTP ($p_1 + p_2 \equiv p_h$). When both individuals experience an increase in survival probability, Eq. (4) also implies that $p_h > p_1$ for a safety paternalist or a pure altruist or paternalist.

3. Contingent valuation survey

The survey was conducted in the city of Örebro by mail in 1998. Prior to the main survey a pilot was used to decide on the bid levels. The sample in the main survey consisted of 1950 individuals between 18 and 76 years of age, and after two reminders the response rate was 55%. The sample was split into five groups in order to examine how the respondents' WTP was affected by which of the following subjects benefited from the safety measure: (i) own, (ii) child, (iii) household, (iv) relatives and friends, and (v) the public.

⁶ For a pure altruist, $(\partial V_{1j}/\partial \pi_{2j})/(\partial V_{1j}/\partial y_{2j}) = (\partial V_{2j}/\partial \pi_{2j})/(\partial V_{2j}/\partial y_{2j})$, since he/she respects the preferences of others.

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