

SRA 2010 Global Catastrophic Risks Sessions
December 5-8, Salt Lake City, Utah
http://www.sra.org/events_2010_meeting.php

Symposium 1: Methodologies for Global Catastrophic Risk Assessment
Chair: Seth Baum
Sponsored by the Risk, Policy and Law Specialty Group (RPLSG)

Title: Global catastrophic risk and regulatory design
Author: Arden Rowell, Assistant Professor and Richard & Marie Corman Scholar at the University of Illinois College of Law

Title: Systematic scenario analysis to characterize global catastrophic risk
Author: Vanessa Schweizer, Advanced Study Program Postdoctoral Fellow at the National Center for Atmospheric Research

Title: Catastrophic risk forecasts from refugee entry futures
Author: Robin Hanson, Associate Professor of Economics at George Mason University

Title: On assessing the risk of nuclear war
Author: James Scouras, Chief Scientist, Strategic Operations Analysis, National Security Analysis Department, Johns Hopkins University Applied Physics Laboratory

Symposium 2: Climate Change and Global Catastrophic Risk
Chair: Vanessa Schweizer
Sponsored by the Economics and Benefits Analysis Specialty Group (EBASG) and the Risk, Policy and Law Specialty Group (RPLSG)

Title: Space-Time Discounting, Global Catastrophic Risk, and Climate Change Economics
Author: Seth Baum, Department of Geography, Pennsylvania State University

Title: Climate Change: A Problem of Optimal Control or Risk Management?
Authors: Roger M. Cooke (presenter) and Carolyn Kousky, Resources for the Future
Note: Unable to present due to scheduling conflict.

Title: The Tragedy of the Uncommons: Catastrophe, precaution, perceptions and politics
Author: Jonathan Wiener, Duke Law School

Title: Rare disasters, risk attitudes, and ambiguity in the economic analysis of climate policy
Authors: Michael D. Gerst, Richard B. Howarth, and Mark E. Borsuk (presenter), Dartmouth University

Symposium 1: Methodologies for Global Catastrophic Risk Assessment

Chair: Seth Baum

Sponsored by the Risk, Policy and Law Specialty Group (RPLSG)

Abstract: Global catastrophic risks (GCRs) are risks of events that could significantly harm or even destroy civilization at the global scale. GCRs are thus risks of the highest magnitude, regardless of probability. Some GCRs include pandemics, global warfare, ecological collapse, and disruptive emerging technologies. The high stakes and generally unprecedented nature of GCRs pose strong analytical challenges. This symposium features diverse methodological perspectives on how to effectively assess GCRs. Scholars from economics, law, policy, and security analysis present specific methodologies including refuge futures, regulatory design, scenario analysis, and deterrence assessment approaches. These methods are examined in terms of how effective it is across different GCRs and what general challenges are posed by the nature of GCR. These insights provide important guidance on how to proceed with ongoing GCR assessment initiatives.

Title: Global catastrophic risk and regulatory design

Author: Arden Rowell, Assistant Professor and Richard & Marie Corman Scholar at the University of Illinois College of Law

Abstract: This presentation addresses two distinct challenges that global catastrophic risks pose to regulatory design. The first challenge is that of identification: what should count as a global catastrophic risk? There do seem to be some risks—for example, climate change, nuclear war, mass pandemic, or extinction-sized meteor strike—that merit special regulatory response. But a regulatory system that treats every severe risk like a global catastrophe will run into trouble (and out of resources) very quickly. The trick, then, is in finding a strategy for separating out the catastrophic from the merely bad, and the global from the merely widespread. Once a global catastrophic risk is identified, creating an appropriate response is complicated by the second challenge to be discussed: that of coordination. Preparing and responding to global catastrophes requires significant coordination among political stakeholders, and this coordination may be required even where the impacts of the catastrophe and/or the precautions against the catastrophe are differentially spread across countries and across populations. This paper addresses several regulatory design strategies for addressing both of these challenges.

Title: Systematic scenario analysis to characterize global catastrophic risk

Author: Vanessa Schweizer, Advanced Study Program Postdoctoral Fellow at the National Center for Atmospheric Research

Abstract: Scenario analysis has long been employed to characterize vulnerabilities and risks in a variety of contexts, from war games to business strategy. However, traditional methods for scenario analysis often provide an incomplete picture of the possibility space, which can leave some risks unrecognized. This is particularly problematic when unrecognized risks are catastrophic. Complex global risks pose additional methodological challenges, as interactions between seemingly unrelated factors can exacerbate local risks or even act synergistically, giving rise to novel threats. Aside from the difficulty of amassing sufficient information to conceptualize complex catastrophic risks at the global scale, integration of information across various domains is a formidable task of its own. In this presentation, the application of the cross-impact balance (CIB) method to scenarios characterizing global catastrophic risks will be discussed. The CIB approach is a systematic method for scenario analysis, and it explores

complete, rather than partial, possibility spaces. It is also well suited for synthesizing knowledge in interdisciplinary settings. Special attention will be paid to the application of the CIB method in the context of the global catastrophic risk of climate change.

Title: Catastrophic risk forecasts from refuge entry futures

Author: Robin Hanson, Associate Professor of Economics at George Mason University

Abstract: Speculative markets have demonstrated powerful abilities to forecast future events, which has inspired a new field of prediction markets to explore such possibilities. Can such power be harnessed to forecast global catastrophic risk? One problem is that such mechanisms offered weaker incentives to forecast distant future events, yet we want forecasts about distant future catastrophes. But this is a generic problem with all ways to forecast the distant future; it is not specific to this mechanism. Bets also have a problem forecasting the end of the world, as no one is left afterward to collect on bets. So to let speculators advise us about world's end, we might have them trade an asset available now that remains valuable as close as possible to an end. Imagine a refuge with a good chance of surviving a wide range of disasters. It might be hidden deep in a mine, stocked with years of food and power, and continuously populated with thirty experts and thirty amateurs. Locked down against pandemics, it is opened every month for supplies and new residents. A refuge ticket gives you the right to use an amateur refuge slot for a given time period. To exercise a ticket, you show up at its entrance at the assigned time. Refuge tickets could be auctioned years in advance, broken into conditional parts, and traded in subsidized markets. For example, one might buy a refuge ticket valid on a certain date only in the event that USA and Russia had just broken off diplomatic relations, or in the event a city somewhere is nuked. The price of such resort tickets would rise with the chance of such events. By trading such tickets conditional on a policy that might mitigate a crisis, such as a treaty, prices could reflect conditional chances of such events.

Title: On assessing the risk of nuclear war

Author: James Scouras, Chief Scientist, Strategic Operations Analysis, National Security Analysis Department, Johns Hopkins University Applied Physics Laboratory

Abstract: The world has neither completely nor permanently escaped the specter of global nuclear war. While the nuclear arsenals of the United States and Russia are significantly lower than their Cold War levels, they still number in the thousands of weapons. Thus, there remains the possibility that deterrence might fail and these arsenals would be used. While any nuclear use would have profound implications for the United States and the international order, a global conflagration that involved the U.S. and Russian nuclear arsenals is among the most horrific catastrophes we can imagine. Because its consequences would be extreme, even a remote possibility of global nuclear war must be considered, especially when viewed over the long term, in formulating national security policy. While careful analysis of the likelihood and consequences of the failure of nuclear deterrence is not usually undertaken in developing national security strategy, general perception of the risk of nuclear war has a strong influence on the broad directions of national policy. For example, arguments for both national missile defenses and deep reductions in nuclear forces depend in no small part on the judgment that deterrence is "unreliable." However, this judgment is usually based on intuition, rather than on a synthesis of the most appropriate analytic methods that can be brought to bear. This presentation establishes a methodological basis for more rigorously addressing the question: What is the risk of nuclear war? Our goals are to clarify the extent to which this is a researchable

question, whether insights from this research might constructively inform policy, and the most promising research paths forward. We focus on assessing and integrating 4 complementary approaches: historical case study analysis, expert judgment elicitation, probabilistic risk assessment, and complex systems analysis.

Symposium 2: Climate Change and Global Catastrophic Risk

Chair: Vanessa Schweizer

Sponsored by the Economics and Benefits Analysis Specialty Group (EBASG) and the Risk, Policy and Law Specialty Group (RPLSG)

Abstract: Global catastrophic risks (GCRs) are risks of events that could significantly harm or even destroy civilization at the global scale. GCRs are thus risks of the highest magnitude, regardless of probability. Climate change has emerged as a particularly important GCR, both for its severity and for the methodological insights found from the study of it. This symposium features diverse perspectives on climate change and GCR. Scholars from economics, geography, law, and mathematics present several important issues in climate change and GCR including the value of statistical life, space-time discounting, political economy, and risk management. These insights from these presentations provide important guidance on how to proceed with ongoing initiatives on climate change and GCR.

Title: Space-Time Discounting, Global Catastrophic Risk, and Climate Change Economics

Author: Seth Baum, Department of Geography, Pennsylvania State University

Abstract: Discounting and global catastrophic risk (GCR) have been identified as crucial elements of climate change economics. In economic models, optimal climate policy is usually highly sensitive to the discount rate. However, the risk that climate change could bring global catastrophe can dominate even the choice of discount rate. This presentation offers new perspective on the relationship between discounting, GCR, and climate change economics grounded in a new theoretical conceptualization of discounting. Whereas discounting is traditionally conceptualized as the comparison of values across time, the new discounting theory compares values across both space and time. The new theory shows that discounting can dominate GCR in analysis of climate change and other risks, but only under extreme discounting assumptions. Furthermore, certain forms of space-time discounting can actually lead to increases in GCR. However, there are strong ethical arguments against such discounting. These arguments indicate that GCR reduction should be a top individual and societal priority.

Title: Climate Change: A Problem of Optimal Control or Risk Management?

Authors: Roger M. Cooke (presenter) and Carolyn Kousky, Resources for the Future

Note: Unable to present due to scheduling conflict.

Abstract: We contrast optimal control and risk management approaches to climate change. Whereas optimal control seeks to maximize consumption, risk management buys down the risk of catastrophic loss. Hallmarks of the risk management approach—stress testing models, exploring the range of possible outcomes given a policy choice, and quantifying uncertainty via structured expert judgment—are illustrated with simple models. The policy landscape under a risk management approach is sketched.

Title: The Tragedy of the Uncommons: Catastrophe, precaution, perceptions and politics

Author: Jonathan Wiener, Duke Law School

Abstract: The classic “tragedy of the commons” phenomenon plagues many shared resources, but the political economy of regulation shows that social institutions can learn and adopt effective policies, norms and institutions to overcome such tragedies. By contrast, rare extreme catastrophic events pose a less tractable challenge, to which societies and institutions respond less readily – what I will call the “tragedy of the uncommons” – such as extreme climate change, large asteroid collisions, and contamination from space. This presentation explores the political economy of precautions against uncommons risks. It suggests that risks of extreme catastrophes go underaddressed because of several factors, including: unavailability (the absence of salient early warning signals to mobilize political response); psychic numbing to mass casualties; absence of identified individual victim or villain; short-termism in business and government; and underdeterrence due to limited liability, widely spread losses, moral hazard through expected ex post relief, and/or the prospect that the catastrophe will destroy the institutions for ex post insurance or sanctions. This analysis highlights twists in the public’s perception of high-probability risks, low-probability (available) risks, and ultra-low-probability (unavailable) risks, which complicate the conventional debate over public versus expert perceptions of risk. It also helps distinguish precaution against mega-catastrophic risks from precaution against more gradual or routine risks. As societies solve their commons problems, uncommons risks become relatively more important; but in practice precautionary policies are often aimed at gradual and routine risks. This analysis points to further problems for precaution against ultra-low-probability mega-catastrophic risks: priority-setting and risk-risk tradeoffs. It seeks new ways for governance institutions to anticipate, prevent and survive rare extreme catastrophic risks.

Title: Rare disasters, risk attitudes, and ambiguity in the economic analysis of climate policy

Authors: Michael D. Gerst, Richard B. Howarth, and Mark E. Borsuk (presenter), Dartmouth University

The accommodation of rare disasters in macrofinancial analysis has been shown to reveal societal risk preferences that are substantially different from those commonly employed in economic models of climate change. We incorporate the rare-disasters framework into a stochastic integrated assessment model to assess the combined effect of empirically supported risk preferences and fat-tailed risk exposure on the optimal choice of climate policy. Results reveal that deep cuts in greenhouse gas emissions are robustly consistent with maximization of social welfare unless society has relatively weak aversion to risk—a situation strongly inconsistent with equity data. In comparison to the extant climate policy literature, this finding is novel in suggesting that aggressive emissions reductions are justified without appeals to a low discount rate, fat-tailed uncertainty, or a steeply convex damage function. A challenge in our analysis is that it is difficult to pin down the relative likelihood of rare disasters, both historically and under future climate change. This introduces ambiguity into our analysis, requiring the consideration of preferences for ambiguity in addition to risk. Assuming ambiguity aversion, we foresee two competing forces which have the ability to change our current results. However, our current working hypothesis is that consideration of ambiguity aversion will lead to a preference for similar or lower stabilization scenarios than the 450 ppm scenario identified by our results to date.