B★SCHOOL *for* PUBLIC POLICY

Better-informed policymaking through a deeper understanding of economics.

Summary: Insuring High Risks Fairly, Protecting Individuals Against Flood Losses

Seminar by Professor Howard Kunreuther

The National Flood Insurance Program (NFIP), which provides federally administered flood insurance, is up for reauthorization in September. Since its inception in 1968, the NFIP has been amended several times. The Biggert-Waters Flood Insurance Reform Act of 2012 was written to address the insolvency of the NFIP by moving to a risk-based premium model for many homes in flood-prone areas, some of which were being charged a subsidized flood insurance premium. Implementation of Biggert-Waters was delayed, however, with the passage of the Homeowner Flood Insurance Affordability Act of 2014. With the continued concern over the financial solvency of the NFIP, the reauthorization will need to address two core questions: (1) What does it mean to implement a risk-based premium? And (2) What does it mean to deal with issues of fairness and affordability?

NEW ERA OF CATASTROPHES

With a higher degree of urbanization, more people are moving into coastal areas, thus the value of property subject to flood and hurricane damage is increasing. As of 2012, the insured value located in U.S. coastal counties from Texas to Maine was $15 trillion. Since consumers currently tend to purchase too little insurance or purchase it only after a disaster has occurred, and as there is limited insurance to cover the damage to infrastructure from natural disasters, taxpayers wind up bearing substantial burdens for paying reconstruction costs from extreme events. The 2005 and 2012 hurricane seasons alone cost taxpayers nearly $150 billion. An article in Climatic Change (March 2015) reports that flood and hurricane-related storm surge damage from climate change could cost U.S. coastal areas approximately $1 trillion by the year 2100. Improving the NFIP is essential for managing such risks.

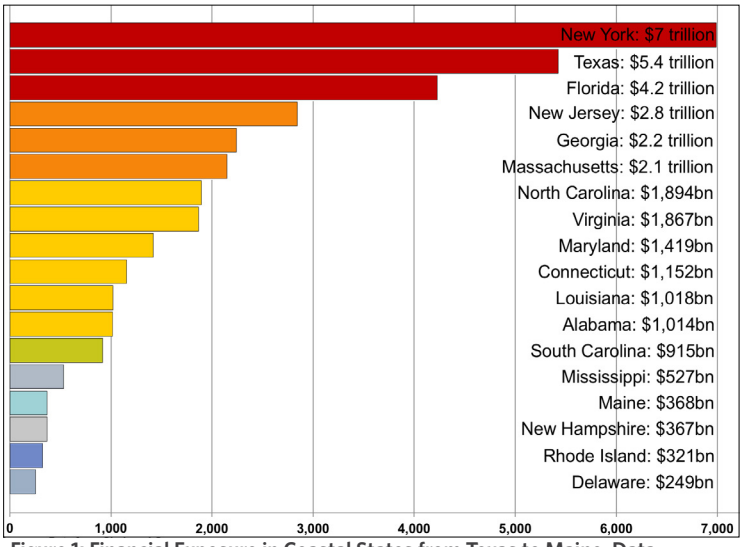

Figure 1: Financial Exposure in Coastal States from Texas to Maine, Data from Clark and Co., 2012

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BEHAVIORAL ECONOMICS AND LOW PROBABILITY EVENTS

Daniel Kahneman, psychologist, author, and recipient of the 2002 Nobel Prize in Economics, has written extensively on the role that intuitive and deliberative thinking play in making decisions. Intuitive thinking relies on simple associations and past experience, and is heavily influenced by biases and simplified decision rules. People do very well using intuitive thinking to make decisions on daily occurrences, but when it comes to handling low probability events, intuitive thinking puts people at a disadvantage. Deliberative thinking, on the other hand, is more effortful and systematic, involves long-term strategy and takes into consideration cost-benefit tradeoffs. Legislation and public policies that encourage deliberative thinking reinforce the need for individuals to mitigate risk and purchase adequate insurance.

Economic incentives can encourage deliberative thinking. Example:

Mr. Jones needs to decide whether to elevate his house in order to mitigate the risk of flood damage. Instinctively, Mr. Jones is likely to approach the problem with intuitive thinking and consider the problem in the short-term, comparing the upfront costs of elevating the house against the expected benefits from loss reduction. The long-term benefits of elevating a house take into account the life of the house, approximately 20-30 years, but Mr. Jones only thinks about the benefits over the next two to three years.

If Mr. Jones were offered a low interest loan that was tied to his property, however, he would have far greater incentive to consider the longer-term benefits of elevating his house, thus reducing his risk of catastrophic property damage, particularly if he learned that his insurance premium would be reduced to reflect the lower claims from future flood and hurricane-related losses.

DESIRABLE FEATURES OF A RENEWED NFIP

In order to encourage long-term, deliberate decision making by property owners in high-risk areas, the NFIP should include two measures that allow for risk transparency. The first is risk-based premiums. Under the current NFIP model, some insurance premiums are subsidized and these property owners have little incentive to take steps for risk-mitigation. Premiums need to reflect risk as a means of signaling to individuals how safe or exposed they are, as well as the extent to which preventive or protective measures can reduce their vulnerability to losses (and, in turn, lower their premiums). In order to have risk-based premiums, the NFIP must also ensure accurate mapping of the flood risk and potential damage to individual structures. (Some states do this already. For example, North Carolina has mapped every single structure in the state using Lidar technology, showing its elevation and potential for flood related damage, as well as its average annual loss.)

If insurance premiums are purely risk-based, however, the costs to some homeowners will increase dramatically. The NFIP therefore needs to deal with fairness and affordability issues by including measures that will offer financial assistance to low-income individuals currently residing in hazard-prone areas. The goal should be to provide sufficient assistance to temper the full risk-based premium—for instance, through vouchers coupled with low-interest loans or grants for mitigation projects—so that the premium becomes affordable. Policymakers can look to other voucher programs, such as food stamps, low-income home energy assistance programs, and the Universal Service Fund as models for assisting those who need it.

The Math—How to Determine a Flood Risk-Rated Insurance Premium

Elevation of the structure: identified on an elevation certificate in relation to Base Flood Elevation (BFE).

Nature of the hazard: probability of floods of different water surface elevations that could cause damage to the structure. (Let p_i = probability of water surface elevation of *i* inches.)

Damage to the structure: inundation depth-damage functions, based on an engineering assessment of how much it will cost to repair after an incident. (Let D_i = damage to structure if water surface elevation is *i* inches.)

Average annualized loss (AAL) from floods: likelihood of floods of different water surface elevation multiplied by damage to the structure. ($\Sigma p_i D_i$)

CONCLUSION

Due to the effects of climate change, there will undoubtedly be an increase in intense weather patterns and resulting catastrophic events, both on the coast and inland. The challenge of mitigating the impact and paying for repairs must be dealt with through well-designed public policy that integrates concepts of behavioral economics to encourage long-term, strategic decision-making. Features of this program would include risk-based insurance premiums, cost-effective mitigation incentives, and financial assistance for those who will be hit hardest by the change in policy.