

# Why is reforming natural disaster insurance markets so hard?

By Katherine R. H. Wagner

## KEY TAKEAWAYS

- Policies related to natural disaster insurance are evolving, but reform is not straightforward.
- Homeowners may not buy natural disaster insurance if their perception of risk doesn't match reality, and insurers may be reluctant to sell insurance if they cannot also insure themselves in capital markets.
- A single natural disaster could bankrupt insurance companies and devastate homeowners without insurance.
- New policies should reflect the challenges that these infrequent, spatially correlated, and catastrophic disasters create.

Hurricane season is upon us, bringing with it increasing threats to homes and their owners, as well as to insurance markets. The past 20 years account for 75 percent of total real hurricane damages that have occurred during the last century. More generally, public flood insurance payouts in the United States have increased twentyfold in the past two decades (Gaul, 2019). The U.S. National Oceanic and Atmospheric Administration forecasts a continuation of this trend during the 2020 Atlantic hurricane season, which began officially on June 1.

Perceptions of risk and beliefs about climate change are evolving as multi-billion-dollar catastrophes such as Hurricane Katrina and Northern California's Camp Fire become more frequent. A majority of Americans now believe that extreme weather will pose a risk to their community within the next 10 years (Leiserowitz et al., 2020). Natural disaster insurers, such as the U.S. National Flood Insurance Program (NFIP) and the California Fair Access to Insurance Requirements (FAIR) Plan, are also concerned about the severity of future weather events.

Public officials are grappling with how to reform these markets to provide adequate coverage to homeowners while simultaneously remaining solvent. These markets were established more than 50 years ago to provide access to insurance against the effects of floods and wildfires, but the underlying risk distributions of these natural hazards look very different today.

Redesigning natural disaster insurance markets to more accurately reflect current natural hazard models is not straightforward. Unlike more commonly studied insurance types such as health or unemployment, natural disaster insurance contracts pay out only when infrequent, spatially correlated, and catastrophic losses occur. This policy brief highlights how these distinguishing market features complicate natural disaster insurance market reform and discusses policy solutions.

## Infrequency

The infrequency of natural disasters can change homeowners' perception of the expected benefit of an insurance contract. Existing research documents that homeowners often underestimate the likelihood that they will experience a natural disaster (e.g., Bakkensen and Barrage, 2019; Royal and Walls, 2019). For example, Bakkensen and Barrage (2019) find that homeowners in high-risk flood zones have lower perceptions than average of the risk that their house will be flooded; 40 percent of these homeowners are “not at all worried about flooding in the next decade.” Homeowners become more likely to purchase flood insurance in the years following a flood, which suggests that suffering a natural disaster corrects this belief, at least temporarily (Gallagher, 2014).

An inaccurate view of the distribution of risk can reduce demand for natural disaster insurance. Homeowners who have never experienced a natural disaster may not perceive an actuarially fair insurance contract as a worthwhile purchase. Willingness to pay for flood insurance, for example, is surprisingly low: Only about half of homeowners in high-risk flood zones are willing to pay an amount equal to their expected benefit for insurance (Wagner, 2020). Risk misperception appears to play a plausibly important role in this low uptake. The wedge between willingness to pay for insurance and its expected benefit makes it difficult for private insurers to sell contracts at prices that will allow them to remain profitable.

Misperception of the benefits of natural disaster insurance has important implications for policy.

First, it is more difficult to use insurance premia to provide accurate signals about risk. Premia increases that insurers contend are needed to align flood and fire insurance rates with current risk levels appear likely to drive many homeowners out of these insurance markets (Wagner, 2020). Second, it suggests that information provision may play an important role in natural disaster insurance reform. Current initiatives to update risk maps

and disclose risk information when a house is sold may encourage homeowners to participate more actively in these markets going forward.

## Spatial correlation

The spatial determinants of natural hazards tie natural disaster insurance markets to housing markets. This is a key difference from most health and unemployment insurance risks, which are primarily determined by characteristics of people rather than features of the natural and built environment. Historically under-priced insurance encouraged further development of high-risk areas with highly desirable amenities, such as beach access and coastal views. Increasing insurance prices or rescinding insurance coverage have the potential to reduce house values in these at-risk areas, and since local property tax revenues depend on house values, local governments have vehemently opposed natural disaster insurance reform (Gaul, 2019).

The spatial correlation of loss events also creates financing challenges for insurers. The U.S. insurance industry is state-regulated, and many private insurers focus on selling contracts in specific regions. These companies risk bankruptcy if many of their clients make claims in the aftermath of the same flood, fire, or earthquake. Private flood insurers, for example, decided that flood risk was uninsurable after the severe Mississippi floods of 1927. The public NFIP, created in 1968 to address these insolvency concerns, is itself insolvent, with a debt burden in excess of \$20 billion (NAIC, 2017). As a result, reform requires not only re-evaluating the design of insurance markets but also rethinking the role of reinsurance markets.

Reinsurance markets offer insurance to insurers, typically by smoothing risk across multiple countries and perils. Private fire insurers may struggle to meet their obligations after a large wildfire in California, but their solvency could be improved with the assistance of a reinsurer that offsets California wildfire risk with uncorrelated risks from Canadian floods, for example.

The amount of reinsurance coverage issued against natural disasters has tripled in the last 10 years and continues to increase in importance (Aon, 2020). These new options seem likely to be an important consideration in policy discussions in the future.

## Catastrophe

In this unusual setting, insurers face a mismatch between smooth inflows of premia revenue and large outflows of claims payments. Infrequent realizations of risk and spatial correlation of losses are less important if the amounts at stake are small. By contrast, a single natural disaster can bankrupt an insurer. The 1994 Northridge earthquake in California, for example, caused insurers comprising over 90 percent of the property-casualty market in the state to either exit the market or severely restrict the types of coverage that they would sell (Jaffee and Russell, 1997). Flood insurance claims paid by the NFIP in the aftermath of Hurricane Katrina in 2005 exceeded the cumulative total of the previous 37 years (Gaul, 2019).

While standard economic models of insurer behavior assume that insurers can break even in any given year, such models “do not apply to risks that cannot be diversified, i.e., the risk of nuclear war (or of a flood or a plague)” (Rothschild and Stiglitz, 1976). Instead, in the absence of reinsurance markets, natural disaster insurers would be required to maintain large quantities of liquid capital as a quite literal rainy day fund. Accumulating such a capital stock is particularly challenging because increasing natural disaster insurance premia has been politically unpalatable, leading reinsurance to look more attractive as losses mount.

However, the current regulatory environment does not generally incentivize risk smoothing through either capital accumulation or reinsurance markets. Industry regulators may be less likely to approve premia increases if there are substantial amounts of cash-on-hand. Such catastrophe reserves are not tax-deductible under U.S. tax law — unlike in many European countries. Property-

casualty insurers in California are also limited in the extent to which they can pass the costs of reinsuring wildfire risk through to insurance rates (CDI, 2018).

One blunt solution to private insurers’ unwillingness to sell natural disaster insurance contracts has been to mandate market participation, as California did in 2019 by prohibiting wildfire insurers from dropping high-risk homeowners. More efficient reforms are hindered by the relatively limited incentives for private insurers to participate in these markets.

## Going forward

Natural disaster insurance policy is beginning to evolve to reflect the changing distributions of underlying risks. Efficient reforms should be tailored to the particular challenges that the features of these markets create. On the supply side, reform could encourage participation of private insurers by facilitating access to capital markets that enable reinsurance and diversification.

However, government intervention in natural disaster insurance markets may be required, because private markets cannot break even if homeowners are unwilling to pay their own insurance costs. On the demand side, then, government agencies should make accurate risk information available to homeowners. Private insurers may not have the incentive to provide such information because they will not capture its full benefit. But up-to-date risk data would allow homeowners to make informed insurance purchase decisions and convey accurate signals about risk through house prices.

Another demand-side policy solution is to require homeowners to purchase natural disaster insurance, which would make homeowners better off should they misperceive the benefits of this insurance. The NFIP, for example, already requires homeowners to purchase flood insurance if they hold a federally backed mortgage, but historically this mandate has been poorly enforced (NRC, 2015).

The scientific community predicts that climate change will cause more severe weather events in the future (IPCC, 2018). Natural disaster insurance markets seem likely to play an increasingly important role in mitigating effects on homeowners. However, natural disaster insurance reform is reactive policy, a consequence of previous inaction to reduce greenhouse gas emissions. Hopefully, insurance reform can be coupled with future climate change policies with the goal of avoiding additional extreme weather events that make these markets necessary in the first place.

## References

- Aon (2020). Reinsurance Market Outlook: January 2020. Technical report, Aon plc.
- Bakkensen, L., and L. Barrage (2019). Flood risk belief heterogeneity and coastal home price dynamics: Going under water? NBER Working Paper No. 23854.
- CDI (2018). The availability and affordability of coverage for wildfire loss in residential property insurance in the wildland-urban interface and other high-risk areas of California. Technical report, California Department of Insurance.
- Gallagher, J. (2014). Learning about an infrequent event: Evidence from flood insurance take-up in the United States. *American Economic Journal: Applied Economics* 6 (3), 206-233.
- Gaul, G. M. (2019). *The Geography of Risk: Epic Storms, Rising Seas, and the Cost of America's Coasts*. Sarah Crichton Books.
- IPCC (2018). Special report: Global warming of 1.5 degrees c. Technical report, Intergovernmental Panel on Climate Change (IPCC).
- Jaffee, D. M., and T. Russell (1997). Catastrophe insurance, capital markets, and uninsurable risk. *The Journal of Risk and Insurance* 64 (2), 205-230.
- Leiserowitz, A., E. Maibach, S. Rosenthal, J. Kotcher, P. Bergquist, M. Ballew, M. Goldberg, A. Gustafson, and X. Wang (2020). Climate change in the American mind. Technical report, Yale Program on Climate Change Communication.
- NAIC (2017). Flood Risk and Insurance. Technical report, National Association of Insurance Commissioners (NAIC).
- NRC (2015). Affordability of national flood insurance program premiums, report 1. Technical report, National Research Council.
- Rothschild, M., and J. Stiglitz (1976). Equilibrium in competitive insurance markets: An essay on the economics of imperfect information. *The Quarterly Journal of Economics* 90 (4), 629-649.
- Royal, A., and M. Walls (2019). Flood risk perceptions and insurance choice: Do decisions in the floodplain reflect overoptimism? *Risk Analysis* 39 (5), 1088-1104.
- Wagner, K. R. H. (2020). Adaptation and adverse selection in markets for natural disaster insurance. Working paper.



**Katherine R.H. Wagner** is a postdoctoral fellow at SIEPR during the 2020-21 academic year and will join the faculty at the University of California, Berkeley, in July 2021, as an assistant professor. Her research focuses on environmental and energy economics and public finance.

The Stanford Institute for Economic Policy Research (SIEPR) catalyzes and promotes evidence-based knowledge about pressing economic issues, leading to better-informed policy solutions for generations to come. We are a nonpartisan research institute, and SIEPR Policy Briefs reflect the views and ideas of the author only.