



CLIMATE DECISION MAKING CENTER Carnegie Mellon University

Insuring Against Global Warming

How will the insurance industry pay for the risks that climate change will bring?

When hurricane Andrew slammed into Homestead, Florida, in August 1992, it left behind 23 deaths and tens of thousands of homes and businesses destroyed. The total insured loss was \$15.5 billion, which hit U.S. insurance companies hard. They weren't prepared to pay for the losses, and eleven companies went broke. Twelve years later, hurricanes in Florida cost about \$23 billion in insured losses, making 2004 the most costly year for catastrophes in the history of insurance.

Hurricane Andrew and its successors prove that weather disasters threaten both the insurance industry and the people it protects. And now, some scientists are predicting more extreme weather events because of global warming, which means the risks could multiply.

Erwann Michel-Kerjan and Howard Kunreuther, risk management researchers at the University of Pennsylvania's Wharton School, are collaborating with Granger Morgan, the director of the Climate Decision Making Center (CDMC), and insurance industry expert Daniel Hoffman to develop a set of decision-making tools for insurance managers who are faced with risks from climate change.

The effect of climate change on insurance matters because coverage provides financial protection, and assures the continuity of social and economic activity when a disaster occurs. People and organizations use insurance as one

of the main methods to manage risks. In the U.S. and in other developed countries, the insurance and reinsurance companies—those that insure other insurance companies—play a key role in economic development and stability.

Economic losses from major natural disasters increased twofold between the 1970s and 1990s, according to the world's leading reinsurance company, Munich Re. Between 1970 and 2000, 38 out of 45 worst insured losses were weather related. Although this rise has been influenced by the increasing activities in hazard prone areas, it raises the important question: how much scientific evidence do we have about the link between global warming, climate change and the occurrence of more extreme natural events?

Besides, as Michel-Kerjan points out, extreme weather is not the only climate-related risk that the insurance industry faces. It also faces other indirect effects.



First, there are liability risks involved in insuring companies that are large emitters of carbon dioxide, one of the main causes of global warming. If someone sues these companies for excessive emissions, insurers may end up paying for large claims.

Second, reinsurance companies are large investors. They can play an important role in the choice of a public company to invest in. In fact, climate change and shareholder interest are becoming more closely intertwined: companies might face increasing pressure from investors to reduce carbon dioxide emissions and to prove that they will reduce their emissions in a cost effective way.

Third, the impact of global warming is likely to create new business opportunities for the insurance and finance industries. For example, insurers could underwrite coverage for new energy-related technologies designed to reduce carbon dioxide, such as capturing carbon dioxide from power generation and other industrial activities and storing it underground. The risks associated with new technologies are either unknown or poorly known, and this in turn is a financial risk to the companies.

Insurers need to understand the risks they face, the new opportunities for providing protection, and the decision options they have. They need to know what kind of insurance coverage is most appropriate for their clients, how to link insurance with methods to reduce risk, and to serve their customers better while keeping their businesses profitable.

Global warming also raises the question of the role of public and private sectors in managing risks and providing protection to potential victims. For example, what would happen if insurers and reinsurers decided to decrease their coverage drastically in certain regions that are more prone to extreme events? What type of risk

<i>US\$ Billion (indexed to 2002)</i>	<i>Event</i>	<i>Victims (Dead and missing)</i>	<i>Year</i>	<i>Country</i>
32.5	9/11 Attacks	3,025	2001	USA
21.5	Hurricane Andrew	43	1992	USA, Bahamas
17.8	Northridge Earthquake	61	1994	USA
11.0	Hurricane Ivan	124	2004	USA, Caribbean
8.0	Hurricane Charley	24	2004	USA, Caribbean
7.8	Typhoon Mireille	51	1991	Japan
6.7	Winterstorm Daria	95	1990	France, UK et al
6.6	Winterstorm Lothar	110	1999	France, Switzerland
6.4	Hurricane Hugo	71	1989	Puerto Rico, USA
5.0	Hurricane Frances	38	2004	US, Bahamas
5.0	Sequake and Tsunami	280 000	2004	Indonesia, Thailand et al
5.0	Storms and floods	22	1987	France, UK et al
4.6	Winterstorm Vivian	64	1990	Western/Central Europe
4.6	Typhoon Bart	26	1999	Japan
4.1	Hurricane Georges	600	1998	USA, Caribbean

Out of the 15 most costly insurance losses between 1970 and 2004 twelve are weather-related.

sharing should emerge between the government and private insurers? The CDMC’s research is analyzing the potential of such public-private partnerships and how they could be formed.

Without such partnerships, existing insurance policies may not be able to handle big disasters. “Hurricane Andrew led to new and different kinds of financial instruments to transfer the risk to the capital markets rather than having them reinsured,” Michel-Kerjan says. Similarly, climate change risks should lead to new tools, but this depends on what the insurance companies feel they can handle on their own and when they will require financial assistance from the capital markets and the public sector.

To define those needs, CDMC researchers plan to hold interviews and workshops with participants from large insurance and reinsurance companies, the academic community, and international organizations such as the World Health Organization and the United Nations Development Programme. Then, they will collaborate with insurance industry experts to develop financial tools for insurers, to help them adapt their policies to climate change and avoid the economic disasters of the past.

The Climate Decision Making Center (CDMC) is an interdisciplinary collaboration between scientists at eight research institutions spanning the U.S., Canada and Germany. The center is anchored in the Department of Engineering and Public Policy, Carnegie Mellon University, Pittsburgh, PA. It is funded by the National Science Foundation and was formed to develop and demonstrate a set of new decision analysis tools for addressing problems which involve high, and often irreducible levels of uncertainty.