

In the context of the support guidelines 'New Economic Aspects' of the Federal Ministry of Education and Research within the framework of the program 'Research for Civil Safety' of the German Federal Government (<http://www.sifo.de/en/index.html>).

WEIGHTING BENEFITS AND COSTS OF SAFETY MEASURES AGAINST NATURAL HAZARDS, ROAD ACCIDENTS AND CRIME.

EMPIRICAL EVIDENCE FROM A DISCRETE CHOICE EXPERIMENT

Extended Abstract

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1 RESEARCH QUESTION

Decision makers on public security¹ face an increasing number of threats. Knowing the benefits and costs of security measures is important to effectively allocate the available budget for security. Whereas direct and indirect costs can be estimated with more ease and accuracy, benefits of security measures such as avoidance of pain and traumata can not be estimated using market prices. As immaterial damages often constitute a large proportion of the total damage, it is important to find a way of evaluating the public willingness-to-pay for security measures, given budget constraints and expected payoffs.

Moreover, different threats to public security such as crime, road safety and protection against natural hazard are to be addressed simultaneously, which is usually organised under different institutions of public security, who then compete for scarce money. It is rather unsolved how scarce governmental resources should be distributed across institutions in order to meet the diverse security needs of the population. Thus, it is necessary to study preferences of citizens who are confronted with alternative threats to public safety, and at the same time with costs and benefits of safety measures which would be able to reduce such competing risks.

2 METHOD

In our empirical research, to shed light on the valuation of benefits of security measures in form of avoided damages, we conduct a comprehensive survey using the method of a discrete choice experiment. Discrete choice experiments ask survey participants to choose between different types of “products”, which are in our case different security measures with carefully specified variations of characteristics and circumstances. With regard to type of risk, we focus on three paradigmatic types of risks in public security: natural hazards, road accidents and crime. Furthermore, we differentiate the various security measures in terms of degree of risk reduction, social costs to society and social benefits as well as individual annual costs.

We apply a discrete choice model as it can quantify the single drivers of the value of the benefit of a security measure. In this case, a single person holistically values a security measure, based on its properties. Discrete choice experiments are widely used in academia and practice to obtain values for goods which do not have a market price (Gingrich et al. (2017), Hauber et al. (2013), Sadique et al. (2013), Ewing and Sarigöllü (2000), Hensher, Shore, and Train (2006) and Ndunda

¹In this paper, we mostly use the word “security”, but in terms of content we follow the definition by Merriam-Webster, according to which the primary definition of safety is “the condition of being free from harm or risk”, which is essentially the same as the primary definition of security, which is “the quality or state of being free from danger”.

and Mungatana (2013)).

A renowned market research institute implemented our survey with more than 2.000 participants in Germany, representative in terms of age, sex, education and place of residence. In order to simulate an actual purchase decision as close as possible, the participants can chose between two differently specified security measures and the opt-out option, whereas the latter is the option to “buy” neither of the alternatives.

3 EXPECTED RESULTS

The setup of our discrete choice experiment for the valuation of security measures allows to quantify the monetary amount individuals are willing to pay for a certain type of security measure with given characteristics in terms of type of risk, amount of risk reduction, ratio between social costs and benefits as well as individual price. The econometric analysis facilitates to quantify the benefits, i. e. the valuation of avoided harms, in the form of the incremental willingness-to-pay for a security measure to avoid damages due to a traffic accident rather than a natural catastrophe as in the baseline case. Another example would be the incremental willingness-to-pay for a security measure that reduces the risk, relative to the baseline case, by an additional let's say 20% points. By estimating the various willingness-to-pay for detailed characteristics of a security measure, we control for variables like age, sex, education and place of residence.

These valuations of the benefits of security measures are an important driver of the meaningfulness of cost-benefit analyses in the domain of public security. However, the innovation of our empirical analysis is the variation of security measures in terms of type of risk, amount of risk reduction, ratio of social costs and benefits and individual costs and the corresponding specific willingness-to-pay for the constituents of a security measure. To know the drivers of the benefits of measures is essential for decision makers to be able to conduct a cost-benefit analysis for security measures and to allocate scarce resources efficiently.

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