At War with the Weather
Managing Large-Scale Risks in a New Era of Catastrophes

Howard C. Kunreuther and Erwann O. Michel-Kerjan
with Neil A. Doherty, Martin F. Grace, Robert W. Klein, and Mark V. Pauly

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Since 2001, we have entered a new era of catastrophes. Our nation is facing large-scale risks at an increasing pace. We are more vulnerable to extreme events as a result of the increasing concentration of population and activities in high-risk coastal regions of the country. The question is not whether large-scale catastrophes will occur, but when and how frequently they will strike and the extent of damages they will cause. Redefining disaster management and new financing solutions are now coming to the forefront of the business and policy agendas in many countries. In fact, we shall all become more involved in a new type of war—a war with the weather.

The recent upsurge in hurricanes, coupled with increasing residential and commercial development in coastal areas of the United States, has exposed people and property to an entirely new scale of destruction, with cascading effects on homeowners, businesses located within these devastated areas, the insurance industry and financial markets, and the public sector. In 2005, three major hurricanes—Katrina, Rita, and Wilma—made landfall in the Gulf of Mexico within an eight-week period, killing over fifteen hundred people, with insurance reimbursements and federal disaster relief of over $180 billion—a historic record. These three storms occurred after four other hurricanes had caused severe damage in Florida in 2004. In 2008, Texas was hit by Hurricane Ike, the third most costly hurricane in U.S. history. The occurrence of hurricanes is highly variable and uncertain from year to year. However, it is unavoidable that in the coming years, more hurricanes will strike the Atlantic and Gulf coasts, and other parts of the nation will experience severe floods and earthquakes, causing extreme damage to residential and commercial property and infrastructure.

Episodes of terrorism share certain similarities with natural disasters. The first successful attack on U.S. soil, against the World Trade Center, occurred in 1993. Over the next eight years, not a single attack was perpetrated by an international terrorist organization in the United States. As time passed, the nation was lulled into a false sense of security. Then Al Qaeda launched its second, and much more devastating, attack on the morning of September 11, 2001.
While terrorism and natural disasters are different, they have several important features in common: uncertainty and wide variances in losses from one year to the next. Experts and decision makers face challenges in assessing the risks associated with these extreme events, developing strategies for reducing future losses and facilitating the recovery process following a major disaster.

Now is the time to develop and implement economically sound policies and strategies for managing the risk and consequences of future disasters. Absence of leadership and concrete actions in this area will inevitably lead to unnecessary loss of lives and economic destruction in the devastated regions.

Guiding Principles

A coherent strategy is necessary to ensure a sustainable recovery from large-scale disasters. This book provides the elements for developing such a program by focusing on the roles of mitigation, insurance, and other risk transfer instruments. These issues are complex. They challenge our capacity as a nation to work together despite very different agendas and priorities regarding the role and responsibilities of the private and public sectors in dealing with catastrophic risks.

Two guiding principles underlie the analyses and proposed strategies for using the insurance infrastructure—one of the largest industries in the world—to deal more effectively with natural disasters:

Principle 1: Premiums reflecting risk: Insurance premiums should be based on risk in order to provide signals to individuals as to the hazards they face and to encourage them to engage in cost-effective mitigation measures to reduce their vulnerability to catastrophes.

Principle 2: Dealing with equity and affordability issues. Any special treatment given to homeowners currently residing in hazard-prone areas (e.g., low-income uninsured or inadequately insured homeowners) should come from general public funding, not through insurance premium subsidies.

This book addresses several basic questions:

- How can these two principles guide the design of insurance and mitigation programs for reducing future disaster losses and providing financial support for victims of these events?
- What roles can the key interested parties affected by natural disasters play in implementing these programs?
- Who should pay (and how much should they pay) to mitigate damages from future natural disasters and the losses that occur following these events?
- How can the analyses detailed in this book help inform private sector decisions and the policy debate in state legislatures and the U.S. Congress?
Focus of the Study

To address these questions, we focus on four states—Florida, New York, South Carolina, and Texas—and metropolitan areas in each of these states—Miami-Dade area, Florida; New York City area, New York; Charleston area, South Carolina; and Houston area, Texas. These regions have been selected because they have the largest property exposure to hurricane risk in the country and present significant differences in insurance market regulation and public/private risk-sharing systems.

Florida presents a specific challenge due to its hurricane exposure, increasing population, and rapid economic development, all of which makes this state a world peak-zone for extreme event coverage and capital allocation. Recently it has been a source of controversy because its state government has intervened in the functioning of the private insurance market more explicitly than in any other state in the country. For these reasons, we devote special attention to Florida, for both the hurricane risk and flood hazards.

Overview of the Book

The fifteen chapters that follow are organized in four parts. Both conceptual and empirical findings are presented using data from several sources (see the Acknowledgments). We highlight each chapter’s key findings at the beginning of the chapter. The relevant analyses supporting these findings are documented in the chapters themselves.

The first four chapters all in Part I detail the factors that have led to a major increase in damage from natural disasters since the 1990s (chapter 1); the current institutional arrangements, including the regulatory environment and private market characteristics for insuring and mitigating risks from hurricanes (chapters 2 and 3); and an analysis of flood coverage provided by the National Flood Insurance Program (chapter 4).

Part II looks at how homeowners make decisions on whether to purchase insurance (chapter 5) and how insurers and reinsurers decide on the amount of coverage to offer and what price to charge for this protection (chapters 6 and 7). New developments with respect to alternative risk transfer instruments involving the capital and financial markets are also analyzed (chapter 8). The last two chapters of Part II provide conceptual and detailed empirical analyses of the factors influencing the demand for and supply of homeowners’ insurance coverage (chapters 9 and 10).

Taken together, our findings reveal that most homeowners do not undertake cost-benefit comparisons in making their insurance purchases. They often choose low deductibles and are likely to underestimate the risk. The analysis also quantifies the degree to which the demand for insurance is sensitive to price. In the four states studied, a given percentage increase in the price of homeowners’ insurance results in a similar percentage decrease in the amount of insurance purchased.
In addition to looking at expected losses, insurers and reinsurers are forced to allocate considerable capital to protect themselves against catastrophic losses to satisfy investors’ and rating agencies’ concerns. There has been a significant increase since 2005 in the use of alternative risk transfer instruments such as catastrophe bonds to complement reinsurance, but these financial instruments still represent a small fraction of capital in the global insurance market. The analysis of the supply of coverage indicates that if regulators suppress rates too much, there is likely to be a severe decrease in the availability of coverage.

We begin Part III by examining what proportion of homeowners in hurricane-prone areas is uninsured, and whether affordability is a significant determinant of insurance status for homeowners residing in these areas (chapter 11). We then provide insight into how homeowners in hazard-prone areas decide whether to invest in cost-effective risk reduction measures and some possible economic incentives for encouraging them to do so (chapter 12). We then examine the impact of the current insurance programs on those affected by the hurricane risk (a status quo analysis). We then determine how much coverage is likely to be made available and what premiums would be charged in a hypothetical unregulated market where rates are determined only by the law of supply and demand (a competitive market analysis) (chapter 13).

Our findings reveal that most people purchase insurance even if they are classified as having income below the affordability threshold. At the same time, most do not mitigate their homes because they cannot justify the up-front investment cost relative to the perceived benefits, due principally to myopia, budget constraints, and underestimation of the risk. Hence, there is a need for well-enforced building codes, tax rebates, zoning ordinances, and premiums reflecting risk that take the benefits of mitigation into account. Should another major hurricane hit Florida in the near future, the state-run reinsurer, Florida Hurricane Catastrophe Fund, might not be able to cover all its losses, and all policyholders in the state will be forced to contribute to help defray these deficits. If insurers were allowed to charge premiums that reflect risk, they would be able to cover most, if not all, of the losses from hurricanes. In that case prices in some hazard-prone areas will be significantly higher than they are today.

Part IV offers proposed strategies to encourage individuals to purchase sufficient insurance and adopt mitigation measures as well as innovative ways to provide enough financial capacity to deal with future large-scale events (chapter 14). We conclude the book with chapter 15, “Winning the War Against the Weather and Other Extreme Events,” which expands our findings to other global risks worldwide. Investment in infrastructure, mitigation, preparation, response and recovery are keys to addressing the challenges we face in this new era of catastrophes. Leadership from top decision makers to define and implement a coherent strategy to achieve these goals is more critical today than ever before.
Moving Forward

Our principal purpose in undertaking these in-depth studies is to examine alternative long-term sustainable strategies for reducing losses from natural disasters and providing financial support to victims of these events.

We are mindful that new alternative strategies may be extremely difficult to implement at this time, because there is a tendency for all of us, whether in the role of homeowner, decision maker in a private or public sector organization, or an elected official at the state, local, or federal level, to focus on short-term crises. However, our nation remains highly vulnerable to large-scale disasters. This calls for decisions by individuals, businesses, Congress, other legislative bodies, and the White House that are based on a sound long-term conceptual framework and well-documented empirical analyses. We hope *At War with the Weather* will contribute to a better understanding of these issues. We look forward to working with key interested parties and top decision makers on the challenges of managing large-scale risks in a new era of catastrophes.

Howard C. Kunreuther and Erwann O. Michel-Kerjan
The Wharton School
Philadelphia, Pennsylvania
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