

## INFORMED DECISIONS ON CATASTROPHE RISK

### **Examining 30 Years of Residential Flood Insurance Claims in the United States: Two Key Findings**

**The NFIP is up for renewal in 2017 and new bills have been introduced (e.g., H.R. 2901) aimed at encouraging the private sector to offer flood insurance on a larger scale than has been done to date.**

**Whether offered by the federal government and/or the private (re-)insurance industry, flood insurance should be priced correctly, based on risk.**

**Residents living in flood prone areas need to better understand their risk—not just the probability of flood, but also the amount of damage they could suffer, in order to take cost-effective resilience-improving actions.**

**Analytics on flood insurance claims can provide important insights both on pricing of insurance and on risk communication.**

#### **WHAT WE DID**

**We analyzed 1 million NFIP flood insurance claims for the entire United States over the period 1980-2012.**

**This is the largest publicly available study of this type ever undertaken.**

- Established in 1968 as a partnership between the federal government and private insurers which sell flood insurance policies and manage claims on behalf of the government, the National Flood Insurance Program (NFIP) provides coverage to 5.1 million policyholders nationwide (total of \$1.25 trillion insured value).
- In recent years the NFIP has come under scrutiny: its \$23 billion debt from a series of catastrophic floods (Katrina, Ike, Sandy) has raised questions about its pricing approach.
- Flood insurance penetration is inadequately low. For instance, 80 percent of residents living in areas inundated by Superstorm Sandy in New York in 2012 had no flood insurance; 92 percent of small businesses lacked that financial protection.
- Most communication about flood risk has been centered on the *probability* of a flood. Little public communication is made on the *flood damage a household can expect*.

#### **FINDINGS**

- **The claim rate for single-family homes is on average not significantly higher in FEMA-mapped Special Flood Hazard Areas (SFHAs) (1.55% per year) than it is in non-SFHAs (1.27% per year).**
- **Over all decades, half of the claims are for less than 10% of the value of the house. About 7% of the claims are for more than 75% of the building value.** (The median paid claim is \$13,000; the 75<sup>th</sup> percentile is at \$41,000; the 99<sup>th</sup> percentile is at \$310,000; 2012 inflation-corrected prices.)

In an article forthcoming in the *Journal of Risk and Insurance*, we analyze 1 million claims nationwide between 1980 and 2012 made available to us by the Federal Emergency Management Agency (FEMA). We investigate the factors that lead to higher or lower claims, as well as how claims are distributed over time and geographically. Better understanding the magnitude and location of flood losses is important to making more informed decisions to strengthen flood resilience.

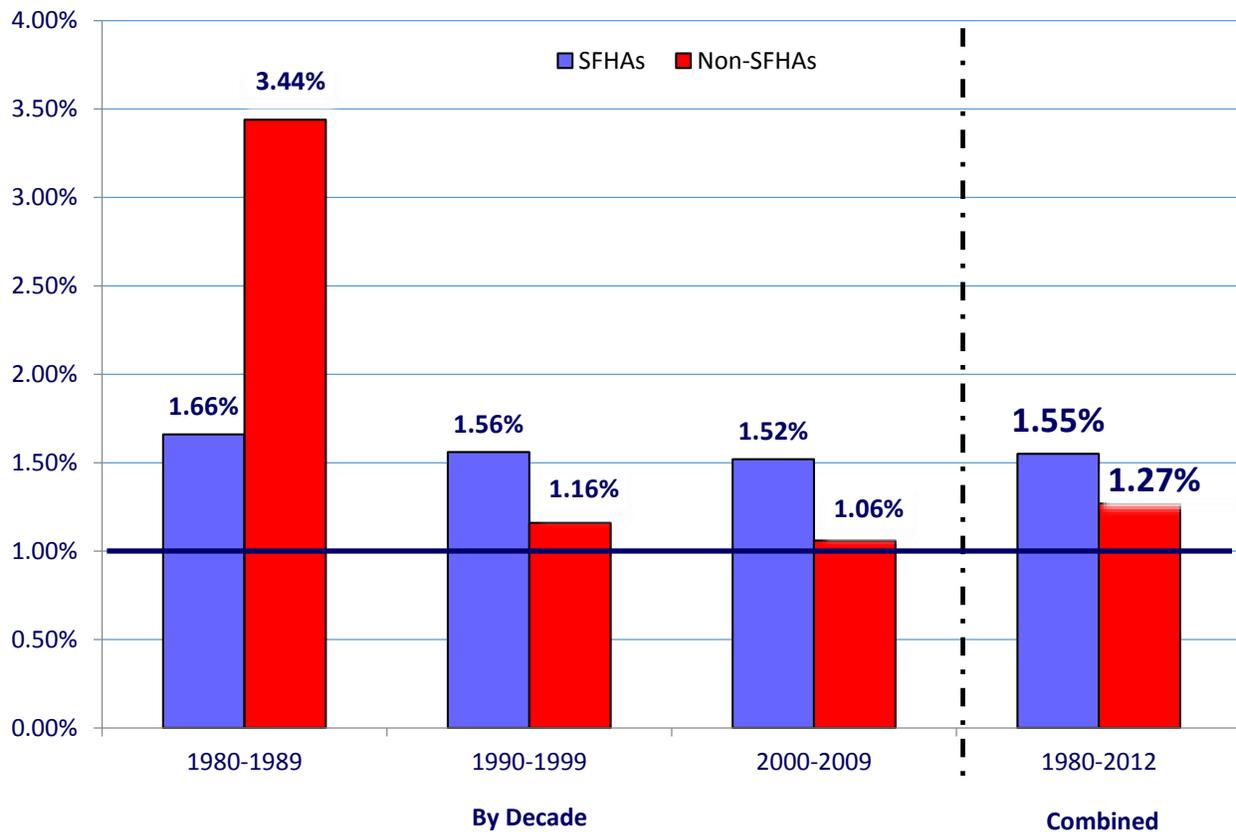
*Note: Here we report 2 of the 6 key findings of the full study (see bottom of next page).*

As discussions intensify about how the private sector can play a larger role in helping ensure that more Americans who are exposed to flood risk both in coastal and inland areas are appropriately protected financially (Michel-Kerjan et al., 2015), we believe better analytics of flood insurance claims will be important to expansion of the private insurance and reinsurance market.

### **FINDING 1: CLAIM RATES**

We find that over the studied period, in FEMA-mapped 100-year floodplains (SFHAs), the average claim rate – defined as the ratio of paid claims to the number of policies-in-force – is 1.55 percent. Surprisingly, outside the 100-year floodplains, the average claim rate is also higher than 1 percent at 1.27 percent, with no statistically significant difference in the rates across the two groups. The SFHA/non-SFHA distinction, often presented as high/low risk, can thus be very misleading. This higher-than-expected claim rate in non-SFHAs could reflect inaccurate and out-of-date flood maps. It could also be due to adverse selection: only the riskiest properties in FEMA-defined non-SFHAs are insuring in these areas.

**FIGURE 1. NFIP SINGLE FAMILY FLOOD INSURANCE CLAIM RATES IN FEMA-DEFINED RISK ZONES OVER TIME**

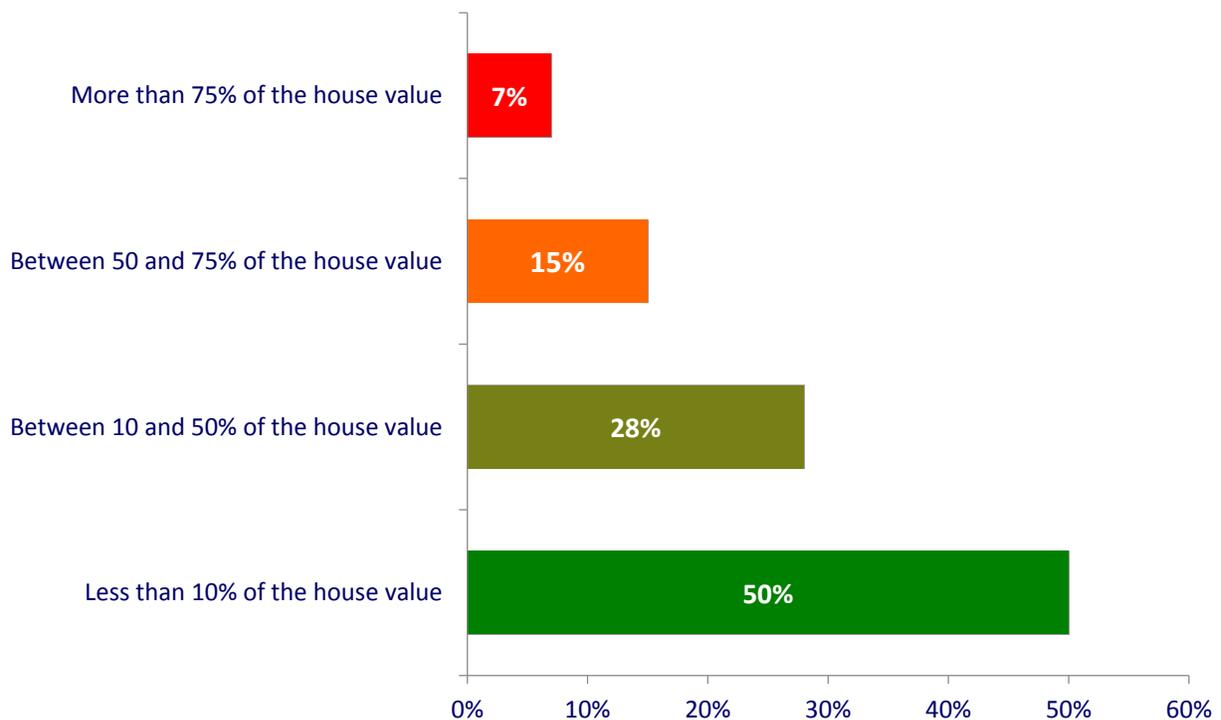


## **FINDING 2: CLAIM DISTRIBUTION**

Behavioral research has shown that individuals have a hard time understanding low-probability risks, such as flooding. It is also not clear that individuals living in flood-prone areas understand the damage that they may sustain in the event of a flood, and thus how much insurance they should purchase. Most outreach about flood risk has focused on the probability of a flood, not the damage that would occur from floods of different magnitudes. This might partially explain why so many do not purchase any coverage. Our analysis of claims offers some insight on the damages homeowners may face should they be flooded, recognizing that flood risk is always defined locally and depends on the topography and construction type of the house, and whether it is elevated.

Our results show that the majority of claims are for modest amounts. Half of claims over the three decades of data we analyzed are for less than 10 percent of the building's value (see Figure 2). Only a small portion of claims exceed three-quarters of a building's value; across all years, 7 percent of claims are on this higher end, and when the year of Hurricane Katrina is excluded, the share drops to 3 percent.

**FIGURE 2. PROPORTION OF ALL THE CLAIMS EXPRESSED AS A PERCENTAGE OF THE HOUSE VALUE**



---

Source: Kousky, C., and E. Michel-Kerjan. "EXAMINING FLOOD INSURANCE CLAIMS IN THE UNITED STATES: SIX KEY FINDINGS" *Journal of Risk and Insurance* (forthcoming). DOI: 10.1111/jori.12106.

Michel-Kerjan, E., J. Czajkowski and H. Kunreuther. "COULD FLOOD INSURANCE BE PRIVATISED IN THE UNITED STATES? A PRIMER" *The Geneva Papers on Risk and Insurance*, (2015), 40, 179–208.

We thank the U.S. Federal Emergency Management Agency (Recovery Directorate and the Federal Insurance and Mitigation Administration) for data used in this research. This work is partially supported by the Zurich Flood Resilience Alliance, CREATE at the University of Southern California (U.S. Department of Homeland Security's Center of Excellence), the National Science Foundation (SES-1062039/1061882), the Travelers-Wharton Partnership for Risk Management Fund, and the Wharton Risk Management and Decision Processes Center.



UNIVERSITY of PENNSYLVANIA  
Risk Management and Decision Processes Center  
The Wharton School  
3730 Walnut Street  
500 Jon M. Huntsman Hall  
Philadelphia, PA 19104-6340  
<http://www.wharton.upenn.edu/riskcenter>

## **Issue Brief: Examining 30 Years of Residential Flood Insurance Claims in the United States: Two Key Findings**

INFORMED DECISIONS ON CATASTROPHE RISKS issue briefs are published by the Wharton Risk Management and Decision Processes Center of the University of Pennsylvania. For additional information, contact Carol Heller, [hellerc@wharton.upenn.edu](mailto:hellerc@wharton.upenn.edu) or 215-898-5688.

© 2016 Wharton Risk Management and Decision Processes Center

### **About the Wharton Risk Center**

Established in 1985, the **Wharton Risk Management and Decision Processes Center** develops and promotes effective corporate and public policies for dealing with catastrophic events including natural disasters, technological hazards, terrorism, pandemics and other crises. The Risk Center research team – over 70 faculty, fellows and doctoral students – investigate how individuals and organizations make choices under conditions of risk and uncertainty under various regulatory and market conditions, and the effectiveness of strategies such as alternative risk financing, incentive systems, insurance, regulation, and public-private collaborations at a national and international scale. The Center actively engages multiple viewpoints, including top representatives from industry, government, international organizations, interest groups and academia. More information is available at <http://www.wharton.upenn.edu/riskcenter>.

### **About the Authors**

**Erwann O. Michel-Kerjan** ([erwannmk@wharton.upenn.edu](mailto:erwannmk@wharton.upenn.edu)) is the Executive Director of the Wharton Risk Management and Decision Processes Center and teaches in the graduate and executive programs at the Wharton School. He chairs the OECD Secretary-General Board on Financial Management of Catastrophes. His research and advisory role focuses on how to better manage and finance extreme events and strengthen resilience through business and policy innovation. He has testified on several occasions before the U.S. Congress on these issues. Author of over 100 publications, his recent books include *The Irrational Economist* (with P. Slovic, 2010), and *At War with the Weather* (with H. Kunreuther, 2011), which received the Kulp-Wright award for the most influential book on risk management. He studied at Ecole Polytechnique (France), McGill and Harvard.

**Carolyn Kousky** ([kousky@rff.org](mailto:kousky@rff.org)) is a fellow at Resources for the Future in Washington, D.C. RFF is a nonprofit and nonpartisan organization established in 1957 that conducts independent research on environmental, energy, natural resource and public health issues. Dr. Kousky's research focuses on natural resource management, decision-making under uncertainty, and individual and societal responses to natural disaster risk. She has examined how individuals learn about extreme event risk, the demand for natural disaster insurance, and policy responses to potential changes in extreme events with climate change. Kousky has a B.S. in Earth Systems from Stanford University and a Ph.D. in Public Policy from Harvard University.