14 Prevention of Surprise

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Summary. Today there is common agreement that human actions are resulting in increasingly large-scale – even global – risks. Yet there seems to be a universal inability to stop these human, environmental and economic effects. In this chapter we consider the management of surprise in the framework of a wide spectrum of hazard levels. For instance, a reduction in greenhouse gases might reduce the probability of extreme climate changes. We have developed a general model for controlling extreme hazards. We first examine the dynamic behavior of a single global society and derive various optimal response strategies to counter the hazard. However, in real life such a global hazard management system does not exist due to a lack of international cooperation among nation states. A gaming model is constructed to elaborate the implications of hazard management when more nations are involved, and when expectations about the hazard are imperfect. While the models involved in this analysis are simple, the results from our numerical experiments are instructive and yield interesting insights into the economics of various institutions governing the interaction of societies and their capacity to mitigate risks. We discuss the outcome of the models in terms of its bearing on modern politics as well as what it might mean to the dangers that await us in the future.

14.1 Introduction

The large-scale disasters of the past few years – such as the recent hurricanes, unusually extensive flooding, devastating bushfires, violent ice storms in many parts of the world, as well as the emergence of previously unknown infectious diseases – have brought home to governments the realization that something new is happening to our global society. Such mega-risks have the potential to inflict considerable damage on the vital systems and infrastructures upon which our societies and economies depend, and create serious difficulties for traditional risk management and risk-sharing actors, such as the insurance industry. Preparing to deal effectively, in an anticipative and cooperative manner, with the hugely complex threats of the twenty-first century is a major challenge for decision makers in government and the private sector alike. In today's world, mankind is confronted with the following questions related to the disaster management process:

1. How do we deal with the large uncertainties and knowledge gaps about the hazards we are creating in a globalized world?

2. What are the best and/or sufficiently robust response strategies to control the hazards we create?
3. How can we design global institutions to implement these preventive measures?

However, we can only currently assess the hazard process imperfectly, and even the evolutions of the basic drivers of global hazards can only be poorly predicted. Today, we can observe three large-scale processes acting as drivers of global risks and opportunities: (1) deep global integration of mainly economic actor networks and intensification of interaction around the globe; (2) a transformation in humanity's relationship with its life-supporting systems due to new technological capabilities, and (3) the ever-increasing number of people occupying space and depleting resources due to increased consumption. These processes can be regarded as an exceptional confluence of three sets of powerful changes that give rise to self-reinforcing mechanisms of economic growth and concomitantly increasing hazard levels. It is precisely the reinforcing relationship of the basic drivers that are present during the Anthropocene that alters the nature of the risks that we have historically experienced. Risks can no longer be regarded as exogenous to human actions; on the contrary, the mega-risks of the twenty-first century are endogenously "produced" by human action. The central focus of this paper is that most of the systematic risks of the twenty-first century are new and socially produced. Yet, we may be unaware of some of these major hazards socially due to knowledge gaps (ignorance), uncertainty or social discounting of these endogenously produced risks. Discounting arises from the fact that humans do not communicate with their environment per se, but with a self-created image of that environment. This gives rise to imperfect assessments of risks and insufficient individual responses to danger.

Navigating and managing under deep uncertainty is the principal challenge to global governance. Differences in the urgency to react to global hazards as well as differences in the economic actions performed to lower risks are the main drivers of many international negotiations such as those around climate change. The question of whether to halt or delay measures to manage global risks is related to uncertainty management. Uncertainty is, in many cases, used to postpone actions. Thus, the biggest anxiety for conducting government operations is anticipating future conditions as perfectly as possible and raising the awareness of major hazards. It seems remarkable how infrequently the problem of managing under deep uncertainty is taken up in daily political discourse. One reason might be that negotiators prefer certainty in the prediction of outcomes and flexibility in terms of choices of outcomes. However, in the presence of continuous technological, social and environmental change, uncertainty about the global mega-risks we create is a defining feature of the "socially" absent character of most hazards. Our lack of knowledge about future outcomes is not a failure of due diligence on our part. Rather, it is an inherent outcome of the biophysical as well