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Assessing the near-term risk of climate uncertainty: Interdependencies among the U.S. States

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Assessing the Near-Term Risk of Climate Uncertainty: Interdependencies among the U.S. States The uncertainty associated with climate change and its impacts makes it difficult for policymakers to determine the priority they should accord climate change risks. While current best estimates of global warming by the year 2100 forecast a rise in the global mean (average) temperature on the order of 2^{o} to 4^{o}C, the uncertainty of these estimates is relatively large. Various studies have attempted to define this uncertainty, which has been characterized as the °™long tail in statistical terms. Contribution to risk from the tail conditions may be much larger than those associate with the even more probable mean estimate. This study demonstrates a risk-assessment methodology for evaluating uncertain future climatic conditions. We estimate the impacts from responses to climate change on U.S. state- and national-level economic activity from 2010 to 2050, noting the impact on the population and businesses as they respond to changing climatic conditions. To understand the implications of uncertainty on risk and to provide a near-term rationale for policy interventions to mitigate the course of climate change, we focus on precipitation, one of the most uncertain aspects of future climate change. We use results of the climate-model ensemble from the Intergovernmental Panel on Climate Change's (IPCC) Fourth Assessment Report (AR4) as a proxy for representing climate uncertainty over the next 40 years, map the simulated weather from the climate models hydrologically to the county level to determine the physical consequences on economic activity at the state level, and perform a detailed 70-industry analysis of economic impacts among the interacting lower-48 states. We determine the industry-level contribution to the gross domestic product and employment impacts at the state level, as well as interstate population migration, effects on personal income, and consequences for the U.S. trade balance. We specifically analyze how consumers and industries respond (adjust) to the changing economic and physical conditions created by climate change. These responses attempt to lessen the economic impacts that would otherwise occur, and thus any integrated economic assessment needs to incorporate the actions that people autonomously take to compensate for negative events. The methodology underlying our analysis, which is implemented through the REMI model, is based on historical response patterns of industries and consumers--how real people in business and on a personal level have behaved in the past to changing economic conditions, policies, and events. We show that the mean or average risk of damage to the U.S. economy from climate change, at the national level, is on the order of $1 trillion over the next 40 years, with losses in employment equivalent to nearly 7 million full-time jobs.

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