Wharton
University of Pennsylvania

RISK MANAGEMENT AND
DECISION PROCESSES CENTER

Annual Report
2019

Research to promote improved risk communication, risk reduction, and risk financing across the public and private sectors

Wharton
University of Pennsylvania

RISK MANAGEMENT AND DECISION PROCESSES CENTER

ABOUT THE CENTER

The Wharton Risk Management and Decision Processes Center, established in 1985, is a research center affiliated with the Wharton School at the University of Pennsylvania. Engaging students and faculty throughout the University in collaborations, research projects, and other partnerships, the Center is recognized worldwide as a leader in risk-related research and policy analysis. The Risk Center also serves as a bridge between scholars at Penn and organizations and decision-makers in the public and private sectors.

Decision Processes
Understanding and improving decision-making in the presence of risk and uncertainty.

Risk Management
Researching, developing, and evaluating strategies for risk communication, risk reduction, and risk transfer.

Public Policy
Improving our risk-related public policies at all scales.

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LETTER FROM OUR DIRECTORS

Since its inception in 1985, the Wharton Risk Management and Decision Processes Center has focused on developing and promoting effective strategies and public policies for managing low-probability, high-consequence events. Today, so-called black swan events are more common and their consequences more severe.

We are thus challenged with the need for more accurate risk assessments, more effective risk communication tools, and improved economic incentives and financial instruments to meet today's risks. To address these issues, the Wharton Risk Center is working in partnership with the public and private sectors and with researchers across disciplines to develop strategies for dealing more effectively with emerging and ongoing threats facing society today and in the future.

Recognizing this challenge and opportunity, Carolyn Kousky, our new Executive Director, has taken the lead in reconfiguring the Risk Center's research into five new labs discussed in this Annual Report. They allow us to deepen our work and engage more directly with our corporate partners, the Wharton School, other centers at the University of Pennsylvania, the relevant public sector organizations, and researchers throughout the United States and abroad.

Via these labs, the Wharton Risk Center is continuing its core work in areas like risk communication and disaster management, expanding into new arenas, such as political risk, and also deepening our ongoing research in areas of global significance, such as climate change and terrorism. Across the labs, the Risk Center is involved in an array of studies and convenvings that address our ongoing themes of better understanding how people and organizations make decisions about risk as a basis for designing more effective strategies for reducing the impacts of adverse and potentially catastrophic events.

In this Annual Report you will read about many exciting new initiatives reflecting our new vision. For instance, this past summer the Wharton Risk Center spearheaded an online ideation project across the university to generate solutions for better managing climate risk in conjunction with the Kleinman Center for Energy Policy, the Penn Program on Regulation, and the Faculty Senate at the University of Pennsylvania. We are piloting a student fellows program and offering more opportunities to Penn students to engage in Wharton Risk Center research. We are also more widely communicating our work via social media and other digital technologies (find us now on Twitter and Facebook).

We look forward to interacting with many of you on these activities.

Howard Kunreuther
Co-Director, Wharton Risk Center

Robert Meyer
Co-Director, Wharton Risk Center

Research Labs

DISASTER RISK MANAGEMENT LAB

In the face of escalating losses from natural and man-made hazards, the Disaster Risk Management Lab undertakes research on risk financing and risk reduction strategies. Ongoing projects examine the functioning of disaster insurance markets, innovative risk transfer products, the design and impact of government disaster aid programs, post-disaster credit markets, and public-private partnerships to ensure equitable financial recovery for all households. Work also seeks to advance smart development, cost-effective building codes, and improved infrastructure decisions.

RISK COMMUNICATION & DECISION-MAKING LAB

To better understand and improve individual and collective decision-making in the presence of uncertainty, the Risk Communication & Decision-Making Lab investigates different approaches for framing and providing information to households, businesses, and public sector decision-makers to ensure that they are aware of the risks they face and able to improve their preparedness and response to future adverse events.

CLIMATE RISK & RESILIENCE LAB

The impacts of climate change are creating a range of risks for households, communities, and businesses. The Climate Risk & Resilience Lab explores public and private sector approaches to improving climate adaptation and building resilience to the adverse impacts of climate change, as well as managing the transition to a low-carbon economy.

BEHAVIORAL SCIENCE & TECHNOLOGY LAB

The Behavioral Science & Technology Lab studies the impact of consumer technology on our lives and applies these insights to a range of initiatives to enhance public welfare, from improving disaster preparedness to building systems that identify and control the spread of false information.

POLITICAL RISK LAB

At a time when companies are struggling to manage geostrategic uncertainty, the Political Risk Lab seeks to identify the drivers of political risk and its impact on companies' performance. Studies are being undertaken to develop a more sophisticated approach to assessing and managing political risk that are likely to create, preserve, and realize value for firms.

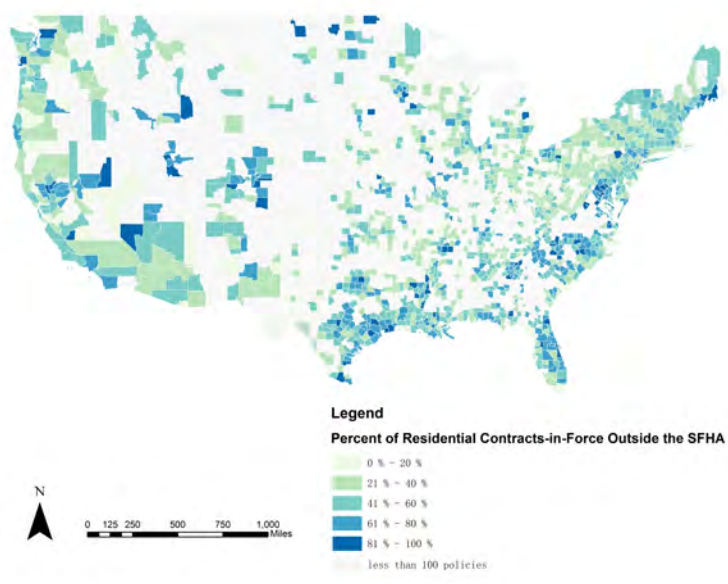
Disaster Risk Management Lab

Over the last several decades, the Wharton Risk Center has been at the center of applied research on disaster risk management across a wide range of perils. This spans disaster finance to hazard mitigation. Ongoing projects in the lab examine the future of flood insurance, flood risk in the U.S. housing market, and insuring ecosystems.

THE FUTURE OF FLOOD INSURANCE

The Risk Center is engaged in several studies on flood insurance in the United States. Last spring, the Center released an Issue Brief on policy options for closing the flood insurance gap. Recently, we completed a white paper that identified the early goals of the National Flood Insurance Program's (NFIP's) mandatory purchase requirement and whether those goals are still being met today.

An ongoing project analyzes the determinants of voluntary purchase of flood insurance. While low take-up rates nationwide suggest that many people do not buy flood coverage, in a number of counties throughout the U.S. the vast majority of policies-in-force are outside the highest risk zones where there is no mandatory purchase requirement and no disclosure of flood risk (see figure). We are investigating what drives voluntary purchases in these locations.



This map shows the percentage of total residential NFIP policies in U.S. counties that are located outside Special Flood Hazard Areas (100-year floodplains).

FLOOD RISK IN THE U.S. HOUSING MARKET

The Risk Center is currently examining lender attitudes toward disaster risk in the U.S. housing market. Based on interviews with key stakeholders in housing finance, the purpose of the study is to better understand their views and concerns about flood risk. In addition, the Risk Center has worked with Fannie Mae and the Penn Institute for Urban Research on a review of flooding and the U.S. housing market broadly.

INSURING NATURE

Ecosystems can lower the risks of natural hazards, such as mangroves mitigating storm surge or wetlands storing flood waters. The ability of natural systems to provide these protective services can be damaged, however, by the very same extreme events for which they offer protection. In recent work, Sarah Light and Carolyn Kousky have investigated the role of insurance in promoting both the conservation and the restoration of natural systems. Under certain circumstances, insurance can be a critical tool to help harness the benefits natural systems can provide.

EXAMINING CITIES THAT ADOPT STRONG BUILDING CODES

Strong building codes ensure residential structures are built to face expected perils and can thus improve the resiliency of cities. Most building codes are adopted at the local level and there is substantial variability in the strength and enforcement of local codes. The Insurance Services Office (ISO) Building Code Effectiveness Grading Schedule (BCEGS), initiated in 1995, is an ideal tool to assess and compare the strength and enforcement of local codes. An on-going study by researchers Jeff Czajkowski and Kevin Simmons examines the characteristics of high performing cities in the state of Florida based on BCEGS ratings.

Not surprisingly, the study finds that cities that achieve and maintain high ratings are those facing the highest risk. Beyond risk, cities most likely to have high ratings are more urban and younger with higher levels of education and greater wealth. They also look at cities showing the greatest improvement in ratings across time. Age and education are no longer strong predictors but risk, urbanicity, and wealth continue to be.

When the statewide Florida Building Code was enacted in March of 2001, cities in the panhandle of Florida were exempt from some of the more expensive provisions of the code. One rationale for the exemption was an incorrect belief at the time that violent hurricanes were less likely in this part of Florida. In 2007, the exemption was rescinded and the greatest improvement in ratings for panhandle cities began. By 2017, all panhandle cities were participants in the BCEGS program and as a group, showed the greatest improvement. Rescinding the exemption illustrates the positive role that statewide public policy can have on creating resilient communities.

SOCIAL RETURN ON INVESTMENT FOR PREPAREDNESS MEASURES

A recently published article examined the use of Social Return on Investment (SROI) analysis to evaluate investments in disaster preparedness. The paper outlines the basic method and then discusses several challenges to using SROI in this context: the difficulty identifying all returns, especially spillover benefits; the challenge of separating attribution from contribution; the resources required to value nonmarket inputs and outcomes; the need to adequately address uncertainty; and the limitation of addressing distributional issues in SROI analysis. The paper also explores those issues and the possibility of conducting an SROI of disaster preparedness activities in a case study of Tulsa, Oklahoma.

Risk Communication & Decision-Making Lab

There has been tremendous progress over the years in risk assessment and modeling. Despite these advancements, many decision-makers may not have access to good risk information or may not fully understand or correctly interpret information presented to them. Without well-understood risk information, however, those at risk are not able to make informed choices about risk management. Consequently, the Wharton Risk Center has a long-standing body of research on effective risk communication in a variety of contexts.

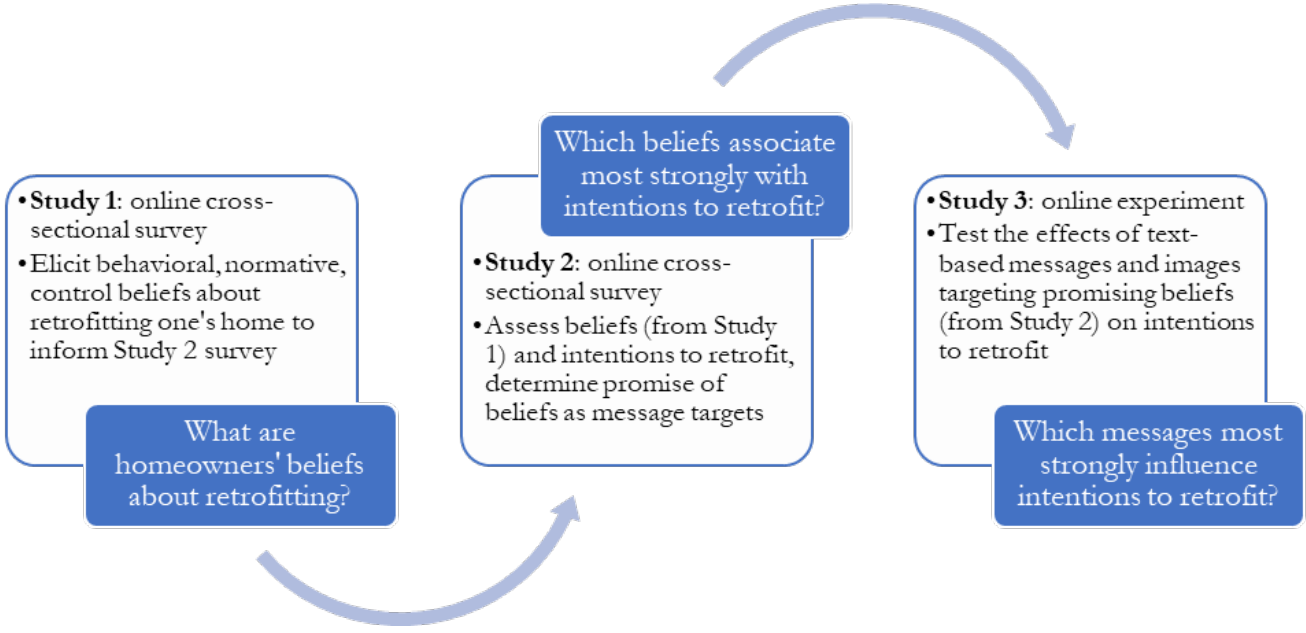
INCREASING MITIGATION THROUGH PERSUASIVE MESSAGING

Wind-related losses from hurricanes are largely avoidable through appropriate property mitigation. However, relatively few homeowners invest in such measures, leaving them at risk of suffering property damage and harm to themselves and their families. With support from the Alabama Center for Insurance Information and Research (ACIIR) at the University of Alabama, the Wharton Risk Center is developing audiovisual messages that aim to increase mitigation activities (e.g., installing a high wind resistant roof) among homeowners in hurricane-prone regions of the U.S. Using theory-driven approaches, researchers from the Center have conducted formative quantitative and qualitative research to identify promising message strategies. Future work will involve experimental studies to test the efficacy of these message strategies in the target population.

How likely is it that you will install a high wind resistant roof with heavier shingles, metal roof panels, or concrete tiles **in the next 12 months**?

- Definitely will not
- Probably will not
- Probably will
- Definitely will

Example question from survey to Alabama and Florida residents.



Schematic of research agenda to increase hurricane mitigation through persuasive messaging.

UNDERSTANDING AND MANAGING 21ST CENTURY RISKS

The Wharton Risk Center has partnered with Decision Research in Eugene, Oregon on a project funded by the Alfred P. Sloan Foundation. The project goal is to better understand how individuals perceive risk and make decisions with respect to risk preparedness.

New developments in computational linguistics tools combined with the availability of extremely large natural language datasets can reveal how common and catastrophic hazards are discussed in everyday language. The research under this grant is comparing findings from text analysis with findings from psychometric surveys for a wide range of hazards. In the work, we are finding that people who choose to buy flood insurance focus on different thoughts and reasons than people who choose not to purchase this coverage.

The project is using web-based experiments and field studies to test hypotheses underpinning strategies designed to motivate individuals to adopt protective measures prior to a disaster. Through this work, we are finding, for example, that presenting the cumulative probability of loss over a longer time period (e.g., a 26% chance of at least one flood over 30 years instead of a 1% annual chance) motivates more people to incur the costs required to protect themselves against rare, catastrophic events. Field experiments further reveal that default options can be used to promote investments in risk-reducing activities. For instance, when additional insurance coverage that could fund mitigation measures post-disaster is a default option, more customers obtain the coverage.

Findings from this research will help identify effective strategies that work with, rather than against, our decision biases and heuristics to improve individual, local, and national decisions about preventing, mitigating, and responding to natural disasters and humanitarian crises and provide guidance for dealing with other catastrophic and common risks.

Climate Risk & Resilience Lab

Society is grappling with the twin climate imperatives of quickly transitioning to a low-carbon economy as well as managing the already materializing impacts of climate change on households, businesses, and communities. The Climate Risk & Resilience Lab is undertaking a range of projects investigating policies and approaches across the public and private sectors for both rapidly reducing carbon emissions and increasing our resilience to the changes the planet is beginning, and will continue, to experience.

CLIMATE RISK SOLUTIONS

The Intergovernmental Panel on Climate Change, summarizing scientific consensus, has warned that to avoid widespread costs from climate impacts, an unprecedented and rapid transition to a carbon-free economy is required. The necessary shift will have economic and distributional impacts at a global scale, both within and across countries. Even if society achieves this ambitious goal, emissions from past decades will persist in the atmosphere causing continued physical risks to households, communities, and businesses and necessitating adaptation investments.

In the summer of 2019, the Wharton Risk Center, the Kleinman Center for Energy Policy, the Penn Program on Regulation, and the Faculty Senate at the University of Pennsylvania hosted a virtual ideation session to generate new solutions for tackling one or more of three interrelated types of climate risk:

Mitigation: How do we reduce emissions rapidly to minimize the risks of catastrophic shifts in earth systems?

Adaptation: How do we reduce the risks of physical climate impacts to households, communities, and businesses?

Transition: How do we minimize the transition risks for businesses and communities as we shift to a carbon-free economy in the face of uncertainty?

Researchers from across multiple schools, departments, and research centers at the University of Pennsylvania proposed thirty solutions to climate risks. These solutions are available at climaterisksolutions.upenn.edu. The solutions span the local to the global, the household to the federal government.

Together, they demonstrate that climate risk management can begin at all scales and in all sectors.

ADAPTATION BLUEPRINT

Coastal areas are dynamic places. Beaches grow and are worn away. Sea levels are rising. Populations and development continue to intensify. Climate change is exacerbating disaster risk. Despite this, public and private policies and—just as importantly—the expectations of residents, often fail to track these shifts along the coast. The framework through which they have been shaped—by design, policy, and markets—over the last half-century is in need of transformation.

The Wharton Risk Center, in partnership with the McHarg Center at the Weitzman School of Design (University of Pennsylvania) and the MIT Norman B. Leventhal Center for Advanced Urbanism teamed up to explore specific solutions for coastal adaptation in the United States. Experts from around the country are contributing chapters to an edited book to be published by Island Press next year. The goals of the book are threefold:

- to reimagine coastal communities that will be resilient and adaptive to changing conditions by harnessing insights from design, planning, law, economics, and other disciplines;
- to identify insights from research that can be incorporated into novel policy approaches and suggest creative new regulatory and planning tools that can anticipate future risks and help communities better adapt to a changing climate; and
- to inventory unmet needs of state and local leaders to develop a bold and relevant new cross-disciplinary research and policy agenda.

THE ROLE OF RISK TRANSFER IN COASTAL ADAPTATION

The Wharton Risk Center has launched a two-year research project, funded by the National Science Foundation and led by Carolyn Kousky, on the role of risk transfer instruments in improving coastal adaptation in U.S. communities. Current tools to finance the recovery from extreme events, and to finance risk reduction as part of that recovery, are not suited to the magnitude of the problem. This project will explore how innovative risk transfer tools can help address four adaptation challenges:

(1) improving recovery for low-income families,
(2) protecting coastal ecosystems,
(3) addressing community fiscal needs post-disaster, and
(4) improving insurance policies to promote mitigation and relocation.

CENTRAL BANKING AND CLIMATE CHANGE RESEARCH PROJECT

Central banks are responsible for oversight of the financial health of nations, including by enacting measures and adopting rules that promote financial stability and reduce financial risk. Their work has global implications. Recently, the central banks of most G-20 nations (though notably, not the Federal Reserve Bank of the United States), formed the Network for Greening the Financial System, which has publicly declared its support for both the goals of the Paris Climate Agreement, and the transparency principles of the Task Force on Climate Disclosures. Ongoing work by research fellow Sarah Light and co-author Christina Skinneris is exploring the role that central banks can and should play with respect to climate change and the extent to which it is a systemic risk within the Fed's scope and mandate.

Behavioral Science & Technology Lab

In recent years, advances in technology have reshaped how, when, and where we make choices. For example, almost 80% of the adult population in the United States now owns a smartphone, with the devices being used not just for mobile communication, but for shopping, banking, information gathering, and entertainment. Additionally, technologies themselves have become increasingly interconnected, augmenting and automating many of the behaviors and decisions in which humans engage. Currently, more than 20 billion smart objects, such as Amazon Echo devices, chatbots, social robots and sensors are connected to the Internet, already dwarfing the 7.35 billion people on the planet. Accompanying these changes has been a flood of data that permits the study not just of how smart devices are being used, but, more critically, how they may be transforming the very psychology that underlies how individuals think, interact, and decide.

HOW TECHNOLOGY IS TRANSFORMING THINKING AND DECISION-MAKING

The Behavioral Science and Technology Lab, led by Bob Meyer and Jonah Berger, was formed to fund and foster research that explores the impact of this technology in a wide range of settings, including disaster risk management, consumer health and finance, and product and service marketing. Activities include:

- ***Behavioral Insights from Text,*** an annual conference initiated in 2018 that draws on the world's leading scholars to discuss how natural language processing and text analysis can be used to shed light on all aspects of human behavior.
- Starting in spring 2020, an annual workshop on ***Artificial Intelligence in Commerce.*** This workshop will be conducted jointly with George Washington University's Center for the Connected Consumer, and serve as a forum for academics and practitioners to share latest findings on how AI is transforming traditional business functions.
- Sponsorship of doctoral student research on human-technology interaction through the Risk Center's Russell Ackoff Doctoral Student Fellowship.

RESEARCH PAPERS COMPLETED IN 2019

The Mobile Truth Serum How Smartphones Enhance Consumer's Willingness to Self-Disclose

Authors: Shiri Melumad and Robert Meyer

As consumers continue to move their online activities to their smartphones rather than their PCs, it is becoming increasingly critical to develop a deeper understanding of how this shift might be altering consumers' behavior online. This research examines a question of particular relevance for firms and managers: Might consumers' willingness to share personal or sensitive information differ when generating content on their smartphone versus PC? Using data from four field and experimental studies in social media posts, restaurant reviews, and survey responses, robust evidence is offered that consumers are more willing to disclose private thoughts and feelings when communicating on their smartphones than PCs. The effect is shown to arise from two unique characteristics of smartphones: the tendency for consumers to associate their phones with greater psychological comfort, and the small size of the device, which leads consumers to narrow their focus on the disclosure task at hand. The enhancing effect of smartphones on self-disclosure yields is shown to have a number of downstream consequences, such as the creation of content that is more persuasive to outside readers, and a greater willingness to answer sensitive questions on surveys. The results suggest that firms may want to encourage customers to provide certain information—or respond to certain sensitive questions—on their smartphones in particular.

The Dynamics of Distortion: How Successive Summarization Alters the Retelling of News

Authors: Shiri Melumad, Robert Meyer, Yoonduk Kim, and Ani Nenkova

Increasingly, information about events and products is conveyed though summaries that may be several steps removed from original content. It is this process that has been argued to give rise to the proliferation of "fake news" and half-truths. Does the process of successive retelling of news events indeed give rise to factual distortion? This question is explored in a large-scale investigation into how news information becomes linguistically altered as it undergoes successive waves of summarization by different writers. Using natural-language processing tools and human judgments of content, the research finds that the retelling of news does not inherently produce new facts, but explains the persistence of "half-truths," where certain facts of stories are accurately retold, but abstracted from the original context that gave them meaning. In addition, there is a bias toward negativity in the facts that are selected for retelling, and the tone with which they are expressed. This evolution is found to be robust across settings that vary the motive for retelling, the context and valence of the original story, and the ability to review several different prior summaries of an event. The work helps explain the rise of negativity that often marks discussion of news events in social media threads.

Political Risk Lab

Political risk, a political change or event that alters the expected returns from economic actions, is not new. Yet, at a time when global economic integration is peaking, fragmentation and competition have become a growing trend in global politics. Analysis of international news stories reveals economic policy uncertainty increased 10-fold in 2019 as the US-China trade war and other conflicts escalated while the vote share for populist parties surpassed the previous historic high reached in 1940.

To bring insights to how companies can manage this complexity, we are proud to announce the launch of the Wharton Political Risk Lab directed by Witold Henisz, Professor of Management at the Wharton School. The Political Risk Lab was made possible thanks to the generous financial support from EY and collaboration with EY's Geostrategic Business Group. The lab is undertaking a program of activity that explores the relationship between political risk, corporate performance, and political risk management.

SURVEY OF 20+ YEARS OF ACADEMIC LITERATURE ON THE IMPACT OF POLITICAL RISK

In August, the Political Risk Lab released a review of the academic literature that analyzed the impacts of political risk on organizations emanating from the transnational, national, or societal levels that highlighted the following key findings:

- **Political risk is rising.** Evidence suggests the incidence of political risk has increased dramatically in the past decade and has become increasingly sophisticated.
- **Political outcomes have a material impact on firms.** The consequences of increasing levels of political risk has impacts on sales, production and operations, research and development, security, finance, regulatory compliance, governance, and reputation.

- **Fragmentation exists in the study and management of political risk.** Political risk is a complex concept, incorporating risks from the transnational level to the local level. The academic and corporate communities tend to focus on discrete risks and discrete impacts rather than taking a holistic cross-functional approach to the management of multiple sources of political risk that could protect firm value and increase growth.

BENCHMARKING THE GLOBAL CORPORATE COMMUNITY

In early October, EY launched a survey of the global corporate community to understand how the business community perceives the political environment, experiences the impact of political risk on corporate performance, and manages political risk. The survey involves both quantitative and qualitative aspects and the Political Risk Lab will partner with EY to analyze its results with the aim of enriching the study of the relationship between the management of political risk and corporate performance. The results of the survey will be shared in the first of a series of annual political risk summits co-hosted by EY and the Wharton Risk Center in 2020.

Funded research projects will analyze the following topics:

- Stakeholder engagement strategies
  - Chinese Belt & Road Initiative projects and their link to conflict as well as opinions of China in the areas surrounding the project.
  - World Bank funded infrastructure projects and their link to conflict, the opinions of countries whose firms are involved in the project in the areas surrounding the project as well as World Bank measures of project performance.
- The impact of conflictual and cooperative relations with environmental NGOs on the outcome of merger and acquisition transactions.
- Impact of political risk on bank balance sheets in the Euro Zone.
- Campaign finance
  - Impact of prior judicial election contributions from corporate donors to subsequent judicial decisions in which corporations are the defendant.
  - Impact of corporate political contributions, appointments of prior government officials and hiring of lobbying agents on outcome of environmental regulatory enforcement actions against corporations.
- Social media campaigns
  - Efficacy of corporate engagement on social media to influence local initiatives to raise taxes on sugar, tobacco and alcohol and restrict genetically modified organisms.
  - Efficacy of NGO engagement on social media to influence opinions of corporations.
- Political risk management strategies of Jewish businesses in Berlin, 1932-1938.

The Risk Center and EY celebrate the launch of the Political Risk Lab in October 2019.

Policy Incubator

The Policy Incubator takes its inspiration from business incubators. A business incubator helps launch and increase the odds of success for creative entrepreneurs or promising product or business ideas. Similarly, the Policy Incubator takes early-stage public policy ideas and provides the support needed to develop them for piloting or implementation.

The Policy Incubator is:

A thought leader, supporting innovative and potentially transformative approaches to building resilience.

A test kitchen, where promising policies are analyzed and researched, giving support and grounding to visionary ideas.

A voice for the public good, committed to resilience opportunities that benefit everyone.

An independent convener, bridging disciplines and sectors, combining perspectives, translating across boundaries, and promoting collaboration through evidence-based policy design and analysis.

A trusted source for independent analysis, workable tools, and implementable solutions.

SUPPORTING FLOOD INSURANCE AFFORDABILITY IN PORTLAND, OREGON

The Policy Incubator teamed up with the Portland Housing Bureau and Reed College economist Noelwah Netusil to investigate the challenges of flood insurance affordability in two neighborhoods of Portland, Oregon. For many low- and middle-income families in these neighborhoods, the price of flood insurance was becoming unaffordable. In response, the Portland Housing Bureau piloted an innovative program to help lower flood insurance premiums through bulk purchase of elevation certificates and insurance consultations. This process also revealed the need for continuing education on flood insurance for agents, a program adopted by Oregon in response. The study team undertook a survey of residents in these neighborhoods to elicit their willingness-to-pay for flood insurance and explored respondents' flood insurance literacy and flood risk perceptions. Findings have implications not just for Portland, but for communities at risk of flooding around the country.

Center Co-Director Howard Kunreuther (right) at a community meeting in Portland, October 2019.

FINANCING THIRD-PARTY WILDFIRE LIABILITIES OF CALIFORNIA'S ELECTRIC UTILITIES

Wildfire risk is escalating in California, as witnessed by the destructive fire seasons in 2017 and 2018. Under a unique legal regime in the state of California, electric utilities are held strictly liable for property damage associated with any wildfire where utility infrastructure is found to have been a significant cause of ignition, even if the utility was not negligent in their risk management actions. These liabilities can reach into the billions. The Wharton Risk Center examined the range of financial mechanisms that utilities could use to access capital to cover this risk, including funded self-insurance, commercial insurance, catastrophe bonds, industry captives, an industry risk pool, and recovery bonds. Such financing also needs the support of state policy reforms to improve wildfire risk management in the face of a changing climate.

DIGITAL DIALOGUES

The Policy Incubator hosts an online series that brings together experts to generate policy solutions to some of the most pressing challenges in disaster resilience. Past dialogues have addressed the following questions:

(1) What specific policies, if implemented, could reduce post-disaster complexity for households and speed delivery of disaster aid to victims?

(2) How can flood risk disclosure be improved?

(3) How can changing flood risk be better communicated to households and communities?

(4) How can federal disaster aid programs be improved to assist low income households?

In each dialogue, experts from academia, nonprofits, and local, state, and federal agencies, shared their insights and proposed policy solutions.

The work of the Policy Incubator is made possible by the generous support of our sponsors: Marsh & McLennan Companies, Pool Re, Risk Management Solutions, and TFIA (an AmWINS company).

Outreach

The Wharton Risk Center widely shares and disseminates its research findings to industry partners, representatives from the public sector, scholars, and students through our publications, events, and other outreach activities.

STUDENT ENGAGEMENT

Fundamental to the Wharton Risk Center's activities is support of student education. Several initiatives support students in research and projects, help develop their skills, and train them as the next generation of experts and leaders.

BOOKS AND PUBLICATIONS

The Risk Center publishes work on an array of topics involving risk management and decision-making. Our policy briefs distill policy-relevant research findings for public decision-makers.

CONFERENCES AND SEMINARS

The Risk Center shares research findings and promotes dialogue and exchange through its conferences, annual corporate sponsor meeting, interdisciplinary seminars, and other project-specific workshops and presentations around the country.

PUBLIC SECTOR INVOLVEMENT

Wharton Risk Center directors and fellows serve on national and international committees involving public sector risk management activities.

SOCIAL MEDIA

The Risk Center has joined Facebook and Twitter to expand outreach and communication. Find us at **@WhartonRiskCtr** and **facebook.com/WhartonRiskCtr**.

STUDENT ENGAGEMENT

The Wharton Risk Center supports student research and professional development in the areas of decision-making, risk communication, and risk management. While the Center has several long-standing initiatives, this year, the Center sought to strategically enhance student engagement by developing new programming for students at the University of Pennsylvania interested in risk and resilience research.

Student Fellows Program

The Wharton Risk Center is piloting a Student Fellows Program in the 2019-2020 academic year that complements students' existing academic experiences by providing research and engagement experience on risk management, resilience, insurance, and public policy topics related to ongoing Wharton Risk Center work or that of our partners. Over the course of the year, student fellows participate in a series of seminars, projects, and activities. They also receive opportunities to interact with Risk Center experts and distinguished visitors.

Our inaugural Student Fellows come from across the University. They are **Amanda Bastelica**, a Masters candidate in Public Administration; **Marina Dauer**, a sophomore double majoring in Environmental Studies and Political Science; **Maeve Masterson**, a sophomore majoring in Sustainability & Environmental Management; **Philip Mulder**, a third-year PhD student in Applied Economics; and **Caroline Murphy**, a junior majoring in Computer Science and minoring in Environmental studies.

For more information on the program, or to sponsor the student fellow program, please email Helen Wiley (hewiley@wharton.upenn.edu).

RUSSELL ACKOFF DOCTORAL STUDENT FELLOWS

The Russell Ackoff Doctoral Student Fellowship program of the Wharton Risk Management and Decision Processes Center provides grants to University of Pennsylvania doctoral students who are pursuing research in decision making under risk and uncertainty. This year, fellowships were awarded to 21 doctoral students at Penn. The fellowships are funded by an endowment provided to the Wharton School by the Anheuser-Busch Charitable Trust. An important component of the Ackoff program is the opportunity for doctoral students and faculty involved in decision research to connect with each other. Recipients of the Doctoral Student Fellowships present their research at the annual Ackoff luncheon in May of each year.

Russell Ackoff Doctoral Student Fellows and Risk Center directors Bob Meyer, Carolyn Kousky and Howard Kunreuther.

HACK-FOR-RESILIENCE AT PENNAPPS XX

This year, the Risk Center and the Insurance Information Institute once again sponsored a "Hack-for-Resilience" route at PennApps, the nation's first student-run college hackathon. Prizes were awarded to the team with the best overall Hack-for-Resilience and the best team that utilized "InsureTech" (i.e., technology innovations designed to improve insurance policies and products). Projects ranged in platform and application, including web development, mobile applications, and autonomous drones. In total, 16 teams participated, developing projects to address diverse challenges in disaster preparedness, response, and recovery.

The winning projects were:

WildFire Protect (1st Prize – InsureTech) is a parametric wildfire insurance product designed to provide immediate payouts to insureds that experience wildfire damage using satellite imagery.
Vivek Mishra, Jeremy Philemon, Siddhant Shenoy

Phoenix (1st Prize – Resilience) is a drone-based tool that helps emergency services monitor wildfires and extinguish them by spraying a suppression agent.
Jaclyn Chen, Ryan Lee, Shrey Pasricha, Michael Wu

PennApps 2019.

ProphetProfit (2nd Prize) is a personal finance app that aims to help people save and grow funds for use in emergency and disaster situations.
Mary Qin, Lucy Yuan, Quincy Chen

Navig8 (2nd Prize) is an application that helps visually impaired people communicate and navigate in disaster situations.
Veer Gadodia, Mohammed Mobasserul Haque, Hritik Sapra, Apoorv Tomar

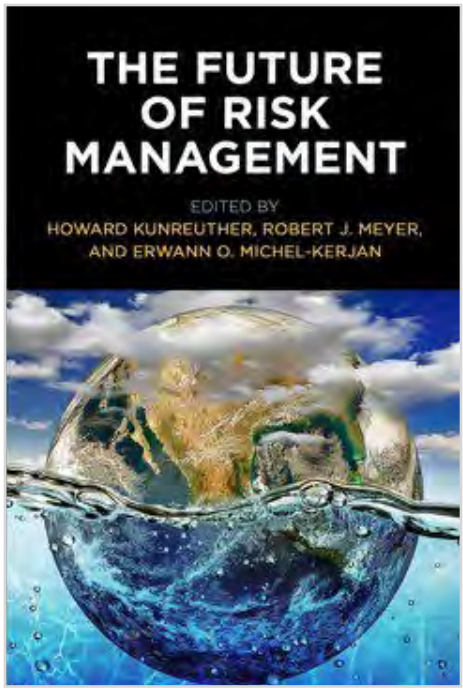
MBA – CLIMATE CAREERS LUNCH

In December, the Risk Center hosted a lunch session for Wharton MBA students. Several Risk Center sponsors spoke about careers in climate risk management. Panelists introduced students to insurance and catastrophe modeling career paths.

STUDENT LISTSERV

On our new Student Listserv, interested Penn students receive updates about upcoming Risk Center events and opportunities. Additionally, the listserv alerts students to other affiliated risk and resilience postings, including events around the University and Philadelphia, grant and funding opportunities, conferences, and internship opportunities.

BOOKS



The Future of Risk Management

University of Pennsylvania Press (2019)

Edited by Howard Kunreuther, Robert J. Meyer and Erwann O. Michel-Kerjan

Contributors: Mona Ahmadiani, Joshua D. Baker, W. J. Wouter Botzen, Cary Coglianese, Gregory Colson, Jeffrey Czajkowski, Nate Dieckmann, Robin Dillon, Baruch Fischhoff, Jeffrey A. Friedman, Robin Gregory, Robert W. Klein, Carolyn Kousky, Howard Kunreuther, Craig E. Landry, Barbara Mellers, Robert J. Meyer, Erwann Michel-Kerjan, Robert Muir-Wood, Mark Pauly, Lisa Robinson, Adam Rose, Paul J. H. Schoemaker, Paul Slovic, Phil Tetlock, Daniel Västfjäll, W. Kip Viscusi, Elke U. Weber, Richard Zeckhauser.

Over recent years, an unprecedented series of large-scale disasters and crises have caused a vast number of fatalities and injuries, destroyed property, devastated communities, imposed significant financial and emotional burdens on individuals and firms, and challenged political leadership.

While significant progress has been made in quantitatively assessing risks, there is also a growing recognition that we need to integrate psychological and behavioral elements into our risk management strategies. Today, the disciplines of finance, geography, history, insurance, marketing, political science, psychology, sociology, and the decision sciences work together to build new approaches.

The essays in this volume provide scholars, businesses, civil servants, and the concerned public tools for making more informed decisions and developing long-term strategies for reducing future losses from potentially catastrophic events.

JOURNAL ARTICLES

Over the past year, Risk Center researchers have produced publications on various topic involving risk management and decision-making. These research articles have been published in leading journals in risk management, insurance, economics, and behavioral science, including:

Annual Review of Resource Economics

Behavioural Public Policy

Duke Law Journal

Environmental Research Letters

Foundations and Trends® in Microeconomics

The Geneva Papers on Risk and Insurance-Issues and Practice

International Journal of Disaster Risk Reduction

Issues in Science and Technology

Journal of Risk and Insurance

Judgment and Decision Making

Land Economics

Mitigation and Adaptation Strategies for Global Change

Risk Analysis

Risk, Hazards, & Crisis in Public Policy

Science of the Total Environment

POLICY BRIEFS

Moving the Needle on Closing the Flood Insurance Gap

In October 2018, the Wharton Risk Center's Policy Incubator hosted a workshop designed to evaluate policy options for expanding the number of people with flood insurance in the United States, particularly those of low and moderate income. In this brief, we present seven approaches that workshop participants felt had the potential to generate substantial increases in take-up rates across the country.

Insuring Against Catastrophic Risks: The Role of Loss Experience and Emotions

One reason that individuals do not purchase insurance is that they are strongly influenced by cognitive biases in their decision process. Two web-based studies reveal that individuals who experienced regret because they were uninsured at the time of a hurricane tended to purchase insurance in the next period. One way to reduce regret for these individuals is to add flood coverage to a homeowners' policy.

Local Solutions to Flood Insurance Affordability: Portland's Flood Insurance Savings Program

Portland, Oregon has adopted an innovative program to help lower income families afford flood insurance. In this issue brief, we examine Portland's Flood Insurance Savings Program in detail, discussing its structure, participants, and impact on flood insurance premiums. We also identify lessons learned that may be useful to other communities struggling with flood insurance affordability and to policymakers considering NFIP reform.

The Mandatory Purchase Requirement: Origins and Effectiveness in Achieving NFIP Goals

After the Mandatory Purchase (MPR) went into effect in 1973, the number of communities enrolled in the National Flood Insurance Program (NFIP) grew rapidly, as did the number of properties with flood insurance coverage. That said, despite the MPR, an insurance coverage gap remains for many properties at risk from flooding. This report examines the motivation behind creation of the MPR and the extent to which it is still meeting original policy goals.

Conferences and Seminars

Behavioral Insights from Text, January 11, 2019

This interdisciplinary event brought together scholars from across the social sciences who use natural language processing and related tools to better understand human behavior. Talks included diverse topics such as psychological drivers of reading online content; effects of mass media and social media coverage of anti-tobacco content on youth; ordering social categories in language; the role of state political parties in American politics; using social media language to understand empathy; and personality traits associated with preferences for media content.

Keynote speaker, Jon Kleinberg, Professor of Computer Science and of Information Science, Cornell University. His research focuses on the interaction of algorithms and networks, and the roles they play in large-scale social and information systems.

Roundtable on Closing the Flood Insurance Gap, Charlotte, NC, June 27-28, 2019

Every major flood event highlights the flood insurance gap among many at-risk households in the United States. AmWINS and the Wharton Risk Center co-hosted a roundtable, chaired by Evan Hecht and Howard Kunreuther, to discuss opportunities for closing this gap. The discussion focused on how state governments, state insurance departments, insurance companies and their agents, the real estate community, financial institutions, and other stakeholders can work together to promote flood insurance among those at risk.

Closing the Gap on Natural Disaster Risk Reduction: Linking Research and Practice, November 9, 2018

Natural disaster losses continue to escalate despite advancements in risk assessment. This conference brought together researchers, practitioners and policy-makers searching for better ways to address natural disaster risk reduction issues. Keynote speaker Jeb Bush, former Governor of Florida and University of Pennsylvania Presidential Professor of Practice, shared his insights on risk management in a dialogue with Howard Kunreuther. Panel discussions centered on the following four topic areas: (1) perceiving and communicating risk; (2) assessing the flood-related risk; (3) disaster financing for resilience; and (4) innovations in risk management.

Governor Jeb Bush opened our November workshop, discussing his experience managing hurricane impacts in Florida.

Gil Gaul presents at The Wharton School in October 2019.

The Geography of Risk: Epic Storms, Rising Seas, and the Cost of America's Coasts, October 2, 2019

The Wharton Risk Center hosted Gilbert M. Gaul, the Pulitzer Prize winning journalist and author of the new book The Geography of Risk: Epic Storms, Rising Seas, and the Cost of America's Coasts (Farrar, Straus and Giroux). The event included a panel discussion with Philip Orton of Stevens Institute of Technology and Howard Kunreuther. Q & A with attendees was moderated by Carolyn Kousky.

PUBLIC SECTOR INVOLVEMENT

The Wharton Risk Center actively engages in policy conversations and works with public sector partners to improve risk-related public policies and programs.

California Climate Insurance Working Group
Carolyn Kousky is the vice-chair of a working group established by the California Insurance Commissioner to find innovative solutions to the risks posed by climate change.

Senate Testimony
Howard Kunreuther testified on June 18, 2019 before the Senate Banking Committee at a hearing titled "The Reauthorization of the Terrorism Risk Insurance Program." He discussed the importance of recognizing and addressing behavioral biases in developing public-private partnerships for risk mitigation as well as the design of risk transfer instruments.

Technical Mapping Advisory Council
Carolyn Kousky serves on the Technical Mapping Advisory Council, a federal advisory committee established to review and make recommendations to the Federal Emergency Management Agency on matters related to the national flood mapping program.

High-Level Advisory Board on the Financial Management of Catastrophic Risks, OECD
Howard Kunreuther serves on the High-Level Advisory Board on the Financial Management of Catastrophic Risks for the Organisation for Economic Co-operation and Development (OECD).

Insurance Information Institute Scholar
Howard Kunreuther and Carolyn Kousky have been appointed to the Insurance Information Institute (III) Non-Resident Scholars program. Non-Resident Scholars are industry practitioners, academics, regulators, and others involved in insurance and related areas. Together with III experts, these scholars enable the III to fulfill its mission to be the trusted source of unique, data-driven insights on insurance to inform and empower consumers.

World Economic Forum
The Wharton Risk Center has been an academic partner of the World Economic Forum since 2005. The Global Risk Risks Report presents the results of the Global Risks Perception survey, in which nearly 1,000 decision-makers assess the risks facing the world.

In the News

MEDIA QUOTES

Carolyn Kousky: “Our building codes and zoning need to keep pace and account for growing risk.”

Washington Post, July 13, 2019

Howard Kunreuther: "In my testimony to the Senate Committee on Banking, Housing, and Urban Affairs, I propose that in analyzing the renewal of TRIA, Congress should consider having the federal government cover cyber losses from a terrorist attack and then recoup their claims payments from the private insurers."

Brink News, July 3, 2019

Robert Meyer: “Public memories of airline disasters tend to fade over time. The reality is that people have short memories.”

Knowledge@Wharton, March 19, 2019

Carolyn Kousky: “Of course, our first response to climate change should be the aggressive pursuit of a carbon-free economy. But just as business-as-usual emissions are no longer tenable, neither is business-as-usual disaster policy.”

Los Angeles Times, February 25, 2019

Howard Kunreuther: “We have a real challenge in adapting to climate change and sea level rise now — taking steps where people generally don’t want to take steps. State [insurance] regulators would have to let insurers charge premiums that reflect risk and at the same time try deal with the affordability issue in other ways, possibly through public-private partnership with the state and the federal government helping low-income people in some fashion.”

Knowledge@Wharton, January 10, 2019

Ben Collier: "It’s great that the market is experimenting...Insurance typically covers property, but households have a variety of additional challenges following a disaster.”

Wall Street Journal, October 20, 2019

Center Team and Partners.

Hi from Risk Center staff, fall 2019

DIRECTORS

Professor Howard Kunreuther, kunreuth@wharton.upenn.edu

James G. Dinan Professor Emeritus, Operations, Information and Decisions (OID) Department, Wharton School, University of Pennsylvania, and Co-Director of the Wharton Risk Center. Howard has a long-standing interest in ways that society can better manage extreme events. He is a Fellow of the American Association for the Advancement of Science, and a Distinguished Fellow of the Society for Risk Analysis.

Professor Robert Meyer, meyerr@wharton.upenn.edu

Gayfryd Steinberg Professor of Marketing, Wharton School, University of Pennsylvania, and Co-Director of the Wharton Risk Center. Bob's research has focused on a range of topics in decision making, for example, linking the much-publicized failures of preparation that contributed to the losses from catastrophic events such as Hurricane Sandy to a number of hard-wired biases in how people respond to risk.

Carolyn Kousky, ckousky@wharton.upenn.edu

Executive Director of the Wharton Risk Center. Carolyn is an expert on issues relating to natural disaster insurance markets, the National Flood Insurance Program, the incentive effects of disaster aid, and policy responses to potential changes in extreme events with climate change. She is the recipient of the 2013 Tartufari International Prize from the Accademia Nazionale dei Lincei. She has a B.S. in Earth Systems from Stanford and a Ph.D. in Public Policy from Harvard.

STAFF

Zoë Linder-Baptie, zoelb@wharton.upenn.edu

Resilience Projects Manager

Zoë's work focuses on risk communication, coastal resilience, and improving local policies surrounding climate adaptation. She holds a B.A. in Urban Sociology and Environmental Studies from Hampshire college, and an MPP and MCRP from the Bloustein School at Rutgers University.

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Research Analyst

Erin's work focuses on the impact of federal loan, insurance, and grant programs on disaster recovery, and whether residential asset prices accurately capture climate change exposure and flood risk. She holds a B.A. in Economics and Government/Legal Studies from Bowdoin College and an MPP from the Harvard Kennedy School of Government.

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Policy Analyst and Project Manager

Helen's work focuses on innovative disaster insurance tools, disaster housing buyout policy, and, more generally, smart climate adaptation strategies. She holds a B.A. in Environmental Policy from Washington University in St. Louis, and an M.Sc. in Geography of Environmental Risks and Human Security administered jointly by the United Nations University and the University of Bonn, Germany.

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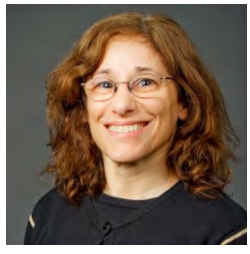
Financial Coordinator



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POSTDOCTORAL FELLOWS

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Reihane Boghrati earned her Ph.D. in Computer Science at the University of Southern California in 2018. Research interests: natural language processing, machine learning methods to investigate psychological phenomena expressed in written and spoken language.

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Lynn's research focuses on behavioral economics. She received her Ph.D. in Behavioral Decision Research from Carnegie Mellon University in 2019, and her B.A. in Economics from Swarthmore College in 2010.

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Elissa completed her Ph.D. in Communication from the University of Pennsylvania. Research Interests: relationship between media messages and risk behavior.

Penny Liao

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Penny's work focuses on environmental and energy economics. She received her Ph.D. in Economics from UC San Diego in 2019, and her B.A. in Economics from the University of Hong Kong in 2013.

Visiting Scholars

The Wharton Risk Center hosts visiting scholars to share ideas and promote cross-institution collaborations. This year, we hosted Dr. Alex Braun and Jantsje Mol.

Dr. Braun is a member of the Executive Board at the Institute of Insurance Economics at the University of St. Gallen in Switzerland. During the fall 2019 semester, he split time between the Wharton Risk Center and Temple University. While in the U.S., his research focused on the potential of securitization as a risk management solution for public risk pools.

Jantsje is a PhD candidate in the Department of Environmental Economics at the Institute for Environmental Studies of the Vrije University in Amsterdam. She visited the Risk Center for a month during the fall 2019 semester to work on a paper analyzing perceptions of flood risk protection.

SENIOR FELLOWS

The Risk Center collaborates with leading scholars from across the University of Pennsylvania as well as outside the University.

Tom Baker

tombaker@law.upenn.edu

William Maul Measey Professor, Law and Health Sciences, University of Pennsylvania Research interests: Insurance law, insurance, risk, and responsibility using methods and perspectives drawn from economics, sociology, psychology, and history.

Jonah Berger

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Associate Professor of Marketing, Wharton School, University of Pennsylvania. Research interests: Word of mouth, social influence, consumer behavior, and how products, ideas, and behaviors catch on.

Sudeep Bhatia

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Assistant Professor, Department of Psychology, University of Pennsylvania. Research interests: Cognitive basis of human judgment and decision making with the use of mathematical and computational models.

Wouter Botzen

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VU University Amsterdam, Institute for Environmental Studies. Research interests: Climate change economics with a particular focus on risk, natural disaster insurance, behavioral economics of decision making under risk, and natural disaster risk assessment and management.

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The K.P. Chao Professor, Professor of Marketing, Statistics, and Education, Wharton School, University of Pennsylvania. Research interests: Bayesian computation, latent variable models, marketing research methods, missing data problems, analytics, psychometrics.

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Richard Perry Professor and Inaugural Director, Perry World House; Professor of Law, University of Pennsylvania. Research interests: International law and global governance.

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Senior Consultant, IHS, Inc. Research interests: Frameworks and methods for measuring intangibles such as resilience, economic effects of strategic decisions and economic impact of policies.

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Edward B. Shils Professor of Law and Professor of Political Science, University of Pennsylvania; Director, Penn Program on Regulation. Research interests: The study of regulation and regulatory processes with an emphasis on the empirical evaluation of alternative regulatory strategies.

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SENIOR FELLOWS

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Alan B. Miller Professor, Professor of Health Care Systems, Wharton School, University of Pennsylvania. Research interests: Health care finance and economics; insurance markets and regulation.

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Garrett Professor of Public Policy & Corporate Responsibility, Columbia University Graduate School of Business. Research interests: Climate change, resources, and environmental economics.

Witold (Vit) Henisz

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Deloitte & Touche Professor of Management in Honor of Russell E. Palmer, former Managing Partner Professor of Management, Wharton School, University of Pennsylvania. Research interests: political and economic reform and transitions, political risk identification and management, project management, rise and fall of neoliberalism, stakeholder engagement.

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Faculty Director, Kleinman Center for Energy Policy, University of Pennsylvania; Lead Investigator, DOE's Energy Efficient Buildings Hub, Philadelphia Navy Yard. Research interests: City and regional planning, economic geography, urban economics, political science, policy analysis.

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EY Professor of Accounting, Wharton School, University of Pennsylvania. Research interests: Cost accounting, intangible assets, performance measurement.

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SENIOR FELLOWS

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Guardsmark Professor, Legal Studies; Director: Initiative for Global Environmental Leadership, Wharton School, University of Pennsylvania. Research interests: Corporate governance, environmental law and policy, environmental management, professional ethics, securities regulation, theories of the firm.

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Michael Platt

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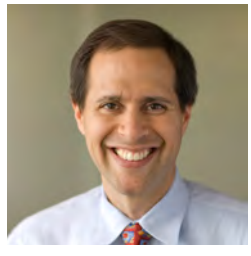
James S. Riepe University Professor, University of Pennsylvania. Research interests: Biological mechanisms that allow people and other animals to make decisions when the environment is ambiguous or complicated by the presence of other individuals.



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Robert D. Eilers Professor, Health Care Management, Wharton School; Professor, Medicine, Perelman School of Medicine; Executive Director, Leonard Davis Institute of Health Economics, University of Pennsylvania. Research interests: Access to health care, economics of the physician workforce, and economic evaluation of medical and behavioral health interventions.

SENIOR FELLOWS

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Associate Professor, Department of Economics, Cornell University. Research interests: Behavioral economics, judgment and decision-making.

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Cecilia Yen Koo Professor, Operations, Information and Decisions, Wharton School, University of Pennsylvania. Research interests: Behavioral decision research, deception and trust, emotions, negotiations.

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Senior Fellow, Resources for the Future. Research interests: Water development projects and ecosystem restoration programs, design of market-like environmental management programs, and increasing the effectiveness of national flood risk management and disaster aid programs.

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CORPORATE SPONSORS

Our corporate sponsors are a vital component of Wharton Risk Center endeavors.

In addition to providing crucial financial support for the Risk Center's operations, our sponsors offer strategic guidance and share insights on our projects. Corporate sponsors make a single or multi-year commitment to either Center activities broadly, to a specific research lab, or to our policy incubator. All corporate partners are invited to attend workshops and conferences and to actively engage with Center researchers. Funders also benefit from visibility and customized relationships across the Wharton School through membership in the Wharton Partnership, the School's primary vehicle for fostering industry-academic collaboration. The Risk Center thanks our corporate sponsors for their support and involvement.

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RESEARCH SPONSORS

Research Sponsors play a crucial role for the Risk Center. Along with providing financial support and collaborating with us on path-breaking studies, Research Sponsors share their expertise and co-host workshops and other events. We thank our Research Sponsors for their partnership.

Alabama Center for Insurance Information and Research, University of Alabama
The Alabama Center for Insurance Information and Research is supporting research at the Wharton Risk Center to improve hazard mitigation among homeowners through persuasive communication.

Alfred P. Sloan Foundation
The Sloan Foundation is supporting joint research by Decision Research in Eugene, Oregon and the Wharton Risk Center to better understand how individuals perceive risk and make decisions with respect to risk preparedness. The research will test strategies to increase individuals' interest in undertaking cost-effective risk reduction measures.

DHS Science and Technology Directorate Flood Apex Program
The Wharton Risk Center has been engaged in several research projects in partnership with the Flood Apex program. This work has included an assessment of the emerging private, residential flood insurance market; exploration of public policies to close the flood insurance gap; mapping flood risk in the U.S. housing market; evaluating the original objectives of the mandatory purchase requirement; and identifying the determinants of voluntary flood insurance purchase.

Geneva Association
The Wharton Risk Center is working with the Geneva Association on a comparative analysis of flood risk management in the United States, Canada, Germany, Japan, the United Kingdom and the Australia.

The Institute for Catastrophic Loss Reduction
The Risk Center is working with the Institute for Catastrophic Loss Reduction to examine participation in the Building Code Effectiveness Grading Schedule (BCEGS) program administered by the Insurance Services Office.

National Science Foundation
Researchers affiliated the Wharton Risk Center are involved in several projects funded by different programs at the National Science Foundation.

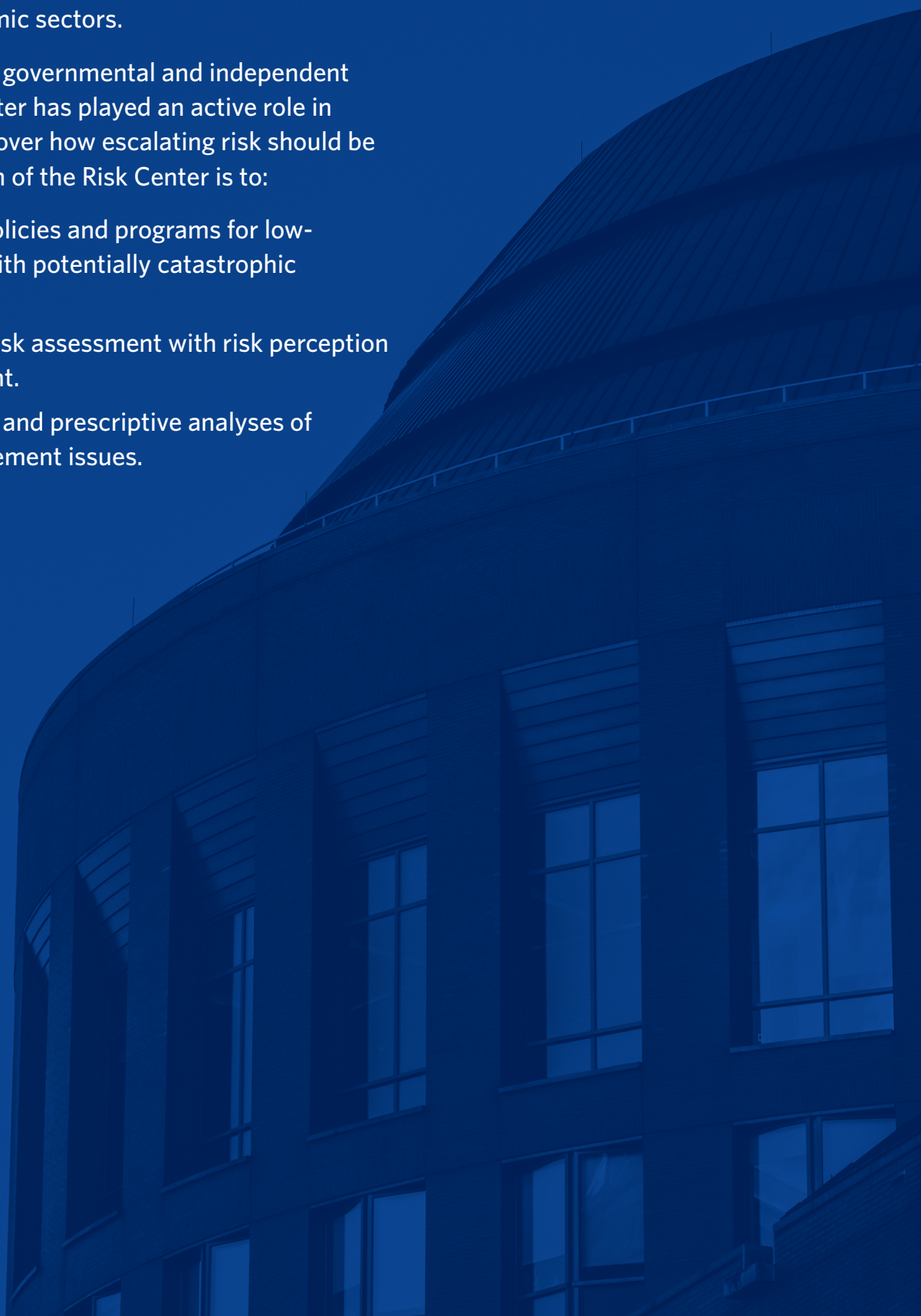
The Travelers Companies, Inc.
The Travelers-Wharton Partnership for Risk Management and Leadership is supporting new research on how the public and private sectors can work together to incentivize individuals, communities, and firms to build their resiliency to extreme events. The partnership with Travelers is allowing the Wharton Risk Center to push the frontier of knowledge and practice on multiple aspects of disaster risk management.

Willis Research Network
The Wharton Risk Center is a member of the Willis Research Network. The Network, created by Willis Re, is a collaboration between academia, finance, and insurance industries.

The Wharton Risk Management and Decision Processes Center, established in 1985, has developed into one of the world's most recognized centers for the study of catastrophe risk management, based both on output and global network of partnerships in the public, private, non-profit and academic sectors.

By developing diverse governmental and independent partnerships, the Center has played an active role in informing the debate over how escalating risk should be managed. The mission of the Risk Center is to:

- Promote effective policies and programs for low-probability events with potentially catastrophic consequences.
- Link the science of risk assessment with risk perception and risk management.
- Conduct descriptive and prescriptive analyses of relevant risk management issues.



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