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Estimating the willingness-to-pay for road safety improvement

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Abstract

Few studies have explored, to date, the issue of the monetary valuation of non-fatal injuries caused by road traffic accidents. The present contribution seeks to raise interest in this question and to estimate, by contingent valuation, French households' willingness-to-pay (WTP) to improve their road safety level and reduce their risk of non-fatal injuries following a road accident.
Much of the literature focused on estimating WTP for a reduction in the risk of fatal accident and on the calculation of the value or price of the risk, collectively named "the value of a statistical life". In contrast, the present paper is interested in the valuation of more or less serious non-fatal injuries caused by traffic accidents. More specifically, it estimates road users' WTP for a reduced risk of being a victim of various types of non-fatal injury.
To do so, contingent valuation was conducted on the adult population (aged 18 years and older) of a French administrative Département (Rhône) during the year 2012. A survey was conducted in 2013 by telephone interview from 2,216 inhabitants, randomly selected from the Rhône population. The stratification of the sample was made by geographic region (two areas in Greater Lyon and outside). This study was based on the stated preference method. Respondents were asked their WTP to avoid diverse consequences of a road accident.
More precisely, the questionnaires contained five categories of questions: (1) personal experience in dealing with road accidents, (2) driving behavior and traffic accident risk perception, (3) use of means of transport (4) general socio-economic characteristics, and (5) willingness to pay to reduce the risk of non-fatal injury following a road traffic accident.
Participants had to envisage contributing financially to the implementation of a local project to improve the safety of road users in the Rhône Département. Since the participants were themselves inhabitants of the Rhône, they should feel immediately concerned by a project within their own area for their routine travel.

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To test the relationship between WTP and injury severity, three road safety projects were independently presented. Each was characterized by the types of injury against which it offered protection. For each project, respondents were asked whether they were willing to pay for the project to be implemented, if so, the maximum amount of money they were willing to pay each year. If not, zero WTP was assigned, and follow-up questions tried to identify the reasons for this choice; this allowed ”genuine zero values”, consistent with an economic decision, to be distinguished from protest responses.
A Tobit and a type-II Tobit model were estimated to identify factors for WTP. The results highlighted the significant and positive influence of injury severity on WTP. Experience of road traffic accidents seemed to play an important role, positively influencing valuation of non-fatal injury. The young people seemed to be more willing to invest in improving their road safety. As predicted by economic theory, the study confirms the positive relationship between WTP and income level.

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Keywords: Road safety; contingent valuation; willingness to pay, risk perception, value of risk reduction

1. Introduction

Economic researches in terms of road safety remain scarce in France while the socio-economic issues are very important. Indeed, impacts of traffic accidents on the economy are considerable. These impacts are often assessed in terms of direct market costs (medical, materials and overhead costs) and indirect costs (loss of future production of those killed and wounded) and in terms of non-market costs (moral damage ...). According to the figures of the French road safety department, the cost of injury accidents is estimated at 9.7 billion in 2011. The reduction of mortality due to traffic accidents is therefore a major public health issue by its consequences on human life and economy. Economic analyzes in this area should allow policy makers to better target their prevention against road accidents.

In this field of study, the economic assessment is done by calculating the economic value of human life and the value equivalent to the damage injury. We use an approach that takes into account; avoided premature deaths, life year gained in health economics and environment, Chanel and Vergnaud, (2004). However, some reluctances appear on part of our societies at the thought of monetizing the suffering caused by an injury or the loss of a life of a road user. There are two main methods, the human capital and the willingness to pay. The first is to enhance the damage (death, injury) according to their impact on the economy, that is to say all the market costs. The second method lies in the assessment of the value people attach to life from investigation where one seeks to know the maximum amount of money that people are willing to pay to reduce the risk of losing life prematurely through various scenarios. Researches on the monetization were made particularly in environment and health fields. Indeed, Chanel et al. (2000) conducted work on the monetization of transport externalities, including air pollution and its health effects. As Alberini and Chiabai (2007), Navrud (2002) meanwhile were interested in the monetization of noise; their work has focused on the relationship between noise and housing prices using hedonic price approach, including Renew et al. (1996), Grue et al. (1997).

The main objective of this article is to study the WTP of the road users to reduce their risk of being injured in a road traffic accident with more or less severe consequences. This is to determine the factors involved in the users' willingness to pay for improving road safety.

This study joins particularly in an approach of monetary valuation of profits bound to the measures of road safety and more generally in cost-benefit analyses.The second section of this paper presents the methodological framework of the study, that is to say the structure of the questionnaire with the development of the scenarios (scenario chosen in a random way among four level projects of different risks) and data collection. The third section highlights the results. These will be discussed in the fourth section and it will finish with some concluding remarks.