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The value of mortality risk reductions. Pure altruism – a confounder?

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ABSTRACT

This paper examines public valuations of mortality risk reductions. We set up a theoretical framework that allows for altruistic preferences, and subsequently test theoretical predictions through the design of a discrete choice experiment. By varying the tax scenario (uniform versus individual tax), the experimental design allows us to verify whether pure altruistic preferences are present and the underlying causes. We find evidence of negative pure altruism. Under a coercive uniform tax system respondents lower their willingness to pay possibly to ensure that they are not forcing others to pay at a level that corresponds to their own – higher – valuations. This hypothesis is supported by the observation that respondents perceive other individuals' valuations to be lower than their own. Our results suggest that public valuations of mortality risk reductions may underestimate the true societal value because respondents are considering other individuals' welfare, and wrongfully perceive other people's valuations to be low.

1. Introduction

The contingent valuation method was initially developed in the US and has been increasingly used since the late 1960s. Fundamentally, the underlying reason for the rise of stated preference methods has been the acknowledgement that substantial portions of utility were not reflected in the observed market prices of (in the first instance) environmental goods. Stated preference methods (SP) have since developed considerably and are now used for valuing other types of goods such as transport, food and health, but the method remains widely debated (Diamond and Hausman, 1994; Jones-Lee, 1989; Lindhjem et al., 2011).

In the present SP study we focus on one specific issue that has been raised in the literature; the question of whether pure altruism is included in the general public's valuations of changes in public safety, more specifically mortality risk reductions. The concept of sympathetic preferences (Smith, 1975), empathetic preferences (Harsanyi, 1977) and altruism (Andreoni et al., 2003) has been dealt with at large in the literature. That individuals may have a non-selfish concern for others has been long acknowledged, but the implications that such empathetic preferences may have on stated preference structures have not been analysed in much detail. The core interest for this paper is the observation that altruistic preferences may take many forms and can be divided into several types according to which components of the others' utility enter into the individual's utility function: *paternalistic* altruism or *pure* altruism (Jones-Lee, 1991, 1992). Paternalistic altruism may be safety-focused or wealth-focused.[1] In the former case, individuals only value the added safety obtained by others and not other factors entering into others' utility function. In the latter case, the only factor of interest is others' wealth. Pure altruism is present when individuals are instead concerned with the general welfare of others, and respect their preferences. In contrast to safety-focused altruism, which one may assume cannot be negative for positive increments in safety, pure altruism can take either a positive or a negative net-value (Johannesson et al., 1996). For instance, in the case of tax based public initiatives, an individual may be concerned about coercing others into having to pay for the public initiative, if she believes that others value it less than she does. This may imply that the individual will state a lower willingness to pay

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[1] In the case where the utility function is assumed to comprise only of the survival probability and wealth (income).

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(WTP) than when the risk reduction is of a private nature.[2] Alternatively, a pure altruistic individual may express a higher WTP for allowing others access to the good, if she believes that others value it higher than she does. The inclusion of pure altruistic preferences in SP studies with uniform coercive payments can be problematic if there is imperfect knowledge of others' benefits, and if costs to others are not (or only partly) considered in the valuation.

The aim of this paper is to examine the public valuation of increased safety by setting up a theoretical framework and subsequently testing predictions via a stated preference experiment. We base the study on traffic safety, but the conclusions are generalisable to other contexts such as health and the environment. We test whether marginal rates of substitution of income for mortality risk (i.e. marginal WTP) include elements of pure altruism. Furthermore, we test whether the net impact of pure altruistic preference can be explained by individuals' *perceptions* of others' WTP for improved traffic safety. To investigate the potential comparability of our survey results with previous findings in the literature, we also test whether we can replicate the finding that public valuations are less than or equal to private valuations in the context of traffic safety using the same methodology that has been applied in the literature to date.

Our motivation for conducting this study is that WTP for own risk reductions often generates higher valuations than WTP for own and others' risk reductions via taxes (Andersson and Lindberg, 2009; de Blaeij et al., 2003; Hultkrantz et al., 2006; Johannesson et al., 1996; Svensson and Johansson, 2010). The observation is based on a small empirical literature that involves testing for differences in marginal valuations of mortality risk reductions in the context of traffic, which ideally only differ with respect to the payment vehicle applied: income tax levies for public investments (used for investing in roads, traffic lights, signage etc.) or out-of-pocket payments for safety devices for the individual (such as air bags, more sophisticated seat belts etc.). Out-of-pocket payments for such items will elicit private value only, whereas income tax levies will disclose citizen's preferences, i.e. individual preferences that potentially involve altruism. Henceforth we refer to private and public valuations, respectively. In contrast, Arana and Leon (2002) and Pedersen et al. (2011) found that public valuations for risk reductions obtained via health programs were higher than private valuations. These findings together with survey results in Viscusi et al. (1988) suggest that public valuations may include a positive value associated with altruistic preferences, but that this positive value in some cases may be overshadowed partly by attitudes towards public and private provision of risk reducing interventions (an explanatory factor identified in Svensson and Johansson, 2010). We propose that an additional explanation could be the prevalence of a negative altruistic component in public valuations. Given that the value of safety *per se* is only equal to or greater than zero (ruling out any type of envy and resentment), altruism with a negative sign can only be present if respondents care not only about the safety of other, but also about other consequences that factor into the utility function, such as coercive payments.

Although stated preference methods which apply tax as a payment vehicle seldom explicitly state that the tax is uniform and coercive, respondents are likely to interpret the vehicle in this way since in most countries tax is not voluntary nor based on individuals' WTP. Theoretical models in this field have analyzed altruism under a tax-regime in which every individual pays according to their WTP and as such are not coerced into paying (Johansson, 1994; Jones-Lee, 1991, 1992). In this paper, we will extend these models to analyse altruism empirically within the realm of a theoretical model where the tax rate is uniform and in effect coercive.

Additionally, our study is different from those previously conducted in the field on two counts. First, in our study we specifically ensure that the public and private goods are identically described. It is a challenge to present a public and a private good holding all other characteristics constant in order to avoid affective reactions. Prior studies, which have attempted to hold all things equal in order to isolate the altruistic component, may have succeeded to different degrees. For example, in the paper by Svensson and Johansson (2010) the private good on offer was a "safety device" whilst the public good was a "public road safety investment". These are essentially very different goods. Public road safety may involve longer travel time if it involves stricter speed limits, and a safety device may not avoid an accident, but merely alleviate the health consequences. Second, our study specifically explores respondents' view on others' WTP for safety, in order to verify whether the net impact of potential pure altruistic preferences under a uniform tax-regime may be driven by respondents' perception of others' valuations. To this end we apply a question format equivalent to that of the inferred valuation approach (Lusk and Norwood, 2009), where individuals are asked to express the valuations of the average citizen.

In the remainder of the paper, we initially present the theoretical foundation of our empirical approach. This is followed by a description of the survey that was conducted, and our analytical strategy. Results are then presented and discussed.

2. Theoretical foundation

Using income tax levies may often be the only realistic and relevant payment vehicle to apply in a stated preference task if the safety intervention is a public good. This payment vehicle may generate valuations that include altruistic preferences. According to the philosopher Thomas Nagel (1970), altruism constitutes a willingness to act in the consideration of the interests of other persons, without the need of ulterior motives. As explained by Andreoni et al. (2003) it may or may not imply sacrifice on one's own part, but it does require that the consequences for someone else affect one's own choice.

Individual preferences for a public good may include altruism, and this altruism may be characterised as being *pure* or *paternalistic*. In his seminal papers, Jones-Lee (1991, 1992) derives the marginal valuation of a change in mortality risk in the presence of different kinds of altruism and under a tax-regime in which every individual pays according to her WTP. We follow the terminology from Jones-Lee (1991) and distinguish between (a) pure selfishness (the assumption in standard economic models), (b) safety-focused altruism (in which altruism relates only to other people's safety) and (c) pure altruism (where people in addition to their own well-being are concerned about other people's utility).[3] If an individual is a pure altruist, her public valuation (individual preferences inclusive of altruism) could be higher/lower than her private valuation depending on her *predictions* of other individuals' net benefit (i.e. the net impact of an increase in the probability of avoiding a fatality and the costs). In contrast, the presence of safety-focused preferences can only impact positively on valuations of public programmes that increase safety. Based on Jones-Lee (1991, 1992) and Johansson (1994) a more formal development of these thoughts is depicted as follows.

Consider a society of n individuals and suppose there is a policy proposal increasing the probability (p) of avoiding a fatal incident from p^{i0} to p^{i1} for individual $i = 1, ..n$. The with-project utility for

[2] An individual may also state a lower WTP if she is a wealth-focused altruist and believes that others ought not to pay more in tax irrespective of their preferences for safety.

[3] Subsequently, we also discuss "wealth-focused altruism" as defined in Jones-Lee (1992).