The Economics of Natural and Unnatural Disasters

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Introduction

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Throughout history mankind has been subject to disasters produced by "Mother Nature" as well as the man-made variety. Only recently, however, have economists understood disasters as economic phenomena to be formally analyzed. Given the magnitude of many recent disasters, their impact on local, regional, and national economies, and the coverage of their consequences in the popular press, it is puzzling that the attention of economists was for so long largely diverted from analysis of these events. Perhaps George Stigler has already provided the answer to this puzzle in his Nobel lecture, where he observed that economists have frequently neglected the study of important current events. He points out, for example, that "during the Industrial Revolution, economists adopted the law of diminishing returns but ignored the most widespread growth of output that the world had yet observed." The explanation that he offered, perhaps tongue in cheek, was that "the scholars who create economic theory do not read the newspapers regularly or carefully during working hours" (1992, p. 61).

We are now observing, happily, a reversal of this practice, as more economists have begun to study the economics of disasters during the past several decades. Although the number of economists who study disasters is still small, the economics of disasters appears to be well on the road to establishing itself as an important subdiscipline in economics.

Why are economists now more likely to pay attention to disasters? As Howard C. Kunreuther and Erwann O. Michel-Kerjan report in their chapter, "Market and Government Failure in Insuring and Mitigating Natural Catastrophes: How Long-Term Contracts Can Help," disasters were, for much of history, regarded as low-probability events. However, they argue that we are now entering "a new era of catastrophes" in which disasters occur with greater frequency and the losses are of

a much greater magnitude than in the past. Why are disasters occurring more frequently and why are the losses increasing? Kunreuther and Michel-Kerjan offer several reasons for the greater magnitude and greater frequency of disasters. One prominent change in recent decades is a significant increase in the population concentrated in urban areas on coasts, which puts more people at risk of losses due to hurricanes and tsunamis. The greater level of economic development in coastal areas has also increased the magnitude of losses. Kunreuther and Michel-Kerjan suggest that global climate change may be at work as well. They point out that of the 20 biggest catastrophes occurring between 1970 and 2004, more than 80 percent were weather-related.

Kunreuther and Michel-Kerjan therefore suggest that the time has come to develop a better strategy for coping with disasters. In their opinion, the recent losses suffered in these catastrophic events suggest that inadequate preparation and inadequate mitigation efforts have been the norm. This, they argue, is due in large part to myopia and misperception of the actual risks, both by potential victims and policymakers.

What do they suggest should be done? Kunreuther and Michel-Kerjan offer several guiding principles designed to stimulate greater mitigation efforts and minimize insurance losses while still offering protection against catastrophe. The primary guiding principle is that insurance should be priced in accordance with risk. They argue that such pricing will create incentives to invest in mitigation efforts, citing substantial evidence for the significant benefits of mitigation. Unfortunately, typical property owners will be unlikely to bear the high up-front cost of mitigation efforts in light of the uncertainty of short-run cost savings. Kunreuther and Michel-Kerjan therefore argue for the development of long-term insurance contracts designed to induce property owners to take a long-run view of the problem. However, they recognize that forces on both the supply side and the demand side militate against the emergence of markets for this type of insurance contract. They therefore suggest government action to help create such markets. They argue that the National Flood Insurance Program might offer the best opportunity to create long-term insurance markets and demonstrate the usefulness of long-term insurance policies and thus encourage their development.

While Kunreuther and Michel-Kerjan are able to demonstrate the potential benefits of long-term insurance arrangements, doubt remains regarding the political will to undertake what is necessary to make them viable. As they point out, private long-term insurance contracts have failed to emerge in part because of government policy. State government insurance regulators have, unfortunately, largely resisted efforts by insurance companies to raise premiums to reflect risks. In fact, there is increasing pressure on state insurance regulators in high-risk states such as Florida to *reduce* insurance rates rather than increase them. The general public often believes that insurance companies have made enormous profits at their expense and that current insurance rates are unnecessarily high due to the greed of insurance executives. It will be a hard sell to convince the public, as well as politicians, who depend on public support, of the necessity of raising rates to reflect risks. While pricing insurance to reflect risks is good economics, such a strategy would entail a high likelihood of loss for politicians who support it.

Anthony M. Yezer's chapter, "Expectations and Unexpected Consequences of Public Policy toward Natural and Man-Made Disasters," focuses on the significance of changes in the expectations of disasters for our understanding of their economic impact. He points out that the infrequency of disasters, the spatial concentration of their effects, and the size of disasters all raise the possibility that the expectations of disasters will change as a consequence of their occurrence. He cites this as a distinguishing feature of disasters in comparison with hazards generally considered. In fact, he claims that this is the most underresearched aspect of the economics of disasters.

Yezer's analysis of the impact of disasters on disaster expectations reveals several possible models of response. His analysis is based on the assumption that disaster expectations are formed on the basis of a comparison of recent disaster occurrences with the historical record. An increase in the frequency of disasters thus raises the expectations of disasters. From this model of disaster expectation he draws conclusions about the relations between economic growth and disasters, the incentives to develop land in disaster-prone areas, and the significance of disaster expectations for insurance markets and public policy toward disasters. Several puzzles regarding the relations between disasters and economic growth, the optimal development of land in hazardous areas,

and the market for disaster insurance can be better understood once one considers that the occurrence of disasters will also change the expectations of disasters.

One of the important lessons he derives from his analysis is the need to distinguish between expected and unexpected disasters in considering the economic impact of disasters. The magnitude of the economic losses a disaster produces depends crucially on the difference between expected losses and unanticipated losses. Among the conclusions Yezer derives from this analysis is that the economic effects of a disaster are dependent not only on the physical severity of the event but also on the extent to which the event and its damage were anticipated. He therefore concludes that government aid to disaster areas should be concentrated on unanticipated disasters. While he recognizes that politically this may not be feasible, he does find evidence that several federal disaster relief policies adhere in some respects to this principle.

Hal Cochrane's chapter, "The Economics of Disaster: Retrospect and Prospect," provides an overview of the development of the economics of disasters. Its insights into reasons underlying the development of the field will be of particular value to readers new to this subject. Cochrane demonstrates that the analysis of disaster mitigation efforts was developed largely as an application of water resource economics combined with insights from the economics of information. He provides an excellent survey of the nature of the cost-loss trade-offs involved in managing hazards as well as a very useful discussion of the value of disaster forecasts in this framework. His application of this model to the case of rising CO_2 emissions and the uncertainty of the forecasts of global warming is a simple but powerful example of the insights that can be derived from the cost-loss model.

Cochrane points out that a correct estimate of losses is a key element in the cost-loss framework. In contrast to Yezer, Cochrane holds the opinion that the housing markets provide little good evidence about the extent to which hazards and particularly disasters are capitalized in housing and land values. As a result he concludes that analysis of housing and land market values offers an inadequate measure of the willingness to pay for safety. He also points out that disasters yield several distinct sorts of losses that are contentious and difficult to measure, including the loss of cultural community and assets of a historical nature.

The chapter concludes with a discussion about the use of input-output analysis as a means of measuring the impact of disasters on local and regional economies. In Cochrane's opinion, input-output analysis, while a useful tool in the right context, has a fatal flaw in its application to disasters, in that it is incapable of addressing the impacts of the supply-side bottlenecks in local and regional economies that occur in the aftermath of disasters. Input-output analysis does not account for insufficient capacity. It is driven by variations on the demand side and thus is inadequate to analyze the supply-side shocks so common in disaster situations. Other techniques such as computable general equilibrium models and econometric analysis are also found wanting in important respects. Cochrane concludes with the advice that the unique nature of these events implies that it might be difficult to draw general lessons about the impact of disasters and to predict the pace of recovery, when such analysis is often based on factors present in the predisaster setting but absent in the postdisaster environment.

While much of the literature in the economics of disasters focuses on market failures and the role of government in postdisaster relief efforts, Peter Boettke and Daniel Smith, in their chapter, "Private Solutions to Public Disasters: Self-Reliance and Social Resilience," examine the much-neglected role of the private sector and markets in the postdisaster recovery process, using post-Katrina New Orleans as an example. They point out that while most of the discussion is focused on the role that government should play, one needs to consider the important role that private entities—both for-profit and nonprofit—can and do play in the recovery process. Furthermore, they argue that one should also consider that the attempts by private entities to cope with the recovery process are often thwarted by government actions both pre- and postdisaster. For example, in New Orleans, government policies encouraged people to locate in flood-prone areas and left them vulnerable to loss because of inadequately constructed levees. In the aftermath of Katrina, occupational and building code regulations thwarted private recovery efforts and distorted the set of price signals necessary to ensure efficient use of the available resources.

Boettke and Smith argue that the price system and private efforts must be and have been an integral part of disaster recovery. However, in disaster situations we are likely to want to suspend the use of the market

and distort the price signals necessary to help with the recovery process, perhaps out of public concern to keep someone from profiting at the expense of others. But Boettke and Smith argue that the pursuit by entrepreneurs of profitable opportunities created by the disaster is the basis of the economic recovery and that efforts to thwart those pursuits are misguided and delay the recovery. Ironically, for-profit entities often were the most civic-minded, responsive, and generous to the community in the aftermath of Katrina.

Daniel Sutter and Kevin M. Simmons, in their chapter, "The Socioeconomic Impact of Tornadoes," point out that tornadoes constitute one of the most common and frequent forms of disaster; they occur in all 50 states and throughout the year. The authors concentrate on three issues: the trend of losses due to tornadoes, the role of the National Weather Service's tornado warning program, and the cost-effectiveness of several tornado loss-mitigation strategies. Their research yields some surprising results. They estimate that the largest segment of losses caused by tornadoes—approximately two-thirds of the total—is the opportunity cost of time spent under tornado warnings. That so much of the cost can be attributed to time spent under warnings is partly accounted for by the steady decrease in the losses attributable to tornado fatalities during the past half-century.

The paper devotes considerable discussion to the factors contributing to tornado losses, including the time of day, the severity of the winds, the location of the storm, and even the day of the week. However, of greatest interest to economists will be the authors' discussion of potential ways to minimize tornado losses and their estimates of the cost-effectiveness of several mitigation strategies. Sutter and Simmons find that attempts to minimize the time spent under warning have the greatest potential, given that this time is the largest component of costs. They claim that the recently adopted use of Storm-Based Warnings by the National Weather Service has the potential to reduce losses by as much as $1 billion per year. In addition, increasing the lead time of warnings also appears to be a cost-effective strategy, up to a point.

Conversely, Sutter and Simmons find that tornado shelters are rarely cost-effective means of reducing casualty losses, in that the cost to save a life exceeds the value statistically assigned to a life. They estimate that even with the widespread use of shelters in a tornado-prone area

like Oklahoma, it would cost about $57 million per life saved. However, they do find that significant value has resulted from the more stringent regulation of manufactured home construction mandated by HUD in 1994. They find that these regulations have reduced losses stemming from casualties significantly and in a relatively cost-effective manner, especially when compared to the cost of building shelters.

The chapters presented here give the reader a sample of the sort of research now being undertaken on the economics of disasters. Several themes long dominant in this literature are thoroughly discussed. These include the ability of potential disaster victims to accurately assess the risks they face, the role of incentives in ensuring that mitigation efforts are undertaken, the adequacy of our evaluation of the impact of disasters on economies, and discussion of the effectiveness of current government policies toward disaster prevention and relief. These will in all likelihood continue to be topics of discussion in the future as well. I hope the following chapters will give readers insight into the current state of debate on these issues.

Reference

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