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CIPR STUDY

Flood Risk and Insurance

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Flood Risk and Insurance

Prologue

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This study would not have been possible without the valuable contributions by members of the CIPR, state insurance regulators and the other invited authors noted for their expertise in flood insurance. All the contributors are listed on page ii.

Disclaimer: This study represents the opinions of the author(s) and is the product of professional research. It is not intended to represent the position or opinions of the National Association of Insurance Commissioners (NAIC) or its members, nor is it the official position of any NAIC staff members. Any errors are the responsibility of the author(s).

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Foreword

By Dimitris Karapiperis, Analyst, NAIC Center for Insurance Policy and Research

The most common and most damaging natural disasters in the country are floods, with eight out of 10 costliest catastrophes in the U.S. involving flooding.[1] No state, region or community across the country is really immune to floods. Aside from specific coastal areas vulnerable to hurricanes and therefore flooding, flash floods and inland flooding can happen anywhere, anytime. According to the Federal Emergency Management Agency (FEMA),[2] in the past five years, all 50 states have experienced a flood or flash flood.

Climatic changes and, in particular, the intensification of the global water cycle[3] may significantly increase flood risk,[4] as well as losses from flooding in the coming years. Responding to this risk is a societal and generational challenge requiring creative solutions from the federal and state governments, scientific community, and the insurance industry to develop effective mitigation and protection strategies along with recovery efforts.

Damage caused by flood is not typically covered under a standard homeowners policy. Instead floods are covered by a federally backed policy issued by the National Flood Insurance Program (NFIP) and available to homeowners, renters and small businesses. The NFIP, overseen by FEMA, which is part of the U.S. Department of Homeland Security (DHS), has practically been the sole provider of flood insurance for almost 50 years.

During the five decades the NFIP has been around, it has earned more in premiums in most years than it has paid out in claims[5] (Figure 1). The NFIP is self-supporting for the average historical year with claims being financed through collected premiums. Catastrophic losses, primarily from Hurricane Katrina and other storms in 2005 and Superstorm Sandy in 2012 required the NFIP to rely on its borrowing authority from the U.S. Department of the Treasury (Treasury) to pay claims (Figure 1).

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[1] www.propertycasualty360.com/2016/04/26/here-are-the-10-costliest-us-catastrophes?t=commercial-business&slreturn=1487795757

[2] www.floodsmart.gov/floodsmart/pages/flood_facts.jsp

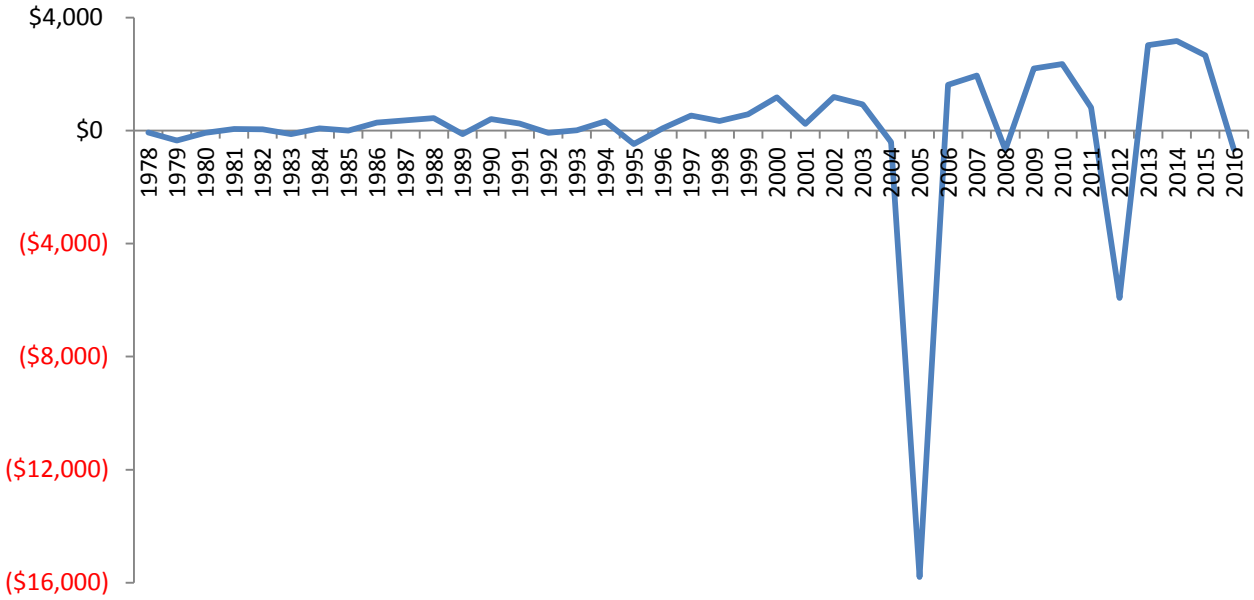
[3] The continuous cycle of processes by which water circulates between the oceans, atmosphere, and land, involving precipitation as rain and snow returning back to the atmosphere by evaporation and transpiration.

[4] Milly, P. C. D., R. T. Wetherald, K. A. Dunne and T. L. Delworth, 2002. "Increasing Risk of Great Floods in a Changing Climate," *Nature,* 415, 514-517.

[5] www.fema.gov/statistics-calendar-year

Figure 1: Difference Between Earned Premium and Claims Paid by NFIP By Year (1978–2015 in $Millions)

Sources: FEMA



In January 2017, the NFIP had to borrow an additional $1.6 billion to cover losses from 2016, bringing its total debt to almost $25 billion.[6] Regardless of whether the NFIP is able to repay this debt, its borrowing authority will automatically drop down to $1.5 billion after Sept. 30, 2017, unless it is reauthorized by Congress, leaving the program, as well as its 5 million policyholders, vulnerable in the event of a major catastrophe. It is worth noting the implications of the non-reauthorization of NFIP would extend far and wide beyond the confines of the insurance market, impacting mortgage lenders and the housing market with serious repercussions for the U.S. economy as a whole handicapping its continuing growth.

Although the NFIP has generally priced its policies at levels inadequate to cover losses from major catastrophes, with coverage in the high risk areas often sold at below market levels, the take-up rate remains at a low 50% in the NFIP flood zones and far less outside these zones. With the recent experience showing flood risk is not limited to NFIP-designated flood zones but in reality it extends to most, if not all, geographic regions expanding coverage is critical as floods are more widespread and happen with increasing frequency.

Furthermore, given the cross-subsidization built in the NFIP system with some areas being overcharged and others undercharged and the substantial flood insurance coverage gap in the country, there is an underserved and often unserved market where private insurers can offer comparable coverage at similar or even lower prices.

[6] www.insurancejournal.com/news/national/2017/02/01/440577.htm

The need to overhaul the NFIP to stabilize its finances and reduce overall exposure is directly connected with the need to encourage greater growth in the private flood insurance market. Private insurers alongside and in competition with a more open and transparent NFIP could increase take-up rates nationally while keeping flood insurance affordable.

To provide a stable environment and reduce uncertainty in the flood insurance market, state insurance regulators support a long-term reauthorization of the NFIP. State insurance regulators believe the NFIP is part a comprehensive approach to address the country's rising flood risk. The other component is the development of an active private market.

The objectives of this study are to promote a better and more complete understanding of the unique challenges of the flood insurance market, examine the central role of the NFIP, and discuss the need for reform and for an increased role for private insurers. By bringing together thought leaders and researchers in the fields of flood risk and insurance, state insurance regulators, insurance industry executives as well as consumer advocates, the study aims to stimulate debate towards advancing solutions to address the risk of flood and support the future development of private flood insurance in the country.

In the following sections of the study, the contributing authors present their views and analyses and consider the many important questions remaining unexplored and unresolved. The views expressed in this study are the opinions of the authors. They are not meant to represent the position or opinions of the NAIC members or the Center for Insurance Policy and Research (CIPR).

The study is organized as follows:

- Section 1 presents information on the rising flood risk and documents the historical floods and losses as well as the factors affecting losses.
- Section 2 discusses how flood insurance purchase decisions are made to help readers understand the reasons for the low take-up rate in the flood insurance market.
- Section 3 examines the past, present and future of the NFIP presenting the current structure of the program and the need for reform.
- Section 4 explores current options for private flood insurance and suggests an all-hazards homeowners policy as a possible solution.
- Section 5 explores policy alternatives for private flood insurance and discusses the challenges for insurers entering the flood insurance market.
- Section 6 presents information on flood insurance regimes existing around the world focusing mainly on Flood Re from the United Kingdom (UK).
- Section 7 offers a consumer perspective on the issue of flood risk and insurance and presents consumer-friendly solutions for NFIP reform and the role of private insurers.

- Section 8 presents the views of insurance industry executives on how best to meet the challenge of providing private flood insurance.
- Section 9 presents perspectives of a select group of state insurance regulators who discuss their concerns with the current state of the flood insurance market and explore new ideas and solutions.
- Section 10 documents state insurance regulatory efforts to reform the flood insurance market and encourage private insurer participation.

People and Property at Risk

People and Property at Risk

By Nicholas Lamparelli, VP of Cat Modeling and Analytics Partner, QBE, and
Ivan Maddox, Product Manager, Intermap Technologies

Introduction

As flood damage has been rising during the last few years, flood insurance has become a favored topic appearing with increasing frequency in the media and trade publications. Unfortunately, flood insurance has never garnered the attention it deserved from the public whose awareness typically only peaks for a time during major catastrophic events. The combination of some recent massive floods and state educational and outreach programs has started conversations which are long overdue.

Both the nature of these storms and floods, and their impact on property owners are gradually getting more attention by both policymakers and the general public, a welcome development because it is changing the way people think about the need for flood insurance.

Floods Have Become Hot Topic

One of the main drivers of people's recent interest in flood insurance has been the fallout from Superstorm Sandy in October 2012—not because it was an unusually powerful storm but because it made landfall on the New York and New Jersey coast. Sandy was downgraded from hurricane to tropical storm just before landfall, yet its record size[7] meant it caused damage and destruction from Virginia to the south, Michigan to the west, and New England and Canada to the northeast.[8] It caused extreme flooding damage right in the country's most populous metropolitan area and inevitably raised the public profile of flood risk to national headlines. This time the billions of dollars in insured and uninsured losses were in New York City, the nation's financial (including insurance) engine-room and one of its two media hubs, and not one of the smaller coastal cities in the south where it happens from time to time. Since Sandy, flooding has never been far from the news, with significant floods in all 50 states including recently the more recent Hurricane Matthew. Flooding now appears to the public to be getting more frequent and increasingly worse creating a new sense of urgency for effective risk mitigation and protection solutions.

It is not the increasing frequency or severity of floods that are most concerning. Instead, it is the lack of flood coverage on those losses for a significant number of people affected posing the greatest problem to society at large. While none of the flooding events over the past few years has been as devastating as Sandy or Katrina, each event has typically illustrated over half

[7] *www.wunderground.com/blog/JeffMasters/hurricane-sandys-huge-size-freak-of-nature-or-climate-change*
[8] *www.cnn.com/2013/07/13/world/americas/hurricane-sandy-fast-facts/*

the damage and losses experienced were not covered by insurance.[9,10] This shortfall of coverage, known as the protection gap, is the nexus of the conversation between insurers, the property-owning public and the government:

- For insurers, the protection gap is an opportunity (uninsured property needing insurance).
- For property owners, the gap is a path to unaffordable losses potentially resulting in bankruptcy and ruin.
- For the government, the gap is the need to pay emergency relief funds to protect property owners from ruin.

The contribution insurers could make in the flood insurance market and the value they could bring to both property owners and taxpayers is considerable. It is now driving bipartisan efforts at the federal level to enable insurers to provide better, affordable and broader flood coverage. The necessary political will is being enabled by state regulatory efforts, as well as industry and consumer advocacy, in Washington and beyond. Flood insurance appears regularly in national headlines and research studies (such as this one), providing the support and reasoning to continue working towards developing a substantial private component in the flood insurance market in this country.

Prior to Katrina and even much earlier there were tempered conversations about how the flood insurance market might be improved, but following Sandy, it has been elevated to a vigorous national debate. As weaknesses and inadequacies of the National Flood Insurance Program (NFIP) have been acknowledged, the need for a more effective flood insurance system, recognizing the important roles of both the public and private sectors, is clear for all to see.

Historical Flood Events and Losses

As mentioned earlier, Sandy was the iconic storm of the past decade putting the human and economic costs of floods front and center. Before Sandy, Hurricane Katrina was the iconic storm of record. The major flooding caused by Katrina (both from the rain and from the failed levees in New Orleans) was responsible for the highest natural catastrophe insured losses to date. Not only was it the most expensive storm, but also it was a live television sensation capturing the attention of both policymakers and the general public.

Hurricane Andrew, which hit Florida and Louisiana in 1992, has now become the second costliest hurricane in U.S. history, and one of the very few Category 5 storms to make landfall in the country. Looking at the rest of the 2000s there were the experiences of hurricanes Ike, Ivan, Charley, and Wilma. For several years after Hurricane Irene in 2011 there was a period of

[9] *artemis.bm/blog/2016/11/10/hurricane-matthew-u-s-losses-only-50-covered-by-insurance-aon/*
[10] *claimsjournal.com/news/southcentral/2016/09/09/273375.htm*

relative calm without any hurricanes making landfall in the country. In 2016 there were two storms, Matthew and Hermine, with neither registering as a really catastrophic event.

Not surprisingly, the top 10 list of most significant NFIP loss events are nearly all hurricanes (see Table 1). Hurricanes, being tropical, discharge an immense volume of water and their size and wind speed push sea water (known as storm surge) several feet above normal levels. Moving sea water is quite destructive, stripping nearly anything in its path.

Table 1: Top 10 NFIP Loss Events
Source: Federal Emergency Management Agency (FEMA)

Events	Date	Amount Paid
Hurricane Katrina	August 2005	$16.3 billion
Superstorm Sandy	October 2012	$8.4 billion
Hurricane Ike	September 2008	$2.7 billion
Hurricane Ivan	September 2004	$1.6 billion
Hurricane Irene	August 2011	$1.3 billion
Tropical storm Allison	June 2001	$1.1 billion
Louisiana Floods	May 1995	$0.6 billion
Tropical Storm Isaac	August 2012	$0.6 billion
Hurricane Isabel	September 2003	$0.5 billion
Hurricane Rita	September 2005	$0.5 billion

Other than hurricanes, newsworthy flooding also has been caused by highly localized rain events, frequently located inland. A list of recent floods caused by 1-in-1000-year rains as defined by the National Oceanic and Atmospheric Administration (NOAA) and the National Weather Service includes:

- Louisiana, especially around Baton Rouge – August 2016
- Maryland, with Ellicott City receiving most of the new coverage – July 2016
- West Virginia, especially Greenbrier County (including White Sulphur Springs) – June 2016
- Harris County (Houston), Texas – April 2016
- South Carolina, with Columbia sustaining significant damage – October 2015

The floods caused by these rain events all resulted in substantial damage, much of it uninsured because the flooding was away from the coast and away from areas designated by FEMA as Special Flood Hazard Areas[11] (SFHAs), suggesting they are at high risk for flooding. Over the years, homeowners have been conditioned to equate areas where flood insurance is required by regulated mortgage lending institutions with the likelihood for flooding—a misconception that has caused significant economic damage to all homeowners, regardless of geography as well as the government.

Current Value and Distribution of Property in Harm's Way

According to a 2015 Industry Exposure analysis conducted by Karen Clark & Co,[12] the total U.S. property exposure is approximately $90 trillion.

- Roughly $16 trillion are in coastal counties on the Gulf of Mexico or Atlantic Ocean seaboard and $6 trillion of the exposure would be considered peak coastal exposure.
- Within the entire boundary of the United States, all 50 states, the District of Columbia, Native American Reservations and America territories of Samoa, and Guam have had emergency flood disaster declarations.[13]

AIR Worldwide in its "Coastline at Risk 2016" paper[14] estimated:

- There are 4.2 million residents living along the hurricane exposed coastlines (coastal exposed counties with less than 10 feet above mean sea level) and of the Gulf of Mexico and Atlantic Ocean.
- Of these, more than half live in South Florida.
- Over the past three years, coastal development has increased by more than 10% for all states except Alabama, Georgia, Maryland, North Carolina, South Carolina and Virginia. On average, coastal development has increased by 13% over the past three years.
- The total coastal exposure estimates between AIR Worldwide and Karen Clark & Co. are in near agreement.

Potential Flood Losses per Major Catastrophe Modelers

According to the modeling firms AIR Worldwide and KatRisk, flood damage is the most frequent form of property loss which is reflected in their models. This is due to the various ways flood events can occur. Regardless of the season, flooding can take place due to excess precipitation, premature snow and ice melting, coastal storms (both tropical and extra-tropical), failure of

[11] *www.floodsmart.gov/floodsmart/pages/faqs/what-is-a-special-flood-hazard-area.jsp*
[12] *www.karenclarkandco.com/news/publications/pdf/KCC_Industry_Exposure_Report.pdf*
[13] *www.fema.gov/disasters/grid/state-tribal-government?field_disaster_type_term_tid_1=6837*
[14] *airww.co/coastlineatrisk*

municipal infrastructure and defenses, and, though rare, even by tsunami (a problem for the five states bordering the Pacific Ocean).

Based on industry exposure (assuming flood coverage on all property exposures), average annual losses due to all forms of inland and coastal tropical flooding have the potential to be two to three times as large as all catastrophic losses combined. Assuming a baseline 1-in-100-year industry loss for US hurricane at $125 billion,[15] an extreme flood year for U.S. could conceivably exceed $200 billion in damage.

States with the highest overall annual inland flood loss potential are:[16] California, Illinois, Louisiana, New York and Texas. Table 2 shows the states with the highest overall coastal flood loss potential are:

Table 2: 10 States at Greatest Risk of Storm Surge Damage[17]

Source: CoreLogic

State	Properties at Risk	Value at Risk
Florida	1,470,000	$386 billion
Louisiana	411,000	$72 billion
Texas	370,000	$51 billion
New Jersey	350,000	$119 billion
Virginia	329,000	$78 billion
New York	270,000	$134 billion
North Carolina	232,000	$65 billion
South Carolina	197,000	$66 billion
Georgia	118,000	$21 billion
Massachusetts	107,000	$50 billion

[15] It is a common industry practice to use the Lloyd's Realistic Disaster Scenario (RDS) as a benchmark 1-in-100-year event: *https://www.lloyds.com/~/media/files/the market/tools and resources/exposure management/rds/rds_january 2016.pdf*

[16] Confidential report

[17] *www.propertycasualty360.com/2013/06/06/10-states-at-greatest-risk-of-storm-surge-damage?page=2&slreturn=1480879465&page_all=1* (via CoreLogic)

Factors Affecting Future Flood Losses

Projected Exposure Growth (increases in population and real value of property)

According to the AIR Worldwide,[18] coastline exposure growth since Hurricane Katrina has slowed from about 7% per year in the 2000s to approximately 4% per year today. A reason for the slowing growth may have been the 2004 to 2005 hurricane season in which four major hurricanes made landfall in Florida (2004), and hurricanes Katrina, Rita and Wilma made 2005 the costliest in US insurance history.[19] These events caused turmoil in the insurance and reinsurance markets, as insurance capacity decreased significantly and needed to be replenished. Also a likely contributing factor to slowdown was the global financial crisis, which devastated the real estate market especially in Florida. Nearly 500,000 homes went into foreclosure in 2010 just in the state of Florida.[20] Coastal development has since rebounded as the economy gradually recovered following the global financial crisis but also because the U.S. coastline has not had a major hurricane of category 3 or stronger make landfall since Hurricane Ike in 2008, and there have been no major hurricane landfalls in Florida since the catastrophic 2004 hurricane season.

Inland exposure to flood is more difficult to assess. Defining whether a property is exposed to inland flooding is problematic due to all the different sources of flooding inland properties are exposed to. All 50 states are exposed to and have had severe inland flooding events and disaster declarations. It is the view of the authors, that all properties have some non-zero probability to a loss from flooding. Because of the complexities of modeling flood and the immaturity of the US models, true exposure to the flooding hazard will take time to analyze. In general, exposure will track U.S. population, which is currently growing at 0.7% annually.[21]

Effect of Inflation on Replacement Costs

At certain points of the business cycle, inflation can pose additional risks to insurers. If insurers are to project future losses, they also must project how changes in inflation may contribute to excess losses.

There are two types of inflation of concern to insurers. The general increase in prices or economic inflation could affect increases in losses for insurers due to rising cost of building stock, contractors, and other direct and indirect materials affecting the settlement of claims. The second type is demand surge inflation, which is the increase in prices of goods and services

[18] *airww.co/coastlineatrisk*

[19] *www.guycarp.com/content/dam/guycarp/en/documents/dynamic-content/Ten-Year Retrospective of the 2004 and 2005 Atlantic Hurricane Seasons Part 1.pdf*

[20] *www.realtytrac.com/content/press-releases/record-29-million-us-properties-receive-foreclosure-filings-in-2010-despite-30-month-low-in-december-6309*

[21] *www.google.com/publicdata/explore?ds=d5bncppjof8f9_&met_y=sp_pop_grow&idim=country:USA:IND:CAN&hl=en&dl=en*

due to a decrease in supply and an increase in demand following a natural disaster, such as a flood. Post-event, while the number of contractors and supplies may stay the same or decline, there is a sharp increase in claimants seeking repairs. While many jurisdictions have laws forbidding price gouging often observed in such times, demand surge inflation is still a strong factor in insurer losses.

General inflation should be modeled by the capital modeling team. Demand surge inflation can be accounted for during the CAT modeling exercises pre and post-underwriting. Insurers should take reasonable steps to estimate their exposure to demand surge and account for those risks in the pricing, claims and risk management operations of the company.

Effect of Urbanization, Population Growth and Economic Expansion in Flood-Prone Areas

Nearly all of the largest population centers in the U.S. are in close proximity to water. Access to large bodies of water is generally an economic advantage as this allows not only the ability to transport people and cargo easily, but also enhances the quality of life of people living in those areas as economic growth increases the opportunities for people to enjoy the access to water beyond just for economic gain.

Demographic trends are showing: 1) cities are growing faster than the rest of the country, and 2) there is a migration from the northern industrial quadrant of the country to southern and warmer and often coastal areas. The state of Florida (which recently passed New York as the third most populous state) is expected to grow another 20% by 2030.[22] CoreLogic estimates there is roughly $1.5 trillion in exposed value to storm surge along the country's eastern and gulf coasts.[23] It seems reasonable to expect with migration and the rise in coastal population the quantity of exposed property will escalate.

This creates a confluence of conflicting factors all stakeholders in the flood risk space will need to acknowledge. There may not necessarily be a direct correlation of population growth in flood prone areas and damage to property due to flood. State and local governments are already active in amending building codes and engineering defensive and risk mitigating protections to effectively reduce damage from floods.

Following Superstorm Sandy, coastal municipalities changed building codes, mandating homeowners whose houses were damaged by the storm surge to elevate them above the Base Flood Elevation[24] (BFE) of the area. Some areas were deemed at such an extreme hazard for repeated flooding and damage, authorities bought damaged homes in buyout programs.[25] Once

[22] *edr.state.fl.us/Content/population-demographics/data/MediumProjections_2015.pdf*
[23] *www.corelogic.com/about-us/news/2014-corelogic-storm-surge-analysis.aspx*
[24] *www.fema.gov/media-library-data/1416428696553-d2b2c680a77990ed9e786b8821f850b0/SandyFS3Recovery_508.pdf*
[25] *www.clm.com/publication.cfm?ID=424*

homes are purchased are demolished and the property is designated as open space by the local government.

Miami Beach and the state of Florida are currently investing billions of dollars in mitigation efforts, which include scores of industrial level sump pumps.[26] In a conversation with Albert Slap, president of Coastal Risk Consulting (a flood modeling firm), the 2016 King Tide (i.e., highest of high tides[27]) season caused floods reaching heights beyond what was expected. But because the city of Miami Beach was able to activate many of the pumps, damage was kept in check for the most part. A major concern expressed by Slap is that pumps alone will not be enough of a mitigation factor to prevent future damage from fairly moderate King Floods or worse, large storm surges from powerful Hurricanes as sea levels are rising due to climate change.

For private insurers looking to provide coverage for flood, an understanding of population exposure and local risk mitigation strategies will allow for accurate modeling to better estimate potential losses at both the risk and portfolio levels. Insurers will need to monitor the entire risk mitigation effort and to be able to make changes as needed to reflect the risk they are now exposed to and to allow for part of the savings from these mitigation efforts to pass to policyholders. Strategies to reduce premiums for reduced risks can encourage policyholders and local authorities to recognize the economic savings for their investments.

Effect of Climate Change and Sea Level Rise on Future Frequency and Severity of Floods

Climate change is still a contentious issue. Politics aside, all parties to an insurance contract must acknowledge the potential consequences in the likelihood the changes in the climate may portend future severe weather and catastrophic events.

In principle, a warming globe will increase both the capacity of the atmosphere to hold moisture and the total amount of moisture itself. This would theoretically mean increasing frequency and intensity of extreme precipitation events and potentially rising severity of hurricanes, tornado and storm activity. A warming climate could release water trapped in glaciers in Antarctica and Greenland, raising sea levels, with estimates being anywhere from an inch or two on average to several inches.[28] Compounding the effect, ocean volume and hence sea levels rise as oceans absorb atmospheric heat. The potential combination of rising sea levels and excess precipitation events likely will increase the flood risk for both inland and coastal communities.

[26] *www.miamiherald.com/news/local/community/miami-dade/miami-beach/article41141856.html*
[27] *bigstory.ap.org/article/de7d9a4478e64d549b2521da74b45662/hurricanes-leave-florida-coasts-vulnerable-king-tides*
[28] *climate.nasa.gov/news/2328/warming-seas-and-melting-ice-sheets/*

Currently, it is hard to tell whether tornadoes and severe storms in the U.S. are increasing or decreasing in frequency or severity.[29] Much of the problem when analyzing historical severe storm activity is modern meteorological techniques, such as Doppler radar, can pick up events occurring in sparsely populated areas of the country, whereas these same events would have been unrecorded decades ago. The same problem of legacy opacity applies to flooding, especially inland flooding. Although we now have the tools to accurately record all flood events, we will not know for sure if the climate is affecting the storm frequency and severity and inland flooding until years or even decades from now.

As with severe storms, it is premature to conclude hurricane activity will deviate significantly from normal historical trend.[30] Regardless of this uncertainty, even if hurricanes mimic the past-recorded distribution of activity, sea level rise due to warming oceans and climate would suggest coastal property destruction beyond our recent experiences with Superstorm Sandy and Hurricane Katrina. In other words, even if the weather is not dramatically altered, we should expect an uptick in damage from coastal flooding in a warming world. This uptick consists of both tropical cyclones and extra-tropical storms such as Nor'easters, Big Blows and other winter storms slamming both coasts.

Perhaps the storms will remain the same in frequency and severity, but the amount of precipitation accompanying the storms will increase. In the past two years, there have been excessive rain events in Colorado,[31] South Carolina,[32] Louisiana[33] and West Virginia,[34] and remarkably three events in just Houston, TX.[35] Rain bombs or wet microbursts are local and excessive rain events where the amount of precipitation is in the 1-in-1000-year range. These types of events generate persistent flash floods, which, as we have seen with the most recent episodes, can be very destructive. The recent increase in frequency may be climate-related and as such may signal an additional type of event society needs to be aware of.

Moreover, climate change and sea level rise may cause severe flooding even in the absence of storms. According to Coastal Climate Solutions, a climate-based flood modeling company based in Florida, flooding from annual King Tides has increased year-over-year over the past decade. It estimates with additional sea level rise, coastal properties will be subjected to multiple days of increasingly more severe King Tide flooding each year. It also forecasts flooding, solely from

[29] *www.wunderground.com/climate/extreme.asp*
[30] *www.gfdl.noaa.gov/global-warming-and-hurricanes/*
[31] *weather.com/storms/severe/news/colorado-flash-flood-how-it-happened-unusual-20130912*
[32] *www.weather.gov/chs/HistoricFlooding-Oct2015*
[33] *www.washingtonpost.com/news/post-nation/wp/2016/08/17/louisiana-flood-victims-face-long-road-back-to-normal-i-lost-everything/?utm_term=.c0aaf6c5619f*
[34] *www.washingtonpost.com/news/capital-weather-gang/wp/2016/06/27/w-va-flood-was-one-in-a-1000-year-event-weather-service-says-more-heavy-rain-forecast/?utm_term=.57e873ec74ea*
[35] *www.intermap.com/risks-of-hazard-blog/2016/08/houston-flooding-again*

King Tides (i.e., not exacerbated by any form of storm), could increase by more than four times by 2030.[36]

Insurers must make reasonable accommodations and take reasonable precautions for potential consequences of climate change. Should projected scenarios come to fruition, insurers not adequately prepared could face an existential threat to their businesses.

State insurance regulators, on the other hand, should continue to pressure insurers to remain, at a minimum, vigilant to the risks posed by climate change. Regulators also need to be prepared to explain to the public why and how price changes may occur should projections begin to materialize.

[36] Private interview with Albert Slap of *Coastal Risk Consulting*

Flood Insurance Purchase Decision

Flood Insurance Purchase Decision

By Howard Kunreuther, James G. Dinan Professor of Decision Sciences and Public Policy, Wharton School, University of Pennsylvania, Co-Director, Risk Management and Decision Processes Center

Role of Intuitive and Deliberative Thinking

A large body of cognitive psychology and behavioral decision research over the past 30 years has revealed individuals and organizations often make decisions under conditions of risk and uncertainty by combining *intuitive* thinking with *deliberative* thinking. In his thought-provoking book *Thinking, Fast and Slow,*[37] Nobel laureate Daniel Kahneman characterized the differences between these two modes of thinking. *Intuitive thinking* (System 1) operates automatically and quickly with little or no effort and no voluntary control. It is often guided by emotional reactions and simple rules of thumb acquired by personal experience. *Deliberative thinking* (System 2) allocates attention to effortful and intentional mental activities where individuals undertake trade-offs and recognize relevant interdependencies and the need for coordination.

Choices are normally made by combining these two modes of thinking and generally result in good decisions when individuals have considerable past experience as a basis for their actions. With respect to low-probability high-consequence (LP-HC) events, however, there is a tendency to either ignore a potential disaster or overreact to a recent one such that decisions may not reflect expert risk assessments. For example, after a disaster, individuals are likely to want to purchase insurance even at high prices, while insurers often consider restricting coverage or even withdraw from the market.[38] In these situations, both parties may focus on the losses from a worst-case scenario without adequately reflecting on the likelihood of this event occurring in the future.

Empirical studies have revealed many individuals engage in intuitive thinking and focus on short-run goals when dealing with unfamiliar LP-HC risks.[39] More specifically, individuals often exhibit systematic biases such as the *availability heuristic,* where the judged likelihood of an event depends on its salience and memorability.[40] There is thus a tendency to ignore rare risks until after a catastrophic event occurs. This is a principal reason why it is common for

[37] Kahneman, D., 2011. "Thinking, Fast and Slow." New York: Farrar, Straus and Giroux.
[38] On changes to insurance demand and supply after extreme events, see: Kousky, C. (forthcoming). Revised Risk Assessments and the Insurance Industry. In: Policy Shock: Regulatory Responses to Oil Spills, Nuclear Accidents, and Financial Crashes, ed. Balleisen, E., L. Bennear, K. Krawiec, and J. Wiener. Cambridge University Press.
[39] Cutler, D. M., and R. J. Zeckhauser, 2004. "Extending the Theory to Meet the Practice of Insurance." Washington, D.C.: Brookings Institute.; Krantz, D. and H. Kunreuther, 2007. "Goals and plans in decision-making." *Judgment and Decision Making* 2(3):137-68.; Kunreuther, H., M. V. Pauly, and S. McMorrow, 2013. "Insurance and Behavioral Economics: Improving Decisions in the Most Misunderstood Industry." New York: Cambridge University Press.
[40] Tversky, A., and Kahneman, D., 1973. "Availability: A heuristic for judging frequency and probability." Cognitive Psychology 5(2), 207-232

individuals at risk to purchase insurance only after a large-scale disaster or other event makes them focus on the risk.

Purchase of Flood Insurance

There is no nationwide data on take-up rates of National Flood Insurance Program (NFIP) policies by flood zone since there is not a database of structures in mapped Special Flood Hazard Areas (SFHA) versus those outside them. Several studies have attempted to estimate take-up rates for flood insurance; their findings tend to be fairly consistent with one another. A study by the RAND Corporation a decade ago found about half of a random sample of homes in the SFHA had flood insurance, although there was high regional variation, with take-up rates higher in the South and West.[41] Another survey of coastal areas similarly found take-up rates around 50%.[42] Outside SFHAs, take-up rates are very low. As the storm surge from Superstorm Sandy caused severe damage to property outside the mapped SFHAs, a report by the New York City's Mayor Office published after Sandy revealed 80% of residents living in areas inundated by storm-surge had no flood insurance.[43]

There are many reasons for the low uptake of flood insurance. The rules of thumb used to make decisions about low-probability events discussed in the previous subsection likely play a role. Residents may perceive the flood risk to be below their threshold level of concern. A study of the risk perception of homeowners in New York City revealed that many of them underestimate the likelihood of water damage from hurricanes.[44] Residents also may not have good information on the risk. Federal Emergency Management Agency (FEMA) flood maps are often interpreted as presenting risk in a binary fashion: A property is either in the 100-year floodplain and at risk, or outside it and safe. Of course, flood risk varies continuously across the landscape and property-owners may not be aware of the risk at their particular location. There also have been studies showing homeowners are myopic or just fail to pay attention to low-probability risks and not seek out the necessary information.[45]

[41] Dixon, L., N. Clancy, S. A. Seabury and A. Overton, 2006. "The National Flood Insurance Program's Market Penetration Rate: Estimates and Policy Implications." Santa Monica, California, RAND Corporation, February

[42] Kriesel, W. and C. Landry, 2004. "Participation in the National Flood Insurance Program: An Empirical Analysis for Coastal Properties." The Journal of Risk and Insurance 71(3): 405-420.

[43] New York City, 2013. PlaNYC: A Stronger, More Resilient New York. New York City, NY, Mayor's Office of Long Term Planning and Sustainability.

[44] Botzen, W., Kunreuther, H., and Michel-Kerjan, E., 2015. "Divergence between Individual Perceptions and Objective Indicators of Tail Risks: Evidence from Floodplain Residents in New York City" *Judgment and Decision Making* 10(4): 365-385

[45] For more details on the nature of systematic biases and heuristics utilized by individuals in deciding whether to purchase flood and other insurance see Kunreuther, H., Pauly, M. V., and McMorrow, S. 2013. *Op cit*

Several previous studies have found those at risk from floods and earthquakes are more likely to purchase insurance for these perils after the occurrence of a disaster event.[46] Recent research by Kousky found after hurricanes, there is roughly a 7% bump in take-up rates for flood insurance.[47] The majority of this increase, however, can be explained by a federal regulation that recipients of federal disaster aid must purchase flood insurance. After accounting for policies purchased because of this regulation, there is a much smaller 1.5% increase in take-up rates. This suggests we may need mandates to make sure people insure against disasters, given the empirical evidence extreme events may not be enough to get people to buy and maintain disaster insurance coverage.

One reason individuals may cancel their policies is because they view insurance as an investment rather than a protective activity. Many feel they are wasting their money on premiums if they have not made a claim for a few years. They perceive the likelihood of a disaster as so low they do not pay attention to its potential consequences and, hence, conclude they do not need insurance. A deliberative model of choice, such as expected utility theory, implies risk-averse consumers should value insurance as it protects them against large losses relative to their wealth. Individuals should celebrate not having suffered a loss over a period of time rather than canceling their policy because they have not made a claim. A challenge facing insurers and the NFIP is how to convince their policyholders *the best return on an insurance policy is no return at all.*

An analysis of all NFIP policies in force between 2001–2009 revealed the median tenure of flood insurance was between two and four years, while the average length of time in a residence was seven years. For example, of the 841,000 new policies bought in 2001, only 73% were still in force one year later. After two years, only 49% were in force and eight years later, only 20%.[48] While the analysis could not separate which policies were cancelled because the policyholder moved to a new location versus those dropping their insurance while remaining in a flood-prone area, the data suggest policy lapses are greater than can be explained by people changing residences. Similar patterns were found for each of the other years in which a flood insurance policy was first purchased.

While there may be many policies dropped relatively soon after being purchased, some policyholders do keep their policies for many years. For instance, when looking at all policies in the NFIP in 2012, roughly 13% were newly purchased that year, but roughly 20% had been in

[46] See, for example: 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; Palm, R. and M. Hodgson, 1992. "Earthquake Insurance: Mandated Disclosure and Homeowner Response in California." Annals of the Association of American Geographers 82(2): 207-222.

[47] Kousky, C., 2016. “Disasters as Learning Experiences or Disasters as Policy Opportunities? Examining Flood Insurance Purchases after Hurricanes” *Risk Analysis*, DOI: 10.1111/risa.12646

[4848]Michel-Kerjan, E., S. Lemoyne de Forges, and H. Kunreuther, 2012. “Policy tenure under the U.S. National Flood Insurance Program (NFIP),” *Risk Analysis* 32(4): 644-658

place for 3-5 years, another 18% had been in place for 6-10 years, and 12% had been in place for over ten years.[49] A deeper investigation shows policies which are held for many years are more likely to be located in high flood-risk areas, suggesting those at higher risk and/or subject to the mandatory purchase requirement are keeping their coverage. A new ability to escrow flood insurance payments may increase the tenure of NFIP policies, if some of the drop in coverage can be explained by policyholders simply failing to take the time to renew.

If widespread take-up of flood insurance is the goal, new strategies may be needed. For example, all disaster perils, or flood in addition to wind, fire and hail, could be included in homeowners' policies, guaranteeing property owners have this coverage. All-hazards homeowners insurance (discussed in more detail in the Private Flood Insurance section) is available in some other countries, and usually involves a cross-subsidy from low-risk to high-risk properties to help make coverage more affordable. Another option is community insurance, whereby a (quasi) governmental entity purchases flood insurance on behalf of residents.

An in-depth examination of community flood insurance found that for there to be any interest on the part of communities, the insurance would need to cost less than the standard NFIP policy.[50] The report proposed parametric insurance, where the payout is based on an observable metric of the hazard, such as surge exceeding a given gauge height, as an option to provide lower limits of more affordable coverage. This could be an attractive option for particular communities, such as levee districts or those more actively managing their flood risk.

[49] Kousky, C., 2015. "Who Holds On to Their Flood Insurance?" *Common Resources*. Washington, DC, Resources for the Future, November 3.

[50] Kousky, C. and L. Shabman, 2015. A Proposed Design for Community Flood Insurance. Washington, DC: Resources for the Future, December.

The National Flood Insurance Program: Yesterday, Today and Tomorrow

NATIONAL FLOOD INSURANCE PROGRAM

The National Flood Insurance Program: Yesterday, Today and Tomorrow

By Carolyn Kousky, Fellow, Resources for the Future and Howard Kunreuther, James G. Dinan Professor of Decision Sciences and Public Policy, Wharton School, University of Pennsylvania, Co-Director, Risk Management and Decision Processes Center

Introduction

The National Flood Insurance Program (NFIP) has been providing flood insurance to residents of participating communities for close to five decades. The program, now housed in the Federal Emergency Management Agency (FEMA), was created in 1968 as a response to a lack of flood insurance on the private market due to the catastrophic nature of flooding. While serious attempts were made to create a flood insurance program, especially in the 1950s, the impetus to create the NFIP finally came in reaction to the escalating costs of ad hoc post-disaster relief legislation, triggered initially by the Alaska earthquake of 1964, and followed by severe flooding and damage from Hurricane Betsy in 1965, the country's first billion-dollar hurricane.[51]

Over time, the NFIP has grown to write more than 5 million policies nationwide with more than $1.2 trillion in coverage. The program also maps flood hazards in participating communities, requires them to adopt minimum floodplain management regulations, and offers grants and incentives to encourage even greater investments in risk reduction.

Historically, the NFIP did not set insurance premiums to cover severe loss years, such as those that occurred in 2005 when losses from Hurricane Katrina and other storms sent the program deeply into debt. In fact, the NFIP paid out more in claims in 2005 than it had over the life of the program. This situation attracted the attention of policymakers, although reform legislation was not passed until 2012 and 2014, when new laws altered aspects of the NFIP pricing, sought to improve mapping and made other programmatic changes.

Since 1968, however, there have been other significant changes which impact the program, such as substantially better quality data on elevation and property exposure, the development of modern catastrophe models, and enormous changes in technology and database management. Private sector insurance and reinsurance also has evolved, so insurers now feel flood is an insurable risk, and the ability to build structures to withstand damage from disasters has improved. The federal government has radically increased its involvement in disaster response, particularly financially. All these changes suggest different ways in which the NFIP could be modernized to be better able to achieve its objectives of reducing future flood losses and providing claims payments to aid the recovery process should residents suffer water-related damage from hurricanes, storms and riverine flooding.

[51] Dacy, D.C. and H. Kunreuther. 1969. "The Economics of Natural Disasters: Implications for Federal Policy," pp. 37– 47, New York, 1969.

This section of the study first provides an overview of the history of the NFIP followed by a discussion of the structure of the NFIP as it exists today, focusing on mapping, hazard mitigation, pricing and an analysis of NFIP claims. The final two subsections discuss possible policy reforms to the NFIP. We emphasize the recent concerns about affordability of flood insurance and propose a broader array of reforms to be considered when the NFIP is up for reauthorization in 2017 that could be the first step in designing an all-hazard homeowners insurance policy. The concluding subsection suggests directions for possible future studies and research.

History of the NFIP

The NFIP was created in 1968 largely in response to the failure of the private sector flood insurance market. Following the severe Mississippi floods of 1927, private insurers concluded the flood peril was uninsurable due to adverse selection, risk-based premiums would be too high for families to afford, and flood losses could be so catastrophic as to cause insolvencies or have a significant impact on surplus.[52] This lack of coverage by the private sector triggered significant federal disaster relief to victims of Hurricane Betsy in 1965 and led to the creation of the NFIP in 1968.[53]

When communities voluntarily join the NFIP and adopt minimum floodplain management regulations, their residents become eligible to purchase a flood insurance policy through the program. When it was created, the NFIP discounted premiums to maintain property values on structures already built in flood prone areas, while new construction was charged premiums reflecting risk. Even though premiums on existing property were highly discounted, relatively few homeowners purchased coverage during the first five years of the program, leading Congress to pass the federal Flood Protection Act of 1973. This Act requires all properties located in a mapped 100-year floodplain, designated as a Special Flood Hazard Area (SFHA), to purchase flood insurance if they have a mortgage or loan from a federally backed or regulated lender. The 1973 Act also requires communities to participate in the NFIP in order to be eligible for federal disaster assistance. The federal Housing and Community Development Act of 1974 added a notification requirement to the mandatory purchase requirement: Federally regulated lenders must inform a borrower if their property is located in an SFHA.

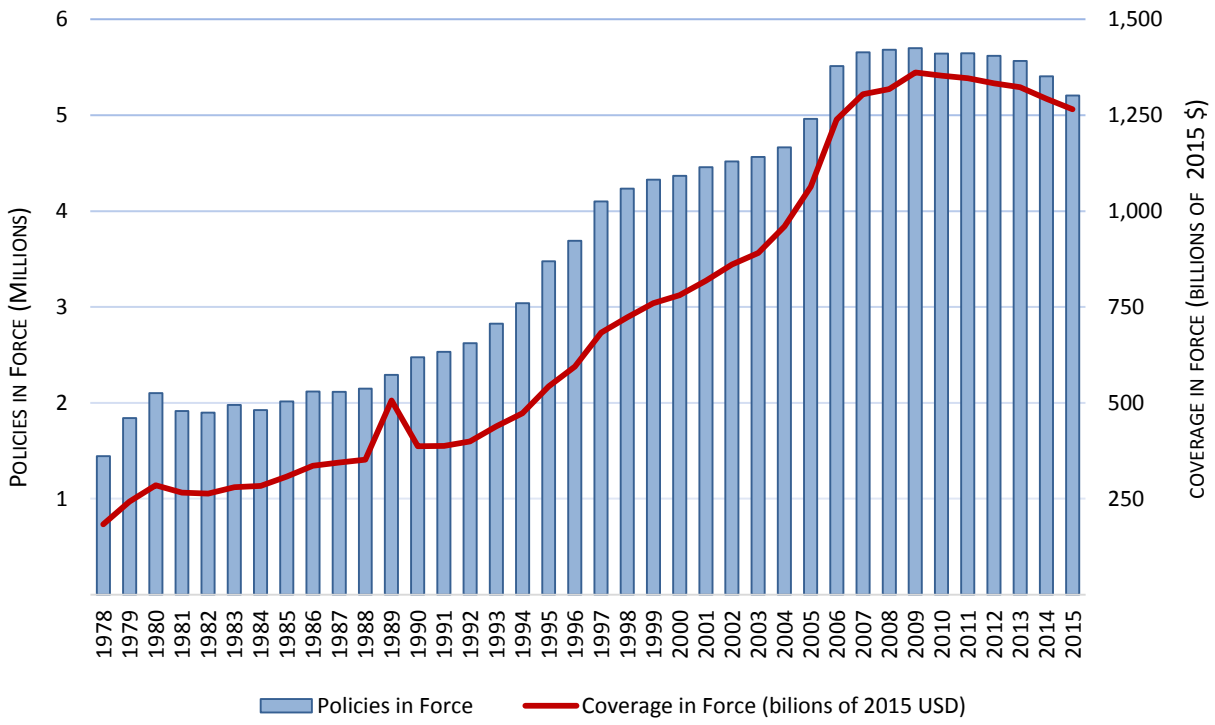
[52] Overman, E. S., 1957. "The Flood Peril and the Federal Flood Insurance Act of 1956." Annals of the American Academy of Political and Social Science 309(1): 98–106; Gerdes, V. 1963. "Insuring against Flood Peril." *Journal of Insurance* 30(4): 547–553; Anderson, D. R., 1974. "The National Flood Insurance Program: Problems and Potential." *Journal of Risk and Insurance* 41(4): 579–599.

[53] For more details on the history of flood insurance and recent developments see Michel-Kerjan, E. 2010. "Catastrophe Economics: The National Flood Insurance Program." *Journal of Economic Perspectives* 24(4):165-86; Knowles, S. G., and H. C. Kunreuther, 2014. "Troubled waters: The national flood insurance program in historical perspective," Journal of Policy History 26(03), 327-353.

Today, more than 22,000 communities participate in the NFIP. The number of policies in-force and coverage in the program has been growing over time as shown in Figure 2. As of Aug. 31, 2016, there were 5.06 million policies in-force nationwide representing $1.245 trillion in coverage. The past few years have seen a drop in total policies, from a high in 2009 (Figure 2). It is unclear the nature of the drivers of this trend. Price may be one of them. FEMA has recently surveyed a sample of policyholders and is making multiple reforms to try to address policyholder concerns about the program in an effort to increase purchase of flood insurance. While there is not a complete data set available, estimates suggest roughly half of those in mapped 100-year floodplains have flood insurance, and much fewer have coverage outside these areas, which is discussed later in this section.

Figure 2: NFIP Policies in Force by Year (1978–2015)

Sources: FEMA



The NFIP never has priced its policies to account for losses from a catastrophic loss year, relying instead on its borrowing authority from the U.S. Department of the Treasury (Treasury). After paying claims from Hurricane Katrina in 2005, the NFIP found itself $18 billion in debt, requiring an increase in its borrowing authority from $1.5 billion to $20.775 billion. After Hurricane Sandy, Congress approved an additional almost $10 billion increase in borrowing authority. Borrowing authority now stands at $30.425 billion. The debt is currently roughly $25 billion, leaving $7.425 billion in claims paying capacity before the limit would have to be raised again. This borrowing authority drops to $1.5 billion after Sept. 30, 2017, unless Congress increases this figure when the NFIP comes up for reauthorization.

Concern over the NFIP debt led Congress to pass the federal Biggert-Waters Flood Insurance Reform Act of 2012 (BW12) in July 2012 (three months before Hurricane Sandy). Among its many provisions, the legislation required the NFIP to produce updated floodplain maps, strengthen local building code enforcement, remove insurance discounts for certain properties and move towards charging premiums reflecting flood risk. Soon after becoming law, BW12 faced significant challenges from some homeowners who were concerned about higher costs of their flood insurance, particularly residents newly mapped into higher risk areas who would immediately face higher premiums under the new law. These residents and other homeowners in floodplains felt their proposed premium increases were unjustified and that they could not afford coverage. In March 2014, Congress passed the federal Homeowner Flood Insurance Affordability Act (HFIAA14). This legislation halted or slowed many of the price increases put in place by the 2012 legislation, discussed further below. It also required the FEMA operating the NFIP to draft an affordability framework based on the recommendations of a National Academy of Sciences (NAS) study that led to two reports: 1) Report 1 was published in 2015[54] and 2) Report 2 in 2016.[55]

Structure of the NFIP

The NFIP provides coverage to any resident or small business in a participating community. The top three states in terms of policies in-force as of August 2016 were Florida (1,783,152 policies), Texas (604,400 policies), Louisiana (452,669 policies) (see Table 3). Together they comprise 56% of all NFIP policies in force nationwide. The NFIP offers a range of residential as well as non-residential policies, as shown in Figure 2. Single-family homes are the largest share of policies.

Table 3: NFIP Policies in Force (as of August 2016)
Source: FEMA

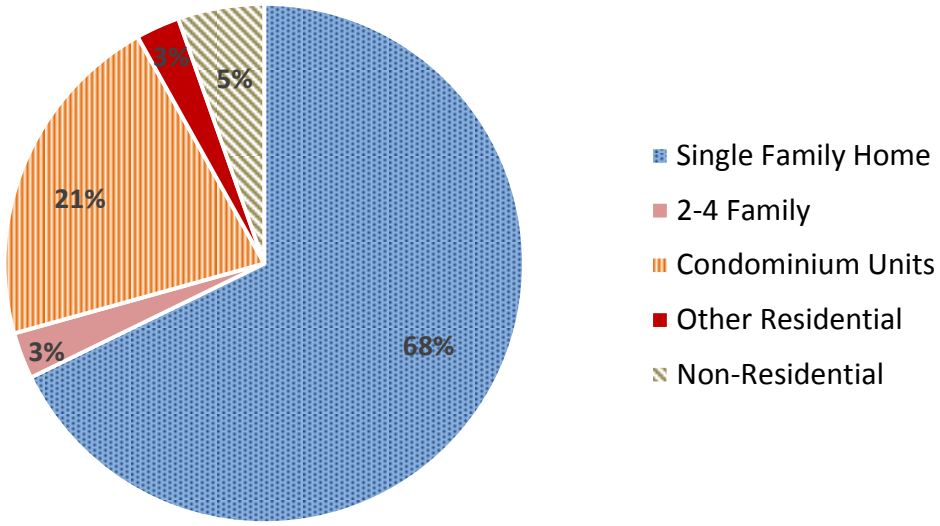
State	Policies in Force
Florida	1,783,152
Texas	604,400
Louisiana	452,669
California	299,170
New Jersey	232,347
South Carolina	200,498

[54] National Research Council. 2015. "Affordability of National Flood Insurance Program Premiums—Report 1" Washington, D.C.: The National Academies Press.
[55] National Research Council. 2016. "Affordability of National Flood Insurance Program Premiums—Report 2" Washington, D.C.: The National Academies Press.

New York	186,720
North Carolina	128,380
Virginia	103,419
Georgia	87,581
Maryland	67,452
Mississippi	65,631
Massachusetts	65,084
Pennsylvania	63,331
Hawaii	59,690
Alabama	54,877
Illinois	43,965
Connecticut	39,382
Washington	39,275
Ohio	36,465
Arizona	35,116
Oregon	30,223
Tennessee	29,760
Delaware	26,524
Indiana	25,387
Michigan	22,653
Colorado	22,554
Kentucky	22,458
Missouri	22,415
Arkansas	18,098
West Virginia	16,897
Oklahoma	15,058
Rhode Island	14,602
New Mexico	13,926
Iowa	13,650
Wisconsin	13,431

Nevada	12,832
North Dakota	11,060
Kansas	10,569
Nebraska	10,516
Minnesota	9,900
New Hampshire	8,582
Maine	8,538
Puerto Rico	7,461
Idaho	6,122
Montana	5,058
South Dakota	4,570
Vermont	4,047
Utah	3,930
Alaska	2,682
District Columbia	2,176
Wyoming	1,904
Virgin Islands	1,602
Guam	216
Northern Mariana Islands	17

Figure 3: NFIP Policies Occupancy Type (as of August 31, 2016)
Sources: FEMA and authors' own calculations

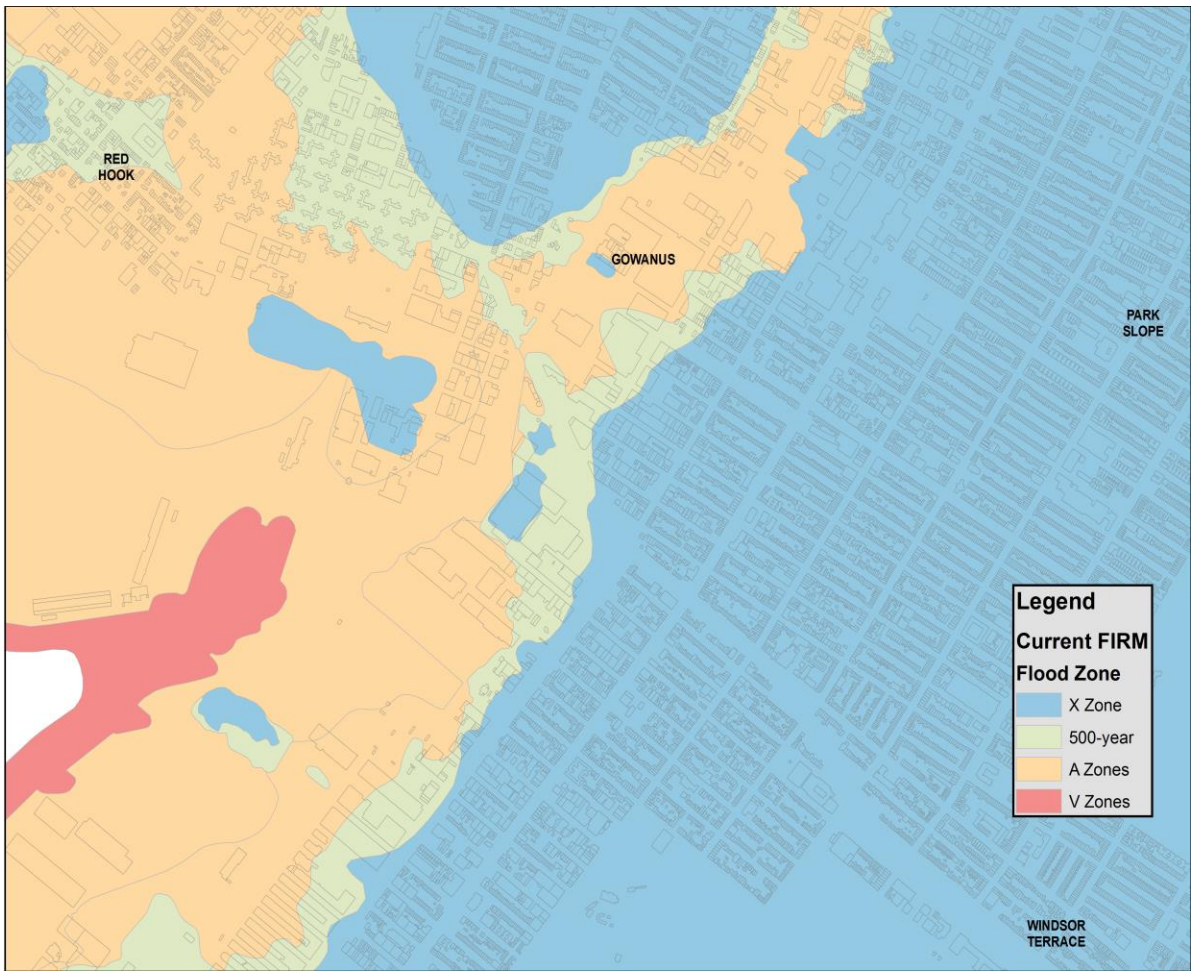


Mapping

In order to guide rate setting and enforcement of NFIP regulations, FEMA maps a community's flood risk and provides it with a Flood Insurance Rate Map (FIRM). These FIRMs delineate the 100-year floodplain, or SFHA. Within the SFHA, there are two zones: 1) the A zone, depicting 100-year floodplains subject to no wave action or waves under 3 feet; and 2) the V zone, subject to breaking waves of at least 3 feet. Outside the SFHA is the X zone, which includes the 500-year floodplain (shaded X), and the area outside both the 100-year and 500-year floodplain (unshaded X). Figure 3 shows an example of the various flood zones from Brooklyn, NY, overlaid on property footprints. While the FIRMs show these various zones, in reality flood risk varies continuously across the landscape. Premiums by flood zone are discussed later in the section.

Figure 4: Flood Zones in Brooklyn, NY (as of 2014)

Sources: Authors with Data from Map Service Center and the City of New York



As a condition of NFIP participation, each time FEMA provides a community with new flood hazard data, the community must use the most up-to-date FIRM to enforce floodplain management regulations associated with the program. These include requiring new development in SFHAs be elevated so the lowest floor is at or above the Base Flood Elevation (BFE). Failure to adopt the new map could result in probation or suspension from the NFIP. When new maps are produced, communities are given a 90-day appeal period. Individuals can also contest their inclusion in the SFHA at any time after a map is effective by submitting a Letter of Map Change and documenting their property is above the BFE.

The BW12 created an advisory group, the Technical Mapping Advisory Council (TMAC), with representatives from the public and private sector and from all levels of government to review and make recommendations related to FEMA's mapping efforts. TMAC was tasked with examining the quality and distribution of FIRMs, performance metrics for mapping; mapping and data standards; how to maintain and update FIRMs; relationships with local partners; approaches for improving interagency coordination; and how to incorporate the best available

climate data into mapping. This includes using a scenario approach to consider changes from erosion and sea-level rise. The TMAC 2015 Annual Report[56] noted the current static NFIP maps do not communicate to residents the "dynamic nature of flooding and the true nature of the risk at various locations on the flood plain." The report presents seven recommendations and multiple sub-recommendations on how FEMA could proceed with providing non-regulatory, but valuable information on future flood risk to communities.

A broader challenge in using FIRMs is that they focus on depicting the SFHA and letting property owners know if they are "in" or "out." This creates a false sense of the risk and a perception flood risk changes abruptly at the boundary of the SFHA, when in reality this is not the case. Homeowners outside the SFHA may conclude they are safe from future flood damage. In reality, they may suffer severe damage from a flood whose annual probability is less than 1%, assuming the map is accurately capturing the 1-in-100-year line, or damage from other flood events if FEMA has underestimated the flood hazard probabilities in some of the X zones.

Hazard Mitigation and the Community Rating System

In order to encourage communities to increase their floodplain management activities, the Community Rating System (CRS) was established in 1990 as a voluntary program. A community can adopt recognized flood risk management activities, receiving points for doing so. As the community accumulates points, it moves up through the levels of the program (from 10 to 1, with 10 being the lowest with no active participation in the CRS and 1 the highest). At each new level, residents of the community whose property is located in a high-risk SFHA receive another 5% discount on NFIP flood insurance rates, up to a 45% discount for a class 1 community. As of 2014, only 5% of NFIP communities participated in the CRS, but they covered more than 67% of all policies in-force.[57] Several researchers[58] examining the CRS have found reductions in flood damages are greatest for communities which have more advanced participation and that certain actions reduce damage or claims more than other activities, not surprisingly.

FEMA also has a mitigation grant program for NFIP policyholders. The Flood Mitigation Assistance (FMA) program was created in 1994 to assist homeowners in undertaking mitigation measures to reduce future losses and future NFIP claims. The grants are available only to NFIP

[56] Technical Advisory Mapping Council (TMAC). 2015. https://www.fema.gov/media-library-data/1454954097105-a94df962a0cce0eef5f84c0e2c814a1f/TMAC_2015_Annual_Report.pdf

[57] FEMA. 2014. Community Rating System Fact Sheet. Washington, DC, Federal Insurance and Mitigation Administration, Federal Emergency Management Agency, March.

[58] Brody, S. D., S. Zahran, P. Maghelal, H. Grover and W. E. Highfield. 2007. "The Rising Costs of Floods: Examining the Impact of Planning and Development Decisions on Property Damage in Florida." *Journal of the American Planning Association* 73(3): 330-345; Michel-Kerjan, E. and C. Kousky. 2010. "Come Rain or Shine: Evidence on Flood Insurance Purchases in Florida." *Journal of Risk and Insurance* 77(2): 369-397; Highfield, W. E. and S. D. Brody. 2013. "Evaluating the effectiveness of local mitigation activities in reducing flood losses." *Natural Hazards Review* 14(4): 229-236. Atreya and Kunreuther (2016) Measuring Community Resilience: The Role of the Community Rating System (CRS). Wharton Risk Center working paper #2016-07.

policyholders. Eligible mitigation projects include, for example, elevation, flood-proofing utilities or relocation of properties. In FY2015, $150 million was available in this program. Prior to 2012, other FEMA grant programs targeted Repetitive Loss properties and Severe Repetitive Loss properties, but the 2012 law combined these with the FMA program. In addition, local governments may use the Pre-Disaster Mitigation Grant program and the Hazard Mitigation Grant program to reduce future flood losses for properties in the NFIP.

Pricing

Annual premiums in 2015 (excluding fees) for a single-family home NFIP policy ranged from roughly $125 at the first percentile to just $3,542 at the 99th percentile with a median of roughly $380 (Table 4). Premiums vary by the amount of coverage purchased and the chosen deductible, as well as a variety of other factors discussed in this section.

Table 4: Annual Premiums for Single-Family Homes in 2015 NFIP
Source: FEMA[59]

	Total Premium ($)	Average Cost per $100 of Coverage
1st Percentile	125	0.10
Median	378	0.14
Mean	663	0.35
99th Percentile	3,542	1.68

Roughly 80% of NFIP policies are charged what FEMA refers to as risk-based rates. These rates are determined based on a model of expected claims but they may not be the same as what a private sector firm would charge due to different administrative costs and loadings (for example, NFIP rates do not include a cost of capital) and more sophisticated methods for estimating the risk.[60] The NFIP prices its full risk policies based on the flood zone in which the property is located using a model of potential flood depths coupled with damage curves at a national rather than local level.

A recent National Research Council report (NRC)[61] reviewed the current NFIP method for calculating risk-based premiums, notably the floodplain analysis and mapping supporting insurance rate setting. The focus of the report is on the methods for calculating risk-premiums,

[59] The authors thank Mitchell Waldner at FEMA for supplying this information.
[60] For more on NFIP pricing, see: Kousky, C. Lingle, B., and L. Shabman. 2016. "The Pricing of Flood Insurance." Unpublished manuscript, Resources for the Future.
[61] National Research Council. 2015. "Tying Flood Insurance to Flood Risk for Low Lying Structures in the Flood Plain" Washington, DC: National Academies Press.

not on what those premiums should be. The report noted "many NFIP methods were developed decades ago and do not take advantage of modern technological and analysis capabilities" and concluded that "the NFIP methods for setting risk-based rates do not accurately and precisely describe critical hazard and vulnerability conditions affecting flood risk for negatively elevated structures" for several reasons. The committee concluded floods occurring with a likelihood greater than 1 in 10 were not represented, flood losses are averaged nationally instead of tailored to each specific location, and some drivers of flood damages, such as duration of inundation and velocity of waters, are not considered but may be important.

Within each zone, full risk rates vary by certain aspects of the house (Table 5). Across all zones, there are different rating tables for different types of properties, such as single-family residential versus commercial. Of course, the coverage level and deductible also are critical in determining the ultimate annual premium. The first $60,000 of coverage for residential policies, called the "basic limit," is charged a higher rate, since losses are more likely to occur in this range. This means policies insuring for higher levels of coverage will end up with a lower average cost per dollar coverage than those insuring for less.

Table 5: Factors Influencing NFIP Rates by Zone
Source: FEMA

A Zone	V Zone	Outside SFHA
• Type of Property • Number of Floors • Basement Presence • Elevation Relative to BFE	• Type of Property • Year of Construction • Obstruction • Replacement Cost Ratio • Elevation Relative to BFE • Numbers of Floors • Basement Presence	• Type of Property • Basement Type • Loss History (for PRP Qualification)

In 2014, the mean annual premium in an A zone was $860, and the median was $560. For properties below the BFE that purchase large amounts of coverage, annual premiums will rise to several thousands of dollars annually. V zone rates are much higher with the mean annual premium in 2014 at $3,880 and the median at $3,530. Note, however, only roughly 1% of policies nationwide are in the V zone as this is a very small geographic area. Within the SFHA (the A and V zones), a primary driver of NFIP premiums is the elevation of the property relative to the BFE or estimated height of waters in a 100-year flood. Below BFE, premiums increase substantially.

Outside the SFHA, the NFIP has two primary rates: Zone X and Preferred Risk Policy (PRP) rates. Zone X comprises areas both within and outside the 500-year floodplain; rates are the same in

both. The PRP policies are lower premiums for properties with a favorable loss history.[62] The rates of PRPs are a fixed price for different sets of building and contents coverage and vary by whether or not the property has a basement. For a policy with the maximum building and contents coverage allowed in the program, the PRP rate is only around $500. Neither X zone nor PRP rates are based on elevation. In 2014, the average annual premium outside the SFHA was $420, and the median was $390.

There are two main classes of policyholders currently receiving discounted rates: 1) pre-FIRM policies; and 2) grandfathered policies. Pre-FIRM properties are those built before FEMA mapped the flood risk in a community. At the time the NFIP was created, Congress was concerned premiums for these structures would be high, given the risk, and did not want to penalize homeowners already living in the floodplain. Pre-FIRM rates are not based on elevation. Even with this discount, most pre-FIRM policyholders are paying more than would be paid under full-risk rating for buildings constructed in compliance with building codes.[63]

Under BW12 and the federal Homeowners Flood Insurance Affordability Act of 2014, all pre-FIRM rates are being phased out. Congress mandated FEMA increase pre-FIRM rates for single family residential properties by a minimum of 5% a year but no more than 18% a year until they reached full-risk rates. For non-primary residences, businesses, severe repetitive loss properties, and properties substantially damaged or improved (meaning in excess of 50% of the building's value), the rate increase is 25% per year. Elevation certificates are required to rate post-FIRM properties, so all pre-FIRM policyholders will need to submit an elevation certificate to FEMA. Their rates will increase until they do so. If a property owner gets an elevation certificate now, however, he/she does not need to switch to post-FIRM rates immediately unless it is beneficial to him/her to do so.

It is likely many pre-FIRM rated properties are below BFE, since it is preferable for properties above BFE to obtain a full risk rate, which is based on elevation. Because of this, many of the properties in the program still obtaining pre-FIRM rates might see their premiums go up considerably as the pre-FIRM discount is eliminated. Data are not available on the elevation of property structures, so this is speculation.

The second large group to pay discounted premiums consists of grandfathered properties. These properties keep the original lower rate when a new map indicates they are at higher risk as long as they maintain a flood insurance policy or if the property is post-FIRM and they can

[62] These are lower rates for properties that are currently in an X zone and have not had any of the following: two claims of more than $1,000 each, three or more claims of any amount, two federal disaster aid payments of more than $1,000 each, three federal disaster aid payments for separate occurrences for any amount, or one insurance claim and two federal aid payments of more than $1,000 each.

[63] Hayes, T. L. and D. A. Neal. 2011. *Actuarial Rate Review: In Support of the Recommended October 1, 2011, Rate and Rule Changes,* Washington, DC, Federal Emergency Management Agency.

demonstrate the home was built in compliance with the hazard map in effect at the time of construction. There are two types of grandfathering. The first is zone grandfathering, which occurs when a property is mapped from a lower to a higher risk zone. If a property is remapped from outside the SFHA to inside the SFHA, they will be transitioned from a PRP rate to an X zone rate since there is no grandfathering of PRP rates.

Elevation grandfathering occurs when a new map changes the BFE such that a property is now lower in relation to the BFE than it was before. Without grandfathering, this could lead to a substantial increase in premiums. But with grandfathering, these properties can keep the older BFE for rating purposes. Grandfathering provides rate protection for properties whose risk increases, but also creates a wedge between risk-based rates and what is paid by policyholders in the SFHA. In areas where risk is likely increasing, such as coastal areas subject to sea-level rise and erosion, grandfathering may become increasingly problematic.

The 2012 and 2014 legislation made some other changes to NFIP pricing. Higher minimum deductibles were established. FEMA was directed to place a 15% assessment on policies in order to build a reserve fund equal to 1% of the sum of potential exposure of outstanding policies. The 2014 law also imposed a $25 fee on all residential policies and a $250 fee on all others to help offset other premium discounts.

Currently, pricing within the NFIP is much coarser than would be done by private sector firms. This coarseness creates implicit cross-subsidies in rates. There are areas where the NFIP is overcharging and areas where the NFIP is undercharging. This creates places where the private sector is able to offer lower premiums. FEMA is in the process of developing a new approach to pricing using modern catastrophe models and improved data that would allow for much more fine-grained pricing. An overhaul of models and data inputs, however, will take many years to achieve. Some more modest changes in rating methods likely will be made in the near-term.

In its December 2015 annual report, the TMAC recommended that "FEMA should transition from identifying the 1-percent-annual-chance floodplain and associated base flood elevation as the basis for insurance rating purposes to a structure-specific flood frequency determination." To do so would require the following data on individual structures in the floodplain:

- **Elevation of the Structure**. Specify the first floor elevation of each structure as identified on its elevation certificate in relation to the BFE. New technologies may be deployed to determine elevations, such as mobile LiDAR (Light Detection and Ranging), so that property owners do not need to individually obtain and pay for elevation certificates.
- **Nature of the Hazard.** Estimate the likelihood of floods of different water surface elevations that could cause damage to the particular structure.

- **Damage to the Structure**. Develop an inundation depth-damage function for the particular structure. To do so requires data on the first floor elevation of the structure in relation to the BFE in order to estimate the impact of floods of different water surface elevation on the structure.
- **Determine Average Annual Loss.** Multiply the likelihood of floods of water surface elevation (pi) by its damage to the structure (Di) over all values of i (i=1…n) to obtain average annual loss (AAL) to the structure, which is given by AAL=$\boldsymbol{\Sigma}$ pi Di .

The federal government has recently contracted with several private reinsurers to improve the NFIP's claims paying ability and reduce the need for the NFIP to borrow from the U.S. Department of the Treasury (Treasury) to cover future claims. More specifically, FEMA is transferring $1 million in NFIP risk to private reinsurers by entering into agreements with Transatlantic Reinsurance, Swiss Re America and Munich Reinsurance America, effective Sept. 19, 2016 for six months. FEMA contracted with Guy Carpenter and Co., a subsidiary of Marsh & McLennan, for brokerage assistance in securing the reinsurance agreements.

This initial offering is quite small compared to potential NFIP claims, as seen in the next section, but FEMA has indicated it plans to purchase a larger amount of reinsurance in the future. While the NFIP has borrowing authority from the Treasury, it has no financial structure in place to guarantee it can pay claims from a catastrophic loss year. To prevent the program from going into debt as it did in 2005 from severe loss years, the program will either need to purchase significantly more reinsurance or make use of other risk transfer instruments. In the absence of these measures, Congress will need to explicitly decide to pay for losses above some threshold.

FEMA reported to Congress on an evaluation of NFIP reinsurance purchases conducted by Guy Carpenter.[64] Guy Carpenter concluded the current market could provide $7.5 billion to $10 billion of vertical event capacity of indemnity coverage, if developed over time to develop comfort with the NFIP's portfolio and exposure and as the supportive modeling develops. That said, such coverage would come at a high cost, and it is unclear how the NFIP could budget for this as current premium revenue would be insufficient and there is already political and homeowner opposition to higher premiums.

Claims

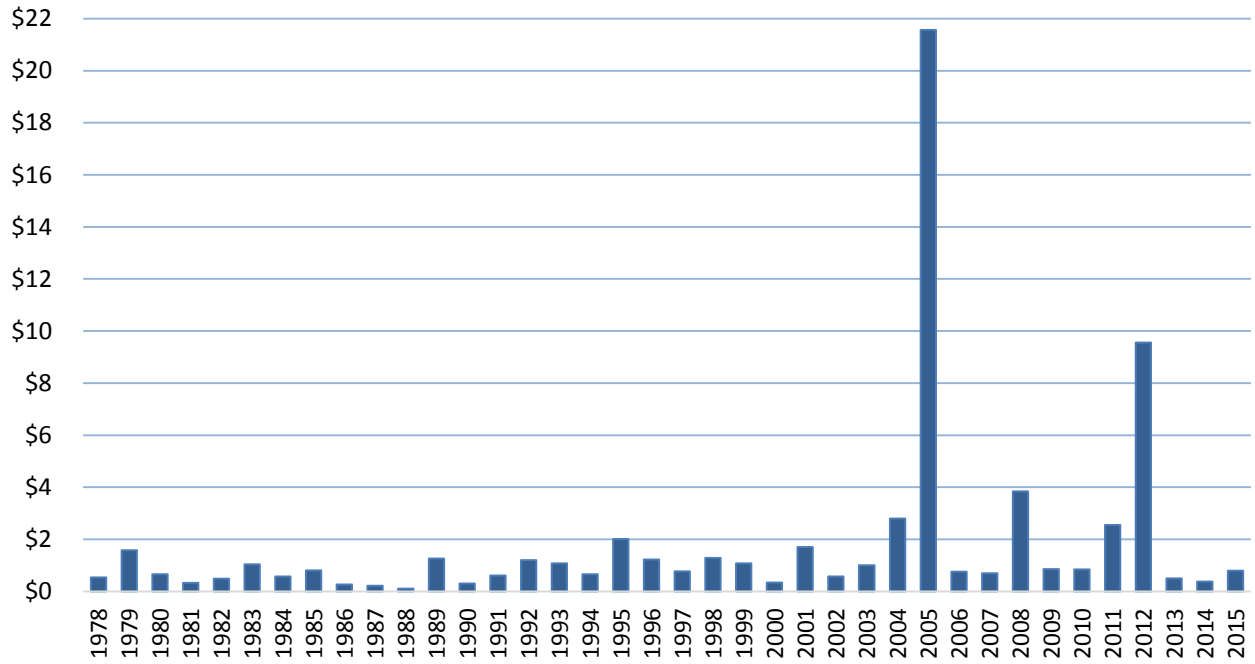
As it has been already noted, the NFIP is currently $25 billion in debt, largely due to losses from Hurricane Katrina in 2005. In 2005, the program paid out more in claims than it had previously over the life of the program. The NFIP saw fairly substantial losses again in 2008 from Hurricane Ike and in 2012 from Hurricane Sandy, as shown in Figure 5. The average paid loss from

[64] NFIP (2015). Report to Congress on Reinsuring NFIP Insurance Risk and Options for Privatizing the NFIP. Washington DC, National Flood Insurance Program, Federal Emergency Management Agency.

Hurricane Katrina was more than $97,000, and the average paid loss from Sandy was $64,000,[65] demonstrating the severe loss years associated with Katrina, and to a lesser extent Sandy, had not just more claims than normal, but higher paid claims, as well. As another indication of this trend, prior to 2004, the maximum number of paid claims at the building cap of $250,000 was 70 in 1989. This figure jumped to 421 in 2004 and then in 2005 to almost 5,000.

Figure 5: NFIP Claims by Year (in 2015 $Millions)

Sources: FEMA

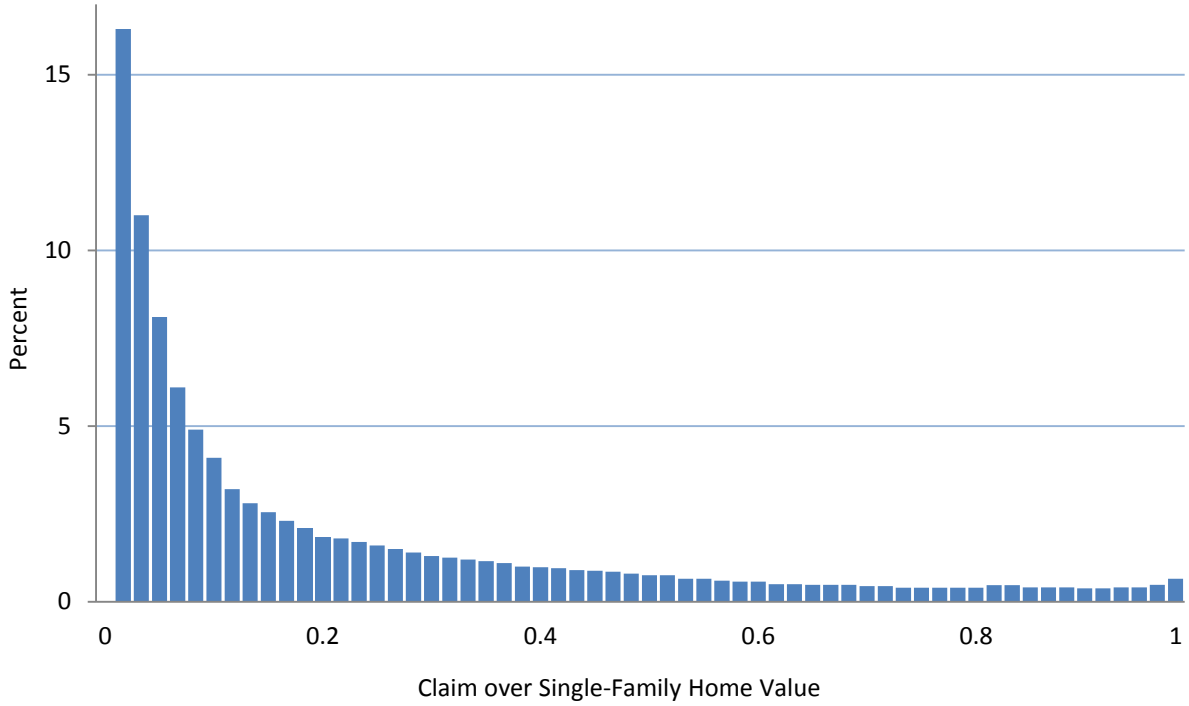


Kousky and Michel-Kerjan[66] analyzed flood insurance claims in the NFIP between 1978 and 2012. They found that in 2012 dollars, more than a quarter of claims paid were under $5,000, around half were less than $13,000, and 75% were less than $40,000, but the 99th percentile was almost $300,000. The NFIP claims database contained estimates of the value of the property. For single-family homes that received a paid claim between 1978 and 2012, Figure 5 plots the percent of claims as a percentage of the building value. Again, while many claims are modest, there are some that are very severe, typical of disaster loss data.

[65] Reported on FEMA website: *https://www.fema.gov/significant-flood-events*

[66] Kousky, C. and E. Michel-Kerjan (2015). Examining Flood Insurance Claims in the United States. *Journal of Risk and Insurance* DOI: 10.1111/jori.12106.

Figure 6: NFIP Claims as Percentage of Building Value for Single-Family Homes (1978-2012)
Sources: FEMA and Authors' Own Calculations



The authors found, in a series of regression analyses, claims are higher for properties at greater risk. Claims in 100-year floodplains not subject to storm surge are higher than claims outside the 500-year floodplain by 20% to 25%. Claims in the 500-year floodplain are higher than those outside it by 13% to 17%. And claims in coastal areas subject to storm surge are higher than those outside the 500-year floodplain by about 35%. Elevated homes have lower claims. Properties in communities participating in the CRS also have lower claims.

Somewhat surprisingly, the authors found the claim rate (the number of claims divided by the number of policies in-force) is not statistically different inside and outside the SFHA. This is likely due to adverse selection, since outside the SFHA, where purchase of a flood insurance policy is voluntary, it is the highest-risk properties tending to insure. It is also the case the maps may not always accurately depict the all-flood perils 100-year floodplain, particularly if they have not been updated in many years.

Addressing Affordability in the NFIP

The following two guiding principles should enable flood insurance to play a more significant role in communicating information on the flood risk to residents in areas subject to inundation,

reducing future flood losses while at the same time addressing the affordability of flood insurance for residents struggling financially to make premium payments.[67]

Principle 1—Premiums Should Reflect Risk

Risk-based flood insurance premiums provide individuals with accurate signals as to the degree of the hazards they face and encourage them to engage in cost-effective mitigation measures to reduce their vulnerability. Risk-based premiums also provide information on which areas are at higher risk to guide development and land use decisions.

Currently, however, as discussed earlier in this section, prices in the NFIP are quite coarse and premiums are often discounted, preventing households from getting an accurate signal of their flood risk. If Principle 1 is applied to risks where premiums are currently discounted, some residents will be faced with large price increases. This is particularly a concern for pre-FIRM policyholders whose structures are below BFE; as the pre-FIRM discounts are phased out, these property owners could see very large increases in their annual premium. This concern leads to the second guiding principle.

Principle 2— Dealing with Equity and Affordability Issues[68]

Those living in high-risk areas but unable to pay the cost of flood insurance should be given assistance, but this should be through a means-tested program distinct from risk-based pricing. In principle, the funding for any premium assistance could come from various sources, such as federal or state tax revenue or extra fees on other policyholders. To prevent further distortion in prices, the former may be preferable. Those who decide to locate in these regions in the future would be charged premiums reflecting the risk. This is important to minimize any moral hazard of an assistance program so that it does not perversely result in an increase in risk. We now turn to addressing affordability options in more detail.

Following the 2012 and 2014 NFIP reform legislation, the affordability of flood insurance has become an ongoing policy concern. While much of the concern by homeowners about being charged higher rates was allayed by the reinstating of grandfathered premiums (see Pricing Subsection earlier), Congress and the NFIP remain concerned about how to help low-income households afford flood insurance. The NRC released a report on this topic in 2015, exploring possible design options for an affordability program.[69]

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[67] These principles are discussed in more detail in Kunreuther, H., and Michel-Kerjan, E., 2011. "At War with the Weather: Managing Large-Scale Risks in a New Era of Catastrophes." MIT Press; and Kunreuther, H., M. V. Pauly and S. McMorrow (2013). *Op cit* .

[68] Principle 2 applies only to those individuals who currently reside in hazard-prone areas.

[69] National Research Council, 2015. "Affordability of National Flood Insurance Premiums: Report 1." Washington, DC, National Academies Press.

The NRC report explored various indicators which could be used to identify policyholders "cost burdened" by NFIP premiums. Proposed methods included some measure of income, housing expenses, or other criteria. Once such a definition is established, a range of policy design questions would need to be answered: Who will receive assistance? What assistance will be provided? How will assistance be provided? How much assistance will be provided? Who will pay for assistance? And how will assistance be administered? FEMA Is currently working on its own affordability framework designed to address these questions it will present to Congress.

One way to maintain risk-based premiums and at the same time address issues of affordability is to offer means-tested vouchers to cover part of the cost of insurance. The following existing programs are examples that could serve as models for developing such a voucher system: [70]

- Food Stamp Program
- Low Income Home Energy Assistance Program
- Universal Service Fund

The amount of the voucher could be calculated using a sliding scale based on the cost-burden metric chosen by policymakers.

There are also similar programs from the insurance space which could serve as models. For example, the federal Affordable Care Act (ACA) established a premium tax credit and a cost-sharing subsidy to help those with lower incomes afford health insurance. The tax credit is available to households without affordable coverage through their employer and ineligible for Medicare or Medicaid whose income is between 100% and 400% of the federal poverty level. This program sets a sliding limit on the percentage of household income spent on monthly insurance premiums. When the cost of a benchmark plan exceeds this cap, the federal government pays the difference in the form of a premium tax credit. For households with income 100-250% of the federal poverty level, there is a maximum out-of-pocket expense for healthcare. This is paid directly to insurers. As another example, in California, households with income below 250% of the poverty level and meeting other eligibility criteria are eligible for car insurance through the Low Cost Auto Insurance Program.

Since the properties having the highest premiums are usually those at highest risk, premium assistance and hazard mitigation could be addressed together. For example, as a condition for the voucher, the property owner could be required to invest in cost-effective mitigation measures. Many flood insurance loss reduction options tend to be expensive, such as elevation and flood-proofing. Due to budget constraints, property owners may be reluctant to invest in these measures because of their high upfront costs. FEMA has some hazard mitigation grant programs that help fund such measures for policyholders, including the Flood Mitigation

[70] For more details on these programs see Kunreuther and Michel-Kerjan (2011) *op cit.*

Assistance Program discussed earlier. Another option is to provide mitigation assistance in the form of a loan. Currently, the Small Business Administration (SBA) provides loans to flood victims for repairing and rebuilding their damaged property and will lend additional funds for mitigation, although very few loan recipients make use of this provision.

Connecticut is one state that has begun offering mitigation loans. In July 2014, Connecticut initiated its "Shore Up CT" program designed to help residential or business property-owners elevate buildings, retrofit properties with additional flood protection or assist with wind-proofing structures on property prone to coastal flooding. This state program, the first in the country, enables homeowners to obtain a 15-year loan ranging from $10,000 to $300,000 at an annual interest rate of 2¾%.[71] The loans are offered to properties in the SFHA and recipients must maintain flood insurance during the duration of the loan.

Mitigation loans could be linked to premium assistance. Qualifying property owners could be given a loan to invest in hazard mitigation and be provided with assistance on their combined premium and loan payment, which would normally be lower due to mitigation. Such a combination could work well for elevating homes, since these currently receive a substantial reduction in flood insurance premiums from the NFIP. Other mitigation measures are not rewarded at all or as much, making this type of program design more challenging for financing under the current program.

An empirical study of homeowners in Ocean County, NJ, reveals the amount of a voucher could be reduced significantly from what it would have been had the structure not been mitigated, as shown in Figure 6 for a property in the V Zone or A Zone.[72] A related study of a voucher/mitigation program applied to homes in flood-prone areas of Charleston, SC,[73] revealed that elevating a house a few feet can decrease the homeowner's risk-based premium by 70% to 80%, saving thousands of dollars annually, and could cut the government's voucher cost by more than 60% when elevation costs are low ($25,000). Even when elevation costs are high ($75,000), as they are likely to be in the V zone, coupling vouchers with mitigation loans still leads to cost savings for the government.

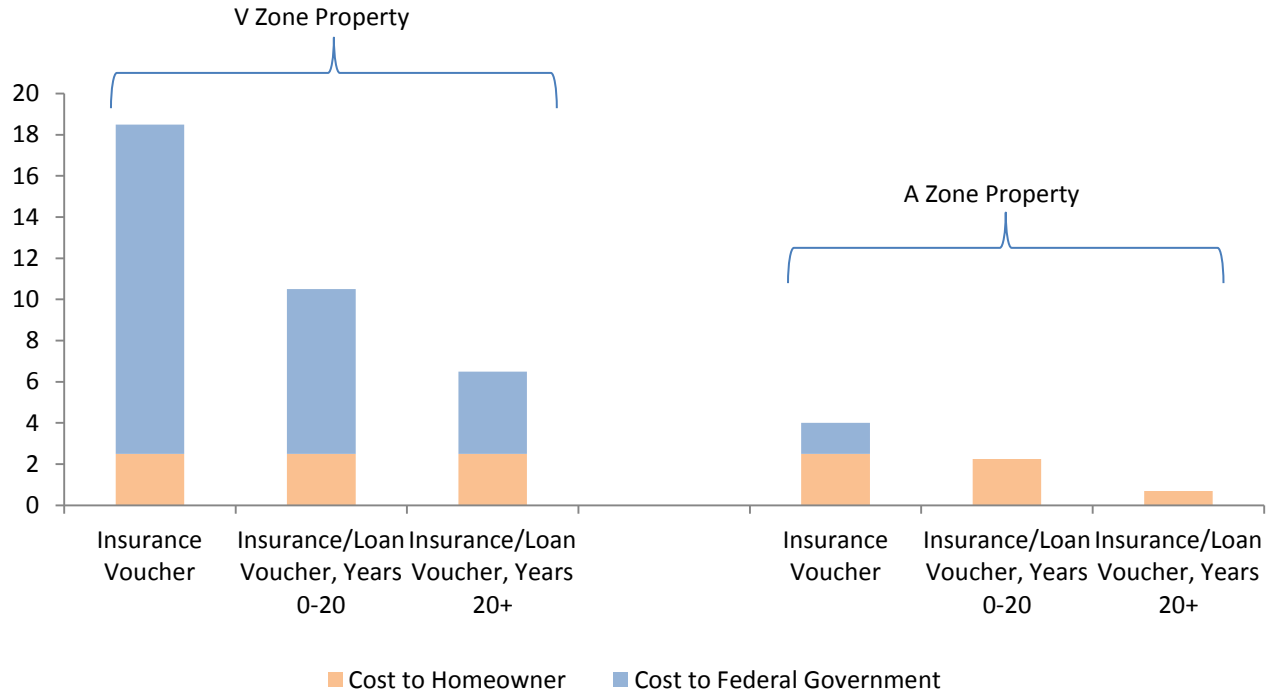
FEMA is currently exploring this and other potential policy options for addressing concerns about the affordability of flood insurance for low-income residents of flood-prone areas. It is also working with other federal agencies to obtain more data on the income and wealth of its policyholders.

[71] *http://shoreupct.org/*

[72] Kousky, C., and H. Kunreuther, 2014. "Addressing Affordability in the National Flood Insurance Program." *Journal of Extreme Events* 1(01):1-28.

[73] Zhao, W., H. Kunreuther, and J. Czajkowski, 2015. "Affordability of the national flood insurance program: Application to Charleston County, South Carolina," *Natural Hazards Review,* 17(1).

Figure 7: Cost of a Combined Voucher and Loan Program to the Federal Government and a Hypothetical Homeowner (in $Thousands)
Sources: Authors' Own Calculations



Modifying the NFIP

The NFIP is scheduled for reauthorization in 2017, presenting a target of opportunity to implement a long-term strategy for reducing risk and stabilizing the finances of the program. Here, we discuss several possible reforms that might be considered by Congress and how these features could be the first step in moving toward an all-hazards homeowners insurance policy.

Proposed Reforms of the NFIP

Flood mapping

Accurate flood maps are needed not only for the highest-risk areas, but also for areas outside those normally considered flood-prone. Such maps, coupled with elevation data on individual structures, would provide information on the likelihood of floods of different depths that could cause damage to the structure, its contents and critical systems like the air conditioning and heating units. State-of-the-art technology, such as Lidar and advanced engineering, could determine the likely damage to the different structures from each of the potential floods. As noted previously, the current FIRMs—while useful for setting rates according to the current tables, identifying those subject to the mandatory purchase requirement and identfying areas for NFIP land use regulations—are inadequate for providing accurate property-level flood risk information. Congress should consider appropriating funding to support development of

improved flood maps that can be used for better risk information for communities, and also to guide an overhaul of NFIP pricing FEMA is currently considering.

Rate setting

FEMA is already developing new approaches to rating within its existing authorities to eventually provide micro-scale flood risk information and more granular pricing. Such an effort would need to be coupled with more property-specific risk mapping as just discussed earlier. This would bring the program closer to true risk-based pricing, more akin to private insurance firms. While such an approach is developed, other simpler reforms could be adopted, including the continued phase-out of pre-FIRM rates. FEMA could also help develop an online calculator, for instance, to help households better understand the cost of flood insurance and their policy options. More differentiated pricing could be explored outside the SFHA, as well.

Affordability

Introduction of risk-based rates will necessitate an assistance program to help low-income residents of flood-prone areas insure. Should no assistance be provided, these households will likely forgo coverage altogether. Contrary to popular belief, federal disaster assistance is rarely enough to make these households whole again after a flood.[74] Lack of insurance in disaster-prone areas will possibly subject residents to serious financial hardship. To protect against this, Congress should consider creating a program to aid qualifying households in insuring. One option is a means-tested voucher provided by the public sector to those who undertake cost-effective mitigation measures. Homeowners who invested in loss-reduction measures, potentially financed through a coupled loan program, would be given a premium discount to reflect the reduction in expected losses from floods. Well-enforced building codes and seals of approval would provide an additional rationale for undertaking these loss-reduction measures.

Maintaining coverage

More could be done to ensure floodplain residents keep their policy over time. One means may be escrowing the premium payment. Having flood insurance paid automatically out of an account along with loan payments, property taxes and homeowners insurance may dissuade people from canceling their policies. As behavioral economics has shown, many people often stick with the status-quo or default option. Another option is a multi-year insurance policy tied to the property. This likewise would deter policyholders from canceling their policies if they did not suffer losses for several years. To empirically test the demand for multi-year insurance, a web-based experiment was undertaken with adults in the U.S. The individuals participating in the experiment were offered a choice between 1-year and 2-year contracts against losses from hurricane-related damage. A large majority of the responders preferred the 2-year contract

[74] Kousky, C. and L. Shabman., 2012. "How Generous Is Post-flood Disaster Aid?" RFF Policy Commentary, June 15.

over the 1-year contract, even when it was priced at a higher level than the actuarially fair price. Introducing a 2-year insurance policy into the menu of contracts also increased the aggregate demand for disaster insurance.[75]

Claims-paying ability

The NFIP is deeply in debt because it never had a financial architecture and rate structure in place in order to be able to play claims from a catastrophic loss year. Current premiums will be unlikely to cover this debt. Congress should consider forgiving the debt while simultaneously putting in place a structure to reduce the need for taxpayer dollars in the future. This will include moving rates closer to risk-based levels, increasing purchase of private reinsurance, making use of other risk-transfer instruments and establishing the federal government explicitly as the payer of last resort for very extreme loss years.

The social welfare benefits of this proposed program would be significant: less damage to property, lower costs to insurers for protecting against catastrophic losses, more secure mortgages and lower costs to the government for disaster assistance.

Conclusion for NFIP Section[76]

The impact of changing climate patterns on future damage from flooding due to potential sea level rise and more intense hurricanes also needs to be taken into account. There is evidence federal agencies and other bodies have underestimated the risks of damage from extreme weather events due to climate change.[77] Hurricane Sandy has stimulated studies on ways communities can be more prepared for future disaster damage as well as highlighting the need for a suite of policy tools, including insurance, to address the climate change problem.[78] While insurance policies tend to be written on an annual basis, information on the nature of the risk over a long time period is needed when making decisions for locating residential and commercial property and when families chose where to live. Today's flood maps do not provide this information.

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[75] Kunreuther, H., and E. Michel-Kerjan, 2015. "Demand for Fixed-Price Multi-Year Contracts: Experimental Evidence from Insurance Decisions." *Journal of Risk and Uncertainty,* 51:171-194.

[76] This section draws on Kunreuther, 2016 *op. cit.*

[77] Repetto and Easton. 2012. " Climate Change and Damage from Extreme Weather Events," *Environment* 52 (2012): 2, 22– 33.

[78] See National Research Council, 2012. *Disaster Resilience: A National Imperative*. Washington, D.C.: The National Academies Press

Hurricane Sandy Rebuilding Task Force, 2013. *Hurricane Sandy Rebuilding Strategy: Stronger Communities, a Resilient Region* August http://portal.hud.gov/hudportal/documents/huddoc?id=hsrebuildingstrategy.pdf

NYC, 2013. PlaNYC: A stronger more resilient NYC. New York City, Mayor's Office of Long Term Planning and Sustainability. http://www.nyc.gov/html/sirr/html/report/report.shtml

New York City Panel on Climate Change, 2015. "Building the Knowledge Base for Climate Resiliency." *Annals of the New York Academy of Sciences* 1336(1):1–150.

Studies are also needed as to ways other policy tools, such as well-enforced building codes to encourage good construction practices, can complement insurance. Enforcing building codes for all residences in Florida could reduce by nearly half the risk-based prices of insurance under climate change projections with respect to hurricane damage in 2020 and 2040.[79]

The challenge facing the U.S. today is how to capitalize on the concerns raised by hurricanes Katrina and Sandy and discussions on the renewal of the NFIP in 2017. The case for making communities more resilient to natural disasters by investing in loss reduction measures is critical today given economic development in hazard-prone areas.[80] For all-hazards homeowners' insurance to be part of such a strategy there is a need for support from key interested parties, including real estate agents, developers, banks and financial institution, residents in hazard-prone areas as well as public sector organizations at the local, state and federal levels.

[79] Kunreuther, H., E. Michel-Kerjan, and N. Ranger. 2013. "Insuring Against Future Climate Catastrophes," *Climatic Change* 18 2, 339-354.
[80] See, National Research Council (2012).

Private Sector Flood Insurance

Private Sector Flood Insurance

By Nicholas Lamparelli, VP of Cat Modeling and Analytics Partner, QBE, and
Ivan Maddox, Product Manager, Intermap Technologies

Current Options

While there is still limited involvement of private insurers in the primary market, there is a growing appetite, especially in the surplus lines market to provide private flood insurance coverage. Furthermore, a number of admitted insurers have been active in the excess market, the oldest segment of the non-NFIP insurance market, offering high-value coverage in excess of the NFIP $250,000 limit as well expanded coverage (i.e., swimming pools, basements), better conditions and additional coverages (i.e., loss of use). Insurers with existing excess business may enjoy an advantage as they enter into an open, competitive and expanding private U.S. flood insurance market.

The newest segment of private flood insurance is characterized by selective picking of specific properties in the NFIP Special Flood Hazard Areas (SFHA) carrying coverage which may be considered overpriced. Since the NFIP defines flood rates over a generalized area, by definition there are properties found at lower as well as higher risk than average within the SFHA.

Private insurance underwriters work to identify homes at lower risk than surrounding properties, and offer lower premiums with better terms than comparable NFIP coverage. By selectively picking lower risks, admitted private insurers can ease their entry into the U.S. flood insurance market.

Currently, a large part of all the U.S. private flood insurance products coming to the market are originating from the Lloyd's market, with numerous syndicates announcing products, and others quietly backing programs through their managing general agent (MGA) networks. Among the private/excess flood insurers and markets in the U.S. are:

American Integrity Insurance Company of Florida (Florida only)[81]
Assurant[82]
Blue River Underwriters[83]
Burns & Wilcox[84]
Centauri Specialty Insurance Company[85]
Coastal American Insurance Company[86]

[81] *http://aiicfl.com/*
[82] *www.assurantspecialtyproperty.com/flood/AssurantPrimaryFlood.html*
[83] *www.blueriveruw.com/flood-reo-wind/*
[84] *www.burnsandwilcox.com/products/commercial-difference-in-conditions/*
[85] *www.centauriinsurance.com*
[86] *http://caic-insco.com*

Hiscox[87]
Homeowners Choice Property & Casualty[88]
Insurmark[89]
Macneill Group[90]
National Flood Services (via Aon)[91]
National Risk Solutions[92]
Coastal Agents (via Orchid MGA)[93]
Reliable Insurance Managers[94]
Ryan Turner Specialty[95]
Schinnerer[96]
The Flood Insurance Agency (via Lexington or Lloyds)[97]
Torrent Flood (via Marsh)[98]
TypTap (Florida only)[99]
Winchester General Agency (Louisiana only)[100]
Wright Flood (via National Fidelity Property & Casualty)[101]

Generally not found in the current options is a bundling of flood as a covered peril on a single policy with familiar coverages for wind and fire discussed in detail in the following subsections.

Pros & Cons of Options

As with any product offered by multiple competitive enterprises, increasing the availability of non-NFIP flood insurance would greatly help expand consumer choice and potentially lower prices. One of the NFIP's shortfalls is the relative lack of choice, both in terms of alternative products and policy variety. The introduction of more flood insurance product choices by the private sector would remedy this shortcoming.

As the flood insurance market expands beyond surplus lines insurers and selective picking, there would be more options to fit a wider portion of the market. With the broadening of the risk pool, insurers would be able to tailor products for higher risk homes, regardless of whether they are in the SFHA. Not all high-risk properties are in the SFHA. Private insurers would also be

[87] *www.hiscox.com/small-business-insurance/newsroom/press/2016/hiscox-launches-new-US-flood-cover*
[88] *www.hcpci.com*
[89] *www.floodwatchins.com/Pages/Home.aspx*
[90] *http://macneillflood.com/*
[91] *https://www.nationalfloodservices.com/*
[92] *www.nrsinsurance.com/Products/Product.aspx?pcid=1026*
[93] *http://coastal.orchidinsurance.com/more_options_flood/*
[94] *www.reliableins.net/flood/*
[95] *https://rtspecialty.com/product/property/*
[96] *www.schinnerer.com/news/schinnerer_introduces_online_flood_solution.aspx*
[97] *www.privatemarketflood.com/*
[98] *http://torrentcorp.com/solutions/get-flood*
[99] *www.typtap.com/*
[100] *www.winchestergeneralagency.com/*
[101] *www.wrightflood.com/*

able to create options for lower-risk properties to eventually compete with NFIP policies in non-compulsory zones (i.e., X zones) and their lower NFIP rates.

Adverse selection could potentially become a concern because there is a legacy of consumers not expecting to need flood insurance unless some governmental or other authority states it is necessary. As a result, insurers tend to be timid in offering actuarially sound coverage on lower-risk property because of the belief (often correct) only people who know they need it (i.e., know more than the insurer) will actually buy it. The problem of adverse selection could be overcome by the broad acceptance of the importance of flood insurance as an essential part of household financial planning.

One way to expand the risk pool and eliminate adverse selection is to make flood insurance compelling enough for all homeowners to seriously consider buying it, regardless of where their home is located. The idea of bundling flood with other perils has been put forward as a way to do this as discussed below. The value in bundled coverage exceeds the security of having flood coverage; it includes the simplicity of having a single policy simply covering anything that can happen to the home.

From an insurer's perspective, bundling flood coverage with other perils is attractive as it generates revenue for multiple non-correlated risks. In the absence of premium for the other perils, mono-line flood policies would tend to overcharge to account for uncertainty.

Thus, bundling flood into homeowner policies may be both the most efficient economic method to cover the risk for insurers and to deliver value and peace of mind to policyholders.

Towards an All- Hazards Homeowners Insurance Policy[102]

By Howard Kunreuther, James G. Dinan Professor of Decision Sciences and Public Policy, Wharton School, University of Pennsylvania, Co-Director, Risk Management and Decision Processes Center

For the insurance industry to consider modifying its standard homeowners policy to include flood and earthquake as part of its standard homeowners coverage, the public sector will need to play a key role in the following two areas:

- **Allowing insurers flexibility in charging risk-based premiums**: Unless state insurance regulators allow insurers flexibility in charging risk-based rates, no insurer will have an interest in marketing an all-hazards homeowners insurance policy. State insurance

[102]The material in this subsection draws on Kunreuther, H. 2016. "All Hazard Homeowners Insurance: Challenges and Opportunities" Paper prepared for the Resources for the Future-Wharton Risk Management and Decision Processes Center Workshop on *Improving Disaster Financing: Evaluating Policy Interventions in Disaster Insurance Markets* Nov. 29-30.

regulators should still play a role in providing consumer protection, such as by specifying a level of surplus or reserves for insurers to pay claims from a catastrophic loss. Insurers will then have to consider ways they can protect themselves against unusually large losses to reduce the chance of insolvency.

- **Covering uninsurable catastrophic losses:** Insurers' withdrawal from certain markets due to the high cost of covering catastrophic risks, including a lack of sufficient reinsurance capacity and other risk transfer instruments, such catastrophe (CAT) bonds, led to the establishment of government-backed programs such as the California Earthquake Authority (CEA), the NFIP, and the federal Terrorism Risk Insurance Act (TRIA).

If insurers were permitted to charge risk-based premiums they deem appropriate, they would very likely want to market coverage against earthquakes and floods as long as they were protected against catastrophic losses. The federal government could provide backstop protection to insurers against catastrophic loss years, such as it currently does in TRIA. Such an arrangement could potentially allow the private sector to operate for all but the most devastating loss years. As TRIA suggests, the loss level triggering public payment could be set quite high. It would be useful and instructive for a study to model the costs of this possibility, both to the federal government and the impact it would have on the cost of all hazards homeowners policies.

Similarly, it has been proposed the federal government could auction a limited number of catastrophe reinsurance contracts annually to private insurers in order to provide them with more capacity to handle truly extreme events.[103] The design of such contracts would have to be specified, and a more detailed analysis would have to be undertaken to determine the potential impact of such an auction mechanism on the relevant stakeholders.

Finally, the public sector, as discussed earlier in the study, could also play a role in improving insurability by reducing losses by offering low interest loans and grants for mitigation if private insurers were to incorporate flood risk in an all-hazards policy.

[103] Lewis, C., and L. Murdock, 1996. "The Role of Government Contracts in Discretionary Reinsurance Markets for Natural Disasters," *Journal of Risk and Insurance* 63(4): 567–597.

Policy Alternatives and Potential Future Flood Insurance Regimes

Policy Alternatives and Potential Future Flood Insurance Regimes

By Nicholas Lamparelli, VP of Cat Modeling and Analytics Partner, QBE, and
Ivan Maddox, Product Manager, Intermap Technologies

Flood Insurance Costs

Costs associated with private flood insurance are similar to any other lines of insurance. Costs can generally be grouped into the following categories:

- **Indemnity and adjustment expenses:** These are the actual losses and loss adjustment expenses associated with writing flood coverage. This segment would also include the tools and technology required to adequately assess loss such as replacement cost estimators, infrared camera equipment, drones and temporary mobile housing for adjusters as well as the adjusters and claims professionals themselves, whether internal or as a third-party organization.
- **Reinsurance expenses:** These are recurring expenses to acquire reinsurance protection. These expenses are continual and manifest whether any claims transpire or not.
- **Underwriting expenses:** These costs arise from the planning of all risk transfer activities from appetite guidelines to risk selection to pricing. These activities would also include the tools and technology to evaluate risk and portfolio optimization such as CAT models, actuarial software and the underwriting, and actuarial and data staff to operate this function.
- **Distribution:** These are expenses associated with selling and distributing policies. These costs include commissions, marketing expenses, tools and technology to assist in those functions along with the staff (both internal and/or external as third-party vendors).
- **Other:** These are all the other expenses directly or indirectly arising from a flood insurance operation. These would include office space, general staffing, taxes, compliance and others.
- **Cost of capital and/or profit margins:** This would be the profit hurdle an insurer would need to clear in order to satisfy its business requirements for operation for the net risk associated with all capital needed to be held against potential net losses not shielded by reinsurance.

Insurance Industry Appetite to Write Flood Insurance

With persistent low interest rates and a multi-year soft-market, insurers have been seeking alternative ways to improve their profitability. The course of action insurers have followed includes increases in premium to create underwriting profit. Insurers historically have been risk-averse and typically do not innovate into new areas without thoughtful and deliberate consideration.

Flood insurance in the U.S. is an enormous source of potential premium in which losses would be mostly uncorrelated with other perils.

Appetite would expand when insurers begin to see the following:

- Congress changes the existing laws allowing non-NFIP flood coverage to satisfy federally backed mortgage lending requirements.
- Mono-line surplus lines insurers and Lloyd's syndicates profitably manage their flood books. The excess markets are generally where insurers, MGAs and Lloyd's of London experiment with rate, form and distribution.
- The different underwriting strategies that these players employ to successfully manage their flood exposure (What tools, models and other technology did they use? How were they used to guide risk appetite, policy language, pricing and other key underwriting criteria?)
- View the various distribution strategies implemented by the initial wave of participants. (Will the flood insurance be sold via brokers/agents, or direct to the consumer? Will flood be a separate line of business or packaged with the other property products?)

Larger insurers begin to expand in newer opportunities once the excess lines have provided a functional and scalable business model to adopt. As additional players enter the market, non-participants may start to move in greater numbers seeing this success and worrying they may lose competitive status or miss out on the billions of premium dollars to be earned.

In contrast, appetite will probably wane if the first wave of entrants cannot successfully develop an underwriting strategy or if loss experience continuously exceeds estimations from CAT models. Risk aversion to this peril will be high unless it can be shown initially and consistently that losses are in-line with actuarial and modeling estimates.

Outside of the traditional insurance market, in the alternative risk transfer market, insurance-linked security (ILS) investors tend to be avid buyers of private flood risk pools. Many private investment funds are pouring cash in ILS investments, with most new issues being oversubscribed. The demand for new issues, especially issues where losses are mostly uncorrelated to other portfolio risks, is partly driven by investors' desire to diversify their portfolios. Participants in the ILS space are already comfortable with how CAT models estimate loss and how to price extreme risks associated with volatile perils as they currently do with hurricane and earthquake risks.

In fact, investors have already proven their appetite for flood exposure when in 2013, $200 million in flood risk was snatched up as the New York Metro system, fresh off massive losses

from Superstorm Sandy, issued a three-year CAT bond named MetroCat Re Ltd.[104] John Seo of Fermat Capital, an ILS investor, spoke in an NAIC Center for Insurance Policy and Research (CIPR) event in October 2014[105] about the NFIP and flood insurance. What is striking about the presentation is the ILS market already recognizes the existing opportunity and it is willingly educating the traditional market on the risk and how they can assist in sharing the load.

This opens opportunities for insurance and ILS participants to partner in finding ways to link flood risk to the capital markets and develop a new set of risk transfer products, which could replace how we currently finance the protection of flood exposed properties.

Private Sector Capacity to Cover Potential Flood Losses

Insurers are supposed to be untroubled with their capacity to cover potential losses; any insurer lacking the capacity to cover losses is destined for failure through regulatory action and customer abandonment. Insurers entering the flood insurance market in the U.S. are part of an industry notable for its effective diversification and management of risk, including reinsurance and insurance-linked securities among other strategies.

According to Aon, 2015 reinsurance capacity was just over $550 billion, while ILS capacity is at $69 billion and expected to rapidly reach $100 billion within the next few years.[106] Couple this with the surplus of the U.S. property/casualty (P/C) insurance industry, the total insurance capacity available is likely well over $1 trillion.

The ability to deploy capacity against flood risk depends on many factors but generally is centered on the severity of individual events, the probability of those events occurring and how events may aggregate over the course of a policy term.

In general, coastal flood events arising from hurricanes are the most probable user of insurance and reinsurance capacity. The largest loss producing events were hurricane-related with Katrina and Sandy the most notable occurrences. The combined insured flood losses from Katrina and Sandy still would be less than 5% of the entire reinsurance capacity. The private insurance market should be able to absorb relatively painlessly the losses currently being absorbed by the NFIP.

A larger question though, is if the private market can expand coverage beyond the current portfolio of NFIP exposure. More exposure requires additional capacity and also a sophisticated set of tools (see below) to quantify how the new exposure can absorb this capacity. If appropriate rates of return can be generated, reinsurers would likely shift and deploy capacity

[104] *www.businessinsurance.com/article/20130811/NEWS06/308119970*
[105] *www.naic.org/documents/cipr_events_141007_symposium_presentation_atl_approaches_finance_cat_risk.pdf*
[106] *http://thoughtleadership.aonbenfield.com/Documents/20160101-ab-analytics-reinsurance-market-outlook-january-2016.pdf*

to flood risk exposure. Also, ILS firms would be willing to raise and deploy existing capital if rates make taking on these risks attractive.

Ability to Accurately Assess Flood Risk

The necessary maps and technologies for property-specific flood risk assessment and portfolio accumulation/loss estimation are now on the market, with a variety of options available. There is no technological barrier to entry into U.S. flood insurance market.

Accurately assessing flood risk is quite challenging and is unlike most other perils in the amount of data and computing required. Traditional modeling and simulation approach loss estimation by breaking the process into three distinct steps:

i. **Hazard**
    a. What types of events should be reasonably expected?
    b. What is the frequency of those events?
    c. What is the intensity or severity of each event?
    d. What is the physical process by which the severity manifests itself? For example, in a hurricane, how does the wind speed from the center of the storm attenuate over distance to the properties being insured? Or in an earthquake, how does the ground motion make its way through rock and sand to insured locations?

ii. **Vulnerability**
    a. How much damage does the intensity (wind speed, ground shaking, flood depth) at an insured location cause?
    b. How do different types of structures behave to different peril intensities?

iii. **Financial**
    a. How does the damage translate into loss to be allocated between the insured, insurer and reinsurer?
    b. What are the final event losses?
    c. How do all the event losses relate to one another?
    d. What are the top loss producing events, and what is the probability of those events occurring?
    e. What are the top aggregate loss producing calendar years?

Coastal Flooding

The first commercially available hurricane model was introduced by Karen Clark of Applied Insurance Research (now AIR Worldwide) in 1987.[107] Modeling firms RMS and Eqecat (now CoreLogic) released hurricane models soon after. Storm surge modeling was not an original component of the hurricane models due to its added complexity and because there appeared to be no substantial private insurance market requiring coastal flood estimates. In the 1990s, storm surge became a mainstay peril as insurers and modeling firms recognized even though flood was excluded from nearly all property policies, insurers were still occasionally required to pay flood losses when the primary cause of loss was indistinguishable between wind or flood.

Most of the commercially available storm surge models are directly derived from the SLOSH [108] model. Modeling firms have evolved the simulation of storm surge over time to better reflect actual experiences and lessons learned from each event and to also align the output for better insurance decision making. In summary, storm surge models use available meteorological data, such as air pressure, wind speed, storm size, speed and track combined with the localized water bathymetry, tide estimates and land elevation to estimate flood inundation and velocity. The vulnerability component of the CAT model then estimates how the water depth and velocity translates into property damage. The modeling firms have even added algorithms into the vulnerability component to estimate the proportion of property loss from wind and water.

From an insurer perspective, there has been some degree of confidence the models are providing valuable feedback as this standard of modeling is firmly required by insurers' internal (actuarial, reinsurance, finance, underwriting departments) and external (rating agencies, regulators, and reinsurers) stakeholders. In fact, there are no alternatives to the CAT models, which explains why they have become ubiquitous.

However, the degree of accuracy of these models depends on the circumstances in which they are used. Understandably, all models have to always account for uncertainty. The commercially available storm surge models add yet another layer of uncertainty on top of the uncertainty already existing from the underlying hurricane model. In other words, however difficult it is to estimate losses from wind, it is even more difficult to estimate losses from moving water due to extreme wind. Thus, the amount of confidence the analytics team should have in the output of a commercial model depends on the circumstances of the portfolio of risks being modeled.

In general, large diversified portfolios simulating over tens of thousands of years of potential events should be more confident than the estimates of regional insurers. Regional insurers in the Gulf and/or Florida should be more confident than insurers focusing on the Northeast. Small mono-line coastal flood carriers will have the most uncertainty to deal with and their product

[107] *www.air-worldwide.com/Blog/Looking-Back-as-We-Move-Forward/*
[108] *www.nhc.noaa.gov/surge/slosh.php*

offerings should be higher priced to reflect the higher reinsurance costs associated with loss uncertainty.

Regardless of company structure, risk appetite or product offering, all insurers should implement continuous and stringent model validation to align actual experience to model estimates.

Inland Flooding

The modeling and simulation of inland floods has only recently been introduced commercially to insurers. Part of the delay in implementing this much needed model is attributed to the lack of private market and the incredible technical challenges impeding development. Because of a serendipitous convergence of timing, these obstacles have now been overcome.

The difficulty in modeling inland floods rests in simulating all the various forms of inland flooding on top of a massive landmass of the U.S. A successful model must keep track of all of the numerous types of storms, covering various lengths of time, and must even take into consideration winter snow pack, river icing and premature thawing. A successful model must also be able to simulate how and where excess water will flow; how the excess water will change the elevation of rivers, lakes and streams; and how the hydrology of the discharge is changed. The model must also have a database of the elevation of the entire land mass and be able to accurately describe how flood waters will traverse across both flood plains and beyond. If that was not enough to manage, the ability to mitigate damage using levees, sewers and other techniques must also be accounted for. According to Guy Morrow of KatRisk, their inland flood model required the use of the Titan supercomputer[109] in order to handle the many billions of calculations required to estimate flood hydrology at a 10m-by-10m resolution.

Inland flood models now are commercially available from the following vendors:

- AIR Worldwide[110]
- Corelogic[111]
- Impact Forecasting (an Aon company)[112]
- KatRisk[113]

Modeling firm RMS anticipates having a U.S. inland flood model within the next year or two. While there could be some skepticism from the insurance industry about the use of new and

[109] *www.olcf.ornl.gov/titan/*
[110] *www.air-worldwide.com/Publications/AIR-Currents/2013/Introducing-the-AIR-Inland-Flood-Model-for-the-United-States/*
[111] *www.corelogic.com/products/u.s.-inland-flood-model.aspx*
[112] *www.aonbenfieldevents.com/SiteCollectionDocuments/201407_analytics_insights_conference/1407_09_insights_breakout_daneshvaran_riverine.pdf*
[113] *www.katrisk.com/*

complicated models to manage flood insurance with all of its extremes and volatilities, the inland flood models themselves have gone through significant vetting. AIR Worldwide released its AIR Inland Flood model for the United Kingdom (UK) in 2008. This was the first fully probabilistic inland flood model of its kind. AIR subsequently began scaling the modeling methodology for the UK to other European countries. The Germany Inland Flood model was released in 2011, and since then, AIR has released models covering Austria, Czech Republic and Switzerland. Other model vendors have followed a similar route. Impact Forecasting has expanded the Eastern European to include Hungary and Slovakia.

These smaller countries have been useful test cases to validate the approach taken by the research teams. So while confidence in a U.S. inland flood model has not taken root yet, the modeling techniques used by the various vendors are nearly a decade old in some cases and have been thoroughly vetted by international insurers, reinsurers and reinsurance brokers. Use of these same models is expanding beyond the U.S. to Canada, Southeast Asia and Latin America in the near future.

Non-Probabilistic Flood Scoring Models

Aside from probabilistic flood modeling, which, as described earlier, is resource intensive, a suite of non-simulation-based platforms exist allowing underwriters to assess flood risk by linking the hazard to a score or some other quantifiable metric underwriters can use to apply guidelines and pricing.

Companies in this area include:

- Coastal Risk Consulting[114]
- CoreLogic[115]
- Intermap[116]
- SpatialKey[117]

These tools are a middle ground between the Federal Emergency Management Agency (FEMA) flood maps[118] and the more extensive and expensive probabilistic simulation platforms.

Ability to Develop Actuarially Sound Prices

With the necessary technologies available for risk assessment, accumulation management and loss estimation, there are no barriers to developing actuarially-based pricing for flood insurance.

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[114] *http://coastalriskconsulting.com/*
[115] *www.corelogic.com/products/riskmeter.aspx*
[116] *www.intermap.com/software/insitepro* disclaimer: the product manager of the InsitePro flood scoring platform is an author of this section.
[117] *www.spatialkey.com/exposure-management*
[118] *https://msc.fema.gov/portal*

The ability to develop actuarially sound rates for any peril requires accurate loss models built using historical loss data. There are two challenges to overcome for the private flood insurance market to develop: 1) access to the extensive database of claims from the NFIP collected over the decades of the program; and 2) supplement the available data with scientific flood models to fill in the gaps between known claims occurred and unique events yet to occur on exposure and regions that have yet to purchase flood coverage.

Should the private market not be allowed access to the NFIP claims database, actuaries would then be forced to rely completely on modeling and simulation for loss estimates in which to build their technical ratings. This would not be a showstopper, since the modeling and simulation would be a requirement of any insurer writing flood regardless. Yet, having decades of information on flood claims to work with would add confidence to new entrants towards the extreme scenarios they will be exposed to.

Underwriting Flood Insurance

The underwriting of flood risks is much more difficult than for any other major peril. As was described in the assessment section earlier, a substantial amount of data and resources are required to assess risk. Even with all of the technologies available, the misinterpretation of a property by inches can vary the estimated loss by two to three times.

In sample portfolios used for this study, loss estimates produced by the flood models of AIR Worldwide and KatRisk showed some locations with incredibly high loss ratios (nearly 5%-10% of total value), which would make those homes effectively uninsurable. Upon inspection, it was found the coordinates of those locations were incorrectly geocoded and instead of being in the vicinity of rivers or coastal waters, the homes were in the water. Insurers seeking to insure flood must raise the overall quality of the data they feed into their models. Underwriters must acquire at least the following layers of property data if they seek to successfully enter this market:

- Exact street address and price latitude/longitude coordinate
- Construction type
- Property use: single family, multifamily, apartment or commercial/mix
- Year built or year of major renovation
- Number of stories

Aside from these property data, factors such as the elevation of the property and the existence of a basement are also important considerations for modeling and underwriting. It is likely there will need to be a circular loop of decision-making between the underwriting team, the modeling team and the actuarial team to develop the needed underwriting guidelines and the pricing and to support that business. While these processes exist for insurers writing CAT

business such as hurricane or earthquake, the challenges surrounding flood risk assessment and underwriting eliminate the possibility an insurer can be successful using the same strategies. Insurers not committed to data quality excellence may experience unexpected large losses or be adversely selected against.

Challenges for Insurers Entering the Flood Insurance Market

Risk Assessment

Quantifying flood risk is unlike any other perils insurers currently cover, even those which are considered catastrophic in nature. The difficulty lies in the various ways a damaging flood can occur. As has been mentioned already, rain does not need to be a contributing factor in the occurrence of a damaging flood. Floods can occur from rapid snow and ice melt, the failure of a dam or levee, a tsunami, or even just unusual high tides. Actuarial methods alone are insufficient in assessing risk of flood loss simply because the causes are to numerous and do not occur with enough frequency in enough geographic areas to be useful.

Making matters more difficult is the fact inches matter. Inches in distance from water sources and also inches in elevation can be the difference between no damage and extensive, catastrophic damage. This makes aggregation of exposure and loss, a common method in rate estimation, incredibly difficult to achieve without having some subsidization of rates between lower and higher risk property owners. There is just no common geographic boundary that can be applied where the subsidization issue does not manifest.

Insurers (and the state insurance regulators) must recognize this problem. Beyond the insurance aspects of flood insurance, the product serves a valuable societal purpose by having private companies set market rates for the risk associated with this peril. Excessive subsidization can mask the true risk by hinting to stakeholders, such as contractors, property owners, lenders and local officials that the risk of flooding to particular parcels are either too high or too low (depending on who is subsidizing and who is being subsidized). This misinformation could be the source of problems down the road as new technology brings transparency to all stakeholders. The best solution is to lean towards risk-based rate setting.

As noted earlier, risk-based rate setting uses technology such as simulation and scoring models, combined with actuarial analyses, to rate each property as a standalone exposure. While it is accepted no model can ever be truly accurate, actuarial assessments of portfolios of risk-based modeled exposures will increase the confidence of the overall rate to the insurer as is currently the case with all other perils as well. This means the insurer looking to enter the flood insurance market must be model-savvy by understanding how the models work, what assumptions were used to construct the model, what the limitations of the model are, and what must the insurer do to fill in any deficiencies within the model.

Additionally, those insurers seeking to enter the commercial side of the market should be prepared to incorporate the services of engineering firms. Site surveys and inspections would be necessary as part of the risk evaluation for large commercial properties. Surveys would take into account critical equipment and property components (such as self-contained power plants) and provide a geographic layout of structures, components and defenses for proper modeling.

Once the insurer has these components in place, an appropriate product can be designed to maximize risk tolerance to the insurer's financial structure and corporate governance.

Sources of Capital/Reinsurance

Flood risk is potentially catastrophic. Flooding can occur over vast geographic areas and can fully damage properties. Insurers seeking to participate in this line of business will need the backing of a superior balance sheet and committed reinsurance.

The good news is reinsurers[119] and the capital market participants[120] active in the ILS market appear eager to supply the capital to back private insurers offering flood capacity. This has been confirmed by the author in several private conversations. These sources of capital do appear to be waiting for the potentially reduced role of the NFIP. In 2017, the NFIP will need to be reauthorized and legislation pending could alter the landscape for private insurers to expand their share of the flood insurance market, especially on the personal lines side of the business.

Product Development

Development of new products will depend on the ability of insurers to assess risk in accordance to their financial structure and corporate governance. To that end, insurers will need to examine multiple business models to determine a product offering which would be economically palatable to the market and competitive against other options (including potential competition and subsidization of the NFIP) while also aligning with their financial ability to maintain their credit ratings and regulatory status.

Some areas of consideration for insurers would include:

- Which lines of business to cover? Commercial or personal lines? Primary layers or excess?
- Which geographic areas of the country? State, regional or national?
- What degree of hazard/loss level is the insurer willing to write? Low hazard/preferred risk flood policies have been attracting the most attention from new entrants, and competition could ultimately create a soft market in this area, exposing carriers to cycles of unprofitability. On the other hand, insuring high-hazard flood has fewer competitors

[119] *http://insurancenewsnet.com/oarticle/RAA-Supports-Legislation-that-Encourages-Private-Flood-Insurance-Market-a-500183*

[120] *www.russbanham.com/2015/10/22/the-next-frontier-of-alternative-capital/*

and insurers in this space may find more room to be price setters and immune to the severe cyclicality of other lines.

- Aside from the structure, will insurers offer contents, loss of use of loss of business income coverage? Commercial buyers of flood insurance will need flexibility in terms and conditions to match their unique business risks. Homeowners may want the option to purchase contents or loss of use coverage to close the protection gap between their flood exposure and traditional policies.
- What deductible are insurers comfortable in offering? While higher deductibles are appealing to most insurers, for some buyers, the option of lower deductibles would be enough to entice the purchase of a policy. The inability to offer lower deductibles in the earthquake insurance market is often touted as one of the major reasons property owners are reluctant to purchase earthquake coverage, even in states such as California, where the take-up rate stands at 10%.

Distribution

How flood insurance is sold may also depend on the regulatory standing of the insurer providing the coverage. Admitted insurers will have the option of going directly to the property owner or to use the brokerage market to acquire access to buyers. Excess and surplus lines insurers will be limited to brokerage business. It is likely specialists in the form of MGAs will be producing niche products to be distributed through both channels.

Because of the complexity of flood insurance, internet-related distribution may not be as straightforward as other lines of business such as auto or homeowners. Flood underwriting will often be time-consuming in that requests for elevation data, the time required to model and request from lenders and other stakeholders will slow down the quoting to binding process. Though many internet and digital-savvy shoppers will press for a complete digital offering, odds favor a combined digital and manual approach to this line for the foreseeable future.

Can Private Sector and Government Flood Insurance Coexist?

NFIP Charging Market Risk-Based Rates

For the NFIP to charge risk-based rates, it will require extensive reform, changing from a lender-facing and development-enabling program to an actual insurance company with industry-standard actuarial and risk diversification strategies. In such a scenario, the NFIP would be a government owned entity in direct competition with a significant portion of the country's enterprises.

NFIP Providing Residual Insurance

The NFIP could remain an insurer of last-resort for low-income/high-risk homeowners. It would be impossible for the program to be solvent in this role, but the overall cost incurred by the government might be lower than what would otherwise be spent in post-disaster flood relief.

NFIP as Reinsurer

The UK has implemented a national reinsurance pool, Flood Re, to cover flood reinsurance with a stated aim to make flood insurance more affordable for property owners. It is a new program, so it is not possible to judge it yet. A more detailed discussion on Flood Re follows later.

The NFIP could conceivably fill a similar role, but the international reinsurance market is very strong, and it is difficult to justify socialized reinsurance on a newly privatized primary insurance market.

Lenders Need NFIP to Continue Defining Mandatory Insurance

The NFIP is a lender-facing program, and from a lender's perspective, it is a success. Any removal of the pre-definition of mandatory flood insurance zones will be unpopular with lenders. However, bundled flood coverage, in which case more and more properties would actually be covered, would be a popular move with lenders.

Lessons from Other Government-Supported Programs

California Earthquake Authority

With the NFIP struggling financially to remain solvent and viable, it is often suggested it could adopt a mission similar to what the state of California implemented when it created the California Earthquake Authority (CEA) in 1996,[121] which in contrast to the NFIP has become financially strong. This appears even more impressive considering the massive catastrophic risks the CEA is exposed to in a state with the geographic size of California, a population of nearly 40 million and teeming with scores of active faults. Many more are buried miles underground and have yet to be discovered.

In order for the NFIP to adopt a marketing strategy similar to that of the CEA, it would be helpful to compare and contrast the two programs to highlight the tradeoffs required to implement such a change.

[121] *www.earthquakeauthority.com/whoweare/Pages/history.aspx*

Financial Structure

Both the CEA and the NFIP are, by mandate, forbidden to generate profits. The NFIP is a federal public agency under the direction of FEMA. The NFIP has access to capital via U.S. Department of the Treasury (Treasury).

The CEA is a quasi-public agency. It is mandated to financially operate independently of the state of California but is managed indirectly through the state government. This essentially shields California taxpayers from being forced to bail out the CEA, via the Treasury of the state of California, should the CEA face insolvency or financial distress.

Premiums

Before the federal Biggert-Waters Flood Insurance Reform Act of 2012 (BW12) was signed into law, the NFIP was not required to charge actuarial sound rates for the risks exposed. In fact, many properties were grandfathered into rating schemes which did not change when the risk assessment changed for the worse or when properties experienced repetitive claims.[122]

The BW12 now mandates actuarially acceptable rates, to be phased in over many years. The CEA, on the other hand, without funding from the state of California, must operate as a traditional insurer. Coverage rates are estimated by actuaries using traditional techniques along with modern scientific modeling. The CEA has elected to simplify the rating territories, and while the rates are actuarially acceptable, it appears there is a degree of subsidization across the state and opportunities for adverse selection.[123]

Premiums Capital Structure

The NFIP has been required to operate from internal funding and in the event of losses exceeding its funding capability it has access to the Treasury. As with Hurricane Katrina and Superstorm Sandy, the NFIP not only exceeded its own internal ability to fund the claims from these events, but also capped out their available credit limit with the Treasury. In both circumstances, permission from Congress was required to essentially bailout the NFIP in order for proper claims settlement.

The NFIP has no cost of capital[124] and, therefore, expenses associated with this are not passed along to policyholders. But, the BW12 does now require surcharges of $25 per primary residence and $250 per secondary properties in order to speed up payments to the Treasury for funds borrowed.

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[122] *www.publicintegrity.org/2011/06/23/5006/government-subsidized-flood-insurance-premiums-are-about-half-full-risk-price*

[123] *www.aria.org/meetings/2013_Annual_Meeting_docs/MondaySession_IID/SessionIID-Theinteractionbetweenriskclassificationandadverseselection-Presentation.pdf*

[124] *www.actuary.org/pdf/casualty/AcademyFloodInsurance_Monograph_110715.pdf*

In 2016, the NFIP purchased $1 million of reinsurance.[125] The motives appear to be experimental as the NFIP weighs its various long-term risk management options. The CEA has a more typical insurance company structure. The CEA has a standard surplus account and transfers its risk of loss above the surplus amount to the reinsurance markets. The CEA also participates in the ILS markets in order to provide additional capital protection, with reduced expense.[126] The CEA has enough surplus and reinsurance to cover a nearly 1-in-500-year event. It estimates the 1906 San Francisco earthquake was a 1-in-300-year event.[127]

Structure Distribution

Flood insurance policies backed by the NFIP are sold either by the agent/broker[128] distribution system or through the Write Your Own (WYO) Program where participating insurers are able to add an NFIP policy to their homeowner policy offering.[129] In both cases, commissions up to 20% of the total gross written premium are possible based on the total amount of premium volume produced by the distributor.

In California, any homeowner insurer licensed in the state, must offer earthquake coverage in the form of a bindable quote and proposal at the time of binding and at each renewal. Homeowner insurers in California that do not wish to offer earthquake coverage must then partner with the CEA and offer a CEA policy at initiation of coverage and/or at renewal. Homeowners cannot purchase a CEA policy without first purchasing a standard homeowners policy.

Structure Exposure to Loss

The NFIP covers a peril high in frequency and high in severity. The CEA covers a peril, which is infrequent and also high in severity. The lack of frequency has allowed the CEA to build and grow a substantial surplus. In fact, since its creation after the Northridge earthquake in 1994, there has not been what is considered a large loss producing earthquake in California. It is conceivable the financial strength of the CEA was a product of geological fortune and not the outcome of a strong insurance business model.

Aside from the fact both the NFIP and CEA are nonprofit public entities their operating models are very different. The CEA operates closer to a traditional insurer. The CEA is actuarially sound and is actively generating surplus and transferring excess risks to the reinsurance and capital

[125] *www.fema.gov/national-flood-insurance-program-2016-reinsurance-initiative*
[126] *www.artemis.bm/blog/2016/03/22/cea-reinsurance-program-nears-4-5bn-but-cat-bonds-hard-to-justify/*
[127] *www.earthquakeauthority.com/media/PublishingImages/Pages/Media-Resources/CEA%20Financial%20Overview%20Document_as%20of%2003-31-2016.pdf*
[128] *www.floodsmart.gov/floodsmart/pages/residential_coverage/agent_locator.jsp*
[129] *www.fema.gov/what-write-your-own-program*

markets. The CEA has the ability to estimate severe loss and build a business environment where it can forecast its operations well into the future.

On the other hand, the NFIP does not currently act as a typical insurer. While the reforms of BW12 manifest themselves on the NFIP, it is important to note, that as a actual insurer, the NFIP will be required to transfer expenses associated with being actuarially sound and expenses associated with capital and reinsurance costs to policyholders. Issues such as affordability will come to the forefront as there is simply a large inventory of homes that will likely become uninsurable. This is a critical contrast between the CEA and the NFIP. The CEA's mandate is to have a market mechanism to make earthquake insurance *available* to the property owners in the state of California. The CEA's main concerns focus on a functional earthquake insurance market and the solvency of the program. The NFIP, since inception, has been focused on *affordable* flood insurance and had little concern for solvency.

Any transition of the NFIP towards a CEA style structure will likely have political consequences. Even in its current state, many NFIP policyholders are already voicing concerns about flood insurance affordability. These protests will get louder as the NFIP begins to evolve to a newer model.

Tension Between Private Insurance and Government Disaster Relief

This is a false premise. Insurers are in the business of risk mitigation, while disaster relief is an established government responsibility. If an area devastated by a natural disaster is well insured, the necessary relief is much reduced. FEMA, as the provider of the relief, should for this reason be the strongest advocate for as much property coverage across the broadest area possible.

Insurance claims are a much more sustainable and feasible vehicle for rebuilding people's lives than government relief efforts. Indeed, insurers compete on the quality of their claims and customer-support after a disaster, ensuring their policyholders are well taken care of. A government agency, meanwhile, cannot compete with that level of attention.

Flood Insurance Regimes around the World

FLOOD RE

Flood Insurance Regimes Around the World

Flood Re from the United Kingdom

By Swenja Surminski, Senior Research Fellow, London School of Economics and Political Science

Flooding is the most common and costliest natural disaster in the United Kingdom (UK), with current projections indicating risks will rise in the future mainly due to more property development in exposed areas and climate change.[130] Unlike most other European countries, the UK has always relied on the private insurance market rather than government to provide flood insurance cover.

Penetration rates are high—reaching approximately 95%[131]—mainly due to the bundling of flood insurance with standard building and contents insurance, meaning customers do not choose to get flood insurance, but automatically receive it along with their standard coverage. Flood insurance is also a requirement for homeowners taking out a mortgage. In response to a series of significant flood events in the 2000s, industry and government reviewed the flood insurance model for the UK. A so-called Statement(s) of Principles set out criteria under which private flood insurance would continue to remain available, even after flood events.

Insurers agreed to provide for flood coverage generally up to a risk level of 1:75 return period for households and small businesses, in return for greater government investment in flood risk reduction measures, better public flood risk mapping, and clearer planning policy and land use restrictions. These agreements between government and industry were seen as temporary means to ensure a functioning market while improving flood risk management standards. However, this did not address growing concerns about pricing implications for those located in high flood-risk areas.[132] This started a new round of negotiations between industry and government, which eventually led to the creation of a new reinsurance pool for flood risks: Flood Re, a not-for-profit reinsurance pool, owned and operated by the insurance industry, but accountable to government.

Established under the Water Act 2014[133] and associated regulations, Flood Re was launched in April 2016. It has been presented by industry and government as an "innovative way to ensure the availability and affordability of flood insurance, without placing unsustainable costs on wider policyholders and the taxpayer."[134] Its purpose is to serve as a cushion to keep flood insurance affordable for policyholders in high-risk areas while accepting the fact the UK market

[130] ASC, 2016
[131] National Flood Resilience Review, 2016
[132] Oxera, 2015.
[133] *www.legislation.gov.uk/ukpga/2014/21/contents/enacted*
[134] Defra, 2013.

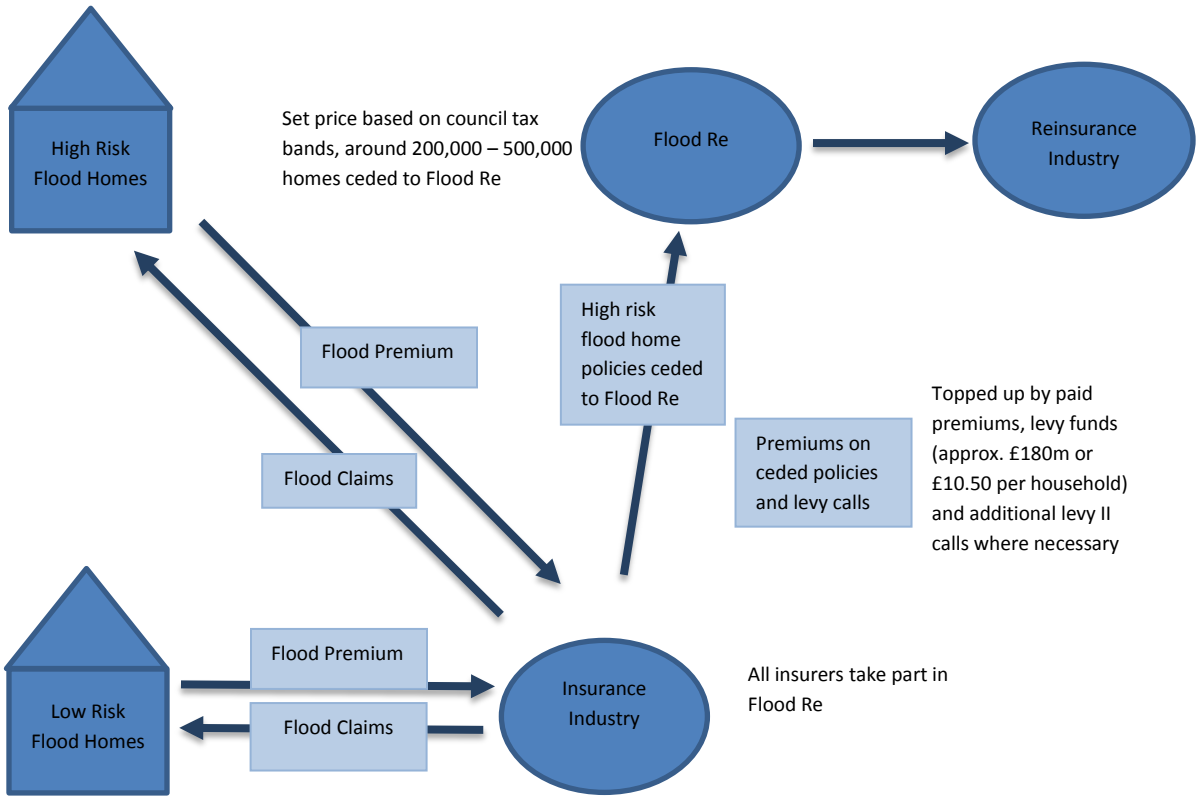
must ultimately transition to risk-reflective pricing. This is expected to occur by 2039. However, like many other disaster insurance schemes not structured with prevention in mind, it is unclear how availability and affordability will be maintained following the transition to risk-reflective pricing, since Flood Re does not provide any direct incentives for risk reducing behavior.[135]

The Operation of Flood Re

Flood Re gives insurers the option of reinsuring high-risk policies with Flood Re at a subsidized price. The subsidy is collected as a levy from insurance companies, which may pass on the levy to policyholders (estimated to be £10.50 ($13.10) per policy).[136] The subsidized price is calculated based on the council tax banding of the insured property with the more affluent the council tax banding, the higher the subsidized price.[137] The logic goes that because insurers can pass on their risk for a reduced reinsurance price they can charge lower prices to policyholders. The operation of Flood Re is reflected in Figure 8.

Figure 8: The Operation of Flood Re

Sources: Centre for Climate Change Economics and Policy and Grantham Research Institute on Climate Change and the Environment



[135] Surminski, 2014.
[136] Aviva, 2016.
[137] The first Flood Re transition plan, 2016.

Generally speaking, only the policies of approximately 2% of households (i.e., households in high-risk areas) are expected to be ceded to Flood Re.[138] This makes sense from an economic perspective. If an insurer can offer flood insurance at a rate more competitive than the subsidized price it is required to pay under Flood Re, there is no incentive to cede the relevant policy. Policyholders have no direct interaction with Flood Re. Instead, private insurers remain the sole source of flood insurance in the market and it is left to their discretion whether to cede into the new pool. It is up to the relevant insurance provider to what extent it will provide information on Flood Re to its policyholders.

Insurers representing 85% of the flood insurance market have so far agreed to participate in Flood Re.[139] As such, first indications suggest the private market has largely adopted the Flood Re program. Since inception, Flood Re is estimated to have underwritten 53,000 policies,[140] while the stated annual aim is to reach 350,000 policies. As it is outside Flood Re's control whether insurers decide to cede their policies, it is difficult to interpret these initial figures.

Observations Relevant for the Current NFIP Discussions

The example of Flood Re offers some lessons for governments seeking to navigate between public policy and private market solutions to address affordability and availability of flood insurance:

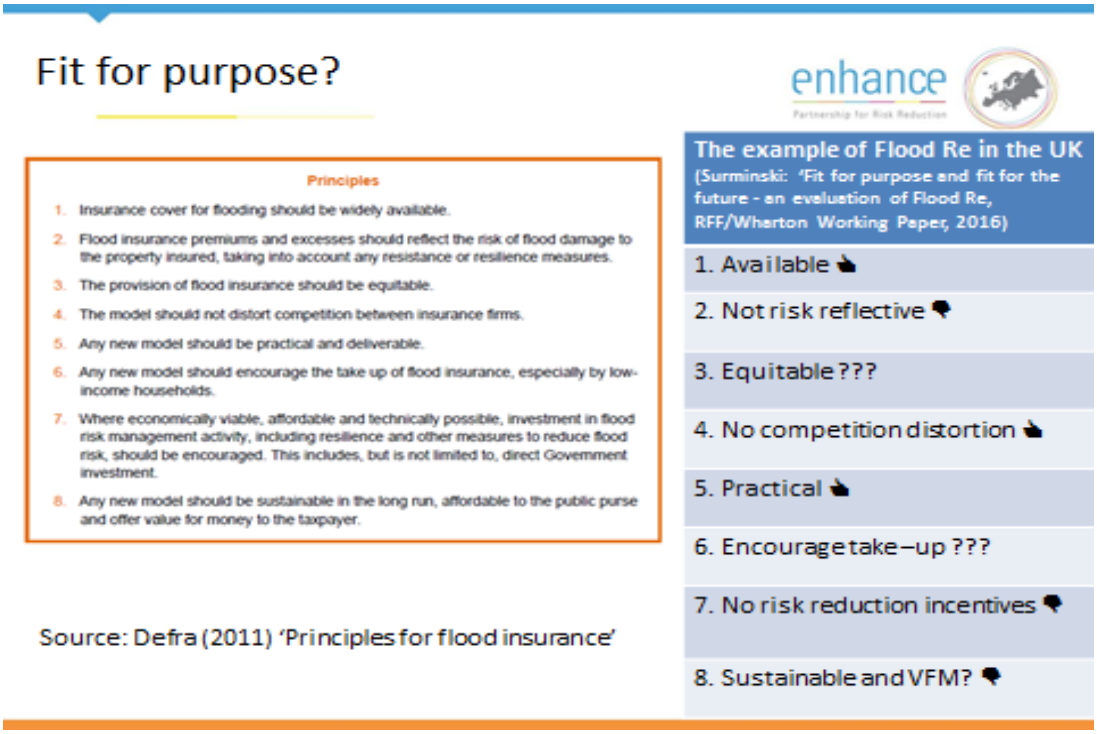
Meeting different objectives – is it fit for purpose?

Flood Re has to satisfy multiple objectives: 1) it seeks to maintain market autonomy, keeping the role of government as minimal as possible; and 2) it is conceived as a transitional tool, in order to pave the way towards risk-reflective pricing in a private market.[141] Figure 9 shows whether the initial design objectives of Flood Re are being met. An initial assessment shows the new pool is a transitional reinsurance arrangement supporting the private insurance market and securing affordability of flood insurance in the UK through premium subsidies. However, this approach leaves UK taxpayers exposed to rising flood risk as it fails to incentivize flood risk management and risk reduction. Furthermore, concerns about its lack of value for money (VFM) still remain.

[138] Defra and ABI, 2013.
[139] Insurance Newslink, 2016.
[140] based on personal communication with Flood Re in October 2016
[141] Surminski for RFF, 2017-forthcoming

Figure 9: Flood Re Assessment

Sources: U.K. Department for Environment, Food & Rural Affairs,
Resources for the Future and Wharton School of the University of Pennsylvania



Indeed, the Secretary of State of the Department for Environment, Food and Rural Affairs had to sign an exemption statement, justifying the policy intervention despite not meeting cost-benefit targets. A key argument for the justification came through the wider benefits of Flood Re, referencing "wider socio-economic and equity reasons for pursuing the Flood Re scheme which are not fully reflected in the strict value for money calculations made in this Impact Assessment – for example it brings more certainty to future evolution of insurance prices with beneficial effects not only on policy holders but also in other markets such as the property market and mortgage lending."[142]

The roles of public and private sectors

Flood insurance in the UK is unique from other countries because it is provided entirely by the private market. Flood Re, despite being a public policy intervention, does not change this. In this sense, it is an addition to the standard home insurance market,[143] providing insurers with an additional weapon in their arsenal to keep flood insurance affordable. Thus far, it has proven effective in allowing insurers to better offset their costs.[144] However, despite being industry-owned and operated, there is still a role for the government in determining Flood Re's rules of

[142] Defra, 2014.
[143] Horn and McShane, 2015.
[144] United Kingdom Insurance Report, 2016.

operation and monitoring, as well as possibly adjusting the responsibility and scope of Flood Re. Furthermore, Flood Re, being created by public law, has direct accountability to parliament, with the Secretary of State of the Department for Environment, Food and Rural Affairs in an oversight function.

On paper, there is no direct financial liability for government, unlike in many other pools and disaster insurance schemes, where government picks up losses beyond a predefined threshold. Throughout the negotiations between industry and government, this point was highly controversial, with the Association of British Insurers (ABI) calling for government to take on a clear financial obligation, and government refusing to commit. There remains the possibility of government stepping in as an emergency bail-out should Flood Re fail, but as the pool has to comply with standard solvency regulation and is buying commercial reinsurance cover, this risk remains low at the moment. Also, if insufficiently funded, Flood Re can make a levy II call[145] for increased contribution from insurers.[146]

Risk reduction impact – fit for the future?

Flood Re is intended to be a transitional tool to a risk-reflective pricing model, which is expected to occur by 2039. However, it remains unclear how this transition can be effectively achieved in the absence of greater efforts to reduce overall flood risk (recalling that rising flood losses was a key motivation to the adoption of Flood Re). These efforts will need to be undertaken by a broad suite of stakeholders, including government investment in flood defences, greater efforts by insurers to promote and value flood resilience, and the adoption of property-level resilience measures by policyholders.

At the policyholder level, Flood Re promotes a degree of risk reduction by its exclusion of post-2009 properties, which may promote resilience in flood plains or the diversion of new developments away from high-risk areas.[147] Developers may also be expected to steer new developments away from flood plains. However, beyond this, it does not have any direct levers to incentivize homeowners; for example, risk reduction is not compulsory and there is no program for resilient reinstatement following a flooding event.[148] This has led to significant criticism.[149] Recent surveys also suggest policyholders have been slow to unilaterally adopt resilience measures.[150] The lack of risk reduction incentives is problematic for Flood Re: A

[145] Flood Re charges insurers an annual levy of £180 million ($224 million) to subsidize the lower premiums and excesses as Flood Re will pay the claims on the households ceded to it by insurers. If needed Flood Re has the ability to issue a compulsory call for a levy II to get additional funding from the insurance industry.
[146] Surminski for RFF, 2017-forthcoming
[147] Hoban, 2016.
[148] Surminski and Eldridge, 2014.
[149] Surminski and Eldridge, 2014.
[150] The Property Flood Resilience Action Plan, 2016.

recent study by Jenkins et al. (2016)[151] suggests Flood Re is likely to face an increasing gap between subsidized premiums and technical risk price in the wake of rising flood risk.[152] Failure to address this would put a significant strain on Flood Re.

Flood Re Conclusion

As a new insurance mechanism, the long-term benefits of Flood Re remain unclear. This section provides a brief snapshot of its operation, and some of the lessons relevant for other countries and frameworks. Flood Re can be seen as an effort to bridge the challenge of affordable premium and the need to shift towards a risk-based system in the longer run, while maintaining a private market approach to flood insurance.

While initial data suggests a positive start for Flood Re, it has not yet been tested by a significant flood event. However, concerns about its cost-effectiveness remain. A recent report from the Finance Department in Ireland concluded Flood Re had much higher set-up costs than originally anticipated,[153] which led to the conclusion the pool would be too costly a model for Ireland to follow.

The most important message to take from the UK's experience is that, despite the greatest of intentions by both the insurance industry and government flood insurance can never truly be kept affordable without a concerted effort by all stakeholders to manage the underlying factors which drive flood risk in the first place.

Flood Insurance Regimes in Other Developed Economies

By Nicholas Lamparelli, VP of Cat Modeling and Analytics Partner, QBE and
Ivan Maddox, Product Manager, Intermap Technologies

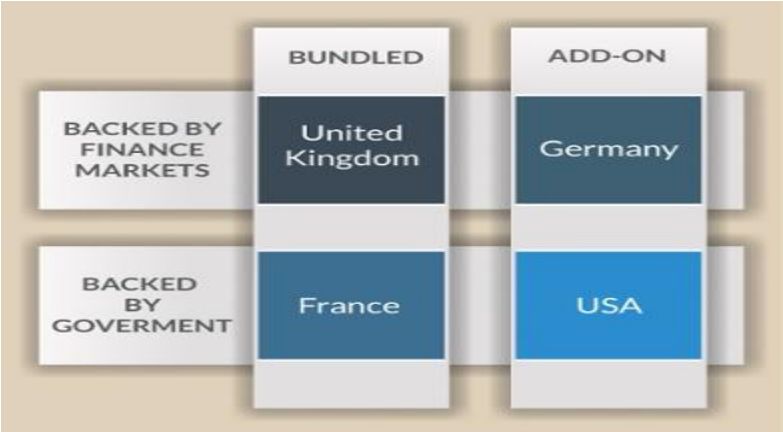
There are four principle types of flood insurance models around the world, differentiated by who backs the insurance (government or private markets) and whether it is bundled or separate from other property insurance coverage (e.g., flood and fire insurance are frequently bundled together).

Each type has its own advantages and disadvantages, and each exists in its region for a variety of reasons. Figure 10 provides a graphic representation of the four types of models.

[151] Jenkins K., Surminski S., Hall J. and Crick F. 2016. "Assessing surface water flood risk and management strategies under future climate change: An Agent-Based Model approach," *Centre for Climate Change Economics and Policy Working Paper No.252; Grantham Research Institute on Climate Change and the Environment Working Paper No.223.*
[152] The first Flood Re transition plan, 2016.
[153] IFPCG, 2016.

Figure 10: Flood Insurance Models Around the World

Source: Intermap



Bundled Flood Insurance, Backed by Private Markets

In this market model, flood insurance is basically included with your insurance policy whether you want it or not. Insurers add the flood coverage onto all policies, thus maximizing the risk pool which keeps costs low. It also diversifies risk across all the perils together and removes the attribution problem and answers the question, what caused the damage? The result ensures solid penetration into the market. This is the UK model, and it also is used in countries like Hungary and China. It is a very effective system for the success of flood insurance, offering wide coverage to property owners at affordable prices while ensuring the insurance industry remains not just solvent, but profitable.

Bundled Flood Insurance, Backed by Government

This is the socialized version of the UK model, where the government administers mandatory coverage for flood and other perils on all property insurance policies. The French and Spanish systems are the most predominant examples of this system. The insurance policies are still written and sold by private insurers, but in this model, the state maintains a pool of capital by collecting a portion of all premiums to back the policies in the case of claims. This system provides a secure market for insurers to operate and thus, is attractive to the industry. Another characteristic of this system is that as development of land continues and catastrophes increase in frequency, the state is incented to ensure the risk of natural catastrophe is minimized by defending rivers or limiting development in flood zones.

Optional Flood Insurance, Backed by Private Markets

Known as the German model, Germany, Austria and South Africa use this system, in which insurers depend upon policyholders deciding to insure their property for flood. This is the most laissez-faire of the systems, but as with any insurance market where coverage is optional, the

problem arises from the market being concentrated on the high-risk segment only. Prices are hard to keep low if claims are likely on the majority of policies sold, which limits penetration and does not offer wide coverage for the society. A possible reason for this is the belief in these countries that flooding and other potential catastrophes should be taken into account by property owners when they build or purchase their buildings.

Optional Flood Insurance, Backed by Government

This is the U.S. model, known as the NFIP, implemented by the FEMA. As with the German model above, this system struggles under the concentration of policies in high-risk areas. Unlike the German model, the NFIP is subject to political pressure to maintain prices lower than actuarial prices, leading to enormous shortfalls of capital. A further weakness of all optional systems is they are over-reliant on the quality of flood maps for risk designation. Typically in the U.S., half of the flood losses occur outside designated higher risk areas, of which 1% was insured for flood, meaning enormous amounts of property subject to flood risk are uninsured.

Countries with Nascent Flood Insurance

There are a handful of developed countries without fully implemented flood insurance markets. Developing nations begin to have flood insurance markets as their property and productivity become valuable enough to insure. Other developed countries, such as Canada, do not have flood insurance due to assorted market conditions or lack of demand.

In Canada, a 2010 pilot project in the city of Winnipeg failed to drive the introduction of flood insurance to Canada as only 30 policies were sold. However, after significant flooding in Calgary and Toronto in 2013, there are now flood programs offered by Canadian insurers, including The Co-operators, RSA Canada, and Aviva, and from Lloyd's of London and their MGAs in Canada.

The Consumer Challenge: The Need for More Education, Protection and Choice

The Consumer Challenge: The Need for More Education, Protection and Choice

By Sonja Larkin-Thorne, NAIC Consumer Representative

Introduction

I approach the flood issues from a unique position as a current National Flood Insurance Program (NFIP) policyholder, NAIC consumer representative, former senior legislative staffer who specialized in insurance issues, and retired insurance professional using the knowledge, expertise and underwriting experience I developed over the last 30 years to assist insurance regulators and consumers.

Consumer Education and the Need for Coverage

Floods are one of the leading causes of catastrophic property loss in the U.S. for properties located in or out of an NFIP designated flood zone. Despite the damage caused by floods each year, few Americans understand the need for or have a federal flood Insurance policy or private coverage to protect the single largest investment the majority of us will make, in owning a piece of the American Dream—a home. Currently, less than 6 million property owners have a flood insurance policy through the NFIP.

The lack of insurance coverage for catastrophic losses is not unusual. California is considered earthquake country but only about 10% of its residents have earthquake insurance, according to the California Earthquake Authority (CEA), which was created in 1996 to fill a void left by the private insurance market.

Insurance of any type is rarely completely understood by consumers and many still believe their homeowners, renters or landlords' building insurance policies will protect them for losses caused by floods and other types of catastrophes. Others believe federal and state disaster programs after a disastrous event will provide enough financial aid to rebuild homes and replace personal items lost or damaged by raising water, dam breaks, storm drain back-up, earthquakes and fire losses. Most consumers do not read or question their insurance coverage. I often remind consumers this is not your grandparents' policy of 50-plus years ago before the word "exclusion" became standard policy language.

Few individuals fully understand flood coverage is primarily a federal insurance program, not written directly by private property/casualty (P/C) insurers and not under the direct supervision of state insurance regulators.

Consumers have many reasons for not purchasing flood insurance, including not being able to afford the cost of this extra coverage, or thinking floods will never affect their home. Many

have heard various concerns about how insurers participating in the NFIP's Write Your Own (WYO) Program handle applications and claims, the problems with NFIP mapping errors, lack of adequate dwelling and contents coverage limits and the failure of major banks and mortgage lenders to enforce the requirements that all federally backed mortgages located in flood areas must have a flood policy. The refusal of many mortgage lenders to accept consumer choice of flood policies outside of the NFIP from insurance companies offering improved coverage limits and better rates reflecting correct map zones is frustrating and burdensome. Why purchase a policy which does not meet your specific insurance coverage needs?

There exists a school of thought that federal and state laws should mandate the purchase of flood coverage for all property owners, regardless of location and risk of loss due to flood. I question why flood and not earthquake? The catastrophic losses caused by both raises the need for a national discussion.

Should we mandate the coverage for both earthquake and flood in the homeowners insurance and renters policy or would the creation of a federally backed catastrophe policy available to all help? Should communities be able to purchase flood policies covering all homeowners in their towns and add a surcharge to all property tax bills?

NFIP Consumer Experience

The NFIP is about 48 years old, $25 billion in debt, and lacking the tools to meet the challenges of a changed insurance marketplace, current consumer coverage and educational needs. During a recent flood meeting in Florida, Roy Wright, deputy associate administrator for insurance and mitigation at the Federal Emergency Management Agency (FEMA) acknowledged the NFIP's failure to be consumer focused.

"At some point, the program focused on companies," Wright said. "It focused on what it means to provide a product and sustain it, but lost track of the 5.1 million policyholders we're here to serve."

This lack of policyholder focus fuels frustration with the NFIP from multiple sources. I experienced it firsthand in my small Connecticut town while working with the town engineering department on my personal NFIP policy underwriting and flood mapping errors. A WYO insurance company suddenly told me, the homeowner, after seven years of having an NFIP policy, my flood zone rating is wrong, providing no proof or recent reports of local NFIP map updates or changes for a participating NFIP community that has not allowed building in a flood zone in almost 30 years. The home is 25-years-old and was built according to all town flood laws. The WYO insurer had a copy of a new CoreLogic report, which was wrong and did not compare it to the original report conducted seven years ago by a predecessor. They ignored the town engineer's email to their own agent suggesting a letter of map amendment (LOMA) would correct the error.

FEMA's NFIP program has no control over data companies providing Standard Flood Hazard Determination (SFHD) reports. FEMA is aware CoreLogic does a parcel report when the NFIP policy only covers a dwelling not land. The first SFHD clearly indicates my home is not in a flood zone, but a small portion at the edge of the parcel is. The consumer is forced to spend hundreds, and in some cases thousands of dollars to correct these errors with neither the WYO or data company like CoreLogic sharing any financial responsibility or accountability for their failures. I recently read up to 80% of LOMA applications are approved by the NFIP.

A town engineering department has to deal with distraught property owners fighting mapping errors and large premium increases, who need to hire surveyor and engineering firms to complete elevation certificates and LOMAs. Consumers assume the cost burden to correct NFIP map errors or inaccurate SFHD reports done by private companies having no accountability for their mistakes.

The frustration is noted in an email sent to me from my town engineer: "In Avon we have two primary problems with FEMA data:

- The flood zone designations do not follow the topography in many areas. I suspect the cause for this was that when flood studies were performed, the mapping used was very "coarse grained"—perhaps U.S. Geological Survey (USGS) Topo maps. When this is compared with higher accuracy topography such as we have here in Avon, it shows flood limits not following the grade of the land. One aspect of this issue was illustrated at your property.
- We have areas in town in which studies were not performed, yet flood zone designations were made. I am not certain how these designations were made, but as before, they do not follow the land form, and worse, they make LOMA request much more challenging since determining the Base Flood Elevation (BFE)[154] is essentially impossible. In one such case I petitioned FEMA to perform a study and it did one. However, it appears the BAS data it used may have been flawed, as the results seem impossible (note – such hydraulic studies require specialized training that I do not have – once again I look at the results and they do not make sense to me) so… if you feel it is worth your time, I would be interested in having you forward these concerns. I honestly don't have high expectations regarding a response however …" Lawrence Baril, PE, GSIP, Town of Avon Engineering, April 11, 2016.

[154] The computed elevation to which floodwater is anticipated to rise during the base flood. Base Flood Elevations (BFEs) are shown on Flood Insurance Rate Maps (FIRMs) and on the flood profiles. The BFE is the regulatory requirement for the elevation or flood-proofing of structures. The relationship between the BFE and a structure's elevation determines the flood insurance premium.

This experience and that of consumers exemplifies the many challenges and frustrations with the current NFIP program. The PBS "Frontline" series "Business of Disaster," May 24, 2016 discusses the problems NFIP policyholders had post-Hurricane Sandy with claims, lost paper work, engineering reports and a feeling of no one to turn to for help.

Consumer-Centric Options and Solutions

There is a need for aggressive consumer outreach and education, improved mitigation strategy, risk assessment tools, and technology to updates maps. It is not enough to place an insert in a property policy renewal, or have a booth at the local home show. The NFIP needs to form partnerships with: 1) the individuals who need and purchase their products; 2) with communities joining the program and are on the front line with residents who have to deal with incorrect maps, surveyors and engineers; 3) with policies offering less than adequate coverage; and 4) state insurance regulators, who, on a daily basis hear consumer complaints about flood insurance but are powerless to change the mistakes made by WYO insurers, flood service companies and mortgage lenders who offer no help to consumers when the SFHD report is wrong.

Flood insurance consumer frustration can be addressed, as the following solutions are available:

- The passage of the federal Flood Insurance Market Parity and Modernization Act. While the legislation failed to pass the Senate in 2016, key reform recommendations should be included in the 2017 NFIP reform bill. Opening up the program to the private insurance marketplace will address the consumer need for choice, improved products and coverage.
- The designated FEMA/NFIP Flood Insurance Advocate who was appointed in 2015–2016 should be accountable for developing a regular dialogue with state insurance regulators, consumers and the NAIC. The advocate should attend NAIC meetings, meet with local communities to hear their concerns with the program and take ownership of the problems caused by flood service companies providing SFHD and WYO insurers when consumer complaints occur.
- The 2017 flood reform legislation must empower state insurance regulators with the authority to intervene and regulate WYO and private insurers writing, selling or delivering a flood policy in their state to ensure compliance with NFIP policy language and consumer protection laws. Currently, consumers have no place to go for relief when WYO insurers violate their rights. Some will say "it is a federal program" but one with no teeth or consumer protection advocates. The state insurance departments are best at enforcement and protection of consumer rights.
- Flood service companies providing lenders or WYO insurers with the SFHD reports should be made accountable to the NFIP, state insurance regulators and consumers for

the accuracy of their reports. Consumers are entitled to and should be provided actual copies of all reports provided to WYO insurers and lenders to determine flood zones and rates. The flood service companies are part of major data collection firms which currently are unregulated yet affect the daily lives of consumers and their financial stability.

- State insurance department websites must be updated to provide consumers with more information than a FEMA/NFIP website link. The NAIC should work with states to develop a standardized flood bulletin, consumer fact sheets containing critical terms and resources such as FEMA/NFIP phone numbers that can be used by all states. All state insurance departments should have a trained flood specialist to guide consumers when conflicts develop with maps and WYO companies.

Consumer Section Conclusion

In closing, I want to remind all the NFIP was designed to provide homeowners and small business owners with protection from losses caused by flood. It is critical we return the program to its original goal of providing consumer protection, adequate levels of building and content coverage to address the needs of now and the future. It cannot be a program that in the end leaves consumers with inadequate coverage limits to restart their lives and rebuild their homes, as well as fighting over claims payments and hiring lawyers only to end up years later with nothing.

Industry Executive Views on Flood Insurance

Coastal American Insurance Company

TypTap™ Insurance

Industry Executive Views on Flood Insurance

Introduction

By Dimitris Karapiperis, Analyst, NAIC, Center for Insurance Policy and Research

As the countdown for the reauthorization of the National Flood Insurance Program (NFIP) has begun, the issues of availability and affordability of flood insurance are at the center of the policy debate. Encouraging and facilitating increased private sector involvement in the sale of flood insurance will increase competition and help provide more choices to consumers regardless of geography. A coordinated public and private effort could increase the overall take-up rate protecting consumers from flood risk across the country.

In this section of the study, two executives from successful private flood insurers share their experience in the flood insurance market and offer their thoughts on the roles and responsibilities of the private and public sectors adding an important and valued perspective as we are looking towards the future.

Observations and Opportunities for Flood Insurance Enhancements

By Ned Dolese, President, Coastal American Insurance Company

Introduction

Coastal American Insurance Company (Coastal) is an admitted company licensed in the states of Mississippi and Alabama. It is the plan of Coastal to seek admission to other states in the near future. Coastal was born out of the need to deliver a viable property insurance solution to a ravaged area of the Mississippi Gulf Coast from Hurricane Katrina. From its formation, Coastal has always required policyholders to purchase and maintain flood insurance with the use of the Coordination of Benefits endorsement which requires matching flood coverage to existing homeowners' coverage.

Working closely with several members of Congress for the development of the federal Homeowner Flood Insurance Affordability Act of 2014(HFIAA14), Coastal has labored to find a more efficient method of addressing the needs of customers in the purchase and maintenance of flood insurance. Coastal's suggested solution has been to introduce and sell a private market flood endorsement.

Observations

Ahead of the upcoming reauthorization of the National Flood Insurance Program (NFIP) in Sept. 2017, it is apparent there are several factors present to address. As noted earlier in the study, the NFIP is currently in debt to American taxpayers in an amount of approximately $25 billion primarily as a result of the catastrophic events such as Katrina, Ike and Sandy. The number of policyholders is shrinking due to challenges to FEMA maps by communities who are looking to advance or maintain development near flood exposed areas. This cannibalization of the program has created undue strain upon the remaining policyholders. This appears to be counterproductive to the need to provide flood insurance protection to citizens of flood-prone areas.

With the federal Biggert-Waters Flood Insurance Reform Act of 2012 (BW12) and HFIAA14, rates have increased, due to actuarially sound pricing models coupled with a component which includes reducing the debt to the American Taxpayer. The result is increased premiums for current and new policyholders.

Further flooding events (primarily riverine or fluvial) have added additional stress and debt to the program. The Louisiana and South Carolina flood events are examples of interior flooding which have occurred in areas not traditionally flooded. These areas did not have any measurable flood insurance take-up rate prior to the flood event. One of the outcomes of all of the flooding events since 2005 has been additional building and elevation requirements on the part of the communities where properties have been rebuilt or retrofitted post-event. As a result of this effort on the part of the communities affected more resilient structures have been

built or retrofitted with the use of new FEMA maps. At the same time, we have seen a higher rate structure for flood insurance for those properties not requiring enhancement or those rebuilt prior to the adaptation of the new FEMA maps by the affected community. The NFIP addresses some of these issues through an option known as grandfathering. This use of a prior flood plain map, to determine a subsidized rate has had the effect of maintaining existing building stock while providing some rate relief to the BW12 rate. It should be noted grandfathering is not a permanent part of the NFIP rating structure.

While there are no problems with the grandfathering rating matrix, there are several issues with the advancement of the program related to grandfathering. The primary issue deals with the "continuous coverage" requirement in order to maintain grandfathering. In order to maintain the grandfathered rate, policyholders must maintain continuous coverage with the NFIP. If they do not, they will lose their grandfathered rate. This has the effect of tying policyholders to the NFIP as the loss of grandfathering will create an unaffordable rate mirroring the problems experienced after BW12 was initially adopted. This was partly offset with HFIAA14, which delayed these rate increases in a more measured fashion.

A secondary issue related to grandfathering is the different rating structure of a primary residence vs. a secondary residence. Even where grandfathering is applicable, the owner of a secondary residence or a rental property will pay a higher rate than for his or her primary residence. This is hardly justified as the flood waters are agnostic as to the occupancy status of the property. The perception someone can pay an additional rate because they can afford to is a form of socially engineering where the rate is not primarily determined by underwriting characteristics. Whether someone is at home (secondary home argument) or they are a renter has little to do in determining whether water intrusion will occur.

Rating vs Pricing Observations

While legislative changes in BW12 pushed the NFIP to collect additional premiums for structures built in or near flood prone areas, it has been undermined by the challenges made to the FEMA mapping program by communities which have the financial and political clout to have their ratings reduced. In some cases rates have been reduced to a point where the individual owner of a property pays significantly lower premiums. One would expect people moved from outside the SFHA to inside the SFHA to consider cancellation of the flood policy as an option. The reason we do not see a large number of flood policies being dropped by these individuals is the mortgage requirement to maintain flood insurance by the lender who has a mortgage secured by a guarantee of a federally backstopped agency. These individuals are motivated to challenge the FEMA mapping decision as to do so is in their best financial interest.

Another group of people are those with subsidized, grandfathered rates. Many of these individuals received significant rate increases under BW12 which were rolled back under HFIAA14. An additional area of rate disconnect is non-SFHAs which universally carry the same rate, regardless of geographic location in the country. In other words, there is not specific rating to one geographic area to distinguish it from another. A policyholder e in one area will pay the

same rate as another if they are both in a Non-SFHA. Couple this with a lack of a requirement to purchase flood insurance from the lender because the lender is not legally obligated to impose the duty on borrowers. Without compulsion from the lender, the borrower might misperceive flood insurance is unnecessary.

Private Market Flood Opportunities

The insurance market is responding to the opportunities afforded by the disconnect in both pricing of the NFIP as well as the uncertainty of reauthorization. The insurance industry has excess capital looking for a return. Thus, the private insurance market is a viable competitor to the NFIP. There are SFHA risks where private sector rates could be less than those charged by the NIFP. There are also specific rating opportunities on Non-SFHA risks. As a result, with private sector involvement, it might be possible to increase the number of people purchasing flood insurance.

Mortgage lenders require private sector insurers to match or exceed the NFIP offerings. Policies are being sold in the marketplace today by admitted insurers as well as surplus lines insurers. These insurers are matching or exceeding coverages and deductibles offered by the NFIP per lending guidelines with competitive pricing.

The private market has a huge advantage over the NFIP in that it does not have a $25 billion shortfall to cover. This shortfall is a disadvantage to NFIP pricing since the NFIP needs to include a provision in its rates to reduce or eliminate the deficit.

The private market is driven by the need to generate a return on its capital. This creates a false impression the private market will abandon flood insurance policyholders if there are losses incurred by the private insurers. There are several factors to consider when looking at this issue:

- The private market is hedging its bet on covering flood by purchasing reinsurance (The NFIP is now doing this as well).
- The private market has the ability to adjust rates after a loss just as the NFIP does by filing for a rate increase on an admitted basis or implementing a rate increase on a surplus lines basis. The market will respond to these rate increases as it always has in the purchase of the private market product post event. We have seen how excess rates have not been politically sustainable per BW12 with the workaround of HFIAA14. The private market will react in the same way with the introduction of new capital post event which will be priced lower than the existing capital in order to generate a return. Competition will spur lower rates as it always tends to do.
- The private market will pick the best risks out of the NFIP, leaving it with less than desirable risks. The NFIP will likely retain those risks subject to repetitive losses or risks having certain underwriting criteria undesirable to the private market. Although not all risks will find a home in the private market, we must have a private market in order to spread the risk equitably for those who want to leave the NFIP. The private market will

also write exposures not being written by the NFIP because it will have specific rating criteria generating a lower rate. In some cases the rates will be attractive enough to encourage, individuals to purchase flood insurance who have never purchased flood insurance before.

What is Coastal American Insurance Company and what is it offering?

Coastal is a rated admitted insurer offering flood coverage by an endorsement. The advantages to Coastal's offering are:

- All coverages, including flood, are contained within one policy.
- All deductibles are contained within that same policy.
- There is a combined, single deductible for Wind, Hail and Flood.
- This single deductible matches the deductible structure in compliance with lending standards.
- Coverage amounts for the flood peril match all other hazards or perils. This exceeds the lending requirements to be equal to NFIP coverages which are limited to a maximum of $250,000 on the structure and $100,000 on the contents.
- Coastal has enhancements not offered by the NFIP. The contract it provides is full replacement coverage policy with additional living expenses which are not offered by the NFIP.
- Because of the use of a single deductible on the multiple perils of wind and flood and because the policy covers flood disputes over the concurrent causation clause have been eliminated.
- With a single deductible written in a single policy with just one insurer, the cost of adjusting a claim and the time it takes to adjust the claims is reduced.
- Coastal uses third-party data from a recognized vendor to confirm its assumptions about a risk. Coastal uses public data to verify distance to any form of water as well as elevation of land. Coastal adjusts its rates further using the elevation of the house if it is elevated above the land. Because of its ability to rate based upon specific risk characteristics, Coastal can generate a specific rate which in many cases may be significantly lower than the comparable NFIP rate. Rather than using a common rate for all X zone properties, Coastal can offer specific rates for non-SFHA properties that in most cases will result in a lower rate structure.
- Coastal can also offer attractive rates for properties in an SFHA where the policyholder is being surcharged based upon occupancy status or lack of grandfathering.

The current NFIP continuous coverage requirements hinder private insurers such as Coastal by penalizing a NFIP policyholder wishing to explore insurance in the private sector. The requirements make it infeasible for the former NFIP policyholder to return to the NFIP as grandfathered rates vanish. The unanticipated effect of continuous coverage requirements is that it is forcing the NFIP to become a primary market of all subsidized risks in SFHAs.

Possible Solutions

There are possible solutions to address some of the idiosyncrasies of the current NFIP. Here is what Coastal suggests to be considered:

- Establish a joint task force of insurers, state insurance regulators and FEMA to develop a workable solution addressing the concerns and needs of all parties.
- Recognize the rating structure needed within the confines imposed on the NFIP.
- Support on the part of FEMA and state insurance regulators for a privatization effort which would loosen requirements implemented by NFIP such as continuous coverage and deductible structure.
- Disclosure on the part of insurers in order to obtain necessary approvals to offer private flood which may be outside of the normal scope of regulatory authority, i.e. disclosure of specific flood reinsurance coverage.
- Consider a possible opt-out option put forward by FEMA which would allow a community to meet the certification requirement of the NFIP if an individual agrees to purchase private market flood insurance and the individual agrees to waive any rights to collect funds post event if they did not have flood insurance coverage in place.

Only through a collaborative effort we will begin to solve this problem.

Admitted Private Market Flood: Lessons from Competing with the NFIP

By Paresh Patel, Chairman & CEO, HCI Group

Background

HCI Group, Inc. is the holding company for two insurers providing flood coverage on an admitted basis in direct competition to the National Flood Insurance Program (NFIP) in Florida—Homeowners Choice Property & Casualty Insurance Company and TypTap Insurance Company.

History

Homeowners Choice was already a top homeowners' insurer in Florida when the federal Biggert-Waters (BW12) legislation began to impact flood insurance rates in late 2013. Our policyholders reached out to us asking if we could help in some way. We studied the problem. Our solution was to offer flood coverage to our existing customers as an endorsement. But more important, with the approval of the Florida Office of Insurance Regulation, we offered coverage at pre-BW12 rates. We wrote our first flood policy in early 2014, for a policyholder whose flood coverage increased from $6,000 to $48,000. We offered the coverage for $6,000. The nearest excess and surplus coverage was at over $12,000.

A few months later, Congress stepped in and rolled back some of the rate increases and set the NFIP on a smooth path to higher rates. Flood insurance anxiety receded for a while but has grown with every passing year as NFIP rate increases have taken effect.

Since our initial entry into the flood insurance market, we have offered an admitted flood insurance product and have improved our understanding of the market as well as the needs of consumers. We have several years of actual risk bearing underwriting experience in the NFIP's top premium state - Florida.

We have internally developed the tools and models required to underwrite, rate and reinsure the risk. To reduce expense ratios and increase efficiency we developed our own technology to instantly price risk.

In early 2016, we launched TypTap Insurance Company which has offered stand-alone flood insurance coverage at prices below the NFIP's pre-BW12 rates. We offer flood insurance across all flood zones V, A and X without any distance-to-coast limitations.

During 2016, TypTap not only wrote policies across Florida, but was affected by two Hurricanes: Hermine and Matthew. The hurricanes validated the TypTap underwriting model as well as its claim handling capability.

TypTap has been through the entire cycle of a flood insurer: setting rates, underwriting individual risks, working with agents, handling catastrophic events and paying claims.

Lessons Learned

Everyone has an opinion on how to insure the flood peril, but very few want to bear the actual risk. Even among those willing to bear risk, most want much higher premiums with little regard as to the coverage being affordable.

Contrary to popular belief, we believe the NFIP is not trying to reduce its exposure or have its customers move to private markets. The NFIP has created obstacles to inhibit its policyholders from moving away. The NFIP's solution appears to be more premium, not fewer insureds.

Private flood insurance is possible and the pre-BW12 rates are adequate for the risks assumed. We are not speculating or engaging in the theoretical but instead we are speaking from our experience.

Private Advantage

A rational question about the future is how can private markets achieve a stable profitable outcome where the NFIP has had such large losses? The answer is rather simple as private insurers can underwrite to better loss ratios and innovate to better expense ratios. TypTap has the technology allowing it to do both.

The NFIP requires inspections and elevation certificates. This results in additional underwriting costs and overhead, all through the chain from agent to WYO insurer to NFIP. TypTap uses technology to provide a quote to consumers in seconds and a policy in minutes. The whole process is completely automated. Hence, TypTap has a much lower expense ratio.

The NFIP must cover all risks, if they qualify, regardless of risk concentration or loss history. This tends to hamper its underwriting and leads to elevated loss ratios. Private insurers can place greater emphasis on risk management and therefore can achieve better loss ratios.

With these two advantages properly harnessed, TypTap can provide flood insurance at similar prices to NFIP but with materially different outcomes.

Prognosis

The NFIP is, and will continue to be, in my opinion, in an untenable situation. It is a product of social policy and politics, not market economics. The NFIP cannot be expected to provide universal coverage at low uniform rates and remain solvent. Yet, this seems to be the current requirement.

With technology, it is possible to provide an alternative to the NFIP at pre-BW12 rates for many of the current NFIP policyholders. While few of its policyholders have switched to private insurers, the trend is in one direction. I believe this trend is irreversible and it will only accelerate. Within a decade, I expect the NFIP will be a residual market mostly populated by uninsurable properties and properties in areas of high risk concentration.

There are efforts by some to resist this trend toward a private flood insurance market. They resist by questioning the viability of private flood insurance and the new insurers. However, they are merely delaying the inevitable, not changing the outcome. The current debate about NFIP reauthorization, reinsurance and other matters will affect the speed of privatization and the form it may take. I expect, although there might be some missteps and failures along the way, progress will be made.

The industry will mature to be dominated by surplus lines insurers or by admitted insurers. Given the early stage of the private flood insurance industry, it is not yet clear who the long-term players will be. I have no doubt there will be a large mature private flood insurance industry within a decade. Actual, hands on experience will matter, and the best way to get experience is to get started, whether you are an insurer or a state insurance regulator.

State Insurance Regulator Views on Flood Risk and Insurance

State Insurance Regulator Views on Flood Risk and Insurance

Introduction

By Dimitris Karapiperis, Analyst, NAIC, Center for Insurance Policy and Research

Recognizing floods are the most expensive form of natural disaster in the United States and are increasing in frequency and severity, state insurance regulators are confronted with the urgent public policy issue of the availability and affordability of flood insurance.

State insurance regulators support facilitating increased private sector involvement in the sale of flood insurance as a complement to the National Flood Insurance Program (NFIP) to help provide consumers with additional choices for flood insurance products. As flood risk extends far beyond the NFIP flood zones it is critical all consumers are educated and informed of the need to purchase flood insurance. State insurance regulators are actively engaged in the effort to increase the take-up rate in their states through public awareness programs and by encouraging a coordinated effort between the public and private sectors for the provision of flood insurance.

In this section we present the views of a number of select state insurance regulators on flood risk and insurance. Drawing from their knowledge and experience as top regulators in their respective states, they discuss the issues they are confronting and they explore new ideas and solutions for flood insurance and the effective management of the nation's flood risk.

Flood Risk and Insurance in California

By Dave Jones, Commissioner, California Department of Insurance

Introduction

As California's insurance commissioner, I am keenly aware of the risk of loss posed by natural disasters, including wildfires, earthquakes, and floods. In fact, flooding is the nation's number one natural disaster. In California, which has faced several recent consecutive years of drought, 2016-17 has been one of the wettest on record, causing flooding and increased risk of flooding. Compounding this risk is the fact that "[f]lood hazards are dynamic and can change frequently because of a variety of factors, including weather patterns, erosion, and new development," according to the Federal Emergency Management Agency (FEMA).

The Need for Flood Insurance

Climate change, resulting in warmer temperatures, has also raised the risk of flooding in California. A large share of precipitation falls as snow and is "stored" as snow pack in the mountains of California, where it remains until it melts later in the year providing a major source of water for California. With rising temperatures, less snow and more rain is predicted, which places greater stress on California's flood control infrastructure – a recent example is the Oroville Dam in Northern California, which faced potential overflow when larger amounts of rain fell than predicted and caused the reservoir behind the dam to fill quickly, while at the same time the volume of water being released on an emergency basis contributed to the failure of a spillway.

As a result of these continuing and emerging flood risks, I continue to encourage all Californians to evaluate their exposure to the risk of flooding and consider purchasing flood insurance as a protection against flood losses.

California, with $295 billion in annual written premium, is the largest insurance market in the nation, and the fourth largest in the world, with flood insurance making a measurable contribution. In 2016, Californians paid more than $225 million in flood insurance premiums. The vast majority of these policies are obtained through the NFIP, a federal program enabling property owners in participating communities to purchase insurance as a protection against flood losses. Participating in the NFIP is based on an agreement between communities and the Federal Government. Californians, in 2016, also paid more than $20 million in flood insurance premiums in the surplus line market.

The Road Ahead

I remain steadfast in my desire to have a robust flood insurance market offering affordable insurance products to protect Californians, and I look forward to being part of the national discussion considering various approaches to accomplish this, including Congressional reauthorization of the NFIP, identification of opportunities to establish a private flood insurance market, ensuring surplus lines products continue to be available until there are viable admitted market options, and other ways to address flood risk.

The state of California and local government land use decision makers also need to be required to consider the cost and risk of floods before putting more people and businesses in harm's way. Currently, local governments making land use decisions to locate new homes and businesses in flood plains bear no liability for those decisions and as a result the risks and cost of putting more people into harm's way is externalized.

Flood Risk and Insurance in Florida

By David Altmaier, Commissioner, Florida Office of Insurance Regulation

Introduction

Flooding is a serious risk in Florida due to the state's geography and proximity to water, both inland and on the coast. As in other states, insurance to cover flood risk is not part of a typical homeowner's policy, so it must be purchased separately if needed. Depending on the home's location, purchase of flood insurance may be required as a condition of a mortgage.

The vast majority of flood insurance coverage in Florida is provided through the NFIP. This issue is a critical concern for our state, as Florida has the largest number of participants in the NFIP and pays four times more into the program than it receives in claim payments.

Generally, there is a 30-day waiting period before flood insurance policies take effect unless purchased with a new homeowners' policy. According to the NFIP, 41 companies in Florida participate in the Write Your Own (WYO) Program, writing more than 99% of all flood insurance policies in the state.

Florida Legislative Initiative

Following the federal Homeowner Flood Insurance Affordability Act of 2014, which repealed and modified certain provisions of the federal Biggert-Waters Flood Insurance Reform Act of 2012 (BW12) which had increased dramatically the price on new and renewal NFIP policies for thousands of Floridians, the Florida legislature passed SB 542, which streamlined the process for private insurance carriers to write flood insurance in Florida. This legislation was designed to provide an alternative to the NFIP and enhance consumer choice while preserving the affordability of flood insurance. Other than the basic coverage provided under a standard NFIP policy, there are three different types of flood coverage allowed:

- **Preferred coverage**, which includes the same coverage as standard flood insurance and also must cover flood losses caused by water intrusion from outside the structure that are not otherwise covered under the definition of flood by the NFIP.
- **Customized coverage**, which is coverage that is broader than standard NFIP flood coverage.
- **Supplemental coverage**, which supplements an NFIP flood policy or a standard or preferred policy from a private market insurer. Supplemental coverage may provide coverage for jewelry, art, deductibles, and additional living expenses. It does not include excess flood coverage over other flood policies.

Private Flood Insurance

In 2016, there were at least 16 admitted insurers in Florida offering primary personal flood coverage outside of the NFIP, with additional insurers expected to start writing in 2017. The insurers generally write only a limited number of policies or policy types, such as for high value homes. Some insurers write this coverage as a stand-alone flood policy while other insurers issue an endorsement to an existing homeowner's policy. According to ad-hoc information provided to the Office of Insurance Regulation, these insurers wrote 9,667 primary personal lines flood policies in Florida as of Nov. 30, 2016, up from 965 as of year-end 2015.

Furthermore, at least 15 admitted insurers in Florida are currently offering personal flood coverage in excess of NFIP flood limits. These policies are written as either stand-alone flood policies or as endorsements onto a homeowner's policy. The insurers generally write only a limited number of policies or policy types, such as for high-value homes. No estimate of the number of policies is available at this time, but it is estimated to be less than 15,000.

In addition to the policies referenced above, there are insurers writing primary and excess private flood for commercial properties, as well as surplus lines insurers writing both personal and commercial primary and excess flood coverage.

According to the 2015 Annual Report of the Florida Surplus Lines Service Office, surplus lines insurers wrote $34.6 million in residential flood insurance premiums in 2015. The total premium volume for admitted insurers writing private flood insurance is unknown as this is not separately collected on any reports submitted to the Florida Office of Insurance Regulation.

While private insurers could provide actuarially sound prices comparable or even lower than NFIP prices, they would be able to only cover some areas of the state. Private insurers may be reluctant to provide flood coverage for highly exposed areas to directly compete with existing NFIP policies. Insurers have repeatedly noted they need data from the NFIP to be able to calculate an actuarially sound rate, so resolving legal privacy issues surrounding the release of the data would be beneficial to the facilitation of a private flood insurance market.

Efforts to Increase Coverage

With national take-up rates around 50% for people residing in NFIP mapped flood zones and far less outside these zones, the issue of increasing coverage for all homes and in all areas potentially vulnerable to floods is critical.

There are likely many reasons people do not buy flood insurance. For some, it may be that it is too expensive. Others may want to save money and buy only the coverage if it is required as a condition of a mortgage. Some people may believe flood coverage is available only for properties in a flood zone. Others believe flood insurance is already part of their standard

homeowners policy. Dispelling those myths and educating consumers on the risk of flooding and the availability of flood coverage is necessary to increase the take-up rate for flood coverage.

The Florida Division of Emergency Management has a flood campaign underway now to encourage Floridians to purchase flood insurance coverage. The Division of Consumer Services of the Florida Department of Financial Services has a section on its website regarding flood insurance, offering advice on disaster preparedness and the need for flood insurance. Additionally, the insurance commissioner's office issues a press release each year prior to storm season urging all Floridians to buy flood coverage.

At the same time, as stated earlier, there are a number of insurers writing private flood insurance in the state. Florida encouraged private insurers in 2014 to write flood insurance by enacting Section 627.715, Florida Statute, which streamlines the rate filing process for flood coverage, eliminates the diligent effort requirement for flood policies issued by surplus lines writers, and provides for a certification by the Office that the policy equals or exceeds coverage provided by the NFIP. The Office is working collaboratively with Florida insurers and well-capitalized reinsurers who are interested in providing a private sector alternative to the NFIP.

On the federal level, the passage of the Flood Insurance Market Parity and Modernization Act would help the private insurance market grow as it would delegate the authority to approve private flood insurance to state insurance regulators, as long as the insurer providing the flood coverage is licensed, admitted or otherwise approved to engage in the business of insurance in the state. This flexibility permits each state regulator to approve private flood insurance coverage which is responsive to the needs of the particular state and which complies with the regulatory requirements of that state. The Act also clarifies that private flood insurance meets the mandatory purchase requirement for mortgages and the continuous coverage requirement.

Obstacles to Overcome

For private flood insurance to grow the following three hurdles need to be overcome:

- **The development of flood insurance rates:** Flood insurance has been written almost exclusively by the NFIP for decades. The data underlying the development of flood insurance rates is maintained by the NFIP, which asserts that federal privacy statutes prohibit the sharing of that data with insurers. Insurers contend these data is essential to the development of actuarially sound flood insurance rates.
- **The uncertainty of the flood insurance market:** As a federal government program, the NFIP is subject to periodic, frequent reauthorization and statutory change. This uncertainty about the role of the NFIP may discourage insurers from entering or participating in the private flood insurance market.

- **The availability and affordability of reinsurance coverage for flood losses:** Flood is a high severity peril, so the availability and affordability of reinsurance coverage for flood losses is an important factor in the emergence, growth and sustainability of the private flood insurance market.

Furthermore, the NFIP should educate policyholders and others about the value of flood insurance, and make sure applicants and policyholders know what private options may be available. At the same time, the NFIP may need to continue to provide coverage for homeowners in certain high-risk areas who may be unable to obtain appropriate coverage in the private market.

Flood Risk and Insurance in Louisiana

By James J. Donelon, Commissioner, Louisiana Department of Insurance and
Thomas Travis, NAIC Liaison, Louisiana Department of Insurance

Introduction

Private flood insurance is a small share of the property/casualty insurance (P/C) market in Louisiana. A survey of the top 20 surplus lines brokers placing business in Louisiana showed almost $1.15 million of first dollar coverage is written in the state, and slightly more than $7 million of excess flood insurance is written in the state. The coverage is generally in the surplus lines market, because it is a high-risk coverage.

Private flood insurers have indicated an interest in writing first-dollar residential coverage in Louisiana. They can generally compete with NFIP rates outside of special flood hazard zones, but there are several south Louisiana parishes in which they would not be able to write coverage competitive with NFIP rates.

Surplus Lines Market

Louisiana has a large surplus lines market with over $1 billion in annual premium. Louisiana has removed barriers to the placement of surplus lines coverage for both commercial and personal lines. Louisiana only requires surplus lines insurance be procured from a "surplus lines insurer" as defined in the Louisiana Insurance Code and through a licensed surplus lines broker.[155]

Like other states, Louisiana imposes most of the regulatory burden on specially licensed surplus lines brokers. These brokers are responsible for ensuring the insurer meets eligibility criteria to write policies in Louisiana and to ensure the companies are financially sound. Brokers are also responsible for collecting the surplus lines premium tax and remitting the tax to the state.

Unless specifically exempted, surplus lines insurance is subject to the same set of regulations to which admitted insurance is subject for things such as claims handling.

Obstacles to Overcome

The first obstacle to the emergence and growth of private flood insurance is the requirement for NFIP coverage for federally regulated mortgage loans when flood coverage is required. The remedy begins with the regulation to permit the acceptance of private flood insurance for loans requiring such insurance. Enactment of legislation such as the Flood Insurance Market Parity and Modernization Act (H.R. 2901) that passed the House late in the 114th Congress would lay the foundation for a competitive flood insurance market.

[155] La. Rev. Stat. Ann. §22:432.

The second obstacle of particular importance to Louisiana is the development of a reasonably priced market for those areas not insurable in a competitive market. Much of south Louisiana is a "working coast," with people living on or near the water because that is where they earn their livings. A substantial portion of the state and its economy would fall into that category, and a dwindling NFIP would soon be in a death spiral without prohibitive rate increases. No depopulation of the NFIP is acceptable unless it includes a market to provide coverage for areas tied to the coastal economy of Louisiana.

The third obstacle to the emergence and growth of private flood coverage is the preference for admitted insurance over surplus lines insurance. Surplus lines insurance usually leads the way into new markets for high or unknown risk insurance as they did with transportation network companies (TNCs). Once the market matures and the risk is better understood, admitted insurers will begin to write more of the coverage. In post-Hurricanes Katrina and Rita, the surplus lines market was an important source of insurance coverage for the small commercial property market. Any program to develop the private market will have to allow for participation by surplus lines insurers. Passage of a provision such as that in the Flood Insurance Market Parity and Modernization Act, which requires the acceptance of flood insurance from eligible surplus lines insurers, would remove this obstacle to the emergence of a private flood insurance market.

The next major obstacle is increasing the number of people who obtain flood insurance, whether NFIP or private. Absent a flood insurance mandate such as that for mortgages in certain flood-prone areas, people generally do not maintain flood insurance. Some do not appear to understand the risk within the 100-year floodplain or in areas not designated as special flood hazard zones. Many have never experienced flooding after many years of occupying a home. After the 2016 floods in Louisiana, it was determined the take-up rate for flood insurance was approximately 14% in flood zones. A solution to the problem would lie in a federal mandate that all policies of property insurance include mandatory earthquake and flood coverage. Such a mandate would spread the risk of both perils over the entire country with minimal costs for those in lower risk areas.

Flood Risk and Insurance in Mississippi

By Mike Chaney, Commissioner, Mississippi Insurance Department, and
Andy Case, Director of Consumer Services, Mississippi Insurance Department

Introduction

Flood risk remains one of the largest natural disaster threats to the state of Mississippi. The Mississippi River with its long history of flooding traverses more than 300 miles, covering the western border with Arkansas and Louisiana. Additionally, the state is bordered by 62 miles of beach from its border with Louisiana, each affected by the Gulf of Mexico and the Mississippi River. This continues to make flooding one the state's greatest threats for loss of life and property.

The vast majority of property protection for flood is offered through the NFIP. Mississippi has more than 35 insurers offering flood protection through the WYO program. There are in excess of 68,000 policies in force, with annual premium of roughly $41 million. These policies represent up to 99% of the flood policies in force.

Following Hurricane Katrina and the changes to the NFIP, necessitated through BW12, flood insurance for the vast majority of Mississippians who are at greatest risk has become largely unattainable through the NFIP due to the rising cost. To compare, at a time when the issue of flood insurance should have been first and foremost in consumers' minds after the devastation caused by Hurricane Katrina, NFIP policies declined by more than 9,900 individual policies since the BW12 legislation was passed. The NFIP loss ratio over the past 37 years is over 486% for Mississippi. Clearly, despite reforms offered through BW12, the NFIP approach does not work.

As state insurance regulators, we at the Mississippi Insurance Department (MID) have heard time and again that the cost of flood insurance through the NFIP has made residing in some areas of our state cost-prohibitive. This is particularly true when combined with premiums for insurance covering other hazards such as wind. In many cases, the MID has been made aware of defaults and foreclosures on mortgage loans solely as a result of the financial hardships presented by NFIP premiums.

Private Flood Insurance

Privatization of flood would offer more choice for the consumer. Currently, there is only one insurer offering private flood insurance through the admitted market in Mississippi. This protection is offered as an endorsement to their current homeowner policy. The MID sees this as a huge advantage for policyholders since having both flood and wind with the same company

essentially removes the wind vs. water concurrent causation issue for the consumer. This was a significant source of complaints and litigation between consumers, who suffered catastrophic damage as a result of Hurricane Katrina, and insurers.

Of the five insurers offering flood loss protection through the surplus lines market, many of these are commercial and are only offered in excess of limits afforded by the NFIP. One member of the surplus lines market does offer private flood protection as a replacement to NFIP protection.

As NFIP becomes less of an option for consumers, we have begun to see private insurers express an interest in entering this market. We believe private insurers of flood can better serve consumers, better assess risk and establish a reasonable price. This is primarily due to the increased interest in this market as competition fosters additional price considerations and analytical risk making with sound pricing as insurers compete for market share. This competitive market will never exist if NFIP is the only flood insurer. As Mississippi has one admitted insurer offering flood currently, we have been approached by new insurers who have expressed an interest in also writing private flood insurance. We believe this is only the beginning, and if the U.S. Congress can work to remove obstacles to private insurers' ability to fairly compete against the NFIP, we will see many other insurers who will be willing to enter this market.

The MID believes private insurers can provide a sound approach to assessing flood risks at prices that not only encourage participation by other insurers (admitted and non-admitted) but also encourage participation by private and commercial property owners.

Additionally, if existing property insurers are willing to offer flood protection as an endorsement to existing all-risk policies, we believe the take-up rate would be enormous, resulting in participation by homeowners with very low to no flood risk (much like we see with earthquake coverage today). This would provide the low- to high-risk analysis needed to price this protection across a wide spectrum of consumers resulting in less price volatility after a catastrophic loss event. This would be much more viable than could ever be realized through the NFIP's current approach and efforts.

Continuing Efforts and Remaining Obstacles

The MID believes private flood insurance policies must be recognized by lenders as meeting the definition of the protection currently afforded by NFIP policies. The coverage being offered as an endorsement to existing wind policies written by the one admitted insurer meets the minimum protection afforded by the NFIP. We strongly encourage this approach as it can

alleviate problems associated with concurrent causation between different insurers writing the wind and flood coverage.

Also, private insurers will need access to NFIP mapping data, as well as NFIP participation, to adequately assess risk and establish actuarial rates that are sound. The NFIP must be willing to provide that needed information.

Additionally, if policyholders are to feel encouraged to participate in the protections offered by the private market, then policyholders need assurance once an insured leaves the protection of NFIP, the same protections previously offered through "grandfathering," remain available for the person to re-enter the NFIP.

Education

The MID, through use of printed material and social media, routinely and regularly reminds the public of the need for flood insurance. The MID also has a Consumer Outreach Coordinator who travels the state to flood-prone areas to promote an understanding of the differences between protections offered by a standard homeowners policy and that of a flood policy as offered through a private insurer or the NFIP.

Additionally, the MID continues to work with the NAIC through the Transparency and Readability of Consumer Information (C) Working Group, to facilitate and develop new consumer shopping tools and to inform and educate consumers on the need for flood insurance.

Flood Risk and Insurance in Pennsylvania

By Teresa D. Miller, Commissioner, Pennsylvania Insurance Department

Introduction

Flood insurance is a big issue in Pennsylvania. FEMA statistics show from 2006 through 2014, Pennsylvania property owners filed more than 18,000 claims with the NFIP for more than $551 million in damages, with claims coming from 66 of the commonwealth's 67 counties.

As a state insurance regulator, I am keenly aware of the devastating effects floods have on constituents and believe it is critical that flood insurance is available and affordable to protect homes, businesses and personal property, providing peace of mind.

FEMA has re-mapped flood zones in Pennsylvania and across the country using the latest 100-year flood projections. The re-mapping has resulted in many properties and in some areas entire communities, being placed into special flood hazard areas for the first time. In some cases, the re-mapped properties have very little or no history of flooding. While consumers can appeal the re-mapping of a property, there are no guarantees the appeal will be successful. Other than hiring a geologist or surveyor, there is no charge to the property owner.

As I travel around the commonwealth, I hear stories of people being unable to afford their homes because of the increased cost flood insurance that has added to their mortgages. Many consumers are unable to sell their homes because of depressed home values caused by rising flood insurance costs. Consumers cannot afford to stay at their homes, and at the same time, they cannot sell their homes without a significant loss in equity. These stories are being lived by homeowners throughout Pennsylvania.

Private Flood Insurance

When I began hearing about these problems facing consumers, my staff and I researched what we could do to help. We found that because of the rising premiums under the federally run NFIP, private insurers are becoming interested in offering flood insurance for the first time. In many instances, private flood insurance comparable to what the NFIP offers is saving homeowners substantial amounts of money.

Facilitating a private flood insurance market in Pennsylvania will provide consumers with access to additional options to protect their homes and personal belongings. This competition is proving to be good for consumers, providing more choices and often better prices. At least five surplus lines insurance brokers sold flood insurance to homeowners in Pennsylvania in 2015,

having written nearly 1,000 policies. We have also started to see licensed insurers offer flood coverage, although they currently serve only limited markets.

What Are the Obstacles?

As private flood insurance is still an emerging product, there are not many insurers offering it and coverage can be hard to find. Another obstacle is that although required to do so by federal law, federal agencies have yet to finalize regulations directing mortgage lenders to accept private flood insurance. This has resulted in some reluctance among lenders in accepting private flood insurance policies. Additionally, the NFIP still offers a less expensive option in many cases, and private insurers often lack access to the types of data they need to consider offering flood insurance.

Who Sells the Bulk of Private Flood Insurance in Pennsylvania?

The bulk of private flood insurance now sold in Pennsylvania is through what is known as surplus lines insurance. Surplus lines insurers are those licensed in other states or other countries. The agents, or producers, who sell this insurance, must still be licensed in Pennsylvania. Surplus lines insurers typically insure unique or otherwise difficult to underwrite risks the admitted market is, at least initially, reluctant to insure.

Generally, after a new coverage has proven itself profitable in the surplus lines market and sufficient data has been gathered to provide a sound basis for rate development, the coverage tends to become a standard product in the admitted market. Ideally, private flood coverage will follow this path and admitted insurers eventually will choose to enter the flood insurance market.

We are finding in many cases, private insurers are willing to offer comparable coverage at substantially lower cost than the NFIP. In Pennsylvania, one property owner would have paid a $7,500 annual premium with the federal program but found private coverage for $1,415. Another homeowner was quoted a $6,000 annual premium by the NFIP, but found a surplus lines policy for $900. Yet another homeowner's story is similar to many in Pennsylvania. This individual lived in his home for many years without experiencing a flood and without flood insurance, but recently was told his property was now in a flood plain because of re-mapping by FEMA. NFIP coverage would have cost him $3,000 a year. He is paying $1,000 a year for a surplus lines policy.

The states where surplus lines insurers are licensed monitor their financial health, and for companies located outside the U.S., the option to join a registry of foreign insurers is available. The surplus lines insurers listed on the NAIC Quarterly Listing of Alien Insurers are subject to

capital and surplus requirements; a requirement to maintain U.S. trust accounts; and character, trustworthiness and integrity requirements.

In Pennsylvania, the Insurance Department can declare a surplus lines insurer ineligible to do business in the state if the insurer is in unsound financial condition, has willfully violated the laws of the state, or does not make reasonably prompt payment of claims in Pennsylvania or elsewhere. The Insurance Department may also suspend, revoke or refuse to renew the license of a surplus lines broker for various reasons, including failure to make and file required reports, failure to collect or remit required tax on surplus lines premiums, failure to remit premiums due insurers or return premiums due insureds within reasonable time limits, or for any other cause for which action can be taken against an insurance producer's license. In Pennsylvania, the Insurance Department also has authority to assess a civil penalty up to $2,000 for the first offense and up to $4,000 for each succeeding offense against anyone violating the Commonwealth's insurance laws.

The one consumer protection surplus line insurers do not have that those licensed in Pennsylvania do is participation in the Guaranty Fund. This fund is paid into by Pennsylvania admitted insurers and will pay claims if an insurer were to become insolvent. However, surplus lines insurers are often large, well-known entities such as Lloyd's of London, the largest surplus lines writer of flood insurance in Pennsylvania. We have not received any consumer complaints against surplus lines insurers related to flood insurance.

NAIC Efforts

As chair of the Property and Casualty (C) Committee in 2016, I testified on behalf of the NAIC before the U.S. House Committee on Financial Services in support of H.R. 2901, the Flood Insurance Market Parity and Modernization Act. H.R. 2901, which passed the U.S. House of Representatives by a vote of 419-0, would require mortgage lenders to accept private flood insurance found acceptable by state insurance regulators. It would also accept private flood insurance as proof of continuous coverage, thereby allowing consumers to test the private flood insurance market and return to the NFIP, if they wish, with their subsidy intact.

In 2016, the Property and Casualty (C) Committee also finalized recommendations for Congress regarding the reauthorization of the NFIP. Some of our recommendations include encouraging the growth of the private flood insurance market as a complement to the NFIP, supporting risk mitigation and sound land use planning, increasing FEMA transparency regarding the process for developing and updating flood maps, and improving education for consumers and producers.

Finally, the Catastrophe Insurance (C) Working Group's 2017 charges include: 1) coordinating with the NFIP in the development of a handbook or white paper to assist state insurance regulators in understanding the federal flood insurance program and how it interacts with state insurance regulation; and 2) collecting and analyzing NFIP data in order to help facilitate private flood insurance markets.

State Programs and Initiatives

Alongside efforts at the national level through the NAIC, I will continue to educate consumers about flood insurance in Pennsylvania. My department created a new web page providing for a one-stop shop for flood insurance information. The webpage includes information about both the NFIP and private flood insurance. As the private flood insurance market continues to develop, I, along with my fellow state insurance regulators, will also closely monitor policyholder experiences to ensure consumers are well served by this emerging market.

Flood Risk and Insurance in South Carolina

By Raymond G. Farmer, Director, South Carolina Department of Insurance

Introduction

In South Carolina, we have 39 insurers writing NFIP policies under the WYO program. In aggregate, these insurers wrote about $111.3 million of flood insurance in 2015. As expected, this represents a small portion of total premiums accounting for approximately 0.5% of the total property/casualty (P/C) industry premiums written in South Carolina.

Although South Carolina has a lot of coastal area, it is a small state and accounts for just 4% of flood insurance policies, total insured value, and written premiums. As of November 30, 2016, there were 201,114 NFIP flood insurance policies in force in South Carolina, ranking South Carolina sixth nationally in terms of policies in force.

Private Flood Insurance

As of 2016, all insurers are required to report private flood insurance policies sold. This will help us as regulators have a greater understanding of the current marketplace for private flood insurance. Currently, we know that some carriers will write flood insurance, but it is typically coverage in excess of NFIP limits. Encouragingly, a number of small insurers have expressed interest to be admitted to sell flood insurance that would directly compete with NFIP coverage. If insurers would apply for expansion to South Carolina to write flood insurance and they were approved, they would be regulated just like any other admitted insurer regardless of what type of coverage they write.

The Need for Flood Insurance

Unfortunately, the number of South Carolinians purchasing flood insurance still remains small despite rising flood risk. It is well understood people are far less inclined to buy flood insurance if it is not required (e.g., by their mortgage lender). There is a false but widespread belief that because FEMA has drawn some maps showing in its opinion whose homes may be at risk for flood, all other homes outside these floodplain maps do not need to have flood insurance.

In South Carolina we learned all homes need to be insured against flooding the hard way. In October 2015, we experienced a 1-in-1,000-year flood event and realized the whole state, at least in my opinion, seems to be in a flood zone. A daily average of 12 inches of rain fell on South Carolina over a few days, while some regions of the state had 24 inches to 27 inches of rainfall. A big part of the state was inundated, especially inland in the surrounding counties of the city of Columbia in what is now considered as one of the most prolific rainfall events in the

modern history of the U.S. Given the enormity of the flooding and the fact the inland areas were outside the flood zone, South Carolinians suffered substantial residential damage with many citizens and businesses facing losses that were not covered by insurance.

The floods also hit our coastal areas around the city of Charleston, which was in a flood zone and had a higher percentage of homes insured, albeit still far too small. Charleston County, along with South Carolina's other coastal counties (Beaufort, Horry, Berkeley, Georgetown, and Dorchester), accounts for roughly 93% of South Carolina's NFIP policies and annual written premium.

In total, the NFIP reported 5,227 claims with paid losses of $133,475,290 from the October 2015 Flood with an average payment of $35,286. By comparison, insurers writing private flood insurance reported 579 claims with case incurred losses of just $13,175,822 from this catastrophic event.

In October 2016, South Carolina was hit by Hurricane Matthew. This storm affected different parts of the state differently. Some coastal counties experienced more wind damage, while others experience significant storm surge. While claims are still being processed, we know that NFIP has received more claims and paid out more in losses from this event than from the October 2015 Flood (6,858 claims with $135,787,190.61 in payments as of 3/2/17). The private flood insurance claims continue to pale in comparison; as of March 1, 2017, insurers had reported 717 private flood insurance claims with case incurred losses of $57,228,872.

I would like to report the majority of folks in the Midlands have since purchased flood insurance to protect their homes from future floods, but regrettably that has not occurred. Some South Carolinians did indeed buy flood insurance but not at numbers as significant as we have hoped. South Carolina's NFIP policies in force count has risen by less than one percent in the last year (199,242 PIF as of 8/31/15 compared to 201,114 PIF as of 11/30/16). Given our experience, we will consider implementing an educational campaign across the state to inform our citizens about the flood risks they are facing and encourage them to purchase the necessary insurance coverage.

Since the private market has not yet developed viable alternatives to the NFIP to cover most people, our state can only direct South Carolinians to FEMA and the NFIP for advice and information about the availability and pricing of flood insurance for their homes. Based on recent conversations I had with other state insurance commissioners, the private market will decide to enter the market at greater numbers at some point, although now it is still on the sidelines.

I am confident private insurers are actively studying their potential involvement in the flood insurance market, and in the near future we will see insurers with actuarially sound products that would be competing with the NFIP. State insurance regulators can continue to inform the public on the need of flood insurance whether or not their homes are located in NFIP flood zones. Once homeowners start demanding flood insurance in greater numbers private insurers will come in the market to provide the necessary coverage.

I believe the HR 2901, as Pennsylvania Commissioner Teresa D. Miller testified in Congress in 2016, is a step in the right direction. The concerns the government-sponsored enterprises (GSEs), Fannie Mae and Freddie Mac, have expressed about insurers providing private flood insurance are unfounded in my opinion.

The Role of the NFIP

Although the NFIP seems reluctant to share with the private sector information and data it has collected over the years about flood risk, increased transparency and collaboration will be key to a successful integration of private insurers in the flood insurance market.

The NFIP is and should remain the market of last resort and maintain a central role in the market when traditional insurers enter the space. At the same time, the NFIP should not be a stumbling block but rather a facilitator of healthy competition among insurers in the private flood insurance market for the benefit of all policyholders.

State Insurance Regulatory Efforts and NAIC Initiatives

State Insurance Regulatory Efforts and NAIC Initiatives

By Dimitris Karapiperis, Analyst, NAIC Center for Insurance Policy and Research, and Brooke Stringer, Financial Policy & Legislative Advisor, NAIC Government Relations Office

Introduction

State insurance regulators are keenly aware of the catastrophic impact floods have on millions of citizens and many communities across all states. They have long recognized it is critical flood insurance is not only available to all those who need it but also it is provided at affordable prices to protect homes and personal property, providing essential protection and peace of mind. The flood insurance market should provide multiple options for consumers to encourage shopping preferred coverage and price. Facilitating increased private sector involvement in the sale of flood insurance products would help promote consumer choice and encourage competition.

Private Flood Insurance Market

As discussed by state insurance commissioners in the Regulatory Views section of the study, even though the vast majority of flood insurance coverage throughout the country is provided by the NFIP, there is an increasing interest among insurers to write primary private flood coverage. Like many types of new coverages, private flood coverage is being developed and offered first by surplus lines insurers, which typically insure unique or otherwise difficult to underwrite risks that the admitted market is, at least initially, reluctant to insure.

While there is some interest from the admitted insurance market at this time, there is a growing appetite in the surplus lines market to provide private flood insurance coverage equivalent to or broader than the offerings of the NFIP. As the industry becomes more comfortable with the ability of the surplus lines insurers to write private flood insurance coverage profitably, the interest of admitted insurers may grow.

The NAIC developed a requirement for insurers to include a line item in their financial statements beginning in 2017 highlighting their private flood insurance activity. Collection of this data will allow state insurance regulators to capture the entire spectrum of flood data to help determine the effect of catastrophic flood events on the U.S. insurance market and identify the percentage of policies sold through the private market versus those sold through the NFIP.

As the private flood insurance market grows and more companies offer coverage, including traditional admitted carriers, state insurance regulation will continue to evolve to meet the size and breadth of the market as well as the needs of consumers. State insurance regulators have a

long history of carefully monitoring the emergence and innovation of new products and coverages, and tailoring regulation over time to ensure consumers are appropriately protected.

Federal Legislative Efforts

In order to better promote and facilitate the development of the private flood market, state insurance regulators believe changes must be made to address some of the unintended consequences resulting from the federal Biggert-Waters Flood Insurance Reform Act of 2012 (BW12).[156] Although one of its objectives was to provide opportunities for the growth of the private market as an alternative to the NFIP, the definition of and regulatory environment surrounding private flood insurance created by BW12 conflicted with this objective making it more difficult for state insurance regulators to protect consumers and ensure availability of the product.

Specifically, BW12 empowers federal banking and housing regulators to potentially regulate the solvency of private flood insurance carriers. State insurance regulators have expressed their concern noting banking and housing regulators lack the expertise and experience to regulate insurers or insurance markets. Banking regulators have different regulatory objectives than insurance consumer protection. Another impediment for entrants into the market is the vague definition of private flood insurance included in BW12.

The NAIC supports the Flood Insurance Market Parity and Modernization Act (H.R. 1422/S. 563) which clarifies that state insurance regulators have the same authority and discretion to regulate private flood insurance as they have to regulate other similar insurance products and markets. This legislation also alleviates state insurance regulators' concerns about the private flood definition in BW12 by defining private flood insurance as a policy issued by a licensed insurer or eligible surplus lines insurer and provides coverage that is compliant with state laws and regulations. These clarifications will assist in removing the restrictive language in current law to help prompt more insurers to enter this market if they are willing. Facilitating the entry of additional carriers into the market will provide consumers with access to additional options for flood insurance products.

Surplus Lines Regulation

In the case of private flood insurance policies written by surplus lines carriers, state insurance regulators will continue to oversee the surplus lines insurance marketplace by imposing capital and surplus requirements on eligible U.S.-based carriers and licensing and supervising surplus lines brokers. While the surplus lines market is regulated differently than the admitted market, state insurance regulators have significant authorities to ensure consumers are well-protected.

[156] https://www.fema.gov/media-library/assets/documents/31946

Surplus lines insurers domiciled in a U.S. state are regulated by their state of domicile for financial solvency and market conduct. Surplus lines insurers domiciled outside the U.S. may apply for inclusion in the NAIC Quarterly Listing of Alien Insurers.[157] The insurers listed there are subject to capital and surplus requirements, a requirement to maintain U.S. trust accounts, and character, trustworthiness and integrity requirements.

Importantly, the insurance regulator of the state where the policyholder resides also has authority over the placement of the insurance by a surplus lines broker and enforces the requirements relating to the eligibility of the surplus lines carrier to write policies in that state. In the event a policyholder is the victim of misconduct by the broker, the insurance regulator can sanction the broker or revoke their license. If there is a problem with coverage and a claim being paid, whether resulting from acts of the broker or insurer, the insurance regulator can ultimately hold the broker liable for the full amount of the policy. This regime provides strong incentives for surplus lines brokers to not only comply with applicable laws themselves but also to sell policies from surplus lines carriers that are in a strong financial condition and in good standing.

Most state insurance regulators can also use their authorities under the state Unfair Trade Practices Act and similar statutes to ensure consumers are protected, including that claims are paid, the insurer or broker is not misrepresenting what is in the policy, as well as remedying other bad conduct. As the private flood market develops, state insurance regulators remain committed to effective regulation and to making changes to their regulatory structure when necessary.

NAIC Guiding Principles for NFIP Reauthorization

As the current NFIP reauthorization expires on Sept. 30, 2017, state insurance regulators have collectively, through the NAIC structure, voiced their support for a long-term reauthorization of the NFIP to avoid short-term extensions and program lapses that create uncertainty in the insurance, housing and mortgage lending markets.

The NAIC Property and Casualty Insurance (C) Committee developed a number of recommendations to the NAIC Government Relations (EX) Leadership Council to convey to Congress as it considers potential changes and improvements to NFIP as part of the reauthorization process to address the country's flood risk. The recommendations are captured in the following NAIC principles:

- Encourage greater growth in the private flood insurance market as a complement to the NFIP to help provide consumers with more choices.

[157] http://www.naic.org/prod_serv_alpha_listing.htm#quarterly_alien

- Support the Flood Insurance Market Parity and Modernization Act (H.R. 2901/S. 1679)[158] which clarifies private flood insurance meets the mandatory purchase requirement and that state insurance regulators have the same authority and discretion to regulate private flood insurance as they have with other similar insurance products. The Act also makes clear that private flood insurance meets the continuous coverage requirement so policyholders have a choice to return to the NFIP without penalty, including not losing any subsidy they previously had with the NFIP.
- Require FEMA to reinstate its prior rules allowing policyholders to cancel their NFIP policies mid-term and receive refunds on a pro-rated basis if they decide to replace their NFIP policies with private flood insurance.
- Require FEMA to share NFIP information, including claims, elevation, and mapping data, with state insurance regulators, insurers, modelers, advisory, statistical and rating organizations in order for the private market to be able to accurately assess flood risks.
- Require FEMA to eliminate the non-compete clause to allow the Write Your Own (WYO) insurance companies to sell private flood insurance outside of the NFIP.

- Review current NFIP training requirements for insurance producers in consultation with state insurance regulators who are tasked with licensing producers who sell NFIP policies. Ensure that any NFIP training is accurate and consistent with regard to the existence and availability of private flood insurance.
- Encourage support for mitigation planning, including mitigation discounts, such as premium discounts or insurance rate reductions to persons who build, rebuild, or retrofit certain residential properties to better resist flood events, and legislative efforts such as the Disaster Savings Accounts Act (H.R. 2230)[159] to allow individuals to set aside funds in a tax-preferred savings account for disaster mitigation and recovery expenses.
- Encourage careful consideration of affordability issues and the impact of NFIP policy changes on current NFIP policyholders. Certain actions should be considered within the reauthorization to address affordability, for example, potentially including continuation by FEMA of its NFIP grandfathering provisions or implementing means-tested discounts coupled with rate reform.
- Require FEMA to provide increased transparency to all stakeholders regarding its decision making process for developing and updating its flood maps and rate making.
- Encourage a coordinated effort between the public and private sector to increase overall take up rates of flood insurance, including facilitating opportunities to educate consumers about flood insurance policy options. Implement methods to ensure better

[158] https://www.congress.gov/bill/114th-congress/house-bill/2901
[159] https://www.govtrack.us/congress/bills/114/hr2230

compliance with the federal mandatory purchase requirement and encourage the purchase of flood insurance for those outside of special flood hazard areas.

Regulatory Initiatives Conclusion

As insurance markets evolve, state insurance regulators remain fully engaged with all relevant stakeholders to promote an optimal regulatory framework—private flood insurance is no exception. State insurance regulators believe that well-regulated markets make for well-protected policyholders and will meet any new challenges posed by a dynamic private flood insurance market.

Flood Insurance Study Conclusion

Flood Insurance Study Conclusion

By Dimitris Karapiperis, Analyst, NAIC Center for Insurance Policy and Research and
Eric Nordman, Director, NAIC Center for Insurance Policy and Research

The authors in this study showed how vulnerability to floods is increasing as weather patterns shift, the climatic conditions change and population grows, especially in high-risk areas. Flood risk mitigation and flood insurance present generational challenges requiring innovative approaches and solutions.

The National Flood Insurance Program (NFIP) has a central and critical role in the provision of flood insurance. The policies associated with it affect millions of Americans and key social and economic institutions. However, the long-term reauthorization of the NFIP, in order to avoid uncertainty in the insurance, housing and mortgage markets is not separate from the need to encourage greater growth in the private flood insurance market as a complement to the NFIP. An increased involvement of private insurers in flood insurance would provide more choices to all consumers making flood coverage more accessible and perhaps less costly.

We are hopeful the insights gained from the contributions of our invited authors will further stimulate discussion among all stakeholders of how best to reform the current system and help assess the implications of any changes on affordability, availability, the federal budget, taxpayer exposure, and the flood insurance market. The ultimate goal, shared equally by all the authors, is to develop and promote those reforms that would best realize the much needed improvements in flood risk mitigation and insurance today and in the future.

For the readers' convenience, a list of a number of suggestions for change discussed in the study is included, with references to the page numbers in the study where the suggestions are presented in more detail. The following suggestions are offered for public policymakers to consider:

- Develop better understanding of population exposure and total risk mitigation strategies for accurate modeling of losses at both risk and portfolio levels p. 14.
- Require mandates to make sure people purchase flood insurance. Mandates would spread the risk of flood over the entire country with minimal costs for those in lower risk areas pp. 20,101.
- Offer community flood insurance where a local government or quasi-governmental entity purchases flood insurance on behalf of all its residents p. 21.
- Flood insurance premiums should in principle reflect risk pp. 39, 43.
- Provide assistance to high-risk area residents through a means-tested program distinct from risk-based pricing pp. 39, 43.

- Improve NFIP mapping using state-of-the-art technology for better risk information p.42.
- Increase consumer acceptance of flood insurance as essential part of household financial planning p. 49.
- Include flood in every standard homeowners insurance policy p. 49.
- Provide flood protection as an endorsement to existing all-risk homeowners insurance policies pp. 87, 103.
- Allow private insurers flexibility in charging risk-based insurance premiums for flood insurance pp. 49, 50.
- Allow private flood insurance to satisfy federally backed mortgage lending requirements pp. 53, 100.
- Allow private insurance to meet the continuous coverage requirement so policyholders can return to NFIP without penalty pp. 85, 116.
- Require FEMA to allow access to the NFIP information and data and supplement with flood models for the development of actuarially sound prices pp. 59, 98, 116.
- Flood service companies providing lenders or WYO insurers with SFHD reports should be accountable to the NFIP, state insurance regulators and consumers for the accuracy of their reports pp. 80, 81.
- Consider an opt-out option allowing a community to meet the NFIP certification requirement if consumers purchase private flood insurance p. 88.
- Bring together insurers, reinsurers and insurance-linked security (ILS) market participants to link flood risk to the capital markets to increase capacity p. 54.
- Insurers should implement continuous and stringent model validation to align actual experience to model estimates p. 57.
- Passage of the federal Flood Insurance Market Parity and Modernization Act (H.R. 2901) and inclusion of key reform recommendations in the 2017 reauthorization of the NFIP pp. 80, 98, 100, 107, 111, 114.
- Empower state insurance regulators with the authority to intervene and regulate WYO insurers to ensure compliance with NFIP policy and consumer protection laws p. 80.
- The NFIP could be an insurer of last resort for low-income and/or high-risk homeowners p. 63.
- Look to California Earthquake Authority (CEA) for lessons for NFIP reform pp. 63-66.
- Look to how flood insurance is provided and regulated in other developed countries (e.g. UK Flood Re) pp. 68-75.
- Establish a joint task force of insurers, state insurance regulators and FEMA to develop a workable solution for flood insurance addressing the concerns of all parties p. 88.

This list has a number of suggestions worthy of further discussion. The CIPR is hopeful the suggestions and the information provided in this report will add to the public policy dialog

to follow. As a nation we are united in the desire to have resilient properties resistant to the forces of nature to minimize the future reparation costs when disaster strikes. Access to adequate flood insurance is a key building block for people to quickly return to normal following a significant flooding event. It helps keep the economy moving forward. Effective land use policy and sound loss mitigation efforts are important to keep the flood insurance product affordable.

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