

Private and Public WTP for Safety - A Validity Test

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Abstract

To elicit an affected population's preferences for, e.g., better health or environment stated preference (SP) methods are often used. SP methods are based on hypothetical market settings which necessitates validity tests of the results. This study describes a validity test on the basis of theoretical predictions and empirical findings for private and public safety measures. According to the test, public willingness to pay (WTP) should exceed private WTP.

Key words: Private; Public; Safety paternalism; Stated preferences; Willingness to pay

JEL classification: D61; D64; I10

1 Introduction

In order to mitigate adverse health effects policy makers can, broadly speaking, choose between private and public safety measures. For instance, whereas legislation on seat-belt usage can be considered a private good for which the individual bears the costs and benefits, public investments to improve the standard of a road that increases safety will benefit all who travels on that road.

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Since safety comes at a cost, policies that increase safety need to be evaluated. In order to secure an efficient resource allocation, policy makers often rely on benefit-cost analysis (BCA). To facilitate the BCA, it is common to use a common metric in form of monetary values for both the costs and the benefits. However, many of the effects induced by safety policies do not have easily obtainable monetary values and for those effects policy makers turn to non-market evaluation methods, such as revealed (RP) and stated preference (SP) methods.

Since SP methods do not rely on the existence of actual market data they are more flexible than RP methods. However, SP methods are based on hypothetical scenarios and it has been found that they often are flawed by several biases such as hypothetical and strategic bias, as well as scale insensitivity (Bateman et al., 2002). Therefore, the hypothetical setting necessitates tests of construct validity (Bateman et al., 2002), i.e. tests of whether the results are in accordance with expectations, based on economic theory and/or empirical findings.

One area where SP methods have been used, is to estimate willingness to pay (WTP) for public safety measures, for which tradeoffs based on actual decisions are usually not available. If individual WTP for private and public safety measures is identical, there would be no need to derive them separately. Since WTP depends on the context and the affected population there is a no a priori ground to believe that they are identical, though. The empirical evidence also suggest that private and public WTP differ. Therefore, policy makers may need different values when evaluating private and public safety policies.

The aim of this study is to describe a validity test for private and public WTP for safety. We use a framework with a mortality risk, but the same framework and analysis can also be applied to morbidity risk, and health and safety in general. The following section contains the model and the predictions. The results are then discussed and some conclusions are drawn in the final section.

2 Theoretical model, empirical findings, and predictions

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

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

which is assumed to be strictly increasing in π_1 and y_1 , and non-decreasing in π_2 and y_2 . Individual 1 is: (i) purely selfish if $\partial V_1/\partial \pi_2 = 0$ and $\partial V_1/\partial y_2 = 0$, (ii) a pure altruist or paternalist if both are strictly positive, and (iii) a safety paternalist if $\partial V_1/\partial \pi_2 > 0$ and $\partial V_1/\partial y_2 = 0$.¹ A safety paternalist, thus, is only concerned about the safety dimension of others' well-being.

For our theoretical prediction of private and public WTP for safety, we follow the analysis in Johannesson et al. (1996). We assume that the private and public safety measures affect individuals in the same way, the difference being the characteristic of the good and the way it is financed. Whereas the private good is paid for by the individual, the public good is financed through a flat tax. The optimization problem for the private good is:

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

where p_1 refers to WTP for the private risk reduction. Since only individual 1 experience an increased safety level, individual 2 remains at his initial utility level, and p_1 reveals 1's WTP regardless of form of altruistic preferences.

¹ Let m_{kl} denote individual k 's marginal rate of substitution of l 's y for π . Then k is a pure altruist if $m_{kl} = m_{ll}$, i.e. k respects l preferences, and a pure paternalist if $m_{kl} = m_{kk}$, i.e. k imposes his preference on l (Jones-Lee, 1992).

For the public safety measure, from which both individuals experience increased survival probabilities, 1's WTP is defined by t_1 . Since t_1 is assumed identical to all, we now have the following optimization problem:

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

Since a selfish individual would not care how a second individual is affected by the public safety measure, his WTP is the same for both measure, i.e. $t_1 = p_1$. For a pure altruist, his WTP depends on how he believes that the second individual is affected by the public measure. If he believes that t_1 approximates the WTP of the other individual, he would report $t_1 = p_1$ (since $i = 2$ remains at his initial utility). On the other hand, if he believes that the project will increase (reduce) the other person's overall wellbeing he/she would state $t_1 > (<)p_1$. For a pure paternalist $t_1 = p_1$, since 1 imposes his preferences on 2. Finally, a safety paternalistic individual would report $t_1 > p_1$ since he ignores the wealth effect (i.e. forgone consumption opportunities through t_1) the safety project has on individual 2.

Since the theoretical prediction on how private WTP is related to public WTP depends on our assumptions about the considered individual's altruistic preferences, we turn to the empirical evidence to complete the picture. There is strong empirical support that individuals are non-selfish regarding safety (health) of others. For instance, there is empirical evidence that mothers and parents are willing to pay more for the safety of their children than for their own safety (Liu et al., 2000; Dickie and Messman, 2004; Chanel et al., 2005; Andersson and Lindberg, 2007), and that WTP for the entire household is larger than individual WTP (Bateman and Brouwer, 2006; Chanel et al., 2005). Moreover, there is also evidence that suggest that individuals are safety-paternalistic (Vázquez Rodríguez and León, 2004; Jacobsson et al., 2007; Holmes, 1990). Hence, overall, the empirical evidence regarding individuals' preferences for others' safety is that they are safety paternalists.

The empirical evidence therefore would suggest that $t_1 > p_1$. However, the empirical findings from SP studies often reveal the opposite, i.e. that respondents

state a lower WTP for a public than for a private good (de Blaeij et al., 2003). The empirical findings on private/public WTP are, thus, not consistent with the predictions of the theoretical model combined with the empirical results on safety paternalism.

3 Discussion

The results in the previous section do not imply that public WTP is higher than private WTP. Estimated WTP should reflect an affected population's preferences for an increased safety and estimates might therefore differ, since there are "no a priori grounds for supposing these preferences, perceptions, and attitudes need necessary be the same" (Jones-Lee and Loomes, 1995, p. 184) across populations. Therefore, comparing values from one country to another, or even between studies within the same country (or city) will not necessarily reveal anything about the validity of the estimates.

The findings apply to situations where WTP for private and public WTP is elicited for the same risk scenario and the same population. For instance, Johannesson et al. (1996), Hultkrantz et al. (2006), and Andersson and Lindberg (2007) estimated private and public WTP for the same risk scenarios and the same population within each study. All three studies fail to pass the construct validity test, i.e. $t_1 > p_1$.²

There are several possible explanations why empirically private WTP is higher than public WTP. People may prefer private to public provision of reducing risk if they believe that the latter will be an inefficient provider or if they do not trust that the promised risk reduction will be reached (Shogren, 1990). Lower WTP for the public good could also be explained by expectations about free riding, i.e. individuals are only willing to contribute to a public good if others

² Johannesson et al. (1996) found among their respondents a "tendency to overstate one's own WTP relative to the WTP of others" (p. 273). They could, however, not distinguish whether this was due to expected free riding or that the project would be expected to reduce the welfare of others.

also are willing to contribute (“reciprocity” (Fehr and Gächter, 2000; Fehr and Fischbacher, 2002)). Explanations such as these cannot be used to justify the empirical findings that $p_1 > t_1$ in studies such as those above. Instead, they suggest that the respondents have not believed in the hypothetical scenario described in the survey, and the estimates are then not valid estimates of the respondents’ preferences.

Therefore, based on Eqs. (2) and (3), and the empirical evidence, unless respondents are asked about their altruistic preferences, a necessary (but not sufficient) condition for estimates of public and private WTP to be valid are that $t_1 \geq p_1$, with weak inequality allowing for pure paternalism or selfishness. If the analyst obtains information about the respondents’ altruistic preferences the condition is not necessary but will instead depend on the findings on altruism (i.e. pure altruism or wealth paternalism).

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