2011

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National Center for Risk and Economic Analysis of Terrorism Events
University of Southern California
Los Angeles, California

Valuing Risks of Death from Terrorist Attacks
October 2010 to September 2011

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"This research was supported by the United States Department of Homeland Security through the National Center for Risk and Economic Analysis of Terrorism Events (CREATE) under Cooperative Agreement 2007-ST-061-RE0001. However, any opinions, findings, and conclusions or recommendations in this document are those of the authors and do not necessarily reflect views of the United States Department of Homeland Security or the University of Southern California."

Cooperative Agreement No. 2010-ST-061-RE0001
Department of Homeland Security

December 31, 2011
ABOUT CREATE
The National Center for Risk and Economic Analysis of Terrorism Events (CREATE) was the first university-based Center of Excellence (COE) funded by University Programs of the Science and Technology (S&T) Directorate of the Department of Homeland Security (DHS). CREATE started operations in March of 2004. This annual report covers the seventh year of CREATE funding from October 2010 to September 2011, the first year under Cooperative Agreement 2010-ST-061-RE0001 from DHS. While the text of this report focuses on the seventh year, all data tables, publications, lists of participants, students, and presentations and events are cumulative from the inception of CREATE.
CREATE’s research mission is to develop advanced models and tools for risk assessment, economic assessment, and risk management to counter terrorism. CREATE accomplishes this mission through an integrated program of research, education, and outreach, spanning the disciplines of economics, psychology, political science, industrial and systems engineering and information science. CREATE develops models, analytical tools, methodologies and software, and tests these tools in case analyses, representing critical homeland security investment and policy decisions.
Due to the cross-cutting nature of research in risk, economics, and risk management, CREATE serves the need of many client agencies at the DHS, including the Transportation Security Agency, Customs and Border Protection, Immigration and Customs Enforcement, FEMA and the US Coast Guard. In addition, CREATE has developed relationships with clients in the Offices of National Protection and Programs, Intelligence and Analysis, General Council, Health Affairs, and Domestic Nuclear Detection. Using a mix of fundamental and applied research, CREATE faculty and students take both the long-term view of how to reduce terrorism risk through fundamental research and the medium-term view of how to improve the cost-effectiveness of counter-terrorism policies and investments through applied research.

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1. Executive Summary

The first year of this project was a pilot phase of a longer term project to value the reduction of risks associated with homeland security policies. The first component of the project is a review of the literature on the perception and valuation of the risks of death from terrorist attacks. The second component of the project is to develop a pilot survey to analyze the valuation of terrorism risks. This part of the project explores different risk perception questions and how they are related to government policies.

The policy context in which this project is being developed is that in which government agencies such as DHS often must assess the benefits of the policies as part of a regulatory impact analysis or other policy assessment. If people value reduction of all fatality risks similarly, then it is a simple matter to use well established estimates of the value of statistical life (VSL) in assessing these risks. Benefits transfer issues such as this arise for all agencies. Usually, the policy assessment issue is whether labor market estimates of VSL can be applied to populations that differ on dimensions such as age, income, and willingness to bear risk. However, for risks from terrorist attacks, the issues are potentially more complex. Deaths from terrorist attacks are a multi-attribute outcome, embodying concerns regarding national security and the safety of society generally.

My research to date suggests that people value terrorism risks quite differently than other causes of death. In particular, prevention of death risks from terrorist attacks is twice as highly valued as prevention of a comparable number of deaths from natural disasters. This project’s ongoing research is designed to refine these estimates and to assess what estimate of VSL is appropriate for benefit assessment purposes in the homeland security policies.

2. Research Accomplishments

A review of the economics literature on the heterogeneity of the VSL is included in my paper, “Policy Challenges of the Heterogeneity of the Value of Statistical Life,” which was published in the Foundations in Trends in Microeconomics series in 2011. That paper considered heterogeneity with respect to personal characteristics as well as cause of death, such as cancer or a terrorist attack. I have attached a copy of this paper as an appendix to this report. The most pertinent material appears in Section 14, Dread and Contextual Sources of Variation in Valuing Life: Deaths from Attacks by Terrorists. Two other papers in preparation noted in section 4 below explore related issues.

The empirical results from my pilot stated preference survey using a nationally representative sample of 1,035 respondents generated results that are inconsistent with the usual benefits transfer assumption of
employing the same value of statistical life (VSL) across agencies. In particular, the empirical results yielded tradeoff rates that implied that prevention of 0.57 terrorism deaths was equivalent to preventing 1 death from natural disasters. Concerns pertaining to national security generally are among those additional factors that are particularly salient. For example, the political party of the respondent affected valuations in the expected manner. Individual valuation of personal safety is also influential in affecting the valuation of reducing risks from terrorist attacks. Seatbelt usage, which is a proxy for personal risk behavior, is positively related to valuation of policies that reduce terrorism risks. These relationships are based on a multivariate analysis that accounts for differences in individuals’ perceived exposure to risk. Thus the findings are for people who are at the average risk level.

The risk reduction policies considered in the survey involved anti-terrorism efforts, the provision of subsidized insurance policies for natural disasters, and compensation of victims of a terrorist attack. The risk belief measures that were most closely related to support of these efforts were subjective assessments of whether the respondent considered himself/herself to face risks that were above average, average, or below average. People who think that they face an above average terrorism risk and an average disaster death risk consider 0.38 terrorism deaths as being equivalent to a natural disaster death. Likewise people who believe that they face a below average risk from terrorism attacks and an average natural disaster risk consider 0.76 terrorism deaths as equivalent to a natural disaster death. These findings generate the quite remarkable result that irrespective of whether people view their risk of death from terrorist attack as being above average, average, or below average, they value reduction of death risks from terrorist attacks more highly than deaths from natural disasters.

Part of the reason for this difference is that there is a perception that deaths from natural disasters tend to embody more individual choice to be exposed to the risk than does being exposed to a terrorist attack. In particular, while this survey evidence indicates there is substantial willingness to support the victims of Hurricane Katrina and other natural disasters, there is an expression of much greater reluctance to provide the same level of assistance should there be a repeat of this natural disaster affecting the same population.

Risks of terrorism are not well known. Unlike contexts such as auto safety, policy decisions related to terrorism risks do not involve a well-defined risk. The annual fatality rate involving motor vehicles is well known, and there is an extensive body of data involving the causes of these accidents. Actual observation of motor-vehicle risks can be supplemented through crash tests and other forms of testing. In contrast, the risks associated with terrorism involve a much more limited information base in countries such as the United States, which fortunately have not had extensive experience with terrorist attacks. As a consequence, the character of the risk being valued is an ambiguous risk unlike the situation of risks known with precision. From the standpoint of statistical decision theory, subjective risk assessments and objective risks should be treated similarly except that there is often the opportunity to acquire information about less well known hazards.

However, notwithstanding this normative prescription that subjective and objective probabilities should be viewed similarly, the public at large may consider imprecisely understood risks in a quite different matter. In situations involving either gains or losses, people often exhibit a form of ambiguity aversion in that imprecisely understood probabilities may be less desirable. If this type of effect generalizes to the homeland security situation, there may be a greater value attached to terrorism risks because they are not well understood. The analysis of the survey questions pertaining to ambiguity during this first period of
project research provided a preliminary, but not conclusive assessment of the effect of risk ambiguity. Two questions in the survey asked respondents about whether they preferred that government policies address risks that are not well understood. This format for assessing the influence of risk ambiguity did not generate significant effects. Attitudes toward risk ambiguity were less influential in affecting the valuation of terrorism risk reduction than were variables pertaining to perception of the level of the risks. Since the level and presence of the risk is more consequential than any influence of risk ambiguity, the relative risk level rather than the ambiguity of the risk will be the main emphasis in future survey development. Nevertheless it may also be desirable to analyze whether consideration of policies with ambiguous risk effects are valued differently, which is a more direct and more meaningful test of the role of risk ambiguity than more directive questions about respondents’ attitudes toward ambiguous policies.

3. Applied Relevance

This research ultimately will be directly relevant to the use of VSL estimates in benefit assessment by DHS. Many government agencies, including DOT, EPA, and part of the DHS use estimates of VSL based on my past research and that of others who have analyzed wage-risk tradeoffs in the labor market. One such example that was featured prominently in a report to DHS by Lisa Robinson was my article, “The Value of Life: Estimates with Risks by Occupation and Industry,” Economic Inquiry, 2004, which developed a wide variety of labor market estimates of VSL. Other agencies, such as DOT and EPA also rely on meta-analyses, including W. Kip Viscusi and Joseph Aldy, “The Value of Statistical Life: A Critical Review of Market Estimates throughout the World,” Journal of Risk and Uncertainty, 2003. This benefits transfer approach is a good starting point for benefit assessment, but if the public’s valuation of the reduction of fatality risks from terrorist attacks is different that workers’ valuation of fatality risks on the job, then any such difference in the value of the mortality risk reduction should be taken into account.

The rationale for making such a distinction is not that lives saved through homeland security policies are any more deserving than those saved by policies of other agencies such as EPA or OSHA. Rather, it is that deaths from terrorist attacks involve attributes pertaining to national security that go beyond the number of people who are killed. The ultimate long-term goal of the research is to explore these attributes and their valuation and to develop estimates of VSL that can be used by DHS for benefit assessment purposes.

4. Outreach and Publications

In 2010 I presented my work on “Policy Challenges of the Heterogeneity of the Value of Statistical Life” as the keynote address at the American Society of Health Economists at Cornell University, June 20, 2010, as the keynote address of the Society for Risk Analysis Europe meetings in London, June 23, 2010, and at the CREATE conference on homeland security in Washington, DC., September 24, 2010.

In 2011 I presented this research at the American Law and Economics Annual Meeting at Columbia Law School, May 20, 2011. Later that year I organized and chaired the session on Value of Life by Different Agencies for the conference, Theory, Science, and Statistics in the Use of Benefit-Cost Analysis, October 20, 2011. Session participants were Elena D. Ryan, Chief, Economic Impact Analysis Branch for Regulations and Rulings, U.S. Customs and Border Protection, Dept. of Homeland Security; Al McGartland, Office Director, National Center for Environmental Economics, EPA; Jack Wells, Chief
Economist, DOT; Susan Dudley, George Washington University and former Director of OIRA, OMB; and Lisa Robinson, independent consultant.

Current and forthcoming publications directly related to this research effort are the following, all authored by W. Kip Viscusi:

