Affordability of National Flood Insurance Program Premiums: Report 1

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AFFORDABILITY OF NATIONAL FLOOD INSURANCE PROGRAM PREMIUMS

REPORT 1

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National Flood Insurance Program Premiums

Water Science and Technology Board
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Although the reviewers listed above provided many constructive comments and suggestions, they were not asked to endorse the conclusions or recommendations, nor did they see the final draft of the report before its release. The review of the report was overseen by David Moreau, Univer-

sity of North Carolina, Chapel Hill; and Michael Goodchild, University of California, Santa Barbara. Appointed by the National Research Council, they were responsible for ensuring that an independent examination of the report was carried out in accordance with institutional procedures and that all review comments were carefully considered. Responsibility for the final content of the report rests with the author committee and the National Research Council.

Contents

Summary

The National Flood Insurance Program (NFIP), established in 1968 and housed within the Federal Emergency Management Agency (FEMA), offers insurance policies that are marketed and sold through private insurers, but with the risks borne by the US federal government. In July 2012, Congress passed the Biggert-Waters Flood Insurance Reform Act (Biggert-Waters 2012, or BW 2012), which was designed to initiate several changes within the NFIP. A core principle of the 2012 legislation was to move toward an insurance program with NFIP risk-based premiums that better reflected expected losses from floods at insured properties.[1] This entailed eventual removal of discounts from NFIP policies known as "pre-FIRM subsidized" (pre-Flood Insurance Rate Map) and "grandfathered" policies. Paying the claims for such policies contributed in part to the NFIP having to borrow from the US Treasury to pay for claims after Hurricane Katrina and late storms. That debt was also a motivation for provisions in BW 2012 that directed FEMA to consider actions that had the potential to improve the financial foundation for the program through premium increases that would better reflect flood risks.

BW 2012 Section 100236 called for an "affordability study" from FEMA that would include "methods to aid individuals to afford risk-based

[1]Some of the terms used in this report may be unfamiliar to the reader or may have been used in inconsistent ways in writing and testimony about the NFIP through the years. Terms specific to the NFIP were taken from FEMA to the extent possible, but other terms were developed by the committee to ensure their consistent use throughout the report. A List of Terms is included at the end of this report for the reader's convenience.

premiums under the National Flood Insurance Program through targeted assistance rather than generally subsidized rates, including means-tested vouchers." The study was to inform the development of an affordability framework by FEMA to help inform NFIP policy decisions. However, implementation of BW 2012 rate increases was expected to take effect without awaiting the study and the development of an affordability framework, including an assistance program (see Appendix A for full language of BW 2012 Section 100236).

As BW 2012 went into effect, constituents from multiple communities expressed concerns about the elimination of lower rate classes, arguing that it created a financial burden on policyholders. Some concerns reflected the reality that purchase of the more expensive insurance was in some instances mandatory. Other concerns were based on expectations that higher premiums would depress home values, and on the question of whether higher premiums would thwart attainment of a long-standing objective of the NFIP to expand the number of properties covered by flood insurance. In response to these concerns, Congress passed the Homeowner Flood Insurance Affordability Act of 2014 (HFIAA 2014). The 2014 legislation changed the process by which pre-FIRM subsidized premiums for primary residences would be removed and reinstated grandfathering. In addition, Section 9 of HFIAA 2014 once again called on FEMA to report to Congress with a draft affordability framework. Specifically, the legislation stated

> the Administrator shall prepare a draft affordability framework that proposes to address, via programmatic and regulatory changes, the issues of affordability of flood insurance sold under the National Flood Insurance Program, including issues identified in the affordability study required under Section 100236 of the Biggert-Waters Flood Insurance Act of 2012.

Section 100236 of BW 2012 mandated that both the aforementioned FEMA affordability study and a study from the National of Academy of Sciences (NAS) to provide input into FEMA's work. In response, the National Research Council (NRC)[2] convened the Committee on the Affordability of National Flood Insurance Program Premiums. The statement of task guiding this NRC committee calls for two reports and explains the content of and distinctions between them:

> The first report, due in February 2015, will discuss the underlying definitions and methods for an affordability framework and describe the affordability concept and applications, and program policy options.

[2]The National Research Council is the working arm of the National Academies. The National Academies is the collective entity that includes the National Academy of Sciences (NAS), the National Academy of Engineering (NAE), the Institute of Medicine (IOM), along with the National Research Council. For more information, see http://nationalacademies.org

> The second report, due in September 2015, will propose alternative approaches for a national evaluation of affordability program policy options, based in part on lessons gleaned from a proof-of-concept pilot study to be guided by the NRC committee.

See Box 1-1, Chapter 1, for the full statement of task.

Consistent with its statement of task, Chapter 6 describes alternatives for determining when the premium increases resulting from BW 2012 would make flood insurance unaffordable and describes key design decisions and policy options for creating an assistance program. Chapter 7 discusses policy alternatives that may lower the cost of flood insurance for eligible households. To set the stage for Chapters 6 and 7, Chapter 2 describes the history of the NFIP emphasizing the effects of that history on premium setting prior to BW 2012. Chapter 3 describes the NFIP pricing practices that were in place when BW 2012 was passed and how BW 2012 might increase premiums. Chapter 4 describes the demand for insurance and offers findings about the challenge of increasing the purchase of flood insurance policies, a long-standing objective of Congress for the NFIP. Chapter 5 identifies places in the nation where the effects of BW 2012 may be most pronounced.[3]

NATIONAL FLOOD INSURANCE PROGRAM HISTORY

Original proposals for a national flood insurance program date back to the 1950s. The original 1968 legislation that established the program, and implementation of the NFIP over the years that led up to passage of BW 2012, reflected an intent to make flood insurance part of a multifaceted national program for flood risk management. That intent, in turn, affected NFIP premium-setting practices that were used prior to BW 2012. The following findings are based on a review of that history.

- **From the inception of the NFIP, and continuing until BW 2012, Congress sought to achieve multiple objectives for the program. The objectives have been to (1) ensure reasonable insurance premiums for all, (2) have NFIP risk-based premiums that would make people aware of and bear the cost of their floodplain location choices, (3) secure widespread community participation in the program and substantial numbers of insurance policy purchases by property owners,**

[3]This report does not attempt to specify programs or actions to promote flood insurance affordability, nor does it advise on how national flood risks might be reduced through insurance or other actions.

and (4) earn premium and fee income that, over time, covers claims paid and program expenses. These objectives, however, are not always compatible, and at times may conflict with one another.

- **The premium-setting practices and procedures that were in place before Biggert-Waters 2012 reflected the multiple objectives of the NFIP, and in some cases reflected premium-setting practices that were put in place when the NFIP was created. BW 2012 increased the emphasis on setting NFIP rates that reflected flood risk, and on charging premiums that would cover claims paid and other related expenses.**

NATIONAL FLOOD INSURANCE PROGRAM POLICY PRICING AND EFFECTS OF BIGGERT-WATERS 2012

Well-established actuarial principles require that the combination of insurance premiums and other income sources yield revenues that will pay expected future claims and insurance program expenses (costs). These principles also hold that premiums for an individual policy, to the administratively feasible extent, should be based on expected claims plus fees for the policy. Further, the principles hold that there should be no cross-subsidy whereby one group of policyholders has higher premiums so that others will have lower premiums. Finally, premiums should be no higher than necessary to ensure that these principles are met; regulation of private insurers is expected to limit premiums to costs of providing coverage plus a competitive return on invested capital. The NFIP, although not a private company, seeks to employ actuarial principles when setting premiums. However, historical precedent and congressional desire for premiums to be reasonable, constrained application of these principles. BW 2012 sought to remove constraints on the NFIP's ability to follow actuarial pricing principles.

As a result, BW 2012 had the potential to increase premiums for three types of NFIP policies: NFIP risk-based, grandfathered, and pre-FIRM subsidized. Pre-FIRM subsided policies have premiums that are less than those of NFIP risk-based policies for structures that were in place before a local flood insurance rate map (FIRM) was available. The NFIP realizes foregone revenues, relative to NFIP risk-based premiums, for this type of policy. To accommodate that reality, FEMA had adopted a revenue target whereby all premium income would equal claims paid on the historical average loss year (HALY). BW 2012 phases out this policy type; as a result, FEMA no longer uses the HALY in NFIP premium setting. The increases may be especially important for the 20% of properties that are eligible for pre-FIRM subsidized premiums.

The grandfathered premiums within the NFIP allow a given rating class to continue for a property even if a new FIRM may indicate a higher level

of flood risk. To make up for revenue losses due to grandfathering the NFIP loads (adds a charge) to other policies in its policy base. Grandfathering—and as a result the cross subsidy—was phased out by BW 2012. HFIAA 2014 reinstated grandfathering.

The Community Rating System (CRS) is a FEMA program that encourages communities to adopt a variety of measures to help reduce flood risks. It allows discounted premiums for some properties when the community adopts one or more NFIP-prescribed flood risk management actions. CRS-discounted premiums are cross-subsidized by charges levied on all NFIP policyholders and were unaffected by BW 2012. The findings that follow are based on a review and discussion of NFIP pricing and the effects of BW 2012 and HFIAA 2014.

- **Prior to BW 2012, the NFIP goal was to offer reasonable premiums, but at the same time premiums were expected to follow actuarial principles and cover claims and expenses over the long term. As a matter of practice, the historical average loss year (HALY) became a total premium revenue target. Rates were set so that the total revenue from all policies was sufficient to replace the premium revenue loss from offering pre-FIRM subsidized polices.**
- **After BW 2012, use of HALY is to be replaced by charging all pre-FIRM properties NFIP risk-based rates. The increase in cost of insurance for policyholders as a result of phasing out pre-FIRM subsidized premiums and the resulting premium revenue increases to the program, may be significant, but can be estimated only when additional data is available.**
- **HFIAA 2014 delayed but did not reverse the BW 2012 requirement to eliminate pre-FIRM subsided rates and to consider changes to NFIP risk-based rate setting practices.**
- **HFIAA 2014 reinstated grandfathering. Revenue losses caused by offering grandfathered premiums, and by CRS discounted premiums, which continue to be offered, are expected to be offset by increasing premiums for all policies. Whether the revenue earned from these cross-subsidies compensates for the forgone premium income is uncertain. If grandfathering or CRS discounting expands, the result will be that NFIP premiums increasingly violate the actuarial principle that premiums should be related to risk.**

INSURANCE DEMAND

A long-standing objective of the NFIP has been to increase purchases of flood insurance policies. The national flood risk management objective of widespread NFIP purchase was one motivation for keeping NFIP premiums

reasonable, with the premise that the level of the premium determines the willingness and ability to purchase flood insurance. However, property owners' decisions to purchase insurance include other considerations and influences unrelated to price. A review of the economics and behavioral sciences literature identified no single strategy that will increase purchase of NFIP policies.

- **The original NFIP legislation expected NFIP premiums to be priced at reasonable levels to promote voluntary purchase of NFIP policies. Empirical studies have found that premium prices may affect takeup rates although the size of that effect is small. The effect of the availability of disaster aid on insurance purchase decisions is uncertain.**
- **Studies have found that people may use intuitive thinking, as opposed to systematic consideration of the cost of premiums in relation to expected claim payments, when choosing to forego insurance or to cancel an existing policy.**
- **The combination of acknowledgement of intuitive thinking and the limited effects of premiums on insurance purchase decisions suggests that lower premiums alone will not increase takeup rates substantially.**
- **Keeping NFIP premiums at reasonable levels can be part of any strategy to maintain compliance with mandatory purchase requirements and increase voluntary takeup rates. A multipart strategy to motivating purchase of NFIP policies can be designed using insights from the behavioral sciences literature.**

NATIONAL FLOOD INSURANCE PROGRAM POLICIES: LOCATIONS OF POTENTIAL AFFORDABILITY CHALLENGES

The NFIP policy database can be used to describe the locations of policies and areas of concentration. Knowing the location of all policies, pre-FIRM subsidized policies, and grandfathered policies could aid in formulating alternative strategies to provide assistance to households that find NFIP risk-based premiums to be affordable. Likewise, knowing the location of policies can provide insight into places where takeup rates are low.

- **About 60% of the approximately 5.5 million NFIP polices are in three states: Florida, Texas, and Louisiana. The rest are distributed widely throughout the nation. Any effects of BW 2012 therefore will be more concentrated in some places, but will appear throughout the nation.**
- **Available estimates of takeup rates suggest that they are low, especially outside Special Flood Hazard Areas. Meeting the long-standing**

goal of high takeup rates for flood insurance would therefore require a large increase in purchases.

- **The extent and location of premium increases that might result from elimination of grandfathering can be determined by further analysis of the policy data, but cannot be estimated now.**
- **Slightly more than 1 million NFIP policyholders—or 19% of all policyholders—are paying pre-FIRM subsidized rates and will potentially see rate increases if the provisions of BW 2012 remain in effect. Pre-FIRM subsidized policies are found throughout the nation, but there are areas of concentration.**

DECISIONS WHEN DESIGNING ASSISTANCE PROGRAMS TO ENHANCE AFFORDABILITY

Both BW 2012 and HFIAA 2014 reflect concerns that NFIP risk-based premiums may be unaffordable for some households. FEMA is directed to review that possibility and suggest policy actions that would make premiums affordable for households that are financially burdened by the cost of flood insurance. If a premium is deemed unaffordable, the household paying that premium might receive assistance. The assistance may offset part of the cost of the premium, may be for mitigation actions that would reduce the risk and in turn the premium, or may be some combination of the two.

HFIAA 2014 suggests that premiums are unaffordable if the premium exceeds 1% of the insurance coverage. Other measures of affordability can be defined by relating household income to the cost of housing or simply be based on when a household income is below a specified level. Whatever measure used, it will be only one consideration in the design of an assistance program. The form and amount of assistance provided, if any, will need to be determined.

- **There are no objective definitions of affordability. Although the concept is substantially subjective, the choice of a definition can be informed by research evidence and experience in administering means tested programs that, for example, provide housing and other assistance.**
- **There are many ways to measure the cost burden of flood insurance on property owners and renters. Policymakers have to select which measure(s) will be used in the NFIP for targeting assistance to enhance flood insurance affordability. This decision is not amenable solely to technical analysis.**
- **To design a program that provides assistance in making flood insurance more affordable to NFIP policyholders, policymakers face several choices, including who will receive assistance, what type of**

assistance will be provided, how assistance will be provided, how much assistance will be provided, who will pay for assistance, and how an assistance program will be administered.

- **The decisions that must be made in designing an affordability assistance program entail tradeoffs that will have to be resolved by policymakers.**

OPTIONS FOR DELIVERING ASSISTANCE TO ENHANCE FLOOD INSURANCE AFFORDABILITY

With passage of BW 2012, Congress asked FEMA to increase rates but at the same time to suggest ways to make premiums affordable through direct assistance programs that are based on ability to pay and means testing. Vouchers in particular were called out for attention. In addition to assistance with paying premiums, means tested assistance can support mitigation that would reduce expected claims and premiums. Proposals for policies that might reduce the burden of premium payments or that might direct mitigation assistance toward households that qualify for assistance have been presented in legislation, in congressional testimony, and in professional literature. The committee reviewed the proposals and concluded the following:

- **The NFIP can strive for risk-based premiums while addressing affordability by implementing a combination of policy measures including means tested mitigation grants, mitigation loans, vouchers, and encouragement of higher premium deductibles.**
- **Reforms to mitigation grant programs can be implemented so that means testing, as a replacement for the current benefit-cost test, is the basis for setting priorities for mitigation grant spending.**
- **A mitigation loan can make it financially attractive and feasible for low-income residents to invest in mitigation measures without having to rely on mitigation grants.**
- **Vouchers are an administratively simple way to direct payments to cost burdened policyholders for use in paying premiums or for offsetting mitigation costs.**
- **The few mitigation measures that result in lower NFIP premiums tend to be expensive, such as elevating homes. As a result of BW 2012, FEMA will consider whether lower-cost mitigation of structures will result in lower premiums. Determining the effect of lower-cost mitigation on NFIP risk-based rates will require additional analyses.**
- **If Congress authorized supplements from the Treasury to be used for making NFIP claim payments in catastrophic-loss years, this could**

allow lower NFIP risk-based premiums and, in turn, less spending for assistance.

- **Some policies that have been advanced to lower NFIP risk-based premiums for cost burdened households either will not have that effect, or may not be easily accessed by cost burdened policyholders. These include reducing administrative fees, disaster savings accounts, and income tax credits and deductions.**
- **Community measures can lower insurance premiums through mitigation actions that benefit clusters of structures and through the CRS. These might be particularly important in mitigation related to multi-family properties.**

Choosing among affordability policy options, alone or in combination, requires an evaluation of their effects not only on premiums for households for which NFIP risk-based premiums create a cost burden but on NFIP net revenues, expenditures from federal general revenues, and takeup rates. This committee's second report, to be published later in 2015, will suggest analytical protocols that FEMA might use to evaluate affordability policy options.

1

Introduction

Floods are natural phenomena in all rivers and river systems in the United States and occur with depths and durations that vary seasonally and annually. Coastal storms and their associated storm surges affect US shoreline locations, especially the eastern and gulf coasts. Riverine flooding and coastal storms are major news items nearly every year in the United States and in the last decade have included Hurricanes Katrina (2005) and Sandy (2012), large floods on the Missouri River and the Mississippi River in 2011, and flash flooding in Colorado's Front Range (2014). Flooding causes property damage and may cause relocations of large portions of communities. Coastal flooding caused by storm surges can damage property along oceans and bays. Given the numerous economic advantages and aesthetic values of habitation and development in floodplains and coastal areas in the United States, many of these areas have large populations and high-value properties. That land settlement pattern is the result of both individual choices and government programs and policies that considered pros and cons of living and working in those areas that have flood risks. Many people who live in areas subject to flood risk do so because of historical, economic, and other circumstances, such as needing or wanting to live close to work, schools, health care, and so on. Some properties in areas of flood risk are second homes. In some locations, flood risk in low-lying areas has depressed property values and resulted in occupation by lower-income households.

The US federal government has adopted policies that seek an appropriate balance between advantages of and risks associated with human occupancy of floodplain and coastal-zone locations. The policies include

the requirement that before a federally funded flood-control project can be authorized and constructed, project benefits must be shown to exceed the costs (see NRC, 1999, 2004). Beginning in earnest in the 1970s, federal policies and programs have sought to encourage state and local governments to adopt floodplain management to manage flood risk (for example, Executive Order 11988: Floodplain Management, 1977[1]). Among the policy options for balancing a location's flood risk against its benefits is the availability of federal flood insurance and encouragement of its purchase.[2] Insurance premiums can help increase property owners' understanding of flood risk. Insurance also can be seen as a replacement for disaster aid, and ideally insurance premiums based on expected flood losses would cause property owners to balance advantages of floodplain location against associated risks as measured by the cost of insurance. For those results to be realized, people would have to purchase the insurance.

The National Flood Insurance Act of 1968 created the National Flood Insurance Program (NFIP), which made flood insurance available to floodplain property owners. After initially being housed in the Department of Housing and Urban Development, the NFIP today is administered by the Federal Emergency Management Agency (FEMA). Beyond setting flood-insurance premiums, issuing policies, and paying for claims, FEMA provides technical knowledge of flood risks to local professional staff and provides risk mapping for premium setting and risk communication purposes. In addition, FEMA has pre-flood mitigation grant programs and post-flood emergency aid and mitigation programs. Many of the programs are linked directly to FEMA's administration of the NFIP. For example, pre-flood mitigation grants are targeted to insured properties that have a history of repetitive damage claims.

Beginning with passage of the Biggert–Waters Flood Insurance Reform Act of 2012 (Biggert-Waters 2012, or BW 2012), NFIP's premium-setting practices have been under intense scrutiny. Understanding the cause of concerns about the NFIP requires understanding its origins. The National Flood Insurance Act of 1968 created the NFIP, in which private insurers would offer policy coverage in partnership with the federal government. Private companies were expected to rate risk and set premiums with NFIP technical assistance and oversight. Private insurers' premiums included charges for administrative costs and profit, as would be the case for any line of insurance. Rather than have the private partners build a reserve fund to

[1]E.O. 11988 from 1977, including a summary of its description and intent, is available at https://www.fema.gov/environmental-planning-and-historic-preservation-program/executive-order-11988-floodplain-management; accessed December 8, 2014.

[2]In the early 20th century, a small number of private companies offered flood insurance in the United States. The great Mississippi River floods of 1927 and additional riverine flooding in 1928 essentially terminated the industry as insurers dropped out of the market (King, 2005).

pay claims for this new line of business, the legislation allowed the federal government to make loans, if needed, to honor claims in years when accumulated premium revenues (net of all payments to the private providers) were inadequate and then to have the loans repaid in years when revenues exceeded claims and expenses.

A concern at the time was that the private insurers' premiums be kept at "reasonable" levels. In practice, the desire to keep rates "reasonable" resulted in two NFIP design features that affected premiums. First, a fully risk-based flood premium would need to include the cost to maintain solvency for expected claims from low-probability–high-damage storms that result in widespread damage (catastrophic-loss events). Fully reflecting such a possibility in NFIP policies might result in higher premiums. The legislation stipulated that the US Treasury would be prepared to serve as the reinsurer, and would pay claims attributed to catastrophic-loss events so that private insurers did not need to include that cost in premiums. The result was that an NFIP risk-based premium for a property might not be based on the full risk associated with the property.[3]

Second, existing properties at especially high risk for flooding might require private insurers to set premiums at extremely high levels. The legislation required the NFIP to determine a reasonable premium for such properties, which would be less than an NFIP risk-based premium. Private insurers would charge the reasonable premium, and the federal Treasury would make annual equalization payments to make up the difference between the NFIP risk-based rate and the lower premium. To qualify for the subsidized premium, a property had to be in a community that was enrolled in the NFIP. A condition of enrollment was that the community would limit new development to areas above the 100-year base flood elevation (BFE), as the BFE was depicted on an NFIP flood-insurance rate map (FIRM) for that location (see the List of Terms, which is included at the end of this report and before the report appendixes, for definitions of these and other technical terms in this report). Once a community was enrolled, these subsidized premiums became available to property owners whose properties were built before the local FIRM was prepared (and referred to as pre-FIRM subsidies). The expectation was that properties receiving pre-FIRM subsidized premiums would eventually be lost to floods and storms and pre-FIRM subsidized premiums would be phased out by that attrition. At that point, the federal role in the partnership would be to provide loans and act as the reinsurer.

[3]Throughout this report, the term *NFIP risk-based premium* is used to recognize that NFIP premium-setting practices are constrained by legislative and executive-branch decisions (see List of Terms). Design features that affect premium levels are discussed in detail in Chapters 2 and 3.

Within a decade, however, the original concept of partnering with the private sector was replaced by a process whereby the NFIP took responsibility for setting rates, issuing policies, collecting premiums, and paying claims. After that transition, the federal Treasury was expected to make loans to the NFIP as needed to honor claims in high-loss years and be repaid in low-loss years. As will be discussed through this report, NFIP risk-based rate setting practice proceeded as though catastrophic losses would not be paid from premiums. Another rate setting practice that continued was to offer less than NFIP risk-based rates to properties that existed before local FIRMs were issued. Equally important, the fundamental premise that premiums be kept reasonable to encourage purchase retained its level of importance in rate-setting. The agency executing those responsibilities today is the Federal Insurance and Mitigation Administration (FIMA), which is in FEMA. Currently, the private sector's role in the NFIP is to serve as the local agent through which property owners apply for insurance and settle claims (see definition of "Write Your Own" [WYO] agent in the List of Terms).

Despite efforts to keep premiums reasonable, the NFIP has always experienced a low level of insurance-policy purchase, or voluntary takeup rate (see List of Terms). Over time, the desire to increase takeup rates has led to a number of program changes and initiatives. Flood insurance purchase was made mandatory for property owners who have a federally insured or backed mortgage on a property that is in a special flood hazard area (SFHA). Voluntary purchase still applies to properties outside an SFHA that do not have such mortgages. To motivate voluntary insurance purchase, there has been enhanced NFIP marketing of its polices, support for building floodplain-management expertise at the local level, development of the preferred-risk policy (PRP), WYO agent training, and such other reforms as imposing a waiting period to prevent coverage purchase only right before a flood event. Although some 5.5 million policies are in force today, they do not provide coverage for all properties in the nation's 100-year and 500-year floodplains. Among the roughly 5.5 million NFIP policies, in 2013 about 20% of policyholders were eligible to pay pre-FIRM subsidized premiums.

NATIONAL FLOOD INSURANCE PROGRAM REFORM LEGISLATION: BIGGERT–WATERS (2012) AND HR 3370 (2014)

The financial obligation for paying insurance claims after Katrina and other large and catastrophic-loss events in 2005—Hurricanes Dennis, Emily, Rita, and Wilma—was assigned to the NFIP. The claims greatly exceeded any available reserve, so as an accounting matter the NFIP was driven into debt. As of December 31, 2013, FEMA owed the US Treasury

$24 billion (its borrowing authority is $30.4 billion; GAO, 2014). The Government Accountability Office concluded that the NFIP "is unlikely to generate sufficient revenue to cover future catastrophic losses or repay billions of dollars borrowed from the Department of the Treasury" (GAO, 2014) and has included the NFIP on its "high fiscal risk" list since 2006. It is worth noting that the intent and design of the NFIP never envisioned burdensome levels of debt in the program.

Concerns regarding long-term NFIP fiscal soundness led to Congress's passage of the Biggert–Waters Flood Insurance Reform Act of 2012. A goal of the legislation was to transition toward an insurance program whose premiums reflected expected flood losses on all insured properties; all NFIP policies would have risk-based premiums. To that end, BW 2012 directed FEMA to review and report to Congress on reforms to set NFIP risk-based rates that would better reflect possible claims. BW 2012, Section 100236, also mandated the present National Research Council study of affordability of NFIP premiums (Box 1-1).

The legislation also required the elimination of pre-FIRM subsidized premiums and removal of "grandfathered" premiums. The grandfathering practice allowed owners of buildings that were built in compliance with previous FIRMs to maintain their original rating classification even if a new FIRM indicated a greater risk of flooding (see List of Terms). The grandfathering practice also allows structures that were not built in compliance with previous FIRMs, but nevertheless demonstrated compliance with those previous FIRMs, to maintain their demonstrated rating classification as long as continuous coverage of NFIP insurance is maintained. Meanwhile, new FIRMs were being produced for many areas across the nation. Some properties that had been mapped outside the SFHA (and often were built intentionally outside) were remapped as inside the SFHA. Owners of these properties who may not have purchased an NFIP policy may now be required to purchase one; in addition, because they would now be in the SFHA, the properties that have new polices would have higher premiums than properties outside the SFHA.

As the provisions of BW 2012 began to be implemented, there was an outcry from some parts of the nation. News accounts reported on possible premium increases that might be in the thousands of dollars per year (see, for example, New Orleans Times Picayune, 2013; New York Times, 2013). Some households that would lose pre-FIRM subsidized premiums argued that the insurance would become unaffordable. Others argued that households had followed the NFIP rules and made financial plans on the basis of expected insurance premium levels and that because they had followed NFIP rules the sharp increases in premiums would be unfair. That argument was especially important to policyholders who would lose grandfathered premiums and now were having to pay more and to policyholders that had

BOX 1-1
Statement of Task

The Federal Insurance and Mitigation Administration (FIMA) is a component of the Department of Homeland Security (DHS), Federal Emergency Management Agency (FEMA), which operates the National Flood Insurance Program (NFIP). On March 21, 2014, President Obama signed the Homeowner Flood Insurance Affordability Act (HFIAA) of 2014 into law. This law repeals and modifies certain provisions of the 2012 Biggert–Waters Flood Insurance Reform Act, and makes additional program changes to other aspects of the program not covered by that Act. One modification regards a study being conducted by the National Research Council of the National Academy of Sciences. HFIAA requires the submission of the Affordability Study by the FEMA Administrator in 18 months from enactment of the Act. FEMA has asked the NAS to provide two reports as part of the NFIP Affordability Study.

The first report, due in February 2015, will discuss the underlying definitions and methods for an affordability framework and describe the affordability concept and applications, and program policy options.

The second report, due in September 2015, will propose alternative approaches for a national evaluation of affordability program policy options, based in part on lessons gleaned from a proof-of-concept pilot study to be guided by the NRC committee.

An ad hoc committee under the auspices of the National Research Council will prepare both reports according to the following statements of task:

First Report

The first report will discuss the underlying definitions for an affordability framework and describe the affordability concept and applications and program policy options.

The first report shall discuss

deliberately built outside the SFHA and now had an unexpected new insurance purchase requirement. In addition, communities where those effects might occur argued that higher premiums might depress real estate values, business profitability, and neighborhood viability. Furthermore, Congress had heard concerns that higher insurance premiums might discourage voluntary purchases and thereby reduce flood insurance takeup rates.

As a result of the vigorously stated concerns about affordability, Congress passed the Homeowner Flood Insurance Affordability Act of 2014

- methods for establishing an affordability framework, including means-tested vouchers, for the National Flood Insurance Program;
- appropriate and necessary assumptions and definitions, including "affordability" and "full risk-based premiums."

This report shall be delivered by February 28, 2015.

Second Report

The second report will propose alternative approaches for a national evaluation of affordability program policy options. The second report will include lessons for the design of a national study from a proof-of-concept pilot study.

The second report shall discuss

- data issues such as needs, availability, quantity, and quality;
- appropriate analytical methods and related considerations, including models, computing software, and geographic areas to be analyzed;
- a proof-of-concept pilot analysis will be subcontracted as part of the study. This analysis will apply different methods for conducting a flood insurance affordability analysis for a state (North Carolina) in which data on elevations of structures and hydrologic flood hazards are readily available. This analysis will inform the committee's deliberations and findings regarding the possibilities for a national-level flood insurance affordability study, for which these data on elevations and flood hazards are less readily available;
- national implications from the proof-of-concept pilot results including, but not limited to, possible impacts on participation rates (the analytical work for the proof-of-concept pilot may be carried out by the NRC directly or using subcontractors as necessary).

This report shall be delivered by September 20, 2015.

(HFIAA 2014). One result of HFIAA 2014 was that grandfathering practices that had been phased out under BW 2012 were reinstated. A second result was that pre-FIRM subsidized premiums would not be lost when a property was sold, as was the case with BW 2012. However, HFIAA 2014 introduced a requirement that owners of primary residences, whether the property was sold or not, face rate increases each year of no less than 5%, and as much as 18%, until the NFIP risk-based premium was reached. HFIAA 2014 left unchanged the BW 2012 requirement that pre-FIRM

BOX 1-2
Considerations in Setting
National Flood Insurance Program Premiums:
Affordability, Reasonableness, and Fairness

The present report uses numerous technical terms, many from the NFIP itself and some from the insurance, actuarial sciences, and other fields. Some of the terms may be unfamiliar to readers or may have been used inconsistently in writing and testimony about the NFIP through the years. Key terms are defined in each chapter of this report. The report also includes a "List of Terms" that are specific to the NFIP. To the extent possible, those terms were taken from FEMA Web sites and reports. Terms that were not defined by FEMA are defined in this report to ensure consistency.

A term that warrants particular discussion is *affordability*. This term was used in BW 2012 (Section 100236) that mandated this report. It also is used in HFIAA 2014 (Section 9) to refer to "targeted assistance to flood insurance policy holders based on their financial ability to continue to participate in the National Flood Insurance Program." Although there is no explicit definition of affordability, use of the phrases *means-testing* and *financial ability* suggests that Congress expected affordability to be defined in relation to an NFIP policy holder's income or wealth. That is consistent with the understanding of the term in the present report.

At the same time, HFIAA 2014 asks the NFIP to "strive for" premiums that are no more than 1% of the policy coverage, a number that is unrelated to either the income or wealth position of the policy holder. It is not clear whether the suggested 1% cap was offered as a definition of premium affordability or had some other basis (for example, to define when premium levels were "reasonable" or "fair"). (The term *reasonable* had been used to describe the desired level of NFIP premiums during hearings for the original legislation that led to the creation of the NFIP in 1968).

Congress strove to set NFIP premiums that were reasonable for two reasons. First, at the NFIP program's inception, all purchase was voluntary. A reasonable premium therefore would not be so high that households would be unwilling to purchase a policy. Second, NFIP risk-based premiums could be extremely high for properties in areas mapped as floodplains but built before the flood risk was identified; some households in this situation would not be able to pay a high NFIP risk-based premium. A reasonable premium for properties built before an area had been mapped was therefore calculated by using lower than NFIP risk-based rates.

Although a premium might be affordable if a household's income were considered, fairness could be a consideration in defining a reasonable premium. A reduced premium would be considered fair because property owners would not be penalized with high premiums if they chose property locations that were consistent with the applicable rules before the NFIP was created. This fairness argument was another reason that lower than NFIP risk-based rates were offered when the program began and is used to justify the practice of grandfathering.

subsidies be phased out through 25% annual increases for nonprimary residences, for properties that made frequent NFIP claims, and others. HFIAA 2014 also added premium surcharges on all polices to help to offset revenue lost to the program from pre-FIRM subsidies that would remain in place until all property owners were paying NFIP risk-based premiums. The HFIAA 2014 legislation expected that all pre-FIRM properties would eventually pay NFIP risk-based premiums; so in the long run, the difference between HFIAA 2014 and BW 2012 would be that grandfathering would be continued. HFIAA 2014 retained the BW 2012 direction that FEMA review its NFIP risk-based premium-setting procedures.

HFIAA 2014, as indicated in its title, reflected concerns about the affordability of flood insurance. Affordability had also been recognized in BW 2012 as a possible concern (Box 1-2 elaborates on the term *affordability* and other related terms central to the present report). Both BW 2012 and HFIAA 2014 contained numerous provisions for assessments and studies, including studies regarding flood-insurance affordability. Both acts mandated studies by the National Academy of Sciences (NAS) and called for related studies by FEMA. BW 2012 called for an "economic analysis" to be conducted by NAS that would, among other things, "compare the costs of a program of risk-based rates and means-tested assistance to the current system of subsidized flood insurance rates and federally funded disaster relief for people without coverage" (PL 112-141; 126 Stat. 957). Appendix A contains Section 100236 of BW 2012, which mandated the NAS study. The charge to NAS was amended in HFIAA 2014, which changed the schedule and resources available for conducting the NAS study; amendments were presented in HFIAA 2014 Section 16 and are listed in the present report in Appendix B). Appendix C contains BW 2012, Section 100236, as amended by HFIAA 2014 Section 16. HFIAA 2014 also called for FEMA to prepare a "draft affordability framework" (Section 9):

> SEC. 9. DRAFT AFFORDABILITY FRAMEWORK.
> (a) IN GENERAL.—The Administrator shall prepare a draft affordability framework that proposes to address, via programmatic and regulatory changes, the issues of affordability of flood insurance sold under the National Flood Insurance Program, including issues identified in the affordability study required under section 100236 of the Biggert–Waters Flood Insurance Reform Act of 2012 (Public Law 112–141; 126 Stat. 957).
> (b) CRITERIA.—In carrying out the requirements under subsection (a), the Administrator shall consider the following criteria:
> (1) Accurate communication to consumers of the flood risk associated with their properties.

(2) Targeted assistance to flood insurance policy holders based on their financial ability to continue to participate in the National Flood Insurance Program.
(3) Individual or community actions to mitigate the risk of flood or lower the cost of flood insurance.
(4) The impact of increases in risk premium rates on participation in the National Flood Insurance Program.
(5) The impact flood insurance rate map updates have on the affordability of flood insurance.

NATIONAL RESEARCH COUNCIL REPORTS

A key consideration throughout the history of the NFIP has been to offer policy alternatives that would be affordable to floodplain and coastal residents. In response to BW 2012 and HFIAA 2014 legislation for NFIP reform, and in response to a request from FEMA, the National Research Council[4] formed a volunteer expert committee in 2013 to address a task statement (Box 1-1) and to issue two reports in 2015.

Like most National Research Council committees, this committee was guided by its statement of task (Box 1-1). When reading this report, it is important to recognize that the language from Section 100236 of BW 2012 as amended in HFIAA 2014 (see Appendixes A, B, and C) differs from the language in the committee's statement of task. The language in the statement of task was discussed and agreed on by FEMA and the National Research Council with consideration of the resources available to the NRC and the needs of FEMA.

This document is the first of two reports from this committee. In keeping with the statement of task, this report offers and discusses alternative definitions of affordability, provides a framework for policymakers to use in designing assistance programs to make flood insurance more affordable, identifies options that in principle may make flood insurance more affordable, and describes possible benefits, drawbacks, and implications of the policy options for addressing affordability concerns. The report does not attempt to design programs or actions to promote flood insurance affordability, nor does it describe how risks associated with floods might be reduced through insurance or other actions. The report does not address how levees affect floodplain development and NFIP insurance rates; this topic was covered in detail in NRC (2013), which was prepared for FEMA. The present report naturally refers often to floodplains and floodplain ar-

[4]The National Research Council is the working arm of the National Academies. The National Academies is the collective entity that includes the National Academy of Sciences, the National Academy of Engineering, the Institute of Medicine, and the National Research Council. For more information see http://nationalacademies.org.

eas; unless otherwise specified, *floodplain* refers to an area inundated by a 100-year (1% annual) flood (see also Appendix E for further discussion of NFIP floodplain designations).

The committee's second report will include alternative analytic procedures for FEMA to consider when it designs a national-level flood-insurance affordability analysis. It will discuss metrics for evaluating affordability policy alternatives described in the present report and possible computational procedures for estimating the effects of policy actions on each of the metrics. The second report will inform FEMA on costs of data collection and implementation of analytic protocols, including a sampling strategy for FEMA to use in implementing a national study. Implications for data and analytic needs for a national study of flood-insurance affordability will be inferred via a case study (or "proof-of-concept" exercise) in applying different analytic processes to available data that have been compiled by the North Carolina Department of Public Safety and that constitutes one of the nation's extensive datasets of locations of structures in floodplains and coastal areas.

During the writing of this first report, the committee held four meetings that were devoted generally to topics under the rubric of "affordability." Meetings were held in January, March, July, and November 2014, all in Washington, DC. In the course of its work, the committee spoke with numerous guest speakers who provided invaluable information for the committee's deliberations about the content of its report. Appendix D lists all those who spoke with the committee during open public sessions of its meetings.

This report contains eight chapters. Chapter 2 provides an overview of the NFIP history and its legacy leading up to BW 2012, focusing on NFIP pricing practices before BW 2012. Chapter 3 explains the process for setting NFIP risk-based premiums and the constraints that the NFIP had to adhere to in setting them. With that understanding, distinctions among NFIP risk-based, pre-FIRM subsidized, grandfathered premiums, and Community Rating System discounted premiums can be explained, as can the reforms called for by BW 2012 and HFIAA 2014. Chapter 4 discusses the demand for insurance and the factors other than price that determine the willingness of floodplain-property owners to buy an NFIP policy. Chapter 5 uses NFIP policy data to locate the areas of the nation where there are concentrations of pre-FIRM policies that would increase to NFIP risk-based premium levels as a result of recent policy reforms. Chapter 6 first describes three alternative concepts of affordability that can be used to define when NFIP full-risk premiums might create a cost burden for homeowners and renters. Chapter 6 also describes potential eligibility criteria and other decisions that need to be made in designing an assistance program, such as the amount of assistance to be provided to eligible households. Chapter 7 describes

policy options that have been suggested by others or that the committee has developed that might make flood insurance more affordable. Some of the options are proposed as ways to lower premiums through mitigation actions that lower risk; others would directly reduce the amount paid for insurance by either cost-burdened groups of property owners and renters or all policy holders. Inasmuch as this is the first of two reports, Chapter 8 describes briefly the objectives of the second report and its relationship to the findings of the present report.

The audience for this report includes FEMA; other relevant federal agencies, such as the Department of Housing and Urban Development; Congress and congressional staff; governors of states that have flood-prone communities; mayors and citizens of flood-prone communities, especially NFIP policy holders; university faculty and other experts in the fields of natural hazards and flood insurance; local and state officials who have NFIP implementation responsibilities; and private sector experts, including insurance companies, mapping companies, and other firms that advise on flood insurance and floodplain management issues.

2

National Flood Insurance Program History and Objectives

This chapter begins with discussion of the history leading up to the 1968 legislation that created the National Flood Insurance Program (NFIP). It is important to recognize that the original concept for the NFIP was a risk-sharing partnership with the private sector. With this history as background, this chapter discusses the enabling NFIP legislation and specific financial roles for the NFIP in the partnership. The changing nature of that partnership helps explain the motivation for provisions in BW 2012 and Homeowners Flood Insurance Affordability Act of 2014 (HFIAA, 2014).

INITIAL PROPOSALS FOR A NATIONAL PROGRAM OF FLOOD INSURANCE

Flood insurance was offered by private insurers between 1895 and 1927, but losses incurred from the 1927 Mississippi River floods and additional flood losses in 1928 led insurers to stop offering flood policies (Brown and Halek, 2010). In the absence of private insurance, post-flood financial aid took the form of flood disaster relief. Over time, the federal government was increasingly asked to provide aid to flood victims as a humanitarian action (Moss, 1999). It was in that context that President Truman proposed a national program of flood insurance. Initially, when requesting aid to victims of Midwest floods in 1951, Truman also asked Congress to "establish a national system of flood disaster insurance" (Truman, 1951a). Truman conceived of a flood insurance program "based upon private insurance with reinsurance by the Government," and if such insurance were available,

"there should be no need in the future for a program of partial indemnities" (Truman, 1951a). Truman submitted draft legislation to Congress in 1952 that envisioned a central role for the private sector, noting that the program "should not compete with private insurance companies" and furthermore, the proposed legislation prohibited federal flood insurance where it was available privately at "reasonable rates" (Truman, 1952). Congress could create a reinsurance fund to ". . . make it possible for private companies to write flood insurance at reasonable rates" (Truman, 1951b) and he noted that rates could be lowered by a "nationwide pooling system" (Truman, 1951b). The proposed bill also put a cap on coverage and hence premiums, imposed a 10 percent deductible, and authorized federal agencies that guaranteed mortgage loans to require the purchase of flood insurance. Thus, as originally conceived, a federal program for flood insurance was designed to replace disaster aid and make private sector insurance more affordable by capping rates, pooling risks geographically, and offering reinsurance to private companies. However, no legislation was passed.

After the 1955 hurricane season, President Eisenhower proposed the creation of an "indemnity and reinsurance program, under which the financial burden resulting from flood damage would be carried jointly by the individuals protected, the States, and the Federal Government" (American Institutes for Research, 2005). That wording suggests that Eisenhower was especially interested in homeowners sharing future disaster aid costs with the government. Congress responded by passing the Federal Flood Insurance Act of 1956, which created the Federal Flood Indemnity Administration and established a flood insurance program, a reinsurance program, and a loan contract program. In 1957, specific implementation proposals were put before Congress, but Congress found them impractical and did not appropriate any funds. The Federal Flood Indemnity Administration was terminated on July 1, 1957.

Following Hurricane Betsy in 1965, Congress passed the Southeast Hurricane Disaster Relief Act. President Johnson pointed out that it was the "sixth law passed in 18 months for the specific purpose of broadening Federal aids for the victims of the unusually severe succession of disasters experienced since the spring of 1964" (Knowles and Kunreuther, 2014). In addition to relief, Congress called for "immediate initiation of a study . . . of alternative permanent programs which could be established to help provide financial assistance in the future to those suffering property losses in floods and other natural disasters, including but not limited to disaster insurance or reinsurance" (Knowles and Kunreuther, 2014).

In August 1966, President Johnson transmitted a task force report to Congress that was to set the stage for broad reforms to the federal role in flood risk management. The task force's report, *A Unified National Program for Managing Flood Losses,* described multiple strategies for

managing flood risks. One section addressed ". . . steps toward a national program for flood insurance" and concluded that flood insurance was "feasible" and could "promote the public interest" and could be used both to help victims bear the risk of floods, and discourage "unwise occupancy of flood-prone areas." Other subjects of reform included improving knowledge about flood hazards, coordination and planning for new development in floodplains, technical services to floodplain managers, and adjustment of flood control policy based on "sound criteria" (Task Force on Federal Flood Control Policy, 1966).

The report argued that the choice to locate in a floodplain might be an individual choice, and that those who chose to locate in floodplains should understand the risk and bear the full costs of their decision.[1] That sentiment was endorsed and elaborated upon in a report from the Secretary of Housing and Urban Development (HUD) issued in the same year. That report stated the following:

> If the new occupant of such areas bears the full cost of flood insurance premiums, then he has to balance up the advantages and the costs of such occupancy. In some circumstances, it may be economic to occupy an area with relatively high hazard of flood damage, because the advantages more than offset the unavoidable costs. This may often be true for summer homes along the coast. . . . In many situations, however, the full costs of occupying high-hazard areas are simply greater than the probable advantages. Under those circumstances, flood insurance premiums which place the full costs on those benefiting from the location can operate to keep unwarranted occupancy to a minimum (U.S. Department of Housing and Urban Development, 1966).

In accordance with earlier proposals, that report argued that flood insurance should be offered in partnership with the private sector. Congressional testimony by HUD, and ultimately the original NFIP legislation, was based on the findings of that report and its appendixes.

[1]The 1966 report described this "occupancy charge" as an ideal policy instrument, but for practical reasons recommended a program of flood insurance. It further stated that "The full costs of flood plain occupance would be shifted to the prospective occupants themselves through the imposition of mandatory, risk-related, annual occupancy charges. The charge would be equivalent to the occupant's estimated annual damages plus any costs his occupancy causes others. These payments would be made to an indemnification fund which would be used to compensate those suffering flood damages."

THE NATIONAL FLOOD INSURANCE PROGRAM: A BRIEF HISTORY

The National Flood Insurance Act of 1968 (Public Law 90-448) created the National Flood Insurance Program, which was to be administered by HUD. Although modified many times, the act remains the legislative foundation of the NFIP. In creating the NFIP, Congress identified two primary objectives: to encourage state and local governments to use land-use adjustments to constrict development of land exposed to flood hazards and guide future development away from such locations, and provide flood insurance through a cooperative public–private program with equitable sharing of costs between the public and private sectors (42 US Code, Section 401 Congressional Findings and Statement of Purpose). With respect to insurance, the law provided that local communities limit new development in some areas of the floodplain, which later were known as Special Flood Hazard Areas (SFHAs; see Appendix E). Once a community agreed to such limits, its citizens would be able to purchase flood insurance policies offered by private insurers in a partnership with the federal government. The mechanism for the partnership was the flood insurance risk pool. The Senate Committee on Banking and Currency described the pool as follows (U.S. Senate Committee on Banking and Currency, 1967):

> *Insurance industry pool*
>
> The insurance pool authorized by this bill will be an association of private insurance carriers formed to make flood insurance available. It will be open to all qualified companies licensed to write property insurance under the laws of the separate States who meet minimum requirements prescribed under the bill. Relations between the Government and the insurance pool will be governed by an agreement which will set forth in detail the conditions of operation.
>
> Participation in the pool by private companies can take the form of risk capital participation. Some companies can elect to operate as fiscal agents for risk-taking members of the pool. The significance of this arrangement is that small companies with limited capital resources will not be prevented from participating.
>
> *Operation of the pool*
>
> Participating member companies of the pool, either as risk bearers or as fiscal agents, will sell and service policies in much the same way as they now sell insurance against fire and other perils. Their relationship with the pool will be governed by an agreement, the conditions of which will be subject to approval by the Secretary of Housing and Urban Development. As fiscal agents they will be paid fees for selling and servicing of policies. As risk bearers, they will share in the aggregate profits or losses of the pool's operation for a particular accounting period. Risk-bearing member

> companies will be jointly liable for the payment of claims by insolvent members. The Government-pool relationship will be governed by an agreement setting forth financial and other arrangements.

The agreement governing the pool partnership would make private risk-bearing possible, but would at the same time be designed to keep premiums reasonable.[2] In practice, the desire to keep rates "reasonable" resulted in two NFIP design features. First, the legislation gave the NFIP authority to borrow from the US federal Treasury, which allowed it to make loans to the pool so it would be able to honor claims for noncatastrophic events. Such loans would be repaid in years when premium revenues exceed claims. That was especially important in the early years of the program before a reserve had been built up. More importantly, as a financial matter, the legislation designated the federal Treasury as the reinsurer and allowed it to bear the cost of catastrophic-loss events; these are low-probability—high-damage storms that result in widespread damage and total claims that greatly exceed the reserves (in the case of the NFIP the borrowing authority) available to pay claims. Because the Treasury was to be the reinsurer once claims in a given year exceed a specified level, an NFIP risk-based premium would not need to include expected claims from catastrophic-loss events, thus keeping NFIP risk-based premiums at reasonable levels.[3]

Second, premiums would be based on less than NFIP risk-based rates for some properties. At the time of the legislation, structures had been constructed in the nation's floodplains with little understanding of or regard for flood risk, in part because flood risks had not been adequately delineated by public agencies and in part because many local governments had not enacted zoning or other regulations to take flooding into consideration when providing permits for new construction. NFIP risk-based premiums for those existing structures would have been extremely high. The legislation deemed such premiums to be unreasonable and created two rating systems for setting premiums. Owners of buildings constructed in the floodplain after flood insurance rate maps (FIRMs) were issued would pay NFIP risk-based rates to the private member of the pool that offered policies. A second rate structure would be used for pre-existing development so that the owners of existing structures would pay less than NFIP risk-based rates. The expectation was that these properties eventually would be lost to floods and storms, and that the need for premiums lower than NFIP risk-based rates would phase out by that attrition.

[2]See Chapter 1, Box 1-2, for elaboration of the term "reasonable" in the NFIP policy premium context.

[3]The financial rules governing the pool could result is some premium receipts being paid for reinsurance, but as a practical matter reinsurance was being offered at no charge to the pool.

The same 1967 report from the Senate Committee on Banking and Currency explained the pool's financial arrangement:

> *Financial arrangements with Government*
>
> Testimony of witnesses at the hearings developed the fact that, for a number of months, discussions had been going on between the Department of Housing and Urban Development and industry as to the financial arrangements which could be made for operating the proposed joint flood insurance program. An understanding has been reached on the broad features of expenses, losses, and profits.
>
> Among the broad features of the financial arrangements which have been discussed, one key feature is that the Government and the industry will both share in expenses and losses of the insurance operation. The basis for this sharing will be the same as the sharing in the risk.
>
> The sharing in risk will be measured by the relationship between chargeable premiums—that is the premiums which policyholders pay—and the estimated risk premiums—that is, the premium needed to cover the actuarial risk plus operating costs and allowance. The Government will assume that proportion of the risk represented by the difference between these policyholder-paid premiums collected and the estimated (actuarial) premium amounts for all policies written and in force under the program.

In practice, at the end of each year the federal Treasury would make a subsidy payment to the pool equal to the difference between the revenue that would have been earned from sale of NFIP risk-based premiums and the premium charged for existing properties. Once properties eligible for pre-FIRM rates were no longer part of the portfolio, the only payments from the Treasury to the pool would be for loans, or in the event of a catastrophic loss. Taken together, those two provisions provided the underlying financial structure for ensuring that premium revenues would equal claims paid plus expenses over time. The 1967 report of the Senate Committee on Banking and Currency stated:

> As the program develops, it can be expected that the industry's risk and share of losses will become greater. This is because existing properties will be substantially improved or replaced by new properties, and therefore, more and more of the chargeable premiums will become full cost premiums. At some time in the future, therefore it is possible for the chargeable premiums to equal the estimated premiums. At that time, the Government will have no liability for expenses or losses, except with respect to reinsurance that may be needed against catastrophic losses. This feature of the proposed arrangement seems to the committee to be desirable from the standpoint of the Federal Government, the private insurance industry, and the public as a whole.

Within a decade, however, the original concept of partnering with the private sector was replaced by the NFIP taking full responsibility for rate setting and risk bearing. In 1979, President Carter signed an order creating the Federal Emergency Management Agency (FEMA). The Federal Insurance Administration (FIA) and the NFIP were moved from HUD and placed under the aegis of FEMA. FEMA almost immediately took action to provide technical floodplain management assistance in communities that had no state or local offices equipped for such work.

FEMA moved to implement the NFIP without a private risk-sharing partner. Instead, it engaged private "write your own" (WYO) companies to act as NFIP policy servicing agents. The WYO program allowed insurance companies to sell and manage flood insurance policies in their own names, which encouraged sales. The companies also would process claims but would not bear any risk or set rates. Even though the risk pool and private partnerships were no longer in effect, communities still had to take the floodplain management actions required to enroll in the program before property owners could purchase insurance.

Eligibility in the program required a community's flood exposure and probabilities to be assessed by the U.S. Army Corps of Engineers in order to create FIRMs and flood hazard boundaries, with FEMA calculating the insurance rates. Significantly, the imperative to keep premiums low for existing properties carried over to the NFIP in its new role. With the pool no longer in place, however, the Treasury had no obligation to transfer funds each year to the NFIP (instead of to the pool) to make up for revenues foregone by offering some properties less than NFIP risk-based rates. Revenues from the former fund transfer were replaced by a process of implicitly adding a charge to premiums on all policies (see Chapter 3 for discussion of the historical average loss year). Equally important, the fundamental premise that premiums should be kept reasonable to encourage purchase retained its level of importance in the federally administered NFIP.

Another provision that carried forward was that a loan from the Treasury was taken to pay claims in high-loss years and was paid back in low-loss years. Hurricane Katrina and other storms in 2005 resulted in unprecedented NFIP payments to settle claims. In fact, the NFIP paid out more claims from 2005 than it had paid over the life of the program to that point (Kousky and Kunreuther, 2014), and this required substantial borrowing. Hurricane Ike in 2008 and Hurricane Sandy in 2012 further deepened the debt. Figure 2-1 shows debt peaking in 2009 and falling to less than $18 billion by the end of 2011. As of December 31, 2013, however, debt had risen again to $24 billion. The increase in debt stimulated congressional debate and led to the BW 2012 reform legislation that in part focused on the revenue adequacy of NFIP premiums.

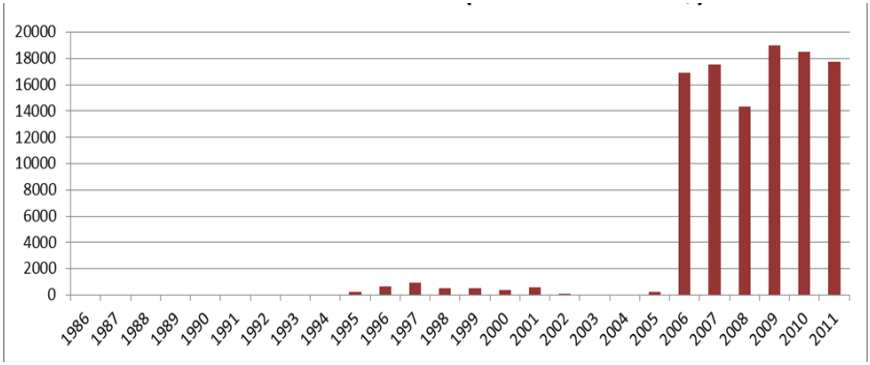

FIGURE 2-1 NFIP cumulative debt (millions nominal $).
SOURCE: King, 2013.

LEGISLATIVE CHANGES: BIGGERT-WATERS 2012 AND HOMEOWNER FLOOD INSURANCE AFFORDABILITY ACT OF 2014

Through a number of specific provisions, BW 2012 emphasized the need to have premium revenues and associated fees eventually cover payouts for claims and NFIP program expenses. To that end, FEMA was directed to change the premiums it was charging to reflect more fully the risks for all classes of policyholders. FEMA was to replace the lower rates for existing properties (which FEMA had called pre-FIRM subsidized rates) that had been offered since the beginning of the program with NFIP risk-based premiums.

The practice of grandfathering had been introduced by FEMA to allow property owners who met specific conditions to keep a lower rate in the event that an updated FIRM showed that they were at a greater flood risk than originally believed. Under BW 2012, following a change to a local FIRM, grandfathered rates were to be phased into NFIP risk-based rates over five years. Other provisions of BW 2012 directed FEMA to review and report on reserves and purchase of private reinsurance presumably with the costs to be recovered by adding to NFIP risk-based premiums.

BW 2012 acknowledged concern for whether NFIP risk-based premiums for all would make premiums unaffordable for some in Section 100236, which called on FEMA to conduct an affordability study. The FEMA study was to be concurrent with implementation of the rate-increasing reforms; thus, the reforms moved forward with no program of assistance in place for policyholders who were required to purchase a policy and might face an unaffordable premium increase.

As implementation of BW 2012 began, the premium increases became a topic of testimony and letters that argued that the proposed changes would result in premiums that were unaffordable to many, and possibly cause economic disruption in communities across the nation. In response, Congress passed HFIAA 2014, which repealed or modified many (but not all) of the rate reform changes that had been enacted in BW 2012. Notably, HFIAA 2014 reinstated the policy of grandfathering premiums. It did not change the sections of BW 2012 that directed FEMA to review aspects of its program that might affect NFIP risk-based rates. A concern expressed in HFIAA 2014 was that the higher premiums would no longer be reasonable, and they would be so high as to discourage purchase of NFIP policies. Section 9 of HFIAA 2014 expressed a concern about "The impact of increases in risk premium rates on participation in the National Flood Insurance Program."

TAKEUP RATES: A CONTINUING CONCERN

The original intent of the NFIP was to set premiums and have rules for insurance purchase that would serve the nation's broad flood risk management goals. The NFIP was expected to minimize taxpayers' costs of disaster recovery by substituting insurance payouts for aid. One NFIP objective was to encourage community floodplain management. The NFIP also sought to advance public understanding of flood risks through risk mapping and risk communication programs. NFIP risk-based insurance premiums were going to help households understand the flood risk at particular locations (or at least the cost of living in such locations), and ensure that the floodplain occupant bore the cost of locating in places that had appreciable flood risks. In order for those goals to be realized, however, the insurance needed to be purchased.

Therefore, in designing the NFIP to help attain these broad flood risk management objectives, Congress always has emphasized the need for high takeup rates, and one means to that end is to keep NFIP premiums reasonably priced. As the NFIP was being created, Congress presumed that once communities learned about the low-cost premiums for existing homes, they would adopt the regulations needed to join the program, and allow residents to purchase coverage under the NFIP. It also was presumed that homeowners and small businesses in eligible communities would enroll eagerly in the NFIP.

Hurricanes in 1969 (Camille) and 1972 (Agnes), however, revealed that only a few communities at risk of flooding had enrolled in the program. When Hurricane Agnes caused extensive damage to Pennsylvania and other East Coast states in June 1972, few parties had purchased insurance, and the NFIP paid $3 million in claims of a total of $3 billion of estimated dam-

ages (Anderson, 1974). To encourage additional NFIP policy purchases, in 1973 Congress passed the Flood Disaster Protection Act (FDPA), which required property owners who were receiving mortgages from federally backed or regulated lenders and whose properties were located in a 100-year floodplain (the SFHA) to purchase flood insurance. Further, to ensure eligibility for all forms of disaster assistance, the new law required communities to participate in the NFIP. The same act reduced the rates for existing properties for the following 7 years in the hope of encouraging participation in the program.

Nonetheless, in 1993, after large floods on the Missouri and Mississippi Rivers, it was found that less than 20% of the flooded structures had been insured (Galloway, 1995). That low takeup rate was part of the impetus for passage of the National Flood Insurance Reform Act of 1994. Provisions of that bill (and which continue today) that were expected to increase enforcement of the mandatory purchase requirement included the following: coverage now is required over the life of a loan, lenders must escrow flood insurance payments when they require escrows, lenders need to obtain flood insurance policies if borrowers do not, and failure to comply with the mandatory purchase requirement can result in the fining of lenders. In addition, to prevent last-minute purchase only when flooding is imminent, the time between purchase of flood insurance and its going into effect was increased to 30 days. The law also prohibited further flood disaster assistance for any property for which flood insurance was not maintained after having been mandated as a condition for receiving disaster assistance. The latter measure was added in recognition of the fact that loan or grant programs, to the extent that they parallel the insurance mechanism, can undermine the ability of the insurance program to operate efficiently and equitably (Hayes, 2003; Knowles and Kunreuther, 2014).

SUMMARY

Throughout its history, the NFIP has been asked to set premiums that are simultaneously "risk-based" and "reasonable." Different administrations and successive sessions of the U.S. Congress have placed varied emphases and priorities on those goals for premium setting. The tensions between these goals are noted in a comment from FEMA that reflect on the early years of the NFIP (Hayes and Neal, 2011):

> Providing certain statutory amounts of insurance at less than full-risk rates was justified as public policy for the following reasons:
>
> (1) Lower premiums for existing construction made it easier to convince communities to join the NFIP. It was very important in the early years of the NFIP to increase community participation so that sound floodplain

management was implemented and the nation's exposure to flood would thereby be slowly but significantly reduced.

(2) It was anticipated that very high premiums would cause great resistance to insurance purchase. However, with reasonable premiums, property owners purchasing insurance at less than full-risk rates would still be funding at least part of their recovery from flood damage. This was considered preferable to the previous arrangement of disaster relief that came solely from taxpayer funding.

(3) In the public policy discussions leading to the authorization of the NFIP, it was determined to be undesirable to potentially force, through high flood insurance premiums, the abandonment of otherwise economically viable buildings.

- **From the inception of the NFIP, and continuing until BW 2012, Congress sought to achieve multiple objectives for the program. The objectives have been to (1) ensure reasonable insurance premiums for all, (2) have NFIP risk-based premiums that would make people aware of and bear the cost of their floodplain location choices, (3) secure widespread community participation in the program and substantial numbers of insurance policy purchases by property owners, and (4) earn premium and fee income that, over time, covers claims paid and program expenses. These objectives, however, are not always compatible, and at times may conflict with one another.**
- **The premium-setting practices and procedures that were in place before Biggert-Waters 2012 reflected the multiple objectives of the NFIP, and in some cases reflected premium-setting practices that were put in place when the NFIP was created. BW 2012 increased the emphasis on setting NFIP rates that reflected flood risk, and on charging premiums that would cover claims paid and other related expenses.**

3

National Flood Insurance Pricing, Policies, and Premiums

When the private–public partnership within the National Flood Insurance Program (NFIP) dissolved in 1978, the NFIP took on the role of pricing policies and bearing risks. The congressional goals for the NFIP of high takeup rates and reasonable premiums, however, continued to influence the pricing of NFIP policies from that time until the passage of Biggert-Waters 2012 (BW 2012). This chapter describes pre-BW 2012 NFIP pricing policies, and in so doing provides a basis for explaining the BW 2012 reforms and the reasons for congressional interest in premium affordability.[1] Because the reforms in BW 2012 were intended to move the NFIP closer to actuarial pricing, this chapter is organized around a discussion of the principles of actuarial pricing.

NATIONAL FLOOD INSURANCE PROGRAM PRICING AND POLICY TYPES

Actuarial Pricing Principles

Insurance requires individuals to pay premiums that are greater than the expected loss (the product of probability multiplied by the amount of

[1]The Homeowner Flood Insurance Affordability Act of 2014 (HFIAA 2014) changed some provisions of Biggert-Waters 2012. The committee recognized these changes, but its task called for a focus on changes made by BW 2012. HFIAA 2014 can be considered from that perspective as a pause in implementing some of the BW 2012 reforms until the Federal Emergency Management Agency completes an affordability framework, and an affordability study.

damage). Insurance is a contract that transfers the financial burdens of a generally low-probability—high-consequence event from the buyer (the insured) to another party (the insurer) in return for stable and predictable periodic payments—the premiums. If an event that is covered by the insurance contract occurs, payment by the insurer indemnifies the insured for their loss up to a maximum amount specified in the policy (the policy limit) in a manner consistent with other contractual terms such as the deductible amount and proof of loss. Thus, insurance is a hedging instrument against the financial consequences of a loss, and the value of this hedge to the insured is realized only if there is a covered loss. Insurance does not alter the probabilities of a loss if an event occurs. Rather, insurance transfers the loss to another entity that is willing and able to accept it. Insurance protects the insured financially if losses could not be borne out of current income or borrowing, and it can speed recovery after the event.

Not all risks can be insured, and several authors have identified ideal conditions of insurability (Swiss Re, 2005; Charpentier, 2008; Kousky, 2013). The conditions include the risk's being uncertain, random, and out of the control of the insured. Individual policyholder risks ideally are independent (not correlated in space or time). In the case of flood risks, those conditions will not hold (Baranoff et al., 2009), as evidenced by the history of private insurance company efforts to offer flood insurance (Moss, 1999). Recognition of that reality was behind the private-public partnership originally envisioned for the NFIP.

The price paid for insurance will include the expected loss, the costs of writing the policy, and processing of claims. It will account for uncertainty and will provide a rate of return to the insurer. In the United States, an important public-sector role, which is executed through state regulation, is to ensure that the insurer uses proper actuarial principles in setting premiums for specific losses covered by a policy. Those principles also are used to structure the explanation of NFIP pricing. In fact, the Federal Emergency Management Agency (FEMA) publishes an annual report called the *Actuarial Rate Review* that documents NFIP pricing practices (see Box 3-1 for additional discussion of the setting of premiums in the NFIP).

The Casualty Actuarial Society (1988) defines four principles of actuarial rating (NRC, 2013).

1. A rating should reflect the expected value of future claims.
2. A rating should provide for all costs associated with the provision of the insurance (accepting the transfer of the risk).
3. A rating should provide for the costs associated with individual risk transfer (no cross-subsidization among policyholders).
4. A rating should be reasonable and not excessive, inadequate, or unfairly discriminatory.

BOX 3-1
Ratings and Premiums

The premium charged for insurance is product of the rate charged per dollar of coverage and the level of coverage chosen by the insured. For the NFIP, the private sector insurance agent who writes the NFIP policy (also known as a write your own [WYO] agent) uses an NFIP-issued flood insurance manual, issued new each year, to find the price per $100 of coverage. Based on tables provided in the manual, the agent needs to obtain information about the property from the owner (for example, the presence of a basement) and an elevation certificate prepared by a certified surveyor. With an elevation certificate, the agent can locate the property within a zone of the special flood hazard area (SFHA), or identify as outside an SFHA. Then, using the flood insurance rate map (FIRM), the agent can calculate the difference between the lowest floor and the Base Flood Elevation (BFE) on the FIRM. With that difference and other factors, the rate per $100 of coverage for the property can be established. The process includes determining which rating table applies to the property in question.

How and whether those principles apply to the NFIP is the initial focus of this chapter.

The first of the principles states that the insurance premium needs to account for the mathematical expectation of the loss of the property being insured. This expected loss often is referred to as the "pure premium." In the case of flood insurance, the pure premium would be this expected loss of the insured property. The pure premium is a forward looking estimate of the cost of this loss over the contract period of the policy. The second principle requires the premium to cover all the costs of risk transfer so that the insurance company can be financially sound. The costs that are added to the premium are for administrative and operational costs, amounts to account for possible errors in assessing (underestimating) risk, and the cost of obtaining a reasonable rate of return for investors in the company. The third principle calls for each risk to be priced for itself and for there to be no cross-subsidization among insureds to the extent possible. When necessary, risk classes may be defined and rates set for the broad group if data is not available or administrative costs would be too high to set rates for individual risks; setting rates for classes of insured is common practice. Finally, if rate making follows the first three principles, it should meet the fourth: to be reasonable and not excessive, inadequate, or unfairly discriminatory.

As is clear from those principles, determining when a premium is actuarially sound can be subject to interpretation, and rate setting must be a

compromise between the ideal and what is administratively possible. The Casualty Actuarial Society (1988) notes several practical considerations when setting actuarial rates. These include the need for having homogeneous groupings of risk, the need to consider historical costs and claims over time, the need to be prepared to pay for catastrophic losses (losses to many of the insured at the same time) via reinsurance, and a regulatory environment that may require cross-subsidies. For example, it might be mandated that automobile insurance policies cannot vary on the basis of age, sex, or race, even if these variables have been shown to be predictors of risk; in this case, rates are still considered actuarially sound, but to be within the confines of the law (Witt and Hogan, 1993).

National Flood Insurance Program Policy Types

National Flood Insurance Program Risk-based Premiums

FEMA defines a risk-based premium as one "charged to a group of policies that results in aggregate premiums sufficient to pay anticipated losses and expenses for that group."[2] That definition calls for actuarial principles that the rates reflect expected losses and other costs of risk transfer and that there not be cross-subsidies across the risk groups. To calculate NFIP rates, FEMA models expected losses for groups of structures that are similar in flood risk and key structural aspects, and then adds to the rates to account for various expenses. The same rate is applied to all the policies in a group or class.

More specifically, for Special Flood Hazard Areas (SFHAs; see Appendix E), FEMA sets rates by using a hydrologic model that includes flood events of various probabilities and relates these events to potential damages. The damage estimates for the different flood events used are checked against claim experience and can vary by factors such as type of basement and number of stories (see Box 3-2 for more detail). Outside SFHAs, rates have been based on actuarial and engineering judgments derived from the results of the rate model and historical experience; the cost of developing detailed analysis of frequency-magnitude relationships would be higher than the value of the information for rate setting that would be gained from such analysis (Garcia-Diaz, 2014; Kousky and Shabman, 2014). This is especially the case for events more rare than a 500-year return period (0.2% probability).

Premiums then are adjusted by several factors. First is a loss-adjustment factor, which covers the costs of loss adjusters and special claims investi-

[2]See https://www.fema.gov/national-flood-insurance-program/definitions. Accessed December 17, 2014.

gations. Second is a deductible offset. Third is an underinsurance factor, which accounts for the fact that many policyholders do not insure to value and therefore lower claims are likely. Finally, an expected-loss ratio adjustment adds to rates to account for agents' commissions and other expenses. The NFIP classifies the first $60,000 of building coverage for single-family homes and $25,000 of contents coverage as the "basic limit" and charges higher rates for coverage under this amount because losses are likely to be under it; rates for coverage beyond the basic limit are lower (Garcia-Diaz, 2014; Kousky and Shabman, 2014). Basic limits are higher for commercial properties.

FEMA maintains that the NFIP risk-based group is rated in accordance with actuarial principles but points out that other objectives for the program constrain the application of the principles. In its 2011 Rate Review, FEMA noted that the price of insurance should provide financial soundness to the program, be fair by allocating costs in proportion to risk, and allow economic incentives to operate and encourage availability of coverage. Those objectives depart somewhat from those noted by the Casualty Actuarial Society. The Rate Review further notes that "the system of insurance and pricing must further the purposes of the Act," which includes encouraging floodplain management, encouraging take up through affordable rates and rates that are acceptable to the public (Hayes and Neal, 2011).

On a more technical level, a 2008 Government Accountability Office (GAO) report raised concerns that some of the data used in the modeling was outdated or inaccurate. FEMA has been updating FIRMs and making other improvements, but some items, such as probability estimates of floods, had not been updated recently (Kousky and Shabman, 2014). In its response to GAO, FEMA—through the Department of Homeland Security (DHS)—agreed with some of the GAO report. It is perhaps most telling that the DHS letter stated at the outset that "while GAO raises valid concerns, DHS believes that the analysis does not grasp some of the generally accepted principles of insurance and actuarial rate setting" and referred to such matters as the need for grouping and recognizing other program objectives in setting rates (GAO, 2008). FEMA has since been engaged in such activities as improving map accuracy.

Preferred Risk Policies

For policies outside the 100-year and 500-year floodplains, FEMA has two rate classes: X zone rates and preferred risk policy (PRP) rates.[3] X zone rates follow a process similar to that for full risk-rated properties in the SFHA as discussed above. PRPs are low rates for structures that are in an

[3]Appendix E contains details of FEMA's SFHA classifications.

BOX 3-2
Estimating Flood-Damage Relationships

In the notation of FEMA, at a given location and for a given structure type the probability of flood water reaching an elevation I, $PELV_i$, is multiplied by the "loss severity" that would occur at the structure if flood waters reached this elevation (that is, damage based on water depth in a given structure). This is referred to as damage by elevation, $DELV_i$, (NRC, 2013). These products are summed over all possible water elevation levels to arrive at an expected loss:

$$\text{Expected Loss} = \left[\sum_{i=Min}^{Max} \left(PELV_i \times DELV_i \right) \right]$$

This calculation is for properties that have similar risk-related covariates (flood risk, elevation, zone, etc.), and a common rate is given to all properties in the class nationwide.

FEMA's process for determining PELV and DELV components in the above expected value calculation is as follows: For PELV at a given location, this collection of probability curves (called PELV curves) is used to describe the probability of water elevation relative to the 1% percent flood stage at that location. These PELV curves yield flood stage probabilities up to the 0.2% event (flood recurrence once in 500 years). To evaluate flood events that have water inundation higher than that specified for the 0.2% flood, the NFIP doubles the 0.2% inundation level and assumes a "catastrophic" flood occurs. Because this "catastrophic" flood has a very low probability, and because there is assumed to be a relatively small incremental increase in damages incurred between the 0.2% inundation level, and double this inundation, it is believed that this approximation will have little effect on the rate that is ultimately determined.

The damage as a function of the flood stage (DELV) is the second component in the expected-value calculation. In a given rating zone, FEMA bases the DELV on historical damage data at different flood stages in the zone, and it varies with structure content and location. When, on the number and variability of claims, the NFIP's historical damage data is sufficiently credible, the NFIP data is used

X zone (no grandfathering is allowed; see below) and have favorable loss history. Specifically, a property cannot have 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 of any amount for separate occurrences; or, one insurance claim and two federal aid payments of more than $1,000 each.

Exceptions to NFIP Risk Based Policies

Before passage of BW 2012, the NFIP had three main classes of policyholders that were offered coverage at less than their risk-based rates: pre-

to develop the damage estimate. When there is no NFIP historical damage data, damage data from the U.S. Army Corps of Engineers is used. When there is NFIP historical data available, however, or when it is not itself fully credible, the NFIP blends the NFIP damage data with the Corps of Engineers damage data by using credibility formulas to determine the DELV entry. That is consistent with standard casualty actuarial practice in private insurance.

After the expected damage value has been calculated, it must be "loaded" to obtain the rate for the NFIP to use. That is done by using this formula:

$$\text{Rate} = \left[\sum_{i=Min}^{Max} \left(PELV_i \times DELV_i \right) \right] \times \frac{\text{LADJ} \times \text{DED} \times \text{UINS}}{\text{EXLOSS}}$$

where LADJ is a load factor that reflects damage adjustment expenses, and DED is a load factor that can be thought of as adjusting the DELV to account for the deductible amount (because the damage actually paid by the NFIP reflects the deductible amount).

The factor UINS makes a further adjustment to account for the underinsurance amount since not all properties can (or do insure) for the full potential damage that might be incurred at their property in a flood, and this effects the amount that must be paid by the NFIP. The value of the UINS factor is estimated by FEMA via a review of historical insurance claims. Incurred losses constitute a nonlinear function of the actual damage severity; most damages are smaller and relatively few are much larger (that is, the damage distribution is skewed). UINS adjusts the DELV to account for this nonlinearity. In 2012 the value used for LADJ was 1.05 and the value used for DED was 0.98 (FEMA, 2013a). In the denominator of the above expression, the factor EXLOSS accounts for the expected damage ratio and a risk contingency factor that differentiates between the structure's being or not being in a velocity zone. EXLOSS adjusts the rate to accommodate commissions, acquisition costs, and other costs in such a way that the product of the rate times the expected damage ratio is sufficient to cover the expected damage when damage adjustment expenses and idiosyncratic choices by the purchaser of the deductible and underinsurance amount are accounted for.

FIRM properties; grandfathered properties; and properties in communities that participate in the community rating system (CRS) program. Each will be discussed in turn.[4]

[4]In addition, included in the 5.5 million NFIP policyholders are other small groups that receive lower rates: (1) those in a V zone with a structure built before 1981 and before maps that consider wave height were adopted in setting flood insurance rates (roughly 7,500 policyholders); (2) those structures in an AR or A99 SFHA with levees in the course of reconstruction or construction but given rates as though full protection were in place (roughly 25,000 policyholders); and (3) policyholders that participate in a Group Flood Insurance Policy (GFIP) (see Appendix E for explanation of FEMA SFHA designations).

Pre-Flood Insurance Rate Map (FIRM) Subsidized Policies

Pre-FIRM properties are those built before FEMA mapped flood risk in a community (Kousky and Shabman, 2014). The pre-FIRM subsidy rate applied only to basic limits of insurance (for buildings, the first $60,000 of coverage). It was a lower rate than risk-based for that amount of coverage and was not set according to the height of the first floor relative to the base flood elevation (BFE; see List of Terms), as is done for risk-based properties in SFHAs. As a result, no elevation certificate (see List of Terms) was required to be eligible for pre-FIRM subsidized rates. Offering rates below risk-based levels violates actuarial principles.

As was explained in Chapter 2, however, such rates were offered to properties that were built before a community joining the program. Recall that when the NFIP public-private partnership was in place, the federal Treasury made annual payments to reimburse the pool as needed. This was done to compensate the private sector for offering premiums below risk-based prices. With the pool gone, the annual cash payments from the Treasury to the program were not continued. Instead, in the 1980s the decision was made to set pre-FIRM subsidies at a level that allowed the combined revenue from pre-FIRM and NFIP full-risk premiums to cover losses for the historical average loss year (HALY), which was calculated as the mean annual loss over the life of the program (Kousky and Shabman, 2014). That had the effect of replacing the direct Treasury subsidy to pre-FIRM policyholders with a cross-subsidy from all policyholders.

The HALY was based on a program claims experience that consisted of high-loss years and low-loss years, but it did not include any catastrophic-loss years. The program borrowed from the Treasury in high-loss years, and returned the funds in years that had lower claims. As noted previously, however, Hurricane Katrina and other storms for 2005 resulted in unprecedented payments by the NFIP. In fact, the NFIP paid out more claims for 2005 than it had paid over the life of the program to that point (Hayes and Neal, 2011; Kousky and Kunreuther, 2014). The 2005 storms and claims payouts were offered by Congress as a loan to the program, and this sent the program deeply in debt to the Treasury.[5] Hurricane Ike in 2008 and Hurricane Sandy in 2012 deepened the debt further.

The debt was so large that paying it back would have led to large rate increases—a step that FEMA did not want to take without explicit support of Congress. In fact, there was congressional instruction that rates were not to increase by more than 10% in any year. Furthermore, the pre-FIRM

[5]As of December 31, 2010, the program had paid $18.5 billion in losses and loss-adjustment expenses and more than $2.4 billion in interest payments because of storm events in 2005. The program carried $17.75 billion in debt with the US Treasury and has repaid $1.8 billion since 2005.

subsidy rate was required by legislation. Thus, although it violated the actuarial principle that the rate should reflect expected future costs, it was not something that the NFIP was willing to change without consent of Congress (Hayes and Neal, 2011). As a result of that reluctance, subsequent claims paid for those high-loss years were not fully incorporated in defining the Historical Average Loss Year.

Grandfathered Policies

Grandfathered properties are ones that were either built in compliance with the local FIRMS in effect at the time of construction, or demonstrated compliance with a FIRM and maintained continuous coverage after FIRM changes are allowed to maintain a lower rate if a new FIRM reclassifies the property into a higher risk zone (Kousky and Shabman, 2014). Zone grandfathering is the most common form of rate grandfathering, and it occurs when a policyholder once was paying a lower rate because of classification as outside the SFHA, but now, because of the new map, is included in the SFHA. Here, the zone-grandfathered policies going from non-SFHA to SFHA do not pay the lower non-SFHA preferred risk policy (PRP) rate but instead pay an average rate, called the X zone standard rate for policies outside SFHAs but without the favorable loss history of the PRPs. Another way in which zone grandfathering occurs is when a new map reclassifies an insured structure from a lower-risk zone to a higher-risk zone. In this case, the grandfathered structure will pay the lower AE zone rate instead of the newer, higher VE zone rate (see Appendix E for more information on distinctions among these flood hazard zones).

Elevation grandfathering occurs when a new map increases the elevation of the mapped 1% flood, but without changing the zone itself. As an illustration, a property that was mapped previously as being 4 feet above the 1% flood elevation but is now, according to the revised map, only 1 foot above it, would still be allowed to use the rate associated with a property 4 feet above the 1% flood elevation.

Although FEMA does not have an estimate of how many properties are paying grandfathered rates, the program tries to recoup lost revenue from the lower rates by charging higher rates for other policies in the SFHA. That is an explicit cross-subsidization between grandfathered properties and all other properties in the SFHA. It is not clear, however, whether the NFIP is increasing other SFHA policy premiums by an amount equal to the discount from NFIP risk-based rates that are being paid by the grandfathered properties.

Community Rating System Discounts

The CRS program rewards policyholders with premium discounts if their communities adopt specified risk mitigation measures. Discounts begin at 5% and reach a maximum of 45% (note, however, that only one U.S. community has reached the highest discount level). These discounts apply to policies in the areas both inside and outside the SFHA, but the premiums discounts differ by area. PRP policies are not given a discount in CRS communities. CRS discounts are accounted for by adjusting all premiums upward so that aggregate revenue to the program is enough to cover expected claims that will continue to occur at properties that have a CRS discount.[6] The expected discount for the April 1, 2014 rate changes was 11.8%, which translates to a 13.4% percent load.[7] The lower rates introduce explicit cross-subsidies into the program given that the rate reductions granted to communities are not constrained to be equal to the change in claims to the program. Again, these are violations of the third actuarial principle, but this was intended to promote wise flood risk management policies and actions by local governments (another NFIP objective). As with cross-subsidies for grandfathering, it is unclear whether the increased rates for other SFHA properties are enough to offset the lower CRS discounted rates.

Administrative Costs

One actuarial principle states that a rate should provide for all the costs of risk transfer. That includes all costs of operating the program. NFIP expenses will differ from the private insurance sector, but including whatever the appropriate costs are in the rate is in line with actuarial pricing principles. Most administrative costs to write policies and process claims are captured in the fees paid to Write Your Own (WYO) companies. The NFIP has voluntarily agreed to pay state insurance taxes and these are included in rates. A $20 policy fee is charged to cover the costs of flood insurance studies, floodplain management activities, and some administrative costs of the program (Kousky and Shabman, 2014). A private company also would load rates to earn a reasonable return on investment, something that the NFIP is not required to do as a public program.

The WYO allowance, as a percentage of written premiums, is roughly

[6]There are some useful community-based actions for which FEMA allows for lower rates, even though they will not necessarily reduce claims from existing properties. For example, publishing flood risk rate maps in a local library may increase general flood risk awareness in the community, but it may not lead directly to reductions in claims by policy holders.

[7]In the insurance sector, *load* is a cost that is built into the cost of the premium. In general, it covers the insurer's operating costs, the chance that the insurer's losses for that period will be higher than anticipated, and any changes in interest earned from the insurer's investments.

15% agent commissions, 2.3% voluntary payment of state premium taxes, and 12.5-13.5% company expenses. The company-expense percentage is based on a 5-year industry average of the expense ratio for multiple property insurance lines and an additional 1% for costs of a federal program. Companies also receive compensation for processing claims, which varies with the size of the claim. WYO companies get a bonus for expanding the policy base of the NFIP (up to 2% of written premiums). In 2008, FEMA used actual expense data to modify the way it handles payments for claims processing because of very large payments to WYO companies in 2004 and 2005 (GAO, 2009; Kousky and Shabman, 2014).

BIGGERT-WATERS 2012 AND THE HOMEOWNERS FLOOD INSURANCE AFFORDABILTY ACT OF 2014

Through a number of specific provisions, BW 2012 directed FEMA to change the premiums it was charging to reflect more fully the risks for all classes of policyholders. In effect, they applied actuarial pricing principles more fully.

Remove Pre-Flood Insurance Rate Map Subsidized Rates

To be consistent with actuarial principles, FEMA was to replace pre-FIRM subsidized rates with NFIP risk-based rates. The replacement would occur more quickly for some properties than for others, but eventually all would pay NFIP risk-based rates. For some properties, effective on July 1, 2012, pre-FIRM subsidized premiums were to be increased at up to 25% per year, and this would continue until the NFIP risk-based rate was achieved. Properties affected by that increase included non-primary residences (such as second homes), severe repetitive loss (SRL) properties,[8] business properties, and homes that after BW 2012 implementation had substantial damage or improvements (of over 30% of the market value of the property). Properties that were primary residences and had pre-FIRM subsidies would be allowed to keep those subsidies until flood insurance was allowed to lapse, the property was sold, the primary residence property sustained substantial flood damage amounting to 50% or more of the property value; or the property was substantially improved.

[8]Biggert-Waters 2012 provided a definition of severe repetitive loss properties as those properties which have "incurred flood-related damage (i) for which 4 or more separate claims payments have been made under flood insurance coverage under this title, with the amount of each claim exceeding $5,000, and with the cumulative amount of such claims payments exceeding $20,000; or (ii) for which at least 2 separate claims payments have been made under such coverage, with the cumulative amount of such claims exceeding the value of the insured structure."

To implement these changes, beginning with policy renewals in October 2013, elevation certificates were required for all pre-FIRM policies whose subsidies were removed to allow the application of the NFIP risk-based rating tables. Because the rating table used for calculating pre-FIRM subsidized premiums did not rely on elevation data and because elevation certificates result in landowner expenses, there was little incentive for landowners to have such a certificate. The result was that in the absence of elevation data, it was not possible for FEMA to make an accurate estimate of premium increases for individual policyholders or for the effect on total revenue to the program if NFIP risk-based rates replaced pre-FIRM subsidized rates. One approximation of the effect on total revenues developed by FEMA concluded that increasing the premium for subsidized policyholders while leaving the remaining policyholders unchanged would cause the aggregate premium for the entire NFIP to increase. That assessment, however, is based on data from a limited study that today is over fifteen years old. Recent efforts to make such estimates have been hampered by this lack of data (GAO, 2014).

Cease Grandfathering

To be consistent with actuarial principles, BW 2012 called for the replacing of grandfathered rates with NFIP risk-based rates. The effect of that provision on total program revenues or on individual policies cannot now be estimated. In any year, calculating the effect on any individual premium would require knowing the zone that the policy is currently rated for, the zone it was in before the map change, and any changes in base flood elevation between the two maps. The change in premium could then be calculated for the given coverage. In some cases, the premium might increase. In other cases, households might realize a premium cost saving if they bought a policy based on the new map if the newer map classified them in a lower risk zone. As a result, the effect of eliminating grandfathering on total premium revenues would be difficult to estimate, especially when it is recognized that if grandfathering were eliminated, the current NFIP practice of adding a charge to all other policies to cross-subsidize grandfathering would cease and that revenue source would be lost.

National Flood Insurance Program Risk-Based Rates

To be consistent with actuarial principles, sections of BW 2012 directed FEMA to review the basis on which it was setting NFIP risk-based rates, with specific attention to ensuring that catastrophic-loss years would be fully incorporated into the NFIP calculation of the HALY. The HALY concept, however, was developed to accommodate the premium revenue loss

caused by offering pre-FIRM subsidized rates. With that rate class no longer available under BW 2012, the HALY concept would not be used by FEMA for setting premiums each year. Nonetheless, the BW 2012 language reflects a concern that NFIP income from premiums would fall short of claims paid and expenses over time. The act therefore requested a report to Congress on the feasibility of purchasing private-sector reinsurance and on the effect of such purchase on premiums and the financial condition of the NFIP. Further reflecting a concern about the ability to pay claims, the act directs the NFIP to build a reserve fund equal to 1% of the sum of potential exposure of all outstanding policies. Finally, with respect to the financial condition of the NFIP, BW 2012 requested a report on what would be required to repay the debt within 10 years. It is currently not possible to estimate accurately how much those provisions would increase NFIP risk-based rates (and in turn premium income), but it is possible to conclude that the combined effects of all provisions would substantially increase NFIP risk-based rates across the board.

Affordability of Premiums after Biggert-Waters 2012

Chapter 2 explained that from the beginning of the NFIP and through the passage of BW 2012, Congress and FEMA sought to maintain premiums at "reasonable" levels. The practical effect was to justify limits on what factors were considered in setting NFIP risk-based rates and to justify pre-FIRM subsidized rates, and grandfathering. BW 2012 implicitly rejected that historical attention to reasonableness when setting rates: all rates were to be changed, and as a result increased, to better reflect actuarial principles. BW 2012 acknowledged a concern about the affordability of premiums when it called for an affordability report and study in Section 100236 (Appendix A). The report would allow FEMA to propose programs of assistance for policyholders whose income or wealth was such as to make it difficult to pay increased premiums. Note that affordable premiums and reasonable premiums are defined differently. Affordability was defined in relation to each policyholder's ability to pay after consideration of his or her income and wealth.

It is worth noting that the premium increasing provisions of BW 2012 were to go into effect on passage of the bill—before any assistance program was studied, let alone put into place. As implementation of BW 2012 began, the resulting premium increases became a focus of intense political and public attention. In particular, Congress received testimony and letters arguing that the proposed rate changes for the pre-FIRM subsidized structures and grandfathered policies would result in premiums that were unaffordable for many persons who had mandatory purchase requirements, and could cause economic disruption in communities around the nation. In

response, Congress passed the Homeowner Flood Insurance Affordability Act of 2014 (HFIAA 2014).

HFIAA 2014 eliminated the triggers that would have led to the immediate and full loss of pre-FIRM subsidized rates when a property was sold or a new policy purchased. For primary residences, HFIAA 2014 replaced the premium increases that would occur at the time of sale or when a policy lapsed with an increase that would begin immediately and was to be 5-15% annually within a single risk class, but no more than 18% annually. This increase would be imposed annually until the premium reached its NFIP risk-based rate. Non-primary residence increases were not affected by HFIAA 2014; as required by BW 2012, annual premium increases of up to 25% would take place until premiums reached their full-risk rate. If a property was sold, the increase took place at the time of sale. The result was still that pre-FIRM subsidized premiums eventually will be gone, as was the case with BW 2012.

HFIAA 2014 reinstated the policy of grandfathering of properties. As noted earlier, some premiums will increase as maps change, and others may decrease. Because the NFIP is likely to continue cross-subsidizing, the effect on NFIP revenues will be muted. The long-term effect of grandfathering, however, will be that increasing numbers of policies violate the actuarial principle that rates should reflect risk. The NFIP is increasingly adding a cost to non-grandfathered premiums to account for the revenue lost (cross-subsidy), so it is causing those premiums to be more expensive (less affordable) and is decoupling those properties' premiums from their risk. It is not possible to say how big a problem this is or will become without a more complete analysis than is possible with the existing NFIP database.

HFIAA 2014 called for a report on an affordability framework for the NFIP that further stressed the BW 2012 request for an evaluation of programs that could provide aid to persons who were burdened by the cost of flood insurance. HFIAA 2014 was clear that any assistance should be offered in consideration of a policyholder's income or wealth; Section 9 called for "targeted assistance to flood insurance policy holders based on their financial ability to continue to participate in the National Flood Insurance Program."

SUMMARY

Restrictions that prevented the NFIP program from strictly following actuarial principles before passage of BW 2012 were aimed at achieving the NFIP goal of reasonably priced premiums. The rising NFIP debt stimulated congressional reform legislation that focused in part on whether NFIP premium setting practices were applying actuarial principles. BW 2012 acknowledged and HFIAA 2014 reemphasized a concern about whether

changes called for by BW 2012 would cause premiums to be unaffordable for many policyholders.

- **Prior to BW 2012, the NFIP goal was to offer reasonable premiums, but at the same time premiums were expected to follow actuarial principles and cover claims and expenses over the long term. As a matter of practice, the historical average loss year (HALY) became a total premium revenue target. Rates were set so that the total revenue from all policies was sufficient to replace the premium revenue loss from offering pre-FIRM subsidized polices.**
- **After BW 2012, use of HALY is to be replaced by charging all pre-FIRM properties NFIP risk-based rates. The increase in cost of insurance for policyholders as a result of phasing out pre-FIRM subsidized premiums and the resulting premium revenue increases to the program, may be significant, but can be estimated only when additional data is available.**
- **HFIAA 2014 delayed but did not reverse the BW 2012 requirement to eliminate pre-FIRM subsided rates and to consider changes to NFIP risk-based rate setting practices.**
- **HFIAA 2014 reinstated grandfathering. Revenue losses caused by offering grandfathered premiums, and by CRS discounted premiums, which continue to be offered, are expected to be offset by increasing premiums for all policies. Whether the revenue earned from these cross-subsidies compensates for the forgone premium income is uncertain. If grandfathering or CRS discounting expands, the result will be that NFIP premiums increasingly violate the actuarial principle that premiums should be related to risk.**

4

The Insurance Purchase Decision

Achieving high rates of flood insurance purchase has been a challenge for the National Flood Insurance Program (NFIP). Congress therefore requested FEMA to consider the effect of premium increases on purchase of flood insurance when proposing an affordability framework (HFIAA 2014). That possibility was also to be part of the analysis called for in BW 2012, Section 100236. This chapter discusses the decision to purchase insurance, focusing mainly on the effect of premiums on purchase decisions. The chapter contrasts a standard model of choice found in the economics literature with behavioral models of choice. These two choice models provide the necessary context for reviewing empirical data on factors that affect insurance purchase decisions. Insights that can be useful for FEMA's efforts to make flood insurance purchase more attractive to households are presented on the basis of this literature review.[1]

RATIONAL ACTOR MODEL OF CHOICE

The rational actor choice model (well known in the economics literature) posits that insurance buyers estimate the probability of events, such as flooding, and their adverse consequences. With an assessment of possible adverse consequences in mind, the individual considers whether to pay a particular premium each year to avoid the adverse consequences if the event occurs. As part of this thought process, the individual will consider

[1]Household reluctance to purchase flood insurance is not surprising, given the reluctance to purchase other lines of insurance (Kunreuther et al., 2013).

different deductibles and coverage limits. There are important exceptions to this simple model; one is risk aversion. People who are averse to risk might be willing to purchase insurance at a premium that exceeds the annual expected loss. To illustrate, suppose a risk-averse consumer is willing to pay an annual premium of $12 to insure against a loss of $100 that has a 1 in 10 chance of occurring in any year. The expected loss in this scenario is $10. The additional $2—the risk premium—reflects the amount above the expected loss that the individual is willing to pay for insurance.

Risk aversion still requires the rational actor to understand insurance. It is necessary for individuals to take time and effort to evaluate options and related financial considerations. This "deliberative thinking" is assumed by the rational actor model (see Kahneman, 2011; Kunreuther and Pauly, in press). Deliberative thinking involves systematic and effortful behavior that often requires complex computations and the use of formal logic.

The rational actor model is most often used to formulate and test hypotheses about the role of prices in decision making. In the flood insurance purchase decision, the price would be the premium paid. The hypotheses are that higher premiums will affect the amount of coverage purchased or the decision to purchase at all. Another hypothesized influence on purchase would be the price of a substitute; in this case, one substitute for having an insurance claim paid is receiving disaster aid. Although the price of insurance is the premium paid for a selected level of coverage, the price of disaster aid is zero. The expected amount of disaster aid, however, depends on an individual's perception of the generosity and timeliness of aid. Even if the price of aid is zero, low expectations of aid may make it an imperfect substitute for insurance. If an individual expects aid to be generous, however, it may discourage purchase of insurance.

Effects of Premiums on Purchase of Flood Insurance

Despite conceptual difficulties,[2] many investigators have attempted to estimate how a change in the price of insurance coverage (the premium)

[2]Specifying a price variable can be a particularly difficult process. The most easily obtained data are for the average premium per household. Because of the rating structure, however, the average premium is much larger than the marginal premium for most households, and not in a predictable way. Furthermore, a particular household is assigned a premium on the basis of various structural features, the rating zone, first-floor elevation relative to base flood elevation (BFE), and the chosen deductible amount. That means that any price variable is probably colinear with other variables in the demand function, and this biases any measure of a price effect. Although the marginal, rather than average, premium may seem less afflicted with statistical biases, it is more difficult to obtain at a household level and relevant only to questions about the amount of insurance coverage purchased, rather than about whether insurance is purchased at all.

might affect the decision to purchase insurance or the amount of insurance to purchase. The metric for this effect is the price elasticity of flood insurance purchase decisions. In 1983, the U.S. General Accounting Office (GAO; now the Government Accountability Office) developed an econometric demand function for number of policies issued as a function of several variables, including average premium paid after adjustments (GAO, 1983a). Data was obtained for the years 1978—1982. The result was an estimate of elasticity of policies in force with respect to average premium of –0.38. That defines a relatively inelastic relationship, in which an increase in premium of 1.0% will result in a decrease in the number of policies equal to 0.38%.

Later, Price Waterhouse Coopers LLP (PWC), after searching the existing literature on price effects, reviewed the 1983 GAO study (PWC, 1999). It was noted that the GAO data covered premiums of $41.50-$88.00 during the 1978—1982 period (roughly $114-$241 in 2014 dollars). PWC adopted the –0.38 elasticity reported by GAO for premiums in that range but then assumed (without evidence) that the price effect would increase for larger premiums, eventually reaching an elasticity of –0.76.

A 1999 study estimated elasticity of policies in force with respect to average price at –0.32, similar to that in the 1983 GAO study (Browne and Hoyt, 2000). It also modeled total insured amount and found it to be considerably more price elastic than policies in force (–1.22). A 2000 report examined data on a sample of 11,000 properties drawn from 18 coastal counties (selected by FEMA) and estimated price elasticity by using an expected utility maximization framework (Landry and Kriesel, 2000). The model had the fraction insured properties as a dependent variable and derived estimates in two ways: using weighted least squares and using maximum likelihood. Neither approach produced a statistically significant relationship between the average premium and the probability of purchasing insurance.

A RAND Corporation study used a national sample of 5,472 single-family homes in a logistic model to estimate flood insurance purchase (Dixon, et al., 2006). On the basis of results of the model, the elasticity of the probability of purchasing insurance with respect to price was estimated to be –0.06; in this case, price is defined as the premium cost per $100, averaged over the total coverage for a property.

A 2008 study collected data on 1,692 properties in two coastal counties of North Carolina and used the data in a Tobit model to estimate flood insurance coverage elected (Landry and Jahan-Parvar, 2008). The formulation is able to recognize the fact that flood insurance coverage is a bounded variable: it cannot be less than zero or greater than $250,000. Two sets of marginal insurance premiums were estimated by using different assumptions for deductible amounts and level of coverage with respect to

replacement cost. The authors also considered the effect of premium subsidies, where they existed, and responses to a household survey designed to elicit more possible explanatory variables. Price elasticities were computed for various combinations of the data sets. On the basis of the high-premium models and the largest data set, price elasticity of insurance coverage was estimated at –0.26 for nonsubsidized properties and –2.09 for subsidized properties. Introducing the household level data from the survey reduced the nonsubsidized elasticity to –0.12. For the low-premium alternative, three model specifications were used for each set of marginal premiums. For the high-premium alternative, price elasticities ranged from –0.12 to –0.49. For the low-premium alternative, all results are somewhat more elastic, although the authors cautioned that these are upper bounds on the true effect.

A 2014 study use a Tobit model of insurance coverage purchased, including two alternative measures of marginal premium (high and low) among the explanatory variables (Howard, 2014). This analysis of insurance demand included estimates of consumer surplus. No price elasticities were reported.

Another 2014 study collected 32 years of data for 153 counties in Georgia (Atreya et al., 2014). The study is notable for several things, such as the inclusion of county-level data on race, education, and age. The dependent variable is policies in force per 1,000 of population; the price variable is average premium cost per $1,000 of coverage (in 2010 dollars). All data are county-level aggregates or averages. Two model specifications and three estimation methods were used, for a total of five sets of results. Price elasticity values ranged from –0.14 to –0.31. The most inelastic value (-0.14) reflects explicit correction for serial autocorrelation. It also was noted that flood insurance purchases increase with educational attainment, with increased proportion of black households, and with age.

Only a few conclusions can be drawn from the literature:

- Overall, the probability of insurance purchase is quite inelastic with respect to either the average cost of coverage (Dixon, et al., 2006) or the marginal cost of coverage (Landry and Jahan-Parvar, 2008). Results of various studies yielded elasticity values in the range of –0.38 (GAO, 1983b) to –0.06 (Dixon et al., 2006); results in the vicinity of -0.10 were more common.
- Subsidized policy-holders may be much more responsive to changes in marginal price than those with full risk premiums (Landry and Jahan-Parvar, 2008).
- Total coverage purchased may be considerably more elastic with respect to average premium cost than the probability of purchasing insurance (Browne and Hoyt, 2000).

- The probability of insurance purchase by households subject to the mandatory insurance provision is slightly less responsive to the average premium than the probability of purchase by households not subject to the requirement (Dixon, et al., 2006). Mandated-insurance households also purchased slightly more coverage than other policy holders (Landry and Jahan-Parvar, 2008).

Effect of Expectations for Future Disaster Aid on Demand for Flood Insurance

Some major flood events lead to presidential declarations and trigger the availability of federal disaster aid. Publicity surrounding such aid often sends a message that large amounts of money are being distributed and may create an impression that a substantial fraction of households flood losses will be compensated. A widely shared perception of generous postdisaster aid might depress the demand for flood insurance (Kousky and Shabman, 2015). The implication of generous post-disaster grants might lead many to view post-disaster aid as a substitute for flood insurance. In reality, federal disaster aid is limited to specific events, is uncertain, is modest in scale, is mostly for repair of public infrastructure or for protection against future damages, and offers little to households that are not insured (ibid.); thus, it may not fully substitute for insurance. It is still possible, however, that a widely shared perception of generous post-disaster aid depresses the demand for flood insurance (Kousky and Shabman, 2012).

An empirical demonstration of this effect may be difficult to obtain. A 2000 paper included previous disaster assistance as an explanatory variable and hypothesized that past experience with high levels of disaster aid would reduce the demand for insurance (Browne and Hoyt, 2000). The result was a small, but statistically significant, positive relationship between disaster aid and insurance purchases. The authors attributed that unexpected result to collinearity: both disaster aid and insurance purchases are thought to positively correlate to the level of risk. Another 2000 study found no evidence of demand suppression by disaster aid (Landry and Kriesel, 2000). Although examined in other contexts (e.g. Herring, 2005; Brown and Finkelstein, 2008), there are few empirical findings on disaster assistance in the United States. One examination of insurance purchases after receipt of federal disaster aid for flood events in Florida found that receipt of individual assistance had a crowding-out effect on flood insurance purchases (Kousky and Michel-Kerjan, 2014). A 2006 study found only a small relationship between insurance takeup rates and disaster aid and only for compensation with respect to damaged property (Dixon et al., 2006). The authors noted, however, that this finding could be because those who

receive assistance do not have the means to purchase insurance coverage or because much disaster assistance is for losses not covered by insurance.

None of the reviewed studies directly investigated property owners' perceptions regarding the future availability of disaster aid, so there is no basis for ruling it in or out as a factor in the demand for insurance. Several laboratory experiments and surveys have asked individuals if they consider disaster aid when making insurance decisions; these have the benefit of assessing how perceptions before a disaster can influence the purchase decision, but there is also concern that answers to surveys may not reflect real-world purchase decisions. Results vary in the literature. Usually, if individuals are told about assistance, it will lower their willingness-to-pay for insurance; but without such a prompt, they may not consider disaster aid when making insurance decisions (Kunreuther et al., 1978; van Asseldonk, Meuwissen, and Huirne, 2002; Botzen and van den Bergh 2012; Petrolia et al., 2013; Raschky et al., 2013).

The rational actor model would suggest that the possibility of disaster aid will discourage the purchase of insurance, but there is no consistent or persuasive empirical evidence of this effect. At best, the effect of perceptions of aid on the flood insurance purchase decision remains an open question.

BEHAVIORAL MODEL OF CHOICE

Behavioral models of choice argue that nonfinancial considerations and intuitive thinking can be used to understand choices. Intuitive thinking relies on mental shortcuts when foregoing, purchasing, or canceling insurance on the basis of such reactions as anxiety or regret; it uses simple decision rules (heuristics) that are influenced by personal experience with events, such as a flood and its consequences. The heuristics require less effort in making a decision than the detailed analyses implied by the deliberative rational actor decision process.

Nonfinancial Considerations

Whether to purchase insurance is a risk management decision, but it may not be based solely on financial considerations (Krantz and Kunreuther, 2007). For example, a homeowner may buy insurance to reduce anxiety about suffering a large uninsured loss (and thus to provide peace of mind) or to avoid regret when a flood occurs about not having purchased a policy. There is an extensive literature on how nonfinancial considerations influence individuals' risk management decisions (e.g., Finucane et al., 2000; Loewenstein et al., 2001). For example, some people claim that they refuse to fly not because they fear a crash, but because they anticipate and dislike feeling anxious about a crash while they are on a plane; however, people

who cannot avoid anxiety about a loss may still find opportunities to reduce this emotion by taking protective measures. That may partially explain the demand by the few who purchase flight insurance. Similarly, individuals might pay more for insurance if they fear a specific event (for example, home damage from a flood) than if they are not concerned about the event even if the actual expected losses are the same. Regret and disappointment are different from anxiety, as they are experienced mainly after a loss rather than before, but anticipation of these emotions also can influence decisions.

For example, consider this common behavior: homeowners purchase flood insurance after suffering damage in a flood and then cancel their policies when several consecutive years pass without experiencing any flood damage. One explanation of this behavior is that reducing anxiety in anticipation of a flood and reducing regret if a flood occurs are both important goals immediately after suffering water damage; the cause of the loss is deeply etched in the purchaser's recent memory. Buying insurance is easy to justify to oneself and others because a flood has just occurred. Several years later, many people may find that the prospect of a flood no longer intrudes on their peace of mind, so they are less anxious about its consequences.

Mental Shortcuts

A second departure from the rational actor model is the process by which individuals consider risk information. This process has been termed intuitive thinking. The literature describing intuitive thinking is vast and at times uses different terms to describe the same phenomenon. Three select findings from the literature on insurance purchase decisions are presented in this section: *prospect theory*, *status quo bias* (a reluctance to consider alternatives to the current condition), and *availability heuristic* (considering the most recent event that occurred most recently to be the most likely).

Prospect Theory

Kahneman and Tversky (1979) proposed prospect theory to explain how individuals make choices when outcomes are characterized by a probability distribution. Prospect theory argues that individuals misperceive probabilities, having a tendency to underweight small probabilities and overweight larger ones. If the probability of an event is perceived to be extremely low, the likelihood is considered to be zero. Empirical studies reveal that individuals tend to experience the pain of a loss twice as strongly as the enjoyment of the gains of the same magnitude. Stated simply, individuals tend to be loss-averse relative to their reference point (Tversky and Kahneman, 1991). For example, a controlled laboratory experiment found that many individuals bid zero for insurance coverage against low-

probability events, apparently viewing the probability of a loss as so small that they are not interested in protecting themselves against it (McClelland et al., 1993).

Status Quo Bias

A flood insurance purchase decision is made when a homeowner buys a house in the floodplain and is considering whether to purchase flood insurance for the first time or when a policy expires and a homeowner has to decide whether to renew it. There is evidence that many individuals are reluctant to depart from the status quo (not having insurance, or holding a policy that is expiring) even though there may be substantial benefits to them from doing so (Samuelson and Zeckhauser, 1988). With respect to consumer insurance decisions, changes in laws in Pennsylvania in 1990 and in New Jersey in 1988 provided an opportunity to examine the impact of the status quo as a reference point on the choice of automobile policies. Insurance laws in the two states differed with respect to the status quo (that is, the default option). In New Jersey, motorists had to change their existing insurance policy to acquire the full right to sue that would result in a higher premium. In Pennsylvania, the status quo was the full right to sue and motorists had the opportunity to reduce their insurance premium by giving up some of their rights to sue. When offered the choice between these two policies, only about 20% of New Jersey drivers chose to acquire the full right to sue. In Pennsylvania, 75% of the insured population retained their current policy, which gave them the full right to sue (Insurance Information Institute, 1992). Similar results were obtained in a hypothetical study with 136 university employees. Interestingly, the effect was even larger in the real world than in the controlled experiment (Johnson et al., 1993).

Availability Heuristic

In some situations, individuals assess the probability of an event on the basis of the ease with which they can imagine its occurrence (Tversky and Kahneman, 1973). The availability mental shortcut implies that individuals are more interested in buying insurance coverage after a disaster because it is highly salient. Indeed, it has been found that takeup rates of flood insurance policies in the United States increase right after a disaster event and then slowly decline (Gallagher, 2014). The flood insurance market offers more striking empirical evidence on that point. A 2012 study examined the number of new policies issued by the program and their durations through 2009 for those residing in both Special Flood Hazard Areas (SFHAs) and non-SFHAs by using the entire portfolio of the NFIP over the period 2000–2009 (Michel-Kerjan et al., 2012). Of the 841,000 new policies in

2001, only 73% were still in force 1 year later; after 2 years, only 49% of the original 2001 policies were still in place; and in 2009, only 20% were still in place.

Although some of these individuals may have sold their homes and cancelled their policies because they moved, the large percentage decrease in the policies in force can be only partially explained by migration patterns. Data from the annual American Community Survey over the period covered by the flood insurance dataset revealed that the median length of residence was 5-6 years—somewhat higher than the median tenure of flood insurance of 2-4 years.

That finding of higher insurance purchase after catastrophe is often true even when premiums increase (unlike NFIP policies). A prime example is the purchase of earthquake insurance after a major seismic event. Surveys of owner-occupied homes in counties in California that were affected by the 1989 Loma Prieta earthquake showed a significant increase in coverage (Palm, 1995): just before the disaster, 22.4% of the homes had earthquake coverage; 4 years later, 36.6% had coverage—a 63% increase. The possibility of a future earthquake was now more salient, so many individuals decided to purchase insurance to gain peace of mind.

The availability of mental shortcuts also implies that before a disaster, the perceived likelihood of another disaster is perceived to be much lower than estimated by experts (Tversky and Kahneman, 1973). For example, consider floods in August 1998 that damaged property in northern Vermont, an area that had not experienced a recent major natural disaster. Of the 1,549 victims of this disaster, FEMA found that only 16% of homeowners who were in flood-prone areas had insurance, even though 45% were required to purchase it (Tobin and Calfee, 2005; Michel-Kerjan et al., 2012). These findings imply that lenders were not enforcing the regulation or that property owners were finding ways to avoid lender enforcement. In the case of Hurricane Sandy in 2012, only about 20% of New York City households that were inundated had flood insurance at the time of the disaster (NYC, 2013).[3]

Framing

Framing refers to the way in which outcomes are described as gains or losses relative to a reference point, which can either be the status quo or another value (Kunreuther and Weber, 2012). One way to encourage individuals to invest in protection is to reframe the probability of risk so that people perceive potential future disasters as above their threshold level of

[3]Many areas inundated by Hurricane Sandy and the associated surge were outside of then-designated SFHAs.

concern. Research shows that simply adjusting the time frame can have a significant effect on the perception of risk. For example, people were more willing to buckle their seatbelts when they were told that they had a one-in-three chance of an accident over a 50-year lifetime of driving, rather than a 0.00001 chance in each trip (Slovic et al., 1978; Kunreuther et al., 2013). Similarly, describing flood probabilities in terms of the number of "1 in 500 year" possible floods during the 30-year life of a mortgage may have greater meaning than telling someone that there a 0.2% chance of a flood in any year.

Suppose that a person is provided with a concrete scenario highlighting the damage to property from a future flood and that this question is posed "How would you fare financially if you did not have insurance and suffered a future loss from a storm similar to Hurricane Sandy?" Individuals at risk may decide that they should purchase coverage rather than regret not being financially protected if they suffer a severe loss. More generally, calling attention to the benefits of insurance by focusing on a specific event such as Hurricane Sandy, is likely to be more effective in increasing takeup rates than framing a general message in terms of reducing damage from future floods or hurricanes. Even before 9/11, controlled experiments revealed that consumers are willing to pay more for insurance against a plane crash caused by terrorists than for flight insurance against any event, a counter-intuitive finding in that by definition "any event" includes a terrorist attack (Johnson et al., 1993; Kunreuther et al., 2013).

IMPLICATIONS FOR ENCOURAGING PURCHASE

Deliberative Thinking

The concept of deliberative thinking is a process that aims to provide concrete and meaningful comparisons in helping people understand a given risk, and removing misperceptions that people may have about that risk. People generally have difficulty in evaluating low-probability risks, but often form more accurate perceptions when numbers are presented in the context of familiar situations. A raw probability number, such as 1 in 1 million, may be an abstract concept, but people can more readily interpret such a number if it is compared with the risk of an automobile accident (1 in 20), or the risk that lightning will strike one's home on one's birthday (less than 1 in 1 billion).

Misperceptions of the likelihood and generosity of aid may influence an NFIP purchase decision. This suggests that decisions on whether to purchase insurance could be affected by providing accurate information on the limits of federal aid. Another example of a misperception is the view of insurance as an investment. Some insured individuals do not feel justified

in continuing to pay premiums when they do not collect on their policies. They view insurance as a poor investment rather than recognizing the fact that they have not suffered any losses for the last few years (Kunreuther et al., 1978). Insurance is a risk-management mechanism, however, and a person should value not having a loss rather than thinking that money was wasted in the premiums. People who view insurance as an investment misunderstand its purpose.

FEMA has prepared a two-page brochure that illustrates this comparison (FEMA, 2012a). Support for deliberative thinking might include expanding the material into a broader educational effort. Expanded educational materials might explain not only the limits of aid but also the uncertainty of the aid being secured. In a broader context, educational materials might increase understanding of the purpose of insurance. In fact, FEMA's FloodSmart program represents a significant effort to inform the public of the benefits of purchasing flood insurance (FEMA, 2014a). In addition, a user-accessible financial decision support tool to help persons to compare the financial consequences of purchasing with those of not having insurance and relying on aid. Dissemination and use of these materials might also be considered. One possibility might be to make such materials available to the community floodplain managers and to write your own (WYO) agents who can work with property owners to assess the merits of aid versus insurance for their particular situation.

Choice Architecture

Households have many financial decisions to make and limited time in which to make them. Some households will use some of the time for a deliberative process when making an insurance purchase decision. Others may use mental shortcuts. In recognizing that some (maybe many) households will use mental shortcuts, the goal of increasing purchase may be served by paying attention to "choice architecture" (Thaler and Sunstein, 2008). The authors of this 2008 article argued that people's choices often depend on how options are presented. For example, consider the situation regarding the NFIP mandatory purchase requirement. There has been continuing attention to enforcement of the mandatory purchase of flood insurance for properties in SFHAs that have federally insured mortgages. As in the past, the focus has been on the lending sector, but there is still less than full compliance. Efforts to increase enforcement of mandatory purchase by focusing on the borrowing sector have been only partly successful. An analysis of the sequence of decisions that includes the property owner who may be reluctant to purchase any form of insurance (for the reasons discussed), the WYO agent, whether the commission for each policy purchased is enough to encourage following up when a policy is dropped, the lender, and who-

BOX 4-1
Multi-year Flood Insurance

To reduce the likelihood that policies will be cancelled the NFIP could introduce multi-year insurance (MYI) to the homeowner. The tendency to maintain the status quo should increase the likelihood that insured individuals will maintain a multi-year policy for the length of the contract whereas they may decide not to renew an annual policy after it expires. Premiums for MYI policies would still be paid on an annual basis, ideally be risk-based and fixed for a specified period (such as 5 years), and undergo periodic scientific review to determine whether the flood risk has changed.

Those not required to purchase flood insurance would have a choice between purchasing a single-year policy or a multi-year policy. If they decide to cancel a multi-year policy before it expires, they would be charged a cancellation fee unless they were moving to another location. A 2015 paper discusses a Web-based experiment with adults in the United States who had the choice of purchasing annual or multi-year policies or being uninsured against damage from hurricane-related losses (Kunreuther and Michel-Kerjan, 2015). The results indicated that there was demand for MYI.

MYI could also directly address the affordability issue and be accompanied by a multi-year home improvement loan to encourage investment in mitigation. Low-income homeowners residing in flood-prone areas could be given a means-tested insurance voucher to cover a portion of the insurance premium and the cost of a mitigation loan. The costs to the homeowner and the federal government would probably be lower than the costs of providing vouchers that cover only the insurance premium (as will be detailed in discussion of mitigation loans in Chapter 7). Well enforced building codes and seals of approval would provide additional rationale for undertaking these loss reduction measures.

ever owns the mortgage over time can identify possible reasons for failures to maintain insurance and suggest policy actions to increase compliance. The focus appropriately would be on the household decision because if households do not choose to drop insurance in the first place, enforcement will be less of a challenge.

An illustration suggests how choice architecture might result in people's buying and maintaining flood insurance policies. An analysis of the entire portfolio of the NFIP revealed that more than half of all NFIP policies (mandatory and voluntary) were canceled between 2-4 years after purchase (Michel-Kerjan et al., 2012). This illustration applies equally to voluntary and mandatory purchase. Currently, the choice context is for households to purchase insurance on an annual basis; that is, they need to evaluate each year whether to renew. If there has not been a flood in the preceding year, the availability heuristics (discussed above) may work against a decision

to renew. If the renewal choice were for multiple years, however, the effect of availability heuristics might be minimized and presenting the choice as a multiyear purchase might take advantage of the status quo heuristic (see Box 4-1).

SUMMARY

A long-standing objective of the NFIP has been to increase purchases of flood insurance. Household decisions on whether to purchase insurance can be understood through different models of choice that in turn have been the foundation for empirical studies of the insurance purchase decision. A conclusion from a review of this literature is that no single strategy will increase purchase of NFIP policies. As FEMA improves its efforts to increase takeup rates through risk communication and other efforts, the literature reviewed here may offer insights that can improve the effectiveness of these programs (Kousky and Shabman, 2015).

- **The original NFIP legislation expected NFIP premiums to be priced at reasonable levels to promote voluntary purchase of NFIP policies. Empirical studies have found that premium prices may affect takeup rates although the size of that effect is small. The effect of the availability of disaster aid on insurance purchase decisions is uncertain.**
- **Studies have found that people may use intuitive thinking, as opposed to systematic consideration of the cost of premiums in relation to expected claim payments, when choosing to forego insurance or to cancel an existing policy.**
- **The combination of acknowledgement of intuitive thinking and the effects of premiums on insurance purchase decisions suggests that lower premiums alone will not increase takeup rates substantially.**
- **Keeping NFIP premiums at reasonable levels can be part of any strategy to maintain compliance with mandatory purchase requirements and increase voluntary takeup rates. A multipart strategy to motivating purchase of NFIP policies can be designed using insights from the behavioral sciences literature.**

5

Locations of Potential National Flood Insurance Program Affordability Challenges

Before passage of Biggert-Waters 2012 (BW 2012), the National Flood Insurance Program (NFIP) used different premium setting practices for different groups of policies: NFIP risk-based (including preferred risk), grandfathered, pre-flood insurance rate map (pre-FIRM) subsidized, and Community Rating Service discounted (CRS discounted). BW 2012 would replace pre-FIRM subsidized and grandfathered premiums with NFIP risk-based rates. The removal of subsidies, and the move toward risk-based rates, can raise premiums for pre-FIRM subsidized and grandfathered policies. BW 2012 also directed FEMA to report on the feasibility of purchasing private reinsurance, to pay down the debt to the Treasury, and to take actions to build up the NFIP reserve fund. Those actions may require FEMA to increase NFIP risk-based premiums, and this would affect all classes of policies.[1]

As premiums increase, the changes in premiums may make insurance unaffordable to some households. There may be locations where increases have adverse effects on a community if premiums increase for a large number of its residents. Before detailed discussion of how *affordability* might be defined (Chapter 6), and how aid programs might be developed if there are affordability concerns (Chapter 7), this chapter discusses the geographic distribution of policies for each policy group. The result is to provide a perspective on the location and extent of potential affordability challenges if all

[1]The Homeowner Flood Insurance Affordability Act of 2014 reinstated grandfathering. The present committee's task statement, however, which was derived from BW 2012, presumes that all premiums eventually would be NFIP risk-based, which is the presumption of this chapter.

provisions of the BW 2012 legislation were implemented. This information has important implications for decisions regarding national level affordability policy design. For example, if a large portion of the potential premium increases was concentrated in a few counties, affordability policy options might be different from what they might be if the potential increases were spread across the entire nation.

This chapter presents several maps that describe the spatial distribution of policy groups. The data used to generate these maps was as follows:

- *FEMA Flood Insurance Policy Database*. This database contains the location of all the flood insurance policies as of October 2013. It provides such information as the address of the policy, the current premium, and the zone in which the policy was rated. This restricted dataset cannot be released to the public because of privacy issues. Results are reported in such a way that privacy is protected.
- *U.S. Census Geographical Area*. This dataset provides the geographic boundaries of approximately 220,000 census-block groups from the 2010 census that form the area of the United States and all territories.
- *FEMA National Flood Hazard Layer*. This dataset has the flood boundaries of all the digital maps that exist in FEMA's inventory as of 2010.

Maps, tables, and data compilations in this chapter were prepared by the AECOM firm, which used FEMA 2013 data that it acquired under a separate contractual agreement (AECOM, 2014). The data above were combined to create the maps in this chapter. Data analysis generally was performed within a spreadsheet, and the results were mapped with a geographic information system (GIS). For example, to show locations of policies, a spreadsheet is used to summarize the Flood Insurance Policy Database, and the summary is then imported into a GIS to be mapped. The spreadsheet used for the present report is Excel 2010 and the GIS used was ArcGIS10.2.2.

The chapter first describes the current NFIP policy portfolio. The geographic distribution of policies included in each policy group is then reported. That reporting is at the state, county, or US Census block group of aggregation as needed to understand the location of a policy group.

NATIONAL FLOOD INSURANCE PROGRAM POLICIES IN FORCE: AN OVERVIEW

Overview

The NFIP had 5,544,629 standard policies in force[2] as of October 2013. A FEMA standard flood insurance policy[3] can be issued for several types of properties:

- Single family housing units, which account for 3,793,421 of the policies in force
- Properties that contain two to four housing units, which account for 264,650 of the policies in force
- Properties that contain more than five housing units, such as apartment buildings and assisted living facilities, which account for 1,192,402 of the policies in force
- Nonresidential properties (buildings for businesses) and residential facilities, such as hotels with short-term guests; Residential Condominium Building Association Policy properties (this applies to condominium complexes whose individual units are separately owned), which account for 294,156 of the policies in force.

Those distinctions are important in understanding the policy database and the presentation of the data in this chapter. Note that a policy may be for a property that has more than one housing unit; an example would be an apartment building.

For residential properties, a further distinction is made concerning whether the property is a primary or non-primary residence. "FEMA defines a primary residence as a building that will be lived in by an insured or an insured's spouse for more than 50% of the 365 days following the policy effective date."[4] Also, a separate category of properties—Severe Repetitive Loss (SRL) properties—are ones that have had four or more separate claim

[2]The information and maps describing NFIP policies in this chapter are derived from data provided to the committee by FEMA. This is the most recent detailed data (October 2013; see FEMA, 2013b) available on flood insurance policies. FEMA policies in force vary from year to year so policy counts made at other times may differ from the counts reported here. The basic unit of consideration for representing the location of these policies is the housing unit, defined by the US Bureau of the Census as follows: "A housing unit is a house, an apartment, a mobile home, a group of rooms, or a single room that is occupied (or if vacant, is intended for occupancy) as separate living quarters. Separate living quarters are those in which the occupants live and eat separately from any other persons in the building and which have direct access from the outside of the building or through a common hall."

[3]NFIP Flood Insurance Manual, General Rules Section, p. GR-2, 1 June 2014.

[4]Source: NFIP Flood Insurance Manual, Definitions Section, p. DEF-7, 1 June 2014.

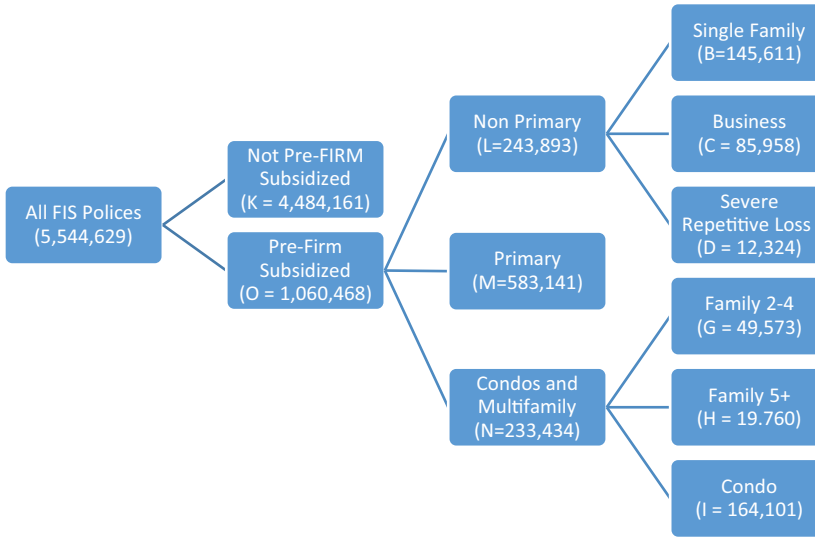

FIGURE 5-1 Classification of flood insurance policies.
SOURCE: AECOM, 2014.

payments that each exceed $5,000 or two or more separate claim payments, the total of which exceeds the current value of the property.[5]

Figure 5-1 depicts a classification of these types of policies. The total number of policies in force in the NFIP portfolio is divided into "not pre-FIRM subsidized" and "pre-FIRM Subsidized." Included in the not pre-FIRM subsidized group are NFIP risk-based policies, grandfathered policies (discussed separately below), and CRS discounted polices. About 20% of the policies are subject to pre-FIRM subsidized premiums.

Figure 5-1 subdivides pre-FIRM subsidized policies into categories. Non-primary properties (designated by L) consist of single family homes (B), businesses and nonresidential buildings (C), and severe repetitive loss properties (D); L = B + C + D. L properties cover policies that under BW 2012 would see increases in rates of 25% per year until the NFIP risk-based premium was paid; the Homeowner Flood Insurance Affordability Act of 2014 (HFIAA 2014) did not change that BW 2012 requirement.

[5]Source: NFIP Flood Insurance Manual, Severe Repetitive Loss Section, p. SRL-1, 1 June 2014.

The second category of policies is for primary residences (M), which total 583,141 policies. This is the category of policies that under BW 2012 would have seen increases in rates of the NFIP risk-based premium when the property was sold. However, HFIAA 2014 replaced that provision by requiring that rates increase by 5-18% per year until the NFIP risk-based premium was being paid. HFIAA 2014 also allowed the NFIP risk-based premium to phase in over time even if the property was sold.

The third category of policies is for multifamily residences (N), which total 233,434. It includes residences with two to four housing units (G), five or more housing units (H), and Residential Condominium Building Association Policy (RCBAP) units (I); N = G + H + I. The condominium category includes units that are owner-occupied and rental properties; most of the condominium units that have pre-FIRM subsidized policies (150,226) are not primary residences. The total number of properties with pre-FIRM subsidized policies that would be affected by BW 2012 is O = L + M + N. This total of 1,060,468 is displayed later in discussions of pre-FIRM subsidized policies.[6]

All National Flood Insurance Program Policies

Figure 5-2 shows the distribution of all 5.5 million policies throughout the nation by county. As the figure shows, NFIP polices are distributed widely, but there are areas of high concentration.

Table 5-1 lists the numbers of NFIP policyholders throughout the nation by state or territory. The table shows the concentrations of policy holders in select areas of the United States. For example, Florida contains 40% of the policies, and Texas and Louisiana together contain 20% percent of the policies.

BW 2012 would affect premiums levels for all these policy types in all these places and in different and undetermined ways. Thus, its effects may be concentrated in some states but be present throughout the nation.

The roughly 5.5 million policies in force today are both in and outside the FEMA-mapped Special Flood Hazard Areas (SFHA; 1% floodplain), but not all the properties in SFHAs have purchased insurance. Estimating takeup rates is difficult because of the lack of data on households and policies in floodplains around the country. It appears that takeup rates are particularly low in areas where purchase is voluntary, but it also seems that many people who are required to purchase the coverage do not. The RAND

[6]Although those distinctions are important for understanding the changes that HFIAA 2014 made in BW 2012, the focus of this report is the NFIP premiums charged to all policyholder under the rating and premium-setting process before BW 2012 and under the rating and premium-setting process after BW 2012.

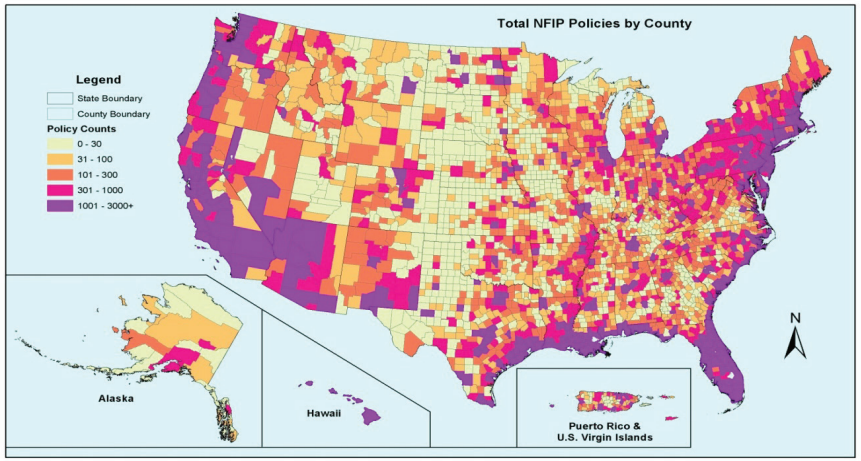

FIGURE 5-2 NFIP policies in the United States by county.
SOURCE: AECOM, 2014.

Corporation estimates that about half a random sample of single-family homes in 100-year floodplains across the country have flood insurance, but this masks high regional variation; the Midwest has the lowest takeup rates—20-30%—and the South and West having takeup rates closer to 60% (Dixon et al., 2006). An examination of coastal properties estimated takeup rates at 50% (Kriesel and Landry, 2004). And a calculation of takeup rates in census tracts (not only in floodplains) along the New Jersey and New York coasts immediately before Hurricane Sandy suggests that market penetration was in the range of 50%, with a few tracts along the coast having rates up to 75% (Kousky and Michel-Kerjan, 2012).

In July 2014, FEMA reported to Congress that 4.9 million housing units are in the riverine or SFHA floodplain (or 1% floodplain) and 3.8 million in the coastal SFHA, for a total of 8.7 million housing units in floodplains (Doug Bellomo, 2014, Federal Emergency Management Agency, personal communication). About 5.5 million NFIP policies are in force in and outside the SFHA; given that over 11 million housing units are in the SFHA alone, it appears that many of the housing units in the nation's floodplains do not have flood insurance. These analyses based on available data suggest that meeting the long-standing goal of high takeup rates for flood insurance would require a significant increase in insurance policy purchases.

TABLE 5-1 NFIP Polices by State or Territory

STATE	NUMBER OF POLICIES
Alabama	58,256
Alaska	3,014
American Samoa	2
Arizona	34,885
Arkansas	21,065
California	273,339
Colorado	22,913
Connecticut	43,400
Delaware	25,585
District of Columbia	2,361
Florida	2,029,025
Georgia	96,872
Guam	253
Hawaii	59,315
Idaho	6,937
Illinois	49,232
Indiana	29,573
Iowa	16,410
Kansas	12,867
Kentucky	25,051
Louisiana	483,218
Maine	9,319
Maryland	73,995
Massachusetts	59,773
Michigan	25,185
Minnesota	12,093
Mississippi	74,095
Missouri	26,206
Montana	5,876
Nebraska	12,709
Nevada	14,611
New Hampshire	9,489

continued

TABLE 5-1 Continued

STATE	NUMBER OF POLICIES
New Jersey	246,498
New Mexico	16,200
New York	196,717
North Carolina	139,121
North Dakota	13,755
Northern Mariana Islands	10
Ohio	41,676
Oklahoma	17,742
Oregon	34,085
Pennsylvania	73,950
Puerto Rico	43,959
Rhode Island	16,101
South Carolina	206,611
South Dakota	5,456
Tennessee	32,780
Texas	629,862
US Virgin Islands	2,090
Utah	4,511
Vermont	4,579
Virginia	115,481
Washington	44,804
West Virginia	20,915
Wisconsin	16,104
Wyoming	2,506
(Records Missing Geocoding)	2,192
Grand Total	5,544,629

SOURCE: AECOM, 2014.

Grandfathered Policies

Grandfathered policies[7] are created when a new version of the FIRM is released and current policyowners want to be rated on the basis of the map that was in effect when the policy was initially purchased. For example, consider a homeowner whose house has a first-floor elevation of 52 ft. In 2008, the owner purchased flood insurance, and the maps show the 100-year flood at an elevation of 53 ft on the basis of a map dated 1983. The homeowner is charged an insurance rate for a first floor that is 1 ft below the 100-year base flood elevation. In 2012, a new FIRM shows a 100-year flood elevation to be at 55 ft, or 3 ft above the first-floor elevation of the house. The policyowner can keep the lower rates of first floor elevation 1 ft below (vs 3 ft below) the 100-year flood elevation if specific conditions exist. Thus, rates may increase, and the design of an affordability framework would be well served if the number and location of grandfathered policies were known.

The FEMA policy database does not contain information on whether a current policy is grandfathered. It does contain the zone that was used at the time the policy was purchased; if the elevation of the structure was obtained, that information is also in FEMA's database. In addition, FEMA maintains a National Flood Hazard Layer (NFHL) for areas where the paper map inventory has been converted to a digital format. NFHL are available for communities that include approximately 88% of the US population and approximately 60% of the land area of the continental United States (see NRC, 2009 for further discussion of FEMA floodplain mapping modernization). The NFHL is the combination of all the community flood hazard information into one database layer in which digital flood maps exist. FEMA also has addresses of policies. The flood policies can be geocoded and intersected with the current map to determine the current flood zone of properties. The following indicators can then be used to determine whether a policy is grandfathered:

- Policy is rated as a Zone X (outside the 100-year floodplain) and now is shown in Zone A (inside the 100-year floodplain).

[7] "Under NFIP administrative grandfathering, post-FIRM buildings in the Regular Program built in compliance with the floodplain management regulations in effect at the start of construction will continue to have favorable rate treatment even though higher Base Flood Elevations (BFEs) or more restrictive, greater risk zone designations result from Flood Insurance Rate Map revisions. Policyholders who have remained loyal customers of the NFIP by maintaining continuous coverage (since coverage was first obtained on the building) are also eligible for administrative grandfathering" (FEMA, 2014b).

- Policy is rated as a Zone X (outside the 100-year floodplain) and now is shown in Zone V (inside the 100-year floodplain and in an area of high wave action).
- Policy is rated as a Zone A (inside the 100-year floodplain) and now is shown in Zone V (inside the 100-year floodplain and in an area of high wave action).

In addition, grandfathering occurs when the flood map elevation increases. The current elevation of the 100-year flood map can be determined with available information. A calculation to locate and map grandfathered premiums was beyond the data and time resources available to the committee for the present report. FEMA has, however, made preliminary estimates of grandfathering and has concluded that, at a national level, approximately 10% of all policies (excluding pre-FIRM subsidized) are grandfathered (Andy Neal, Federal Emergency Management Agency, personal communication, 2014).

Policies Other Than Pre-FIRM Subsidized

BW 2012 called on FEMA to report to Congress on the possibility of making changes that might raise NFIP risk-based premiums. Figure 5-3 maps the distribution of all policies other than pre-FIRM subsidized, according to US Census block group;[8] these are policies that might be affected by changes in premiums even if they are not currently paying pre-FIRM subsidized premiums.

Although there are areas of concentration these policies in this group (purple in Figure 5-3), policies in this group are found in large numbers in census block groups around the nation (pink and red shading in Figure 5-3).

Pre-FIRM Subsidized

Holders of pre-FIRM subsidized policies may see significant increases in premiums. The spatial pattern of significant premium increases for NFIP pre-FIRM subsidized policies is shown by state in Figure 5-4. The states that have the largest populations—California, Texas, New York, and Florida—have large numbers of pre-FIRM subsidized policies and high numbers of

[8]A census block group has a population of 600-3,000 people, or an average of 533 housing units. As of 2013, the US population was approximately 316 million, and there were approximately 133 million housing units. To assemble data on the population, counties are assembled or divided into census tracts, of which there are about 74,000. Those are subdivided into census block groups (220,000) and then into census blocks (11 million). A US census block Group contains an average of 600 housing units (for more information see https://www.census.gov/geo/maps-data/data/tallies/tractblock.html).

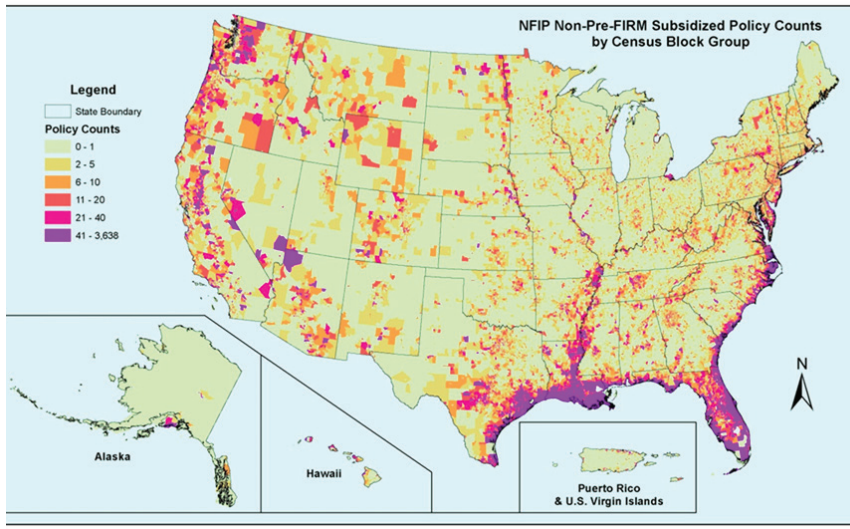

FIGURE 5-3 NFIP non—pre-FIRM subsidized policy counts by US Census block group.
SOURCE: AECOM, 2014.

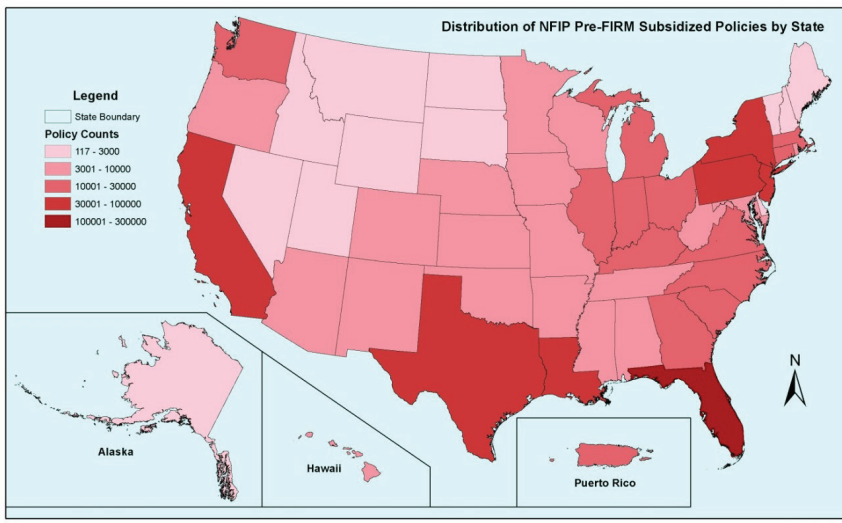

FIGURE 5-4 Distribution of NFIP pre-FIRM subsidized policies by state.
SOURCE: AECOM, 2014.

all policies. Louisiana, New Jersey, and Pennsylvania round out the top seven states of NFIP pre-FIRM subsidized policy numbers.

Another perspective on the location of pre-FIRM subsidized premiums is presented in Figure 5-5. The figure illustrates the spatial pattern of the ratio of pre-FIRM subsidized to total flood policies [(O/(K+O)] in each state. It shows that the Midwest and Great Lakes regions have higher percentages of pre-FIRM subsidized policies, and the South and West regions have lower percentages. That is not surprising inasmuch as the southern and western United States is where population growth is creating newer housing stock (compared to the Midwest and Great Lakes regions), presumably built after the local FIRM was issued. Depending on perspective, possible affordability concerns due to removing pre-FIRM subsidies could be concentrated in different areas of the nation. If both perspectives are used, however, the possible affordability problem appears to be national in scope.

An even finer level of spatial detail can be used by allocating the policies to census block groups and then mapping the distribution of pre-FIRM subsidized policies at the census block group level. The impression from Figure 5-6 is that the pre-FIRM subsidized policies are spread widely, but an important calculation based on the data underlying the map shown is that 80% of NFIP polices are concentrated within 6% of the US census block groups. Focusing on the purple areas suggests that there are

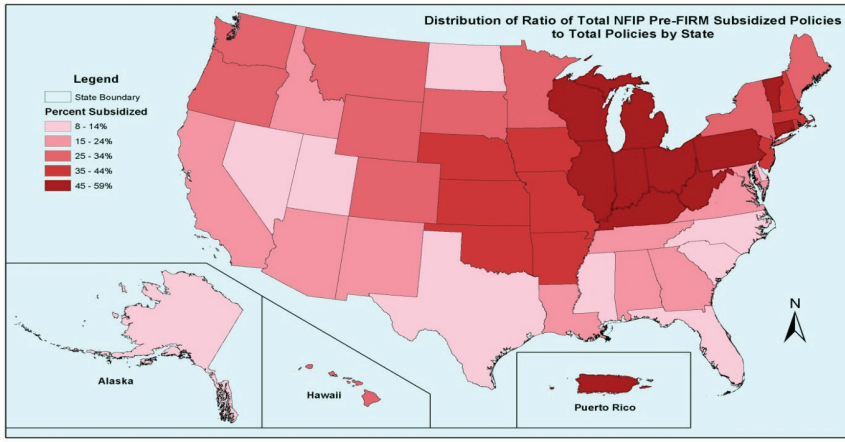

FIGURE 5-5 Distribution of the ratio of total NFIP pre-FIRM subsidized policies to total policies.
SOURCE: AECOM, 2014.

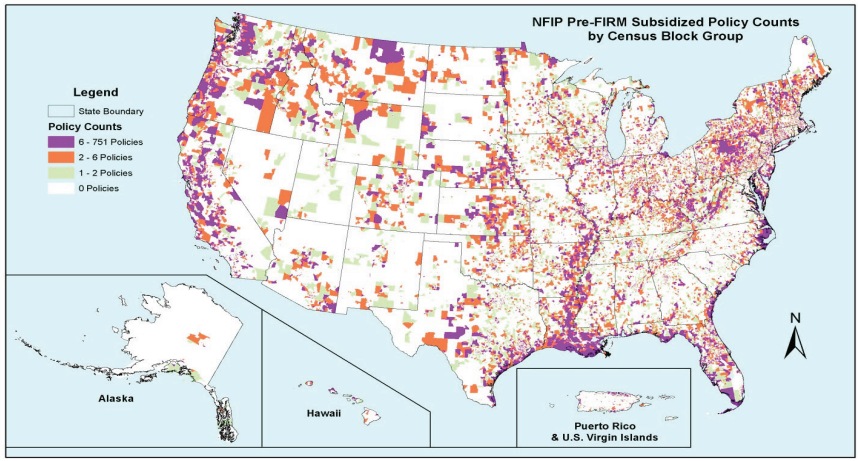

FIGURE 5-6 NFIP pre-FIRM subsidized policy count rankings by US Census block groups.
SOURCE: AECOM, 2014.

small geographic areas (recall that an average census block group contains approximately 600 housing units) in which removing pre-FIRM subsidized premiums may affect a large percentage of households in a single community.

SUMMARY

Determining whether there are concentrations of NFIP policies may be useful for designing a national affordability framework.

- **About 60% of the approximately 5.5 million NFIP polices are in three states: Florida, Texas, and Louisiana. The rest are distributed widely throughout the nation. Any effects of BW 2012 therefore will be more concentrated in some places, but will appear throughout the nation.**
- **Available estimates of takeup rates suggest that they are low, especially outside Special Flood Hazard Areas. Meeting the long-standing goal of high takeup rates for flood insurance therefore would therefore require a large increase in purchases.**
- **The extent and location of premium increases that might result from elimination of grandfathering can be determined by further analysis of the policy data, but cannot be estimated now.**

- **Slightly more than 1 million—or 19% of the policyholders—are paying pre-FIRM subsidized rates and will potentially see rate increases if the provisions of BW 2012 remain in effect. Pre-FIRM subsidized polices are found throughout the nation, but there are areas of concentration.**

6

Affordability Concepts and a Framework for Assistance Program Design Decisions

Section 9 of the Homeowner Flood Insurance Affordability Act of 2014 (HFIAA 2014) required FEMA to propose an affordability framework for the National Flood Insurance Program. That legislation requesting this framework asked FEMA to propose options for "Targeted assistance to flood insurance policy holders based on their financial ability to continue to participate in the National Flood Insurance Program." A similar requirement is found in Section 100236 of the Biggert-Waters Act of 2012 (BW 2012), which called on FEMA to analyze "methods for establishing an affordability framework for the National Flood Insurance Program, including methods to aid individuals to afford risk-based premiums under the National Flood Insurance Program through targeted assistance rather than generally subsidized rates, including means-tested vouchers."[1]

This chapter describes different concepts of affordability and associated ways of measuring the cost burden on a property owner or renter from purchasing flood insurance. Metrics for measuring affordability can be described, but the threshold for defining when an insurance premium creates a cost burden requires making a policy judgment. Given that some affordability criterion is chosen, the chapter presents a decision framework that could be used in the design of targeted assistance programs for flood insurance affordability. This framework presents a list of choices to be made by program designers: who will receive assistance, what type of assistance

[1]BW 2012 phased out grandfathered premiums, but HFIAA 2014 reinstated them. For purposes of this chapter and to be consistent with the committee's task statement, this discussion assumes that all premiums have been raised to NFIP risk-based levels.

will be provided, how assistance will be provided, how much assistance will be provided, who will pay for assistance, and how an assistance program will be administered.

MEASURING THE COST BURDEN OF FLOOD INSURANCE PREMIUMS AND DEFINING AFFORDABILITY

Although a lower insurance premium clearly is more affordable than a higher premium, there is no objective threshold that separates affordable premiums from unaffordable premiums, and thus defines affordability, either for an individual property owner or renter, or for any group of property owners or renters. Instead, there are many subjective concepts of affordability that are influenced by social norms and can be informed by, for example, data on income and expenditure patterns or experience in operating social assistance programs. Those concepts reflect concerns about how premium increases might affect both *willingness* and *ability* to purchase insurance. The concern about the ability to purchase was especially relevant in the BW 2012 and HFIAA 2014 language in light of legal and regulatory provisions that make purchase of insurance mandatory if a property in a Special Flood Hazard Area has a federally backed mortgage.

This section discusses three of the many potential approaches to the concept of affordability: a capped-premiums approach, an income approach, and a housing-cost approach. Those approaches specify different ways of measuring the cost burden on a property owner or renter of having to buy flood insurance. According to each approach and its associated cost burden measure, flood insurance is assumed to become unaffordable when the cost burden becomes excessive. What constitutes "excessive" must be specified by policymakers, who must also choose the affordability concept(s) that will be used for the NFIP. As discussed later, a chosen affordability concept and cost burden measure can be used to establish eligibility criteria for a program that provides financial assistance to make flood insurance more affordable. The cost burden measure also can be used to monitor changes in affordability of flood insurance and differences in affordability of insurance between areas or types of households.[2]

[2]Although as discussed in this report, flood insurance is considered to be unaffordable to a household if and only if the household is cost burdened by having to pay for flood insurance, being cost burdened does not necessarily imply that a household would be eligible for financial assistance. Further, a household could be eligible for assistance without being cost burdened, as surely has been the case for some households under NFIP pre-FIRM subsidy and grandfathering provisions.

Capped Premiums Approach

In Section 16 of HFIAA 2014, Congress proposed a capped premiums approach. Under this concept of affordability, a flood insurance premium is defined as not affordable if it is greater than a specified percentage of the coverage of the policy. HFIAA 2014 suggested that this threshold value be 1%. The capped premiums approach does not consider household income, assets, or expenditures on housing, food, medical care or other goods and services in determining whether a flood insurance premium imposes a cost burden.

Income Approach

Many federal and state assistance programs, as well as provisions of the federal income tax code, provide assistance with housing costs and other expenses that is based on household income. For example, eligibility for public housing is limited to low-income and moderate-income households whose incomes do not exceed 80% of the median income in their county or metropolitan area. Housing assistance through rent subsidies (housing vouchers) administered by local housing authorities generally is limited to low-income households (those whose income does not exceed 50% of the median income of the county or metropolitan area in which it is located), and by law, 75% of vouchers must be provided to households whose income does not exceed 30% of the area median income. To be eligible for benefits under the Supplemental Nutrition Assistance Program (SNAP, formerly the Food Stamp Program), a household—with some important exceptions—is eligible if its monthly gross income is at or below 130% and its monthly net income is at or below 100% of the applicable federal poverty guideline.

On the basis of the concepts underlying the designs of these and other programs, an income approach to affordability assumes that flood insurance imposes a cost burden and is thus unaffordable for any household whose income is below a specified standard. That standard could be based on median income for the area or federal poverty guidelines, for example, and could be set to include not only low-income but also a substantial fraction of moderate-income households among those judged to be cost burdened by the new flood insurance premiums. In any case, the standard chosen would have to be specified by policymakers.[3]

[3]Although this discussion refers to a "standard," the standard could be a set of thresholds that vary by geographic area, household size and composition, and other characteristics.

Housing Cost Approach

This approach considers not only a household's income but also housing costs, and assesses the ratio of housing costs to income when the NFIP premium is added to other housing costs. If the ratio exceeds a specified value, the flood insurance premium is regarded as cost burdensome and deemed unaffordable.

As its name implies, this concept of affordability has been used in research and assistance programs pertaining to housing (Hulchanski, 1995; Tighe and Mueller, 2013). In applying the concept to homeowners, housing costs typically include payments for mortgage principal and interest, property insurance (including flood insurance), property taxes, homeowner association or condominium fees, utilities (fuel for heating and air conditioning, water and sewer, and trash collection), and maintenance. In the case of renters, many of those costs are not paid separately but are combined in landlords' calculations of monthly rent.

To use the housing cost approach for measuring the cost burden of NFIP premiums, policymakers would have to select the threshold—usually expressed as a percentage—at which the ratio of housing costs to income is judged to become burdensome and thus unaffordable. The US Department of Housing and Urban Development (HUD) identifies households that experience housing costs of 30% of income or more as cost burdened and those who pay 50% or more as severely cost burdened.[4] That affordability standard has been described as follows (Glaeser and Gyuorko, 2008):

> A consensus seems to have arisen that housing becomes "unaffordable" when costs rise above 30 percent of household income. This is not only the standard used by the Millennial Housing Commission in its recent reports, but also is the basis for a number of U.S. Department of Housing and Urban Development (HUD) policies.

If policymakers were to choose the 30% threshold for the NFIP, for example, a household would be flood insurance cost burdened if its housing costs, including the NFIP premium, exceeded 30% of its income. Under that policy choice and criterion, the size of the burden would be the dollar amount beyond 30% of household income that would be required to pay for housing because of the amount of the flood insurance premium. For a household already housing cost burdened—because its housing costs without flood insurance exceed 30% of its income—the entire NFIP premium would be viewed as a flood insurance cost burden. For a household

[4]According to national Consumer Expenditure Survey data for 2013, the share of income spent on housing is 27.9% for the median homeowner without a mortgage, 34.1% for the median homeowner with a mortgage, and 38.5% for the median renter (http://bls.gov/cex/2013/combined/tenure.pdf).

that spends less than 30% of its income on housing, the flood insurance premium would be viewed as affordable as long as overall housing costs remain no higher than 30% of income.

A chosen affordability concept and cost burden measure can be used to monitor changes in the affordability of flood insurance and differences in the affordability of insurance between different areas or types of households. In addition, the concept and measure can be used to establish eligibility criteria for a program that provides financial assistance to make flood insurance more affordable. Choosing an affordability concept and cost burden measure, however, is only one decision that must be made in designing such a program. Additional decisions required of policymakers are discussed next.

A DECISION FRAMEWORK FOR DESIGNING TARGETED ASSISTANCE TO MAKE FLOOD INSURANCE MORE AFFORDABLE

This section discusses decisions that policymakers must make when designing a flood insurance affordability assistance program. These design decisions are as follows:

1. Who will receive assistance?
2. What type of assistance will be provided?
3. How will assistance be provided?
4. How much assistance will be provided?
5. Who will pay for assistance?
6. How will an assistance program be administered? (See Figure 6-1.)

As described below, many of those decisions entail tradeoffs that involve incentives to purchase flood insurance, incentives to undertake mitigation activities, direct costs of assistance to make flood insurance more affordable, and administrative costs of providing such assistance. The present report discusses the nature of these tradeoffs in general terms. Possible analytic methods for assessing the tradeoffs will be described in this committee's second report (which will be issued later in 2015).[5]

[5]Assistance program costs can be paid from general government revenues and can be recovered by charging cross-subsidies as added surcharges on all NFIP policies (such as temporary surcharges put into place by HFIAA 2014) or by raising levels of all premiums as is done to support Community Rating System and grandfathered premiums. There will be limits on general revenues made available, and substantial cross-subsidies that violate actuarial principles may cause concern. For those reasons, the consequences for the size of the required assistance budget will be a constant consideration in how the questions will be answered.

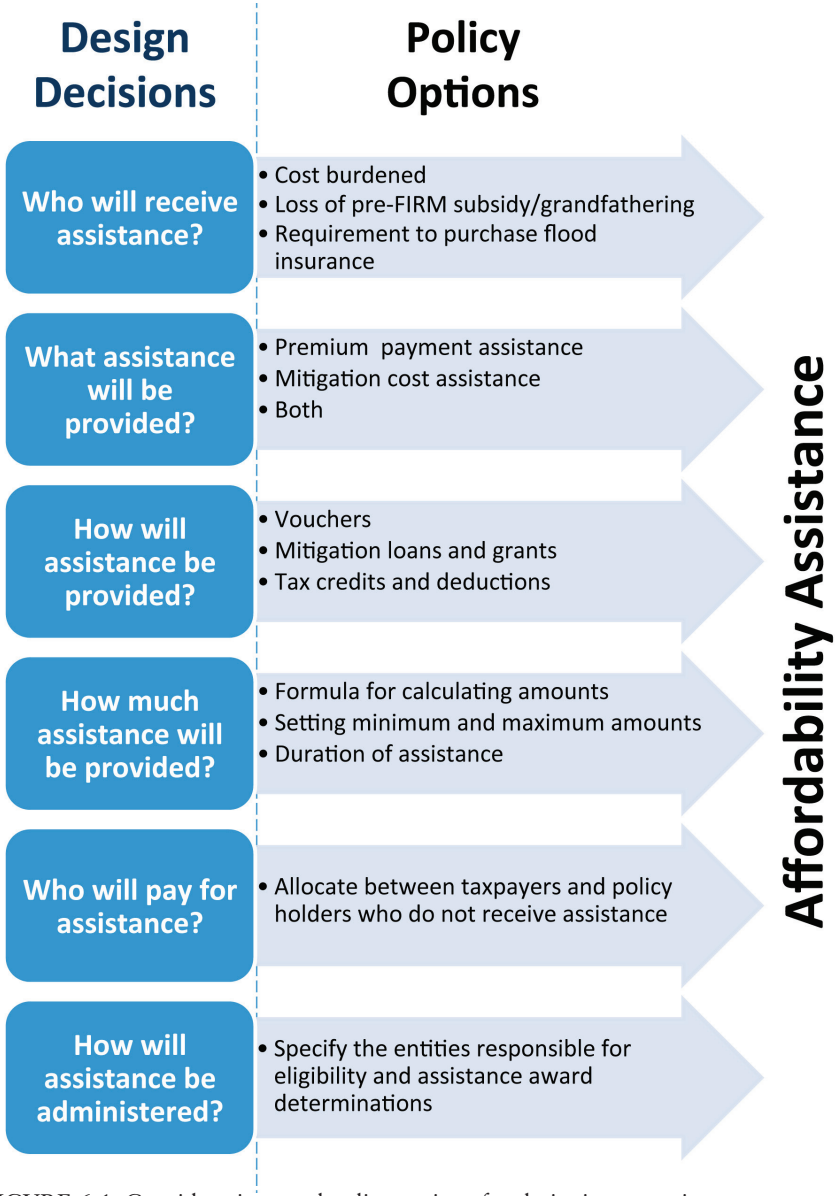

FIGURE 6-1 Considerations and policy options for designing an assistance program for a flood insurance affordability framework.

Decision 1: Who Will Receive Assistance?

In specifying who is eligible to receive assistance, policymakers could initially select an affordability concept and associated measure of cost burden. They could then consider whether to impose additional eligibility criteria. For example, should eligibility be limited to policyholders who previously received assistance through pre-FIRM subsidies or grandfathering? Should assistance be limited to low-income and moderate-income policyholders? Should assistance be considered for households that have experienced dramatic increases in flood insurance policy premiums? Those specific questions and broader issues in the specification of eligibility criteria are discussed next.[6]

Eligibility Based on Being Cost Burdened by Flood Insurance

Three affordability concepts and associated measures of cost burden were discussed in the first section of this chapter. Policymakers could select one of those concepts or measures or some other alternative. Once a concept and a measure have been selected, it will be necessary to define the components of the cost burden measure and specify any applicable thresholds. With the capped premiums approach, the percentage (premium relative to coverage) that identifies burdensome premiums would have to be selected. For the income approach, income has to be defined, and policymakers have to specify the income threshold (or set of thresholds) below which households are considered cost burdened by flood insurance.[7] The housing cost approach requires a definition of housing costs, a definition of income, and a threshold that identifies the ratio of housing costs to income at which housing costs are considered burdensome.

After a cost burden measure has been selected, its components have been defined, and the applicable thresholds have been specified, whatever data needed to measure a particular household's flood insurance cost burden would have to be obtained and used by the agency that is administering the assistance program to determine whether the household is cost burdened. The housing cost approach could impose substantial reporting burden on households that have to provide data on income and expenses and entail substantial administrative costs to collect, process, and verify the data. That might also be true of the income approach, although it would

[6]This discussion focuses on which households are eligible for assistance, but policymakers also will have to decide which properties are considered when determining a household's eligibility. One option would be to consider only primary residences.

[7]A definition of income specifies the components of income that are counted. Household membership must also be defined. For more information about definitions used to determine SNAP eligibility, for example, see htttp://www.fns.usda.gov/snap/eligibility.

not require data on housing expenses.[8] In contrast to the income and housing cost approaches, the capped premiums approach requires no additional data beyond what is needed to calculate premiums.[9] That offers the potential for administrative cost savings. However, unless income is considered as an additional eligibility criterion (as discussed below), the capped premiums approach has no means testing that would target assistance to those who would have the greatest need according to the income and housing cost approaches (the issue of whether assistance should be more specifically means tested and the issue of administrative burden and costs are discussed later in this chapter).

After the selection and full specification of a cost burden measure, several questions remain to be answered by policymakers. Will any households that are not cost burdened be eligible for assistance? If so, how will they be identified? Will all cost-burdened households receive assistance? If not, what additional criteria will be used to target assistance? Additional criteria that could be used to expand or restrict eligibility for assistance are discussed next. As policymakers consider these or other criteria, one issue arises consistently: If funds available for assistance are largely fixed, policymakers who are specifying eligibility criteria face a tradeoff between providing greater assistance on average to a smaller number of eligible households and providing less assistance on average to a larger number of eligible households.[10]

Eligibility Based on Loss of Pre-FIRM Subsidized or Grandfathered Premiums

Pre-FIRM subsidies and grandfathering have served as forms of assistance to policyholders, lowering premiums and making flood insurance more affordable. One possible eligibility criterion for a new assistance program would make assistance possible only for those policyholders who previously paid pre-FIRM subsidized or grandfathered premiums (perhaps as of a specified date)—that is, policyholders who previously were receiving assistance. Alternatively, any household that was eligible for a pre-FIRM subsidized or grandfathered premium (as of some date)—regardless of whether it purchased insurance—could be eligible for assistance under a new program. Because pre-FIRM subsidies and grandfathered premiums

[8]The income and housing cost approaches are familiar to housing program administrators and might offer opportunities to link and potentially integrate flood insurance assistance with existing housing assistance programs.

[9]If a household is losing a pre-FIRM subsidy, data on the household's property that had not been previously obtained may be needed to calculate the risk-based flood insurance premium.

[10]If funds are not limited, assistance costs may rise as the number of households eligible for assistance grows.

were offered to households without regard to income or housing expenses, limiting eligibility for a new assistance program to households that received or could have received pre-FIRM subsidies or grandfathered premiums would probably prevent some households from receiving assistance even though they would be cost burdened by risk-based premiums according to the income or housing cost approaches.

Although payment of or eligibility for a pre-FIRM subsidized or grandfathered premium might be used as a criterion to reduce the number of flood insurance cost burdened households that are eligible to receive assistance, such a criterion could also be used to expand the number of households that are eligible for assistance. For example, in addition to households that are cost burdened by flood insurance, any households that are not cost burdened but previously paid pre-FIRM subsidized or grandfathered premiums might be made eligible for assistance. A broadening of the eligible pool in this way could be justified by, for example, interpreting a curtailing or elimination of pre-FIRM subsidized or grandfathered premiums as a breach of an implied promise to owners of NFIP-insured properties who had counted on continuation of subsidized or grandfathered premiums (for themselves and for potential buyers of their properties), especially those who were subject to the mandatory purchase of flood insurance.[11]

Eligibility Based On Requirement To Purchase Flood Insurance

A household that is subject to mandatory purchase of insurance and that pays a pre-FIRM subsidized or grandfathered premium, has three choices when its premium rises to a new risk-based rate: discontinue compliance with the purchase requirement, continue compliance and pay the higher premium, or purchase a different quantity of insurance to the extent a bank authorizes it (higher deductible and lower limit).

To encourage continued compliance, policymakers might choose to target assistance to households that are flood insurance cost burdened and are required to purchase flood insurance. Such targeting of assistance might encourage compliance of some households that were not previously compliant. At the same time, households that purchased flood insurance voluntarily but are not eligible for assistance might drop their coverage if premiums rise.

[11]Even with this interpretation, policymakers may choose to limit the duration (and amount) of assistance that would be provided to such households. Policymakers may also specify that eligibility for assistance based on previous eligibility for pre-FIRM subsidized or grandfathered premiums would cease when a property is sold. Potential restrictions on eligibility for assistance or limitations on assistance amounts based on the duration of assistance are discussed further under "How much assistance will be provided?" (Decision 4).

Eligibility Based on Housing Tenure

Housing tenure refers to whether a household owns its home or rents. As noted previously, the share of income spent on housing by the median renter is over 38% percent, so increases in rent due to higher flood insurance premiums passed on by landlords (or higher premiums for personal property coverage) might create a substantial need for financial assistance to renters. However, targeting assistance only to homeowners has advantages. First, in addition to the immediate costs of higher premiums if pre-FIRM subsidies and grandfathering are eliminated—costs that are borne by homeowners and potentially renters—homeowners are affected when costs of increased premiums are capitalized into property values and lower resale prices.[12] Second, limiting eligibility to homeowners may ease the administration of an assistance program that uses the housing cost approach to measuring the cost burden of flood insurance. It is relatively straightforward conceptually (even though burdensome to policyholders and administratively expensive) to identify flood insurance cost burdens for homeowners.

The targeting of assistance for renters would require developing estimates of the percentage of rent attributable to the cost of flood insurance passed forward to tenants.[13] It will be especially challenging when renters are residents of multi-family buildings and a single premium is paid for the entire building. There are over 233,000 such buildings across the nation (about 25% of all pre-FIRM polices; see Chapter 5), and there are areas, especially urban locations, where there are likely to be concentrations of such buildings. Although the most straightforward approach would be to base assistance on total rental housing costs, such an approach would probably provide assistance for housing costs that have nothing to do with flood insurance premiums. Some states that have property tax circuit breaker programs[14] provide property tax assistance to renters on the basis of the

[12]Resale prices may reflect the market's assumptions regarding future premium levels. Eliminating a premium subsidy reduces resale value by the increment of value that reflects the subsidy. However, the economic impact on the seller is essentially the same as the impact of the future higher insurance premiums if the property had not been sold. The former is merely the capitalized value of the latter. In short, the so-called asset value shock is not different from the shock of higher premiums extending into the future. In contrast, in the absence of a sale, reduced property value.

[13]Renters can pay directly for flood insurance covering their personal possessions and already pay NFIP risk-based rates for contents coverage. However, they still would be affected by elimination of pre-FIRM subsidized rates and grandfathering provisions if increased premiums on structures were passed along as rent increases.

[14]Programs in which state governments provide property tax refunds to those whose property taxes are deemed too high. For more information see http://www.cbpp.org/cms/?fa=view&id=51.

assumption that a portion of their rent (typically 15-35%) is attributable to property taxes paid by landlords (Anderson, 2012). Similar reasoning could be used in providing assistance to ease flood insurance cost burdens borne by renters, but it would still require much analysis to determine the percentage of the rent that is attributable to flood insurance costs.

Eligibility Based on Household Income

As in some of the housing assistance programs described earlier, policymakers designing a flood insurance assistance program might seek to provide greater assistance to households of low or low-to-moderate income. Although policymakers can use the income approach to measuring cost burden to target assistance to any particular income class (such as households whose income is below 50% of the area median), they can do that with the other two cost burden approaches only by making income a separate eligibility criterion or by basing assistance amounts on income (see Decision 4 below: How Much Assistance Will Be Provided?). As noted previously, the capped premiums approach takes no account of household income, whereas the housing cost approach identifies as cost burdened households whose housing costs, including flood insurance, exceed a specified percentage of their income. With both approaches, eligibility for assistance among cost-burdened households could be further restricted to households that, for example, have low-to-moderate incomes.[15]

Eligibility Based on Mitigation

FEMA-approved methods of mitigation of flood risks to insured properties could be used to reduce insurance premiums (discussed in greater detail in Chapter 7). To reduce any disincentive to mitigate and, more generally, encourage mitigation, the performance of specified mitigation activities could be a requirement for eligibility to receive flood insurance assistance.[16] As will be discussed in Chapter 7, the reduction in risk attributable to mitigation could be reflected in reduced premiums.

[15]If such a provision were adopted, administrative burden and costs could be reduced for some households through the use of adjunctive eligibility, that is, automatic eligibility for flood insurance assistance based on participation in another means tested assistance program, such as SNAP.

[16]Assistance for undertaking mitigation activities is discussed under Decision 2: What Assistance Will Be Provided? and in Chapter 7.

Eligibility Based on Community Characteristics

All the eligibility criteria discussed so far pertain to characteristics of individual households—whether the household is cost burdened, whether it has paid a pre-FIRM subsidized or grandfathered premium, and so forth. However, community characteristics also can be considered as eligibility criteria for individual households, restricting or expanding the eligible pool.[17]

One criterion that would reflect a concern for the effects of increased premiums on neighborhood vitality would be the prevalence of households whose premiums become cost burdensome when pre-FIRM subsidies and grandfathering are eliminated. Households that benefitted from such subsidies and grandfathering might be especially prevalent in some communities whose vitality could be threatened by the elimination of pre-FIRM subsidies or grandfathering. Policymakers could make all households in a community eligible for assistance if a specified (or higher) percentage of them would likely be eligible on the basis of their individual circumstances. In addition to protecting the vitality of a community, this eligibility criterion could reduce administrative burden and costs by removing the need to establish eligibility of every household, as discussed further under Decision 6: How Will an Assistance Program Be Administered?[18]

Another potential eligibility criterion could be the engagement of state and local governments in certain mitigation activities. Activities that have been or could be undertaken are discussed in detail in Chapter 7. This criterion could provide an incentive to undertake mitigation and promote cost sharing of efforts to reduce premiums and enhance the affordability of flood insurance (an issue discussed under Decision 5: Who Will Pay for Assistance?).

As suggested by this discussion, household and community characteristics can be used jointly to determine eligibility. For example, assistance could be provided to cost-burdened households only if they are in communities where the prevalence of cost-burdened households is high, concentrating assistance where it is judged to be most needed.

[17]Availability of NFIP flood insurance to property owners in a community is already conditioned on the community's willingness to adopt and enforce various regulations to reduce vulnerability to flooding (for example, requirements to elevate new construction to the elevation of the 100-year flood).

[18]National school meals programs have special provisions that allow districts to serve free meals to all students in schools in low-income areas without certifying the eligibility of individual students for free meals.

Decision 2: What Type of Assistance Will Be Provided?

In addition to specifying criteria for determining whether a property owner or renter is eligible for assistance, policymakers must identify the form(s) in which assistance will be provided. Two broad types of assistance that might be made available to individual property owners or renters are

- *Premium assistance* that directly reduces the amount that a property owner or renter pays for flood insurance,
- *Mitigation assistance* that indirectly reduces the amount that is paid by helping a property owner to finance mitigation activities that reduce risk in ways that will be reflected in a lower insurance premium.

Decision 3: How Will Assistance Be Provided?

Premium or mitigation assistance can be delivered in many ways. Discussion of a variety of options is presented in Chapter 7; the focus here is on application burden and administrative costs of an assistance program. Providing premium assistance at the time of purchase, for example, might ease the application burden on the property owner relative to some other modes of delivering assistance. However, with any mode of delivering assistance, administering premium assistance to a specific group of property owners might entail substantial costs if extensive efforts are required to verify eligibility. That might suggest providing assistance through an existing administrative process. For example, providing premium or mitigation assistance through an income tax credit could rely on existing tax compliance activities but would require changes in the tax code, tax forms, and return processing procedures. It also would impose a burden on property owners who are eligible for assistance but are not otherwise required to file tax returns.

Decision 4: How Much Assistance Will Be Provided?

In addition to determining who is eligible for assistance, policymakers must specify a formula or algorithm for calculating the amount of assistance for which an eligible property owner (or renter) qualifies. Different formulas or algorithms might be specified for premium and mitigation assistance. The methods selected to calculate assistance will reflect normative standards regarding the expected contribution of the property owner toward purchasing flood insurance or paying for mitigation and how the property owner's personal circumstances (such as household income and

housing expenses) affect the amount of assistance provided. Choices also will reflect the consideration of tradeoffs. For example, providing more generous assistance will make flood insurance more affordable and potentially increase takeup rates (see Chapter 4 for further discussion). However, it will also increase the total budget for the assistance program (for a given number of property owners receiving assistance).

The central input into a formula for calculating, for example, the amount of premium assistance might be the same measure of cost burden that is used to determine eligibility for assistance. If so, the amount of assistance could equal the entire cost burden or some proportion of it, where the proportion might vary with the property owner's household income or according to whether the property owner is required to purchase insurance, has undertaken mitigation activities, or is elderly or disabled. Concerns about burden or the administrative costs of providing assistance might lead to the specification of a guaranteed minimum amount of assistance provided to an eligible property owner. The minimum could be a fixed dollar amount, or a percentage of the NFIP risk-based premium. The amount of assistance might also be capped, for example, at a fixed dollar value, a percentage of the NFIP risk-based premium, or the difference between the NFIP risk-based premium and the premium previously paid under pre-FIRM subsidy or grandfathering provisions.

A related design question is the amount of assistance to provide if housing costs excluding flood insurance exceed whatever affordability standard has been adopted (for example, a household is cost burdened if housing costs are greater than 30% of income). In that case, the following questions must be addressed: Will the flood insurance assistance program be responsible for eliminating any of the cost burden that is not due to flood insurance? If a household is cost burdened in the absence of insurance, will the amount of assistance equal the entire NFIP risk-based premium? Or will the amount of assistance be capped if it is determined that the household could afford more expensive housing than the standard? If many households are in this situation, the eligibility criteria and assistance formula could be reviewed to assess, for example, whether the standard is too generous or does not appropriately reflect geographic differences in expenses or whether the measure of income used understates available resources.

In determining the amounts of assistance that will be provided, additional questions that arise pertain to the duration of assistance. Will assistance be provided indefinitely to a property owner who remains eligible under whatever criteria have been specified? Or will assistance be time limited? Will the formula or algorithm for calculating assistance amounts

reflect the number of years for which assistance has been provided to a property owner, potentially reducing the amount of assistance over time?[19]

In addition to considering whether to limit eligibility or assistance amounts on the basis of the duration of assistance, policymakers will need to consider how year-to-year variation in the amount of assistance might affect a property owner's decisions to purchase flood insurance and maintain coverage. For example, should the eligibility criteria and formula or algorithm for determining assistance amounts be specified so that the amount of assistance provided to a property owner is relatively stable or, changes in a highly predictable way? In addition, how can such stability or predictability be obtained while maintaining a high degree of accuracy in targeting assistance to those most cost burdened by flood insurance premiums?

In deciding how much assistance will be provided to eligible property owners, an important question is whether premium or mitigation assistance will be an entitlement or will be limited by the amount appropriated by Congress. If assistance is considered to be an entitlement, anyone eligible will receive the full amount of assistance for which they qualify. If assistance is not an entitlement, it may be necessary to limit the amount of assistance provided so that the total for all recipients does not exceed what is available. One possible approach in such a case is a priority system that provides assistance to property owners on the basis of severity of the cost burden, income, whether the purchase of insurance is mandatory, elderly or disabled status, or other household or community characteristics; property owners at higher priority would receive assistance before property owners at lower priority. An alternative would be a pro rata reduction in all assistance awards that is based on the expected shortfall in available funds.

Making decisions about each of those matters may require development of formulas and algorithms that balance the different considerations in offering aid. With such complexity, it can be important to maintain as much "smoothness" as possible in the formula or algorithm (Zaslavksy and Schirm, 2002). Ideally, property owners facing similar circumstances receive similar amounts of assistance, and situations in which one property owner receives substantially less assistance than a property owner who has only slightly less income or slightly higher housing expenses and roughly the same flood insurance premium are avoided.

[19]Limitations on the duration of assistance could also be specified through eligibility criteria. For example, a property owner could become ineligible for assistance after a specified number of years or after receiving a specified total amount of assistance.

Decision 5: Who Will Pay for Assistance?

The decision about who pays for assistance entails two main choices. The first is the degree to which costs are borne by federal taxpayers versus NFIP policyholders who do not receive assistance but pay for assistance to others through a cross-subsidy (see Chapter 3). The second is the degree to which aid program costs are borne broadly (for example, nationally) versus more locally (by states, tribal nations, or communities) or are shared by federal and local governments.

One consideration in making the first choice is the capacity of policy holders who do not receive assistance to pay for assistance to other policyholders through premium surcharges or implicit loadings. That capacity will fall as the fraction receiving assistance or the average amount of assistance rises. A consideration is whether some who do not receive assistance might drop coverage if their premiums increase substantially to pay for this assistance. If the federal taxpayer is going to be paying for assistance, such payment will require congressional authorization and appropriation(s).

In determining how much of assistance costs to allocate nationally, versus locally, a relevant consideration is the incentive for local authorities to undertake mitigation efforts that broadly benefit residents in the community. There is a greater incentive to undertake such efforts if a greater share of the assistance costs is to be borne locally, in which case a local government can reduce its costs for assistance by undertaking mitigation activities that reduce premiums and the need for assistance.

Decision 6: How Will an Assistance Program Be Administered?

In administering a program of targeted assistance, policymakers must identify which entities are responsible for determining whether a property owner is eligible and how much assistance that property owner will receive under the established eligibility criteria and assistance formula or algorithm. In addition to the broad decisions that must be made about how to determine, for example, eligibility for assistance, many more detailed decisions will need to be made, including how to define a household, how to define income, how to treat a household's assets in determining its need for assistance, and whether to take into account the effects on unusually high nonhousing expenses (such as medical expenses) on household resources. Policymakers also will have to determine how the necessary data will be obtained from households (for example, through an application for assistance).

To enhance program integrity, policymakers may also specify procedures for monitoring the accuracy of eligibility and assistance award determinations, and designate an entity that will perform such functions.

Candidates for those various administrative activities include FEMA; HUD; state, local, and tribal government organizations; and private insurers that administer the write your own (WYO) flood insurance policy program (see List of Terms).

Another important consideration in determining how to administer one or more assistance programs is the balance between maximizing access among those who are eligible and minimizing administrative costs. Striking such a balance requires the tradeoff between the accuracy of targeting assistance and the cost of administration. Generally, to target means tested assistance, detailed data are needed on income, expenses, and other characteristics of individual households. Obtaining and processing such data are burdensome and costly. These activities can be prone to error, and it might be prudent to verify the accuracy of the data (on at least a sample basis), which entails another administrative cost.[20] Strategies that seek to minimize data needs include community eligibility options and homeowner eligibility based on extant public data.

One community eligibility option would be to make all homeowners in a community eligible for assistance if, for example, the community's poverty rate is sufficiently high, the median income is sufficiently low, or many homeowners that previously paid pre-FIRM subsidized or grandfathered premiums.[21] This approach will sacrifice some accuracy in targeting, providing assistance to homeowners who are not flood insurance cost burdened based on the basis of their individual circumstances and failing to provide assistance to cost-burdened homeowners in communities that are not eligible for assistance.[22] In addition, even if a community eligibility approach identifies exactly the homeowners to whom policymakers wish to provide assistance, a remaining challenge is to determine the amount of assistance that will be provided to each individual homeowner without data specific to each homeowner. Community eligibility also raises the issue of whether to define a community on the basis of census geography (described in Chapter 5) or jurisdictional boundaries. If, instead, eligibility were based on publicly available data on characteristics specific to individual homeowners, such

[20]For SNAP, a quality control system has been developed to monitor the accuracy of eligibility and benefit determinations. See http://www.fns.usda.gov/snap/quality-control.

[21]For such a community, it is assumed that the eligibility rate of individual homeowners would be sufficiently high to make it cost-effective to dispense with individual eligibility determinations; that is, the administrative cost savings would exceed the costs of providing assistance to the relatively few homeowners who would not be eligible on the basis of their own circumstances. As noted previously, national school meals programs have special provisions that allow districts to serve all students in schools in low-income areas without certifying student eligibility. This practice allows the districts to process fewer applications and thereby reduces administrative costs.

[22]If an entire community is ineligible for assistance, eligibility could be determined household by household, which would incur higher administrative costs.

as assessed property values, a homeowner could be eligible for assistance if their property values were less than a specific dollar amount or below a particular percentile for the community. Of course, if that criterion does not reflect a given homeowner's flood insurance cost burden and thus the need for financial help, assistance will not be accurately targeted.

Clearly, strategies that seek to minimize data needs have limitations. Nonetheless, some consideration of those approaches is warranted if for no other reason than to provide context for considering limitations of and justification for using more complex and costly approaches. In addition, it might be possible to use streamlined eligibility procedures in some areas, and more complex procedures elsewhere to strike a balance between the objectives of targeting and the goal of minimizing administrative costs.

SUMMARY

This chapter discussed concepts of affordability and presented a decision framework for designing assistance programs to make flood insurance more affordable—the affordability framework called for by recent legislation. The discussion of affordability describes three potential measures of the cost burdens imposed on households by NFIP premiums. In HFIAA 2014, Congress proffered a capped premiums measure, and suggested that a premium exceeding 1% of the insurance coverage is burdensome and thus unaffordable. A second measure of cost burden uses an income test, and identifies a flood insurance premium as unaffordable for any household whose income is below a specified threshold. A third measure considers not only a household's income but also its housing costs, and assesses the ratio of housing costs to income when the NFIP premium is added to other housing costs. If the ratio exceeds a specified value, the flood insurance premium is regarded as cost burdensome and therefore unaffordable. Those three measures reflect different subjective judgments about the cost burden of flood insurance premiums and about whether such premiums are affordable. More generally:

- **There are no objective definitions of affordability. Although the concept is substantially subjective, the choice of a definition can be informed by research evidence and experience in administering means-tested programs that, for example, provide housing and other assistance.**
- **There are many ways to measure the cost burden of flood insurance on property owners and renters. Policymakers have to select which measure(s) will be used in the NFIP for targeting assistance to enhance flood insurance affordability. This decision is not amenable solely to technical analysis.**

Choosing a cost burden measure, however, is not the only policy choice in designing a financial assistance program. The many considerations, and some policy options, in designing a means tested assistance program for an affordability framework are summarized in Figure 6.1.

- **To design a program that provides assistance in making flood insurance more affordable to NFIP policyholders, policymakers face several choices, including who will receive assistance, what type of assistance will be provided, how assistance will be provided, how much assistance will be provided, who will pay for assistance and how an assistance program will be administered.**

Not surprisingly, tradeoffs arise in making policy choices. For example, providing assistance to more policyholders will require cutting the average amount of assistance provided if the total cost of the assistance program is to be held steady. If instead, more generous assistance is provided, insurance takeup rates might increase, but the total cost of the assistance program might also increase and incentives to mitigate might decrease. As another example, in specifying eligibility criteria for assistance, more specific and accurate targeting of assistance based on policyholders' characteristics will require policyholders to provide more personal data, and this will increase the burden on policyholders and raise administrative costs of processing and verifying data provided.

- **The decisions that must be made in designing an affordability assistance program entail tradeoffs that will have to be resolved by policymakers.**

7

Policy Alternatives for an Affordability Strategy

This chapter begins with the premise that some households will face National Flood Insurance Program premiums that would be unaffordable if they had to pay NFIP risk-based premiums. As a result, some or all of those households might receive financial assistance. Whereas Chapter 6 discussed the full range of decisions that must be made by policymakers in designing assistance programs, this chapter focuses mainly on how assistance will be provided. It reviews three broad policy options for providing assistance:

- Direct financial assistance to policyholders. This could be for mitigation actions that reduce the cost of flood insurance or for the cost of premiums directly. The households would need to meet predefined eligibility and assistance criteria (as discussed in Chapter 6) before assistance is offered.
- Additional NFIP reforms, which could reduce the cost of flood insurance for all policyholders through changes to NFIP structure and requirements.
- Community-based programs.

DIRECT FINANCIAL ASSISTANCE TO POLICYHOLDERS

Assistance policies for individual policyholders can be related to implementing mitigation measures that lower premiums, directly subsidizing the annual cost of flood insurance premiums, or a combination of the two. The specific property owners receiving assistance would be determined by the

defined eligibility criteria and the amount of assistance received may vary among those eligible (see Chapter 6). The direct assistance options are discussed below, recognizing that an affordability program may include several of them simultaneously.

Targeted Mitigation Grants

Even if mitigation could be implemented by policyholders to reduce premiums, the cost of such actions may be a barrier to their adoption. Existing mitigation grant programs, paid for from general federal revenues, might be modified to overcome that barrier. Federal grant programs currently support mitigation (see Box 7-1). Two of them provide funding for

BOX 7-1
Programs for Mitigating Flood Damages

Two grant programs fund mitigation before a flood: the Pre-Disaster Mitigation (PDM) program and the Flood Mitigation Assistance (FMA) program. Annual funding for the PDM program since 2002 has ranged from $25 million (in 2002 and 2013) to $150 million (in 2003 and 2004). In FY 2014, $63 million was available for the program. The FMA program supports elevation, relocation, floodproofing (only for commercial structures), as well as demolition and rebuilding of property that received significant damage from a severe flood.

The FMA was created in 1994 to reduce insurance claims under the NFIP and is funded by the National Flood Insurance Fund.[1] In 2006 and 2007, FEMA received funding requests for the PDM that were 3 three times greater than funds available (McCarthy and Keegan, 2009). In 2013, FEMA received applications for more than twice the appropriations received for the FMA program (Garcia-Diaz, 2014).

There are two primary post-flood disaster programs: the Hazard Mitigation Grant Program (HMGP) administered by FEMA and the Community Development Block Grant Disaster Recovery (CDBG-DR) administered by HUD. Both programs require a presidential disaster declaration, and the CDBG-DR program requires a supplemental appropriations bill. For large disasters or multiple events in a single year, the HMGP usually receives supplemental funds to augment annual appropriations.

Following a disaster declaration, states and local governments can receive a portion of the total FEMA aid through the HMGP to fund long-term mitigation measures. If states have adopted a FEMA-approved Enhanced Mitigation Plan, they can receive a larger share of funds. The HMGP requires a 25% state match (CDBG dollars can be used for this purpose).

[1]See http://www.law.cornell.edu/uscode/text/42/4017 for details on the purposes and operation of the National Flood Insurance Fund.

mitigation before a disaster event occurs and two are targeted at areas that have experienced disasters by incorporating mitigation in the post flood rebuilding process. In all programs, states, tribes, or territories apply for the funding and if approved, funds are disbursed to local government or agency sub-applicants for use at individual properties. Reforms to target funds toward securing NFIP premium affordability for cost burdened households may be necessary.

Three ways of reforming mitigation grant programs to address affordability can be identified. First, mitigation projects must pass an engineering feasibility test and show that the benefits in the form of reduced future claims, net of premiums paid, exceed the costs of the mitigation. In 2013, FEMA issued a memorandum, which was based on review of 11,000 previous mitigation investments, that said that elevation or acquisition of structures (buyouts) in a Special Flood Hazard Area that cost less than $175,000 or $276,000, respectively, can be automatically considered to pass the benefit–cost test (memorandum from David Miller, FEMA Associate Administrator, Federal Insurance and Mitigation Directorate, to Regional Mitigation Division Directors and Hazard Mitigation Assistance Branch Chiefs, 2013[1]).

With that benefit-cost decision rule, a property owner who is paying pre-FIRM subsidized premiums and making large and frequent claims can receive mitigation assistance without regard to their ability to pay for his or her own mitigation. Once the provisions of BW 2012 and HFIAA 2014 have been fully implemented (the premise of this discussion), premiums will be NFIP risk-based. As a result, the difference between future claims and premium revenues (the benefit) would shrink for all properties. As the benefits of mitigation as currently calculated approach zero, the benefit–cost test would no longer be useful for establishing mitigation funding priorities. The benefit–cost criterion might be replaced with a means tested basis for prioritizing mitigation grant spending.

Second, an administratively simple assistance program would begin with eligibility criteria chosen by FEMA and Congress that can be used to identify a group of households that have pre-FIRM subsidized premiums and would be allowed to retain those premiums (or have premiums frozen at a level consistent with the household's ability to pay).[2] These same households then would be given priority for receiving mitigation grant funding as such funding becomes available. In this way, mitigation funds

[1]http://www.fema.gov/media-library-data/1382557637411-c1e5842153d2c957aabc0a09f008564c/PrecalcBenClarific_memo_508withsig.pdf.

[2]As long as this group of households pays less than NFIP risk-based rates, NFIP revenues for the group could fall below expected claims. Congress could consider continuing the HFIAA 2014 surcharge on all policies to cover this revenue shortfall, or could agree to pay claims made by households in this group from general revenues.

are targeted to those for whom the NFIP risk-based premium creates an affordability challenge. Once mitigation funding is received, a property owner would, consistent with BW 2012, pay NFIP risk-based premiums thereafter, although the owner may still quality for premium assistance (see discussion of vouchers).

Third, the post flood Hazard Mitigation Grant Program (HMGP) and the Community Development Block Grant Disaster Recovery (CDBG-DR program; see Box 7-1) could be used for elevating homes or instituting community measures that may alter the FIRM or increase standing in the Community Rating System (CRS; see Chapter 3 and discussion below). Because use of funds for those types of projects is at state and local government applicants' discretion, these applicants could design programs to direct mitigation assistance to low-income households that face the prospect of paying NFIP risk-based insurance premiums. In fact, a portion of the CDBG funds is directed to benefit primarily low-income or moderate-income households.[3] One challenge posed by relying on post flood mitigation grant programs is the delays experienced by state and community officials, as well as households, between submission of a grant application and the awarding of funds. That time delay can be substantial (for example, 18 months or longer), and additional time then is required for state and local government to provide funds to approved homeowners. If homeowners are trying to use funding for a mitigation action that will lower their insurance burden, the NFIP could offer the lower premium as soon as the mitigation project is approved for funding (even if the mitigation has not been implemented).

Mitigation Loans

Mitigation measures can have significant initial costs, but any reductions in annual NFIP premiums will occur later. Ideally, a household may consider a mitigation measure to be cost-effective if the reduction in annual premiums exceeds the initial cost of the mitigation measure. Even if the mitigation is deemed cost effective, mitigation grant funds may not be available and the household may have little access to funds for making the investment. For example,[4] suppose that a household faces a $4,000 NFIP

[3]The Department of Housing and Urban Development notes that this requirement can be met through uses of the funds in which the majority of beneficiaries have low or moderate income or through activities that benefit an area in which over half of the population is of low or moderate income. See https://www.hudexchange.info/cdbg-dr/cdbg-dr-eligibility-requirements.

[4]These suggested calculations suggest deliberative thinking on the part of the household, but (and as pointed out in Chapter 4) homeowners may focus primarily on benefits from investments in the short term, and thus place lower priority on future returns from their mitigation investment.

risk-based premium and could implement low-cost mitigation at a cost of $25,000 and that as a result the annual premium falls from $4,000 to $500 (an annual saving of $3,500). The $25,000 initial cost of mitigation, however, may be prohibitively expensive. Indeed, low-income households are unlikely to have the cash needed to make the investment and may not have access to a mitigation grant. If the household received a 20-year $20,000 loan at an annual interest rate of 3%, the annual loan payments would be $1,680. The NFIP premium would fall to $500 and the total annual cost for managing the household's flood risk would fall from $4,000 for the NFIP premium to $2,180—$500 for the NFIP premium plus $1,680 for the mitigation loan.[5] The household may be able to afford the $2,180 annual payment but not the $4,000 annual premium.[6]

Although a loan might appear to make financial sense, a low-income household may not have access to a private commercial loan. Funds might therefore be allocated to a federally backed loan program that is targeted to households that have little access to commercial credit. Also, the attractiveness of a loan depends on the interest rate. Interest rates currently are low and a loan program could offer low rates. If interest rates increase, the program might offer a below-market rate. Interest rate discounts and the need for federal loan guarantees given the possibility of high default rates make this a subsidy program that might be available only to homeowners who meet eligibility and assistance criteria on the basis of the considerations discussed in Chapter 6.[7]

Vouchers

This committee's task statement, as derived from BW 2012, identifies "means tested vouchers" for the NFIP as a specific means for providing assistance when NFIP risk-based premiums create a household affordability problem. Generally, a voucher is a certificate issued to an individual to

[5]The results shown in this illustrative example are specific to the estimates of dollar costs used for making this calculation. Therefore, no general conclusions about the benefits of a loan should be based on this single illustration.

[6]The loan can make the household financially better off each year that it resides in their home. However, the household may not intend to live in the home for the 20 years assumed in the example above. The loan, however, would be a lien on the property and the mitigation would be expected to increase the home's market value. If the property were sold, the outstanding balance of the loan would be paid off at closing.

[7]For example, the Small Business Administration has a low-interest disaster loan program for households that need funds to repair and rebuild, and it might be authorized to issue such loans. If any new federally backed loan program is to be implemented, it may need to be authorized by Congress and be designed according to tightly specified rules. Guidelines for setting up federally backed loan programs can be found at http://www.whitehouse.gov/sites/default/files/omb/assets/a129/rev_2013/pdf/a-129.pdf.

pay for all or part of a specific good or service. The funds to support a voucher program may come from general revenues. As an alternative, the NFIP may be permitted to impose a surcharge on all policies and use the revenues to provide vouchers to those eligible. Such a surcharge would need to be evaluated against the actuarial principle of minimizing cross subsidies (Chapter 3). In this application, the voucher would be provided to qualifying persons each year when the NFIP premium is due so that the allocated funds could be used to pay a portion of the cost of the premium. Each year, the household would be informed of the cost of the insurance and would apply for a voucher. Funds for offering the voucher would be made available on an annual basis with the amount based on the criteria discussed in Chapter 6.[8]

Ease of administration suggests offering the voucher through existing programs. One approach would allocate funds for the voucher to the Department of Housing and Urban Development through its existing means-tested housing assistance programs. Another possibility is that the NFIP might administer the program by offering a premium discount to those eligible and then transferring an amount equal to the difference between the NFIP risk-based premium and the discount to the NFIP reserve.

Annually issued vouchers could also be used to offset payments for mitigation loans. More specifically, if the property owner were offered a multi-year loan to invest in mitigation, the voucher could cover not only a portion of the resulting risk-based insurance premium, but the loan cost to make the package affordable. A 2014 study proposed using vouchers to cover both mitigation and insurance costs. It was concluded that such a program would probably be financially more attractive to both the property owner and the federal government than a voucher program that covered only the insurance cost, because the mitigation measures would lead to permanent reductions in expected NFIP payouts and hence lower insurance premiums (Kousky and Kunreuther, 2014).

Federal Tax Deductions and Credits

Oher ways to lower household costs of flood insurance premiums or mitigation investments that lowers premiums are through tax deductions and tax credits. A tax deduction reduces how much taxable income an individual must claim on his or her return. An example is the mortgage interest deduction, which allows property owners to deduct annual interest on their home loans from their income. In fact, tax deductions are used to help disaster victims. For example, for presidentially declared disasters, filers can

[8]Vouchers also could be extended at the discretion of Congress to those who voluntarily buy a policy and the costs borne by the federal government.

deduct some losses not covered by insurance or disaster aid. Eligibility for the deduction is means tested: filers must first subtract $100 and then 10% of their adjusted gross income from their losses (IRS, 2014a).

A tax credit, in contrast, directly reduces the amount of taxes owed. The benefit of a deduction is determined by the filer's marginal tax rate and by any constraints on the amount that is allowed to be deducted. The reduction in taxable income is also limited to taxpayers who itemize their deductions rather than taking the standard deduction. In 2011, just under 32% of taxpayers itemized their deductions (IRS, 2014b). A credit is independent of the tax bracket but benefits only those who owe taxes unless it is in the form of refundable tax credits, whereby a refund is given if the filer owes less tax than the credit. Two examples are the Earned Income Tax Credit and the First Time Homebuyer Credit. Credits generally provide greater financial assistance in that they lower the actual amount of taxes paid.

Table 7-1 shows deductions or credits that could be given to policyholders on the basis of the amount of premium paid and any other eligibility criteria for determining assistance to address affordability (discussed in Chapter 6).

Some arguments have been raised in favor of and against using the tax code for social policy. On the one hand, the tax code has been criticized for not being transparent, having uncertain effects on behavior, introducing economic distortions, and not appropriately targeting those in need of tax

TABLE 7-1 Effects of Tax Deductions and Credits on Affordability

	Premium	Mitigation
Credit	* Reduces taxes owed by premium paid (or portion thereof) * Would benefit only those owing tax, unless it is a refundable credit	* Reduces taxes owed by amount spent on qualifying mitigation activities (to address affordability would need to be activities that reduced premiums) * Would benefit only those owing tax unless it is a refundable credit
Deduction	* Reduces taxable income by premium paid (or portion thereof) * Would benefit only those paying income tax * Constitutes a higher benefit to persons having higher income	* Reduces taxable income by amount spent on qualifying mitigation activities * Would benefit only those paying income tax * Constitutes a higher benefit to persons having higher income

relief. Some also have contended that it is inappropriate to use the federal tax code to guide social policy. Those favoring use of the tax code maintain the IRS is in a good position to administer income-based policies and that some tax incentives produce better results and are more permanent than outlays (Stead, 2006).

In 2013, a bill entitled the Flood Mitigation Expense Relief Act was introduced. It offered a $5,000 tax credit to taxpayers (individuals or small businesses that had 50 or fewer employees) that undertook qualifying flood mitigation expenses, held an NFIP policy, owned property that faced premium increases, and had an elevation lower than base flood elevation (BFE), or was in a newly mapped high-risk area. Prior to passage of HFIAA 2014, the Flood Mitigation Expense Relief Act of 2013 was introduced. It included a tax credit of up to $7,500 for qualifying flood mitigation expenses for individuals or small businesses that held an NFIP policy (the credit would terminate in 2022). This bill delegated to FEMA the task of defining what flood mitigation expenses would qualify for the credit. To date, neither of these bills has been passed.[9]

Disaster Savings Accounts

Another disaster assistance option is a tax deductible disaster savings account. Pre-tax funds placed in such an account could be used to cover disaster damages, hazard mitigation investments and/or flood insurance premiums. In fact, the Disaster Savings Accounts (DSA) Act of 2014 would allow homeowners to contribute up to $5,000 annually to cover uninsured disaster damages that exceeded $3,000 for a state or federally declared disaster. Funds could also be used to cover investment in a list of mitigation measures specified in their bill. Funds could be contributed pre-tax, and amounts withdrawn for the designated uses would not be taxed.

The manner in which such accounts are most likely to contribute to NFIP affordability, however, may be to use them for covering homeowner expenses below the insurance policy deductible (Lehrer, 2007); this would encourage homeowners to purchase much less expensive coverage with higher deductibles. If a household could save $5,000 or $10,000 over time, it could purchase an NFIP policy that covers only damage above that threshold. As discussed in the section on higher deductibles (below), this would lower the cost of the NFIP premium.

[9]At the state level, South Carolina adopted a law in 2007 that provided an annual tax credit of up to $1,250 for property owners that pay more than 5% of their income toward flood insurance on the filers' legal residences. It is not refundable, so it benefits only those that owe taxes. A similar design could be used for a federal program of providing assistance through the tax code for those who are cost burdened by premium payments.

The financial benefit to a household would depend on its marginal tax rate: higher income households would obtain a larger absolute benefit than lower income ones. It also would not help those whose disposable income is insufficient to place funds into such an account. The costs to the federal government would be the foregone tax revenue; these costs could be calculated in a manner similar to that of other tax-preferred accounts, such as those for health care or retirement.

ADDITIONAL NFIP REFORMS

This section discusses actions that have been suggested in legislation or by stakeholders as a means of lowering premiums for all policyholders.[10] They include expanding the variety of mitigation measures, higher deductibles, designating the US Treasury as a reinsurer during catastrophic-loss years, enhancing the write your own (WYO) agent advisory role, reducing loadings for administrative costs, and eliminating mandatory purchase.

Expanding the Variety of Individual Mitigation Measures That Reduce Premiums

If mitigation actions[11] lead to lower damages and lower expected claims, they could make NFIP policies less expensive for households that implement them.[12] However, at the household level, there are only a few mitigation actions that might result in lower NFIP premiums. They include elevating a building above BFE, building a replacement structure above BFE on the same footprint, modifying the ground floor with wet floodproofing measures and moving all improvements and habitable areas up to the second floor, and, for nonresidential structures, dry floodproofing.[13]

As discussed in Chapter 3, NFIP premiums are based on the relation of

[10]BW 2012 Section 100232 asks FEMA to report on opportunities for private insurers to participate in the provision of flood insurance, either as primary insurers or as reinsurers. FEMA may include assessments of whether privatization might result in lower rates and premiums.

[11]The focus in this section is on ways to implement mitigation measures in single-family homes. Implementing these measures for multi-family units may be expensive and so may require community-wide action.

[12]Mitigation also may help reduce future uncompensated flood damages, and increase resilience of both the household and the community.

[13]Dry floodproofing—prohibiting water from entering a structure—below BFE is not allowed for residential buildings, except in communities that have been given an exception from FEMA for basements. It is not allowed in V zones. Wet floodproofing—using water resistant materials—may be allowed for small enclosed areas or if specified requirements are met and a variance is issued. For more details on floodproofing and the requirements under the NFIP, see https://www.fema.gov/national-flood-insurance-program-2/floodproofing.

the first floor to the BFE, so elevating the home can always result in lower premiums. Elevating a structure can be expensive, however, particularly for large slab structures. In fact, HFIAA 2014 requires the NFIP to consider mitigation measures other than elevating homes for reducing property insurance premiums.[14] One possible approach for single family households that may be more affordable than elevating a structure is low-cost retrofitting of structures that experience shallow water flooding. Studies of that topic date back to the 1960s (Sheaffer, 1960; Sheaffer et al., 1967; Laska, 1986; Laska and Wetmore, 1990, 2000; FEMA, 1999). FEMA has developed several handbooks for identifying mitigation measures and describing their implementation (see FEMA, 2007, 2012b, 2013c). The US Army Corps of Engineers has provided guidance on the topic (USACE, 2005), and FEMA recently refined its publication on low-cost retrofitting (FEMA, 2014c). Homes may realize substantial reductions in damages if shallow water flooding is reduced, which in turn could lead to reduced claims. One challenge for FEMA and the NFIP will be to determine whether shallow water flooding is the reason for the modest claims and, if so, to reflect low-cost retrofitting approaches in the rating tables for homes where shallow water flooding is likely.

For a broader set of mitigation measures, including shallow water flooding, to be considered in setting premiums, FEMA would need to develop data and analyses that would link the measures' expected reduction in losses to insurance premiums. A particular concern about the effectiveness of any such measures is how to ensure needed maintenance once they are implemented and the reliability of human actions to activate them during floods. Implementation rules and requirements would have to be promulgated for eligible flooding conditions, eligible structures, eligible mitigation measures, requirements for implementation, and the actuarial calculation of the reduction in flood insurance premiums that results from different retrofit measures.

Approximately $150 million was provided by Congress in 2014 for pre-disaster mitigation (see Box 7-1), but that funding allows for only 2,500 structures to be elevated if a $75,000/house cost estimate is used.[15] As one option for FEMA to consider, a portion of the grant funds could

[14]See Sections 14 and 26 of the act. Section 14 directs FEMA to carry out studies to estimate risk premium rates "based on consideration in part of the flood mitigation activities undertaken on a property, including differences in the risk due to land use measures, floodproofing, flood forecasting, and similar measures." Section 26 directs FEMA to issue guidelines for alternatives to elevation, to take them into account when calculating rates, and to inform homeowners about how they will affect their rates.

[15]The $75,000 figure admittedly may be low. The median building elevation costs of elevations through the FEMA mitigation program (2008—2013) was $166,000 (Ryan Janda, FEMA, personal communication, 2014).

be set aside for lower-cost alternative mitigation, and this would still leave FEMA pre-disaster and post-disaster mitigation funds to pay for elevating homes for which lower-cost alternatives may not be effective. That would allow a predictable source of funds for lower-cost mitigation.

Encouraging Selection of Higher Insurance Deductibles

As a general matter insurance premiums can be lowered if the purchaser chooses a higher deductible. In the case of flood insurance, the NFIP offered deductibles to homeowners that prior to BW 2012 ranged from $500 to $5,000. A 2010 study found that of the more than 1 million flood insurance policies in force in Florida in 2005, almost 80% of policyholders chose the lowest possible building deductible, $500, and around 18% chose the second-lowest deductible available, $1,000 (Kunreuther and Michel-Kerjan, 2009; Michel-Kerjan and Kousky, 2010). BW 2012 increased the minimum deductible and it is now $1,000.[16] Recent data show that 88% of the homeowners who have NFIP risk-based policies maintained the standard $1,000 (that is, the lowest) deductible. Of the pre-FIRM subsidized homeowners, 37% choose a $2,000 deductible, and 42% choose $1,000. Although those data show that people prefer lower deductibles, they also suggest that offering a higher deductible as a default may lead a sizable number to choose to keep that option—a finding consistent with a large number of empirical studies that show that people disproportionally prefer the default option (see Johnson et al., 2012).

In the case of flood insurance, if the standard deductible chosen was $5,000 instead of $1,000, the NFIP risk-based insurance premium for any residential structure in the SFHA would be reduced by 25% (FEMA, 2014b). For example, a household that was paying $4,000 for flood insurance with a $1,000 deductible would pay $3,000 if it took a $5,000 deductible. If a low-income household suffered a loss of $5,000 or less, however, it may have financial difficulty in covering the repair cost if it took the higher deductible. FEMA's Individual Assistance (IA) program does provide funds for losses incurred but are not covered because of the deductible. Although such households could potentially be assisted, receiving IA funding is not a certainty and in any case would not be received as quickly as payment for an insurance claim.

The choice of the amount of a deductible depends on a calculation that considers the future value of lower premiums against the possibility of bearing the cost of less damaging (and perhaps more frequent) flood events. Even with such a calculation, other considerations might go into that choice. In fact, the literature on this topic suggests that, for whatever

[16]Current deductibles are $1,000, $1,250, $1,500, $2,000, $3,000, $4,000, and $5,000.

reasons, insurance purchasers tend to choose lower deductibles (Cutler and Zeckhauser, 2004; Doherty and Schlesinger, 1983; Kunreuther, Pauly, and McMorrow, 2013; Sydnor, 2010).

For example, a 1983 study found that consumers choose the lowest deductible to be as fully protected as possible if they suffer a large loss (Doherty and Schlesinger, 1983). A "disappearing" deductible provides a rationale for a homeowner to take a larger deductible with a reduction in premium, knowing that the deductible will disappear if the loss is high enough. For illustration, if the flood damage exceeds $50,000 then the deductible disappears. The NFIP might offer a disappearing deductible, and, given that the NFIP claims data show relatively few large losses from floods, the increase in premium caused by offering such a policy would be small relative to the premium for a policy that has a low deductible. Whatever deductible amounts are offered by the NFIP, encouraging the consideration, if not the choice, of higher deductibles is a possible role for the WYO agent (the WYO agents' role in assisting homeowners is discussed in greater detail later in this chapter).

Rely on the US Treasury to Help Paying Claims in Catastrophic-Loss Years

Whether the NFIP can raise revenue to pay back the debt, build a reserve that can cover catastrophically high-loss years, and simultaneously promote takeup and keeping premiums at levels that would not require a substantial program of policyholder assistance remains an open question. Revisiting the original 1968 legislation (Chapter 2) that created the NFIP suggests one possible way to reconcile conflicting goals. The 1968 legislation established the US Treasury as a reinsurer for catastrophic-loss years: when total losses in any year exceeded a threshold level, the Treasury would provide the funds needed to honor claims that exceeded the threshold.

The logic at that time was that if the Treasury acted as reinsurer, NFIP risk-based premiums would be kept at reasonable levels to encourage purchase. In the contemporary context, proposing a similar role for the Treasury could be one option within a larger affordability context. It might work as follows. First, Congress could forgive all or a share of the current NFIP debt. Second, Congress could designate the US Treasury as reinsurer for the NFIP, as was the case in the original legislation. Specifically, Congress could explicitly state that when total annual losses in the program exceed some designated threshold (as an illustration, $2 to $6 billion, perhaps on the basis of the average of noncatastrophic historical claims years), the Treasury will provide funds to allow the NFIP to honor all the claims. The funds may be provided through the Disaster Relief Fund, and, if needed, by an emergency supplemental budget. Taken together, those

two actions could result in lower NFIP risk-based premiums, enhance affordability, and in turn lead to less spending for assistance. Congress would incur occasional costs by designating the US Treasury as the source of funds for payment of claims above the defined threshold in high-loss years but would not need to draw on the Treasury each year to provide assistance payments to policyholders who face unaffordable premiums.

Enhance the Write Your Own Agent Advisory Role

The WYO agent has the most direct and most frequent contact with property owners as the owner considers an NFIP purchase decision. There may be opportunities for the agent to play a new and creative role in providing residents in flood-prone areas with information on the risks they face and actions they can take to reduce future losses and make their premiums more affordable. More specifically, agents could provide data on the premium savings associated with investing in specific loss reduction measures (especially as new measures are considered in rating a property's risk), inform homeowners of mitigation programs, assist in obtaining mitigation loans and choosing the deductible, and so on.

For a WYO agent, providing those services would require additional work, new training, and new technology. FEMA could provide the necessary new training and technologic support. For example, Web-based and automated rating tables might allow a WYO agent to evaluate the effect of a mitigation action on premiums quickly, especially if the number of mitigation actions that affect premiums is increased. The cost of increased time to learn and then consult with clients may have to be compensated. The costs may increase WYO administrative charges, but FEMA may deem such additional costs to be justified. Whether the costs would be recovered through higher premiums is a matter to be determined.

In addition, because WYO agents and their companies are compensated as a percentage of the premium charged (for example, 15% of the premium to the agent), a different compensation structure that is not based on a percentage of the premium may be required.

Reducing National Flood Insurance Premium Administrative Cost Loadings in Premiums

The NFIP pays a portion of premium revenue to the WYO insurance companies to compensate them for writing policies, collecting premiums, and settling, paying, and defending claims. Reducing administrative costs could help lower premiums across the board but determining the effects of this option requires an understanding of the fees paid to WYO companies.

When those are examined, substantial reductions in premiums through lower WYO payments appear unlikely.

WYO companies receive an allowance that is composed of three categories: 15% of written NFIP premiums covers agent commissions; 2.3% of written NFIP premiums goes to voluntary-payment state premium taxes on WYO policies; and 12.5-13.5% of written premiums compensates insurance companies for their expenses. In addition, if WYO companies meet targets to increase the number of policies written, they can receive up to a 2% bonus.

There is little room to adjust commissions. The NFIP has entered into an agreement to pay state premium tax taxes (state insurance departments oversee the WYO companies). Those costs thus seem difficult to reduce. To determine how much insurers receive for expenses, the NFIP calculates a 5-year industry average of multiple property insurance lines and then adds an extra 1% to cover additional expenses for participating in a federal program.

Although the NFIP could potentially collect actual expense data from the approximately 85 WYO companies, the administrative cost of such data collection is nontrivial, and it is unclear how large the savings would be. A 2010 GAO report noted that a survey of six WYO companies found that payments from FEMA were 16.5% higher than actual expenses (GAO, 2010). That would be a reduction in administrative costs but not a very large one, so it is unlikely to address premium affordability issues substantially and, like some other measures discussed herein, would not be targeted specifically at cost-burdened households.

In exchange for processing claims, WYO companies receive reimbursement according to established formulas and additional reimbursement for any special handling expenses, such as litigation costs or engineering studies. Paying WYO companies according to the size of claims led to extraordinary payments to WYO companies in 2004 and 2005. In response, in 2008, FEMA used actual expense data to modify how it handles payments, considering actual costs incurred by the companies (GAO, 2009). Questions of administrative costs of the NFIP are still under review, but the costs to pay WYO companies may be modest in light of the time and cost involved.

Eliminating the Mandatory Purchase Requirement

Households that have mortgages from federally backed or regulated lenders and that are in a mapped SFHA are required to purchase flood insurance policies. Households that have received disaster assistance also

may be required to have flood insurance policies.[17] One way to eliminate the financial burden of NFIP premiums is to eliminate this requirement. If purchase were voluntary, those who could not afford the NFIP risk-based premiums would not have to incur the expense.

If the past is a guide, it is likely that takeup rates for policies could drop substantially if homeowners were not required to purchase them. The NFIP adopted the mandatory purchase in 1972 because 4 years after the NFIP was established in 1968, fewer than 200,000 flood insurance policies were in force nationwide (Pasterick, 1998). In addition, findings in the present report's Chapter 4 suggest that many households may not voluntarily purchase disaster insurance, even if they would not be cost burdened by it.

As a result, households would need to rely more upon their own resources for post-flood recovery. Households could potentially receive federal aid, although such aid is usually modest, uncertain, and delayed (see Kousky and Shabman, 2012). In addition, the presence of uninsured properties may reduce the resilience of a community in event of a flood disaster. For all these reasons (as noted in Chapter 2), increased takeup rates always have been a goal of Congress for the NFIP. As long as high takeup rates remain a program objective, the additional objective of making premiums affordable, even if there is a subsidy to some, is likely to be a more successful option than making all purchases voluntary.

COMMUNITY-BASED PROGRAMS

This section discusses an affordability strategy that depends on community-based measures of flood risk reduction. Flood hazards and flood insurance premiums can be reduced by a variety of measures, including the limiting of development in floodways, development of stormwater retention practices, construction of wetlands and other green infrastructure for water retention and enhanced drainage, and construction of levees, floodwalls, or dunes to control flood hazards (FEMA, 2013d). Flood risk management projects have been instituted across the nation in partnership with the US Army Corps of Engineers, but state and local funding alone can be used for such projects. Some community-level mitigation measures can lead to lower NFIP premiums through modifications to FIRMs or through the Community Rating System (CRS), discussed below.

[17] At times, federal disaster assistance may help victims with these costs. For example, many recipients of HUD assistance have low incomes and HUD grant funds can sometimes help to maintain flood insurance for these individuals (Tobin and Calfee, 2005). Similarly, state and local governments have at times used federal disaster aid dollars, such as FEMA Other Needs Assistance, to help cover the costs of flood insurance policies for recipients of the aid.

Community Mitigation Programs

HFIAA 2014 requires FEMA to recognize the effectiveness of communitywide and area-wide mitigation activities when setting insurance premium rates (Section 14) and to maintain updated maps for the communities that reflect mitigation actions (Section 27). Community-based efforts aim to direct resources to measures that may benefit clusters of structures, even multiple neighborhoods, while dispersing mitigation knowledge more broadly among community officials and residents.[18] A recent pilot project funded by FEMA and implemented by the Natural Hazard Mitigation Association engaged 10 communities that were actively involved in mitigation. The project, the Resilient Neighbors Network, emphasizes partnerships and recognition and rewards to motivate communities and regulatory and economic alignment (see Hayes, 2012). Many communities are working with FEMA to learn the best ways to promote and incentivize local risk reduction efforts and collaboration among communities. This effort demonstrates a commitment by FEMA to encourage self-initiated efforts in conjunction with their more prescribed CRS approach.

The Community Rating System

The CRS offers premium reductions for "community floodplain management activities that exceed the minimum NFIP requirements" to "reduce flood damage to insurable property, strengthen and support the insurance aspects of the NFIP and encourage a comprehensive approach to floodplain management" (FEMA, 2015). A community that has cost burdened households may take actions to increase flood hazard preparedness, which may result in reduced premiums, by participating in the CRS. For example, representatives of CRS communities in Louisiana have increased their CRS engagement since passage of BW 2012 by forming regional collaborative groups that meet regularly to share best practices for undertaking specified measures, especially ways to improve risk communication (personal communication, Monica Ferris, University of New Orleans, 2014). The regional groups have also transformed their CRS involvement into a community engagement approach. If this multi-community collaboration results in actions that earn additional points in the CRS program, more households may benefit from lower premiums. Some studies have found that CRS participation in various measures—such as open space protection, high elevation

[18]Community-based efforts also may help prepare for flood-related losses that are due to climate change impacts such as sea level rise and increased precipitation and increased severity of tropical storms. These challenges can be brought to the attention of communities through such community-based efforts as those described in this section, especially given the role of communities in land use regulations for floodplains and building codes.

requirements, and small flood control projects—has reduced flood claims and property damage (Brody et al., 2007; Michel-Kerjan and Kousky, 2010; Brody and Highfield, 2013).

Joining the CRS requires a community application. Requirements were modified in 2013, and some of these modifications of which were considered by some communities to be burdensome. For example, smaller communities with little GIS technical capability have difficulty in producing the detailed maps that FEMA requires to earn points for some activities (for example, improving a community's drainage capacity). The modest premium reduction achieved for the prescribed CRS actions and the small number of communities that have attained substantial rate improvements do not suggest that this program, given the costs of application, will contribute greatly to the affordability of flood insurance. A recent increase in interest in the CRS by many communities, however, suggests that they believe that the CRS will help to lower premiums, and that they may be willing to incur the CRS application costs.

Community Insurance Policies

Various reforms to the NFIP have been considered over the years. One is community-level insurance policies. A community insurance option would enable communities to purchase a group flood insurance policy on behalf of all properties that are at risk of flooding. The community would pay a single premium for the group policy and then recover the costs of the policy through special assessments levied on covered properties, most likely as an adjunct to the property tax. A FEMA report that evaluated NFIP reform options that were based on assessments by expert panels concluded that a community insurance option would substantially reduce exposure to flood hazards but that administrative challenges and political feasibility would need to be addressed (FEMA, 2011). Under HFIAA 2014, FEMA has been directed by Congress to examine and report on a community insurance option.

Community insurance would increase takeup rates by automatically insuring all members of a participating community. That could exacerbate, instead of lessen, affordability problems by forcing all members of a community to pay flood insurance premiums. That said, risk-based premiums could be coupled to premium reductions when communities or individuals engage in flood risk management activities that lead to higher adoption of flood mitigation measures. If the reduction in premiums incentivized greater adoption of hazard mitigation at a community level, such as encouraging communities to move up through the CRS program discussed in the previous section, it would translate into lower insurance costs for all residents—but again the reduction in premiums may not be sufficient

to address affordability issues. Community insurance could shift the issue of affordability to the local level and let each community address it in the way that it sees fit; this could be achieved through cross-subsidizations in the assessments of premiums or by using other community funds to offset high premiums for low-income and moderate-income households. And, of course, community insurance could be combined with other programs discussed in this section.

SUMMARY

BW 2012, Section 100236, as well as HFIAA 2014, focus on affordability of insurance rates motivate the development of affordability policy options. Chapter 6 discussed the array of decisions that must be made by policymakers, and this chapter has focused on options for assisting individual policyholders or entire communities. Although the options are discussed separately, a subset of them could be implemented simultaneously. The options can be combined in different ways; for example, mitigation loans may be reserved for low-cost mitigation actions. Options may have conditions attached to them; for example, eligibility for a voucher for assistance in paying a premium may include a requirement to implement mitigation actions.

- **The NFIP can strive for risk-based premiums while addressing affordability by implementing a combination of policy measures, including means tested mitigation grants, mitigation loans, vouchers, and encouragement of higher premium deductibles.**
- **Reforms to mitigation grant programs can be implemented so that means testing, as a replacement for the current benefit-cost test, is the basis for setting priorities for mitigation grant spending.**
- **A mitigation loan can make it financially attractive and feasible for low-income residents to invest in mitigation measures without having to rely on mitigation grants.**
- **Vouchers are an administratively simple way to direct payments to cost burdened policyholders for use in paying premiums or for offsetting mitigation costs.**
- **The few mitigation measures that result in lower NFIP premiums tend to be expensive, such as elevating homes. As a result of BW 2012, FEMA will consider whether lower-cost mitigation of structures will result in lower premiums. Determining the effect of lower-cost mitigation on NFIP risk-based rates will require additional analyses.**
- **If Congress authorized supplements from the Treasury to be used for making NFIP claim payments in catastrophic-loss years, this could**

allow lower NFIP risk-based premiums and, in turn, less spending for assistance.

- **Some policies that have been advanced to lower NFIP risk-based premiums for cost burdened households either will not have that effect, or may not be easily accessed by cost burdened policyholders. These include reducing administrative fees, disaster savings accounts, and income tax credits and deductions.**
- **Community measures can lower insurance premiums through mitigation actions that benefit clusters of structures and through the CRS. These might be particularly important in mitigation related to multi-family properties.**

8

Future Work

In Section 100236 of the Biggert-Waters Flood Insurance Reform Act of 2012, Congress directed FEMA to cooperate with the National Academy of Sciences on an affordability study. Section 100236 referred to another section of BW 2012, which called on FEMA to develop an "affordability policy framework" and affordability policy options to mitigate adverse effects of premium increases. These affordability policy options were to be evaluated as part of the Section 100236 study. Section 9 of the Homeowner Flood Insurance Affordability Act of 2014 (HFIAA 2014) further emphasized the interest of Congress in having FEMA submit concepts for an affordability framework, and added time and resources to support the national affordability study called for in Section 100236 of BW 2012.

This is the first of two reports from the National Research Council Committee on the Affordability of National Flood Insurance Program Premiums. It describes policy options that might be part of an affordability strategy. The second report will propose analytical procedures with which FEMA might conduct an analysis of those options. This concluding chapter summarizes briefly this report's key findings in light of objectives for Report 2.

The objective of BW 2012 was to yield NFIP risk-based premiums for all policies and an NFIP financial structure that would avoid large future

debt.[1] Provisions of BW 2012 that were expected to achieve those results, and the history of those efforts, were discussed in Chapters 2 and 3. The elements of the affordability framework mentioned in BW 2012 and stressed in Section 9 of HFIAA 2014, called for actions that could provide assistance to households for which NFIP risk-based premiums would be unaffordable. The concern for affordability was motived by two situations that were expressed in testimony and constituent letters after BW 2012 began to be implemented. The first cause for concern was that NFIP risk-based premiums might impose unaffordable costs on some property owners (and renters) that were mandated to purchase flood insurance and that where there were concentrations of such properties (Chapter 5), financial stresses on individual households may have effects on the economy of a neighborhood or community. A second cause for concern was that higher premiums might result in greater noncompliance with the mandatory purchase requirement and discourage voluntary purchase (Chapter 4).

This committee's second report will describe an analytic protocol(s) that FEMA could employ to simulate effects of different affordability policies on NFIP and on policyholders. The policy alternatives that FEMA might evaluate can be developed by applying the framework for organizing the decisions that must be made in designing an assistance program (Chapter 6) and policy alternatives (Chapter 7). Chapter 7 presented policy alternatives that have been suggested by others or that the committee has developed that could enhance affordability of flood insurance. Some of the options are mitigation actions that would lower risk and thus lower premiums. Other options directly reduce amounts paid for insurance premiums.

The committee's Report 2 will propose a procedure(s) for FEMA to use in conducting a national analysis of affordability policy options. A premise of Report 2 will be that NFIP risk-based premiums will be paid by all policyholders. Therefore, assistance policy options will be formulated for illustration as necessary to describe the computational and data needs for assessing the full array of policy options that FEMA may consider. One example of an affordability policy option is the combination of NFIP risk-based premiums for all, with means-tested vouchers for premium assistance funded by surcharges on all policies. Another example is the combination of NFIP risk-based premiums for all, with means-tested mitigation grants funded by general federal revenues for the most cost-effective (premium reducing) mitigation actions.

For any policy option, analytical procedures must be capable of esti-

[1]HFIAA 2014 reinstated grandfathering and changed when some households that were paying pre-FIRM subsidized premiums would pay NFIP risk-based premiums. HFIAA 2014 made no other changes to sections of BW 2012 that affected premiums. The present report presumed full implementation of BW 2012 as envisioned originally.

mating effects on different objectives. The set of objectives will be derived from the specific language of BW 2012 and HFIAA 2014 and from the present report. Evaluation objectives will include the following:

- The number of households subject to mandatory insurance purchase and are cost burdened by paying NFIP risk-based premiums
- The total of NFIP premiums and surcharges less claims paid and administration costs for a specified period (net program revenue)
- Total federal outlays for payments to cover NFIP net revenue "shortfall," for premium assistance, for federal share of mitigation cost, and for post-flood aid for a specified period
- Number of policies in force (takeup rate)

In its second report, which will be issued later in 2015, the committee will report on the costs for FEMA to implement the protocol(s), in consideration of computational needs, access to available data, and a sampling strategy for collecting data that is not now available. To refine the descriptions of data needs and costs, the analytic protocol(s) will be tested as a proof-of-concept by using data and readily available analytic platforms that are available from the North Carolina Department of Public Safety.

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List of Terms*

*Indicates that a definition is taken, with minor editing, from the Federal Emergency Management Agency Website.[1]

The terms are ordered so that each definition(s) builds on a previous definition(s) and thus are not listed alphabetically as in a glossary.

Flood*: A general and temporary condition of partial or complete inundation of normally dry land area.

Floodplain*: Any land area susceptible to being inundated by water from any source.

Flood frequency: Probability, expressed as a percentage, that a given flood stage elevation will be equaled or exceeded in any given year.

Direct physical loss by or from flood*: Loss of or damage to insured property caused directly by a flood.

Flood risk: The expected direct physical loss (flood damage) in any year from a range of floods with a specified frequency.

1% annual chance flood*: A flood stage elevation that has a 1% chance of being equaled or exceeded in any given year; also known as a 100-year flood or base flood.

[1]https://www.fema.gov/national-flood-insurance-program/definitions#P.

Mitigation*: Action to reduce or prevent future damage, preferably before a disaster strikes (see Floodplain management).

Floodplain management*: The operation of an overall program of corrective and preventive measures for reducing flood damage, including an emergency preparedness plan, flood-control works, and floodplain management ordinances (see Mitigation).

Community*: A political entity that has the authority to adopt and enforce floodplain ordinances (engage in mitigation) for the area under its jurisdiction as a requirement of the National Flood Insurance Program. In most cases, a community is an incorporated city, town, township, borough, or village or an unincorporated area of a county or parish.

Flood hazard boundary map*: Official map of a community issued by FEMA on which the boundaries of the flood, mudflow, and related erosion areas of varying flood risk have been designated.

Special flood hazard area*: The land in the floodplain within a community that is subject to a 1% or greater chance of flooding in any given year. Also called the regulatory floodplain.

Base flood elevation*: The elevation of surface water resulting from a flood that has a 1% chance of occurrence in any given year.

Negatively elevated structure*: A structure in the Special Flood Hazard Area with a ground floor elevation below the BFE.

National Flood Insurance Program flood zone*: A geographical area shown on a Flood Hazard Boundary Map or a Flood Insurance Rate Map that reflects the severity or type of flooding in a Special Flood Hazard Area. Zones associated with the letter A refer to flood elevations associated with the 1% annual chance flood. Zones associated with the letter X have a lower flood risk than those associated with the A zone. V zones are areas where the Base Flood Elevation also includes storm surge and wave effects.

Flood insurance rate map*: Official map of a community on which FEMA has delineated Special Flood Hazard Areas, Base Flood Elevations, and risk premium zones applicable to the community.

Map Revision*: A change in the Flood Hazard Boundary Map or Flood Insurance Rate Map for a community that reflects revised zone, base flood, or other relevant information.

Pre-FIRM building*: A building constructed or substantially improved on or before December 31, 1974, or before the effective date of the initial Flood Insurance Rate Map of the community, whichever is later.

Subsidy: Direct financial assistance intentionally given to a business or individual and paid from general government revenues.

Cross-subsidy: Direct financial assistance intentionally given to a business or individual by using a good or service paid for by charging higher prices to other users of the good or service.

Actuarial pricing principles: A set of guidelines recognized by professional actuaries as guides for setting premiums. A rate should reflect the expected value of future claims, provide for all the costs of risk transfer (insurance program administration), and provide for all costs associated with individual risk transfer by trying to avoid cross-subsidization among policyholders. If those three principles are met, premiums should not be excessive, inadequate, or unfairly discriminatory (American Academy of Actuaries, 2012).

National Flood Insurance Program servicing agent*: A corporation, partnership, association or any other organized entity that contracts with FEMA to service insurance policies as direct business.

Write-Your-Own program*: A cooperative undertaking of the insurance industry and FEMA that began in October 1983. It operates within the context of the NFIP and involves private insurance carriers that issue and service NFIP policies.

Rating: The guidance used by an NFIP servicing agent to calculate the premium for a specific property. The guidelines are in NFIP rating tables and are used to estimate premiums on the basis of various characteristics, NFIP flood zone locations, elevations, and coverage levels.

Elevation certificate*: A certificate that verifies the elevation data on a structure on a given property relative to the ground level. It is used by local communities and builders to ensure compliance with local floodplain management ordinances and is also used by insurance agents and companies in setting premiums for flood insurance policies.

NFIP risk-based premium: The premium for a group of policies that, as legislative and administrative constraints allow, will meet actuarial pricing guidelines.

Pre-FIRM subsidized premium: A premium made available to owners of properties that were located in a Special Flood Hazard Area before the first Flood Insurance Rate Map for the community was issued. The rate per $1,000 of coverage for the first $60,000 of coverage is less than the NFIP full-risk rate. There is no cross-subsidization in the NFIP full-risk rating table to offset the loss of premiums revenues due to the lower than NFIP full-risk premiums.

Grandfathered premium*: A premium for a post-FIRM building that was constructed in compliance with the floodplain management regulations in effect at the start of construction. Such a premium will continue even if a FIRM revision results in a higher Base Flood Elevation. There is a cross-subsidization in the NFIP full-risk rating table to offset the loss of premium revenues due to the lower than NFIP full-risk premiums.

Community Rating System (CRS)*: A program developed by FEMA to provide incentives for communities that have gone beyond the minimum NFIP floodplain management requirements and developed extra measures to provide protection from flooding.

Community Rating System discounted premiums: Discounted premiums reduced from NFIP full-risk premiums that are available for some properties in a community if the community adopts one or more NFIP flood risk management actions. The discount varies with the community actions and is available to properties that would be paying NFIP full-risk premiums and are in a Special Flood Hazard Area. There is cross-subsidization in the NFIP full-risk rating table to offset the loss of premium revenues due to the lower than NFIP full-risk premiums.

Mandatory purchase*: The requirement, under the provisions of the Flood Disaster Protection Act of 1973, that individuals, businesses, and others buying, building, or improving property that is located in identified Special Flood Hazard Areas in participating communities to purchase flood insurance as a prerequisite for receiving any type of direct or indirect federal financial assistance (for example, any loan, grant, guaranty, insurance, payment, subsidy, or disaster assistance), if the building or property is the subject of or security for such assistance.

Takeup rate: Ratio of the number of properties that have NFIP flood insurance policies to the number of eligible properties. Takeup rate can be affected by the mandatory purchase requirement and by voluntary purchase decisions of property owners and renters.

Appendix A

Section 100236 – Biggert-Waters Flood Insurance Reform Act of 2012

SEC. 100236. STUDY OF PARTICIPATION AND AFFORDABILITY FOR CERTAIN POLICYHOLDERS

(a) FEMA STUDY.—The Administrator shall conduct a study of—
(1) methods to encourage and maintain participation in the National Flood Insurance Program;
(2) methods to educate consumers about the National Flood Insurance Program and the flood risk associated with their property;
(3) methods for establishing an affordability framework for the National Flood Insurance Program, including methods to aid individuals to afford risk-based premiums under the National Flood Insurance Program through targeted assistance rather than generally subsidized rates, including means-tested vouchers; and
(4) the implications for the National Flood Insurance Program and the Federal budget of using each such method.
(b) NATIONAL ACADEMY OF SCIENCES ECONOMIC ANALYSIS.—To inform the Administrator in the conduct of the study under subsection (a), the Administrator shall enter into a contract under which the National Academy of Sciences, in consultation with the Comptroller General of the United States, shall conduct and submit to the Administrator an economic analysis of the costs and benefits to the Federal Government of a flood insurance program with full risk-based premiums, combined with means-tested Federal assistance to aid individuals who cannot afford coverage, through an insurance voucher program. The analysis shall compare the costs of a program of risk-based rates and means-tested assistance to the

current system of subsidized flood insurance rates and federally funded disaster relief for people without coverage.

(c) REPORT.—Not later than 270 days after the date of enactment of this Act, the Administrator shall submit to the Committee on Banking, Housing, and Urban Affairs of the Senate and the Committee on Financial Services of the House of Representatives a report that contains the results of the study and analysis under this section.

(d) FUNDING.—Notwithstanding section 1310 of the National Flood Insurance Act of 1968 (42 U.S.C. 4017), there shall be available to the Administrator from the National Flood Insurance Fund of amounts not otherwise obligated, not more than $750,000 to carry out this section.

Appendix B

Homeowner Flood Insurance Affordability Act of 2014 – Section 16

SEC. 16. AFFORDABILITY STUDY AND REPORT

(a) STUDY ISSUES.—Subsection (a) of section 100236 of the Biggert-Waters Flood Insurance Reform Act of 2012 (Public Law 112–141; 126 Stat. 957) is amended—
(1) in paragraph (3), by striking "and" at the end;
(2) in paragraph (4), by striking the period at the end and inserting a semicolon; and
(3) by adding at the end the following new paragraphs:
"(5) options for maintaining affordability if annual premiums for flood insurance coverage were to increase to an amount greater than 2 percent of the liability coverage amount under the policy, including options for enhanced mitigation assistance and means-tested assistance; "(6) the effects that the establishment of catastrophe savings accounts would have regarding long-term affordability of flood insurance coverage; and "(7) options for modifying the surcharge under 1308A, including based on homeowner income, property value or risk of loss."
(b) TIMING OF SUBMISSION.—Notwithstanding the deadline under section 100236(c) of the Biggert-Waters Flood Insurance Reform Act of 2012 (Public Law 112–141; 126 Stat. 957), not later than 18 months after the date of enactment of this Act, the Administrator shall submit to the full Committee on Banking, Housing, and Urban Affairs and the full Committee on Appropriations of the Senate and the full Committee on Financial Services and the full Committee on Appropriations of the House of Rep-

resentatives the affordability study and report required under such section 100236.

(c) AFFORDABILITY STUDY FUNDING.—Section 100236(d) of the Biggert-Waters Flood Insurance Reform Act of 2012 (Public Law 112–141; 126 Stat. 957) is amended by striking "$750,000" and inserting "$2,500,000."

Appendix C

Section 100236 – Biggert-Waters Flood Insurance Reform Act of 2012 as Modified by HFIAA 2014, Section 16

SEC. 100236. STUDY OF PARTICIPATION AND AFFORDABILITY FOR CERTAIN POLICYHOLDERS

(a) FEMA STUDY
The Administrator shall conduct a study of — (1) methods to encourage and maintain participation in the National Flood Insurance Program; (2) methods to educate consumers about the National Flood Insurance Program and the flood risk associated with their property; (3) methods for establishing an affordability framework for the National Flood Insurance Program, including methods to aid individuals to afford risk-based premiums under the National Flood Insurance Program through targeted assistance rather than generally subsidized rates, including means-tested vouchers; (4) the implications for the National Flood Insurance Program and the Federal budget of using each such method; (5) options for maintaining affordability if annual premiums for flood insurance coverage were to increase to an amount greater than 2 percent of the liability coverage amount under the policy, including options for enhanced mitigation assistance and means-tested assistance; (6) the effects that the establishment of catastrophe savings accounts would have regarding long-term affordability of flood insurance coverage; and (7) options for modifying the surcharge under 1308A, including based on homeowner income, property value or risk of loss.
(b) NATIONAL ACADEMY OF SCIENCES ECONOMIC ANALYSIS
To inform the Administrator in the conduct of the study under subsection (a), the Administrator shall enter into a contract under which the National

Academy of Sciences, in consultation with the Comptroller General of the United States, shall conduct and submit to the Administrator an economic analysis of the costs and benefits to the Federal Government of a flood insurance program with full risk-based premiums, combined with means-tested Federal assistance to aid individuals who cannot afford coverage, through an insurance voucher program. The analysis shall compare the costs of a program of risk-based rates and means-tested assistance to the current system of subsidized flood insurance rates and federally funded disaster relief for people without coverage.

(c) REPORT

Not later than 270 days after the date of enactment of this Act, the Administrator shall submit to the Committee on Banking, Housing, and Urban Affairs of the Senate and the Committee on Financial Services of the House of Representatives a report that contains the results of the study and analysis under this section.

(d) FUNDING

Notwithstanding section 1310 of the National Flood Insurance Act of 1968 (42 U.S.C. 4017), there shall be available to the Administrator from the National Flood Insurance Fund, of amounts not otherwise obligated, not more than $2,500,000 to carry out this section.

Appendix D

Invited Guest Speakers at Committee Meetings

Federal Agencies

Thomas Hayes, Federal Emergency Management Agency, Washington, DC
Ryan Janda, Federal Emergency Management Agency, Washington, DC
David Miller, Federal Emergency Management Agency, Washington, DC
Andy Neal, Federal Emergency Management Agency, Washington, DC

Alicia Cackley, Government Accountability Office, Washington, DC
Pat Ward, Government Accountability Office, Washington, DC

Dan Hoople, Congressional Budget Office, Washington, DC

Todd Richardson, Department of Housing and Urban Development, Washington, DC
Josh Sawislak, Department of Housing and Urban Development, Washington, DC

Other Government Agencies

John Dorman, North Carolina Department of Public Safety, Raleigh
Katherine Grieg, New York City Mayor's Office, New York
Tim Trautman, Charlotte-Mecklenberg County, Charlotte, NC

Nonprofit and Trade Organizations

Chad Berginnis, Association of State Floodplain Managers, Madison, WI
Birny Birnbaum, Center for Economic Justice, Austin, TT
Steve Brown, National Association of Realtors, Washington, DC
Susan Gilson, National Association of Flood and Stormwater Management Agencies, Washington, DC
James Lynch, Insurance Information Institute, New York, NY
Frank Nutter, Reinsurance Association of America, Washington, DC
Tabby Waqar, National Association of Home Builders, Washington, DC

Research Organizations

Craig Colten, The Water Institute of the Gulf, Baton Rouge, LA

Appendix E

NFIP Flood Designations

Moderate to Low Risk Areas

In communities that participate in the NFIP, flood insurance is available to all property owners and renters in these zones:

ZONE	DESCRIPTION
B and X	Area of moderate flood hazard, usually the area between the limits of the 100-year and 500-year floods. Are also used to designate base floodplains of lesser hazards, such as areas protected by levees from 100-year flood, or shallow flooding areas with average depths of less than one foot or drainage areas less than 1 square mile.
C and X	Area of minimal flood hazard, usually depicted on FIRMs as above the 500-year flood level.

High Risk Areas

In communities that participate in the NFIP, mandatory flood insurance purchase requirements apply to all of these zones:

ZONE	DESCRIPTION
A	Areas with a 1% annual chance of flooding and a 26% chance of flooding over the life of a 30-year mortgage. Because detailed analyses are not performed for such areas; no depths or base flood elevations are shown within these zones.

continued

AE	The base floodplain where base flood elevations are provided. AE Zones are now used on new format FIRMs instead of A1-A30 Zones.
A1-30	These are known as numbered A Zones (e.g., A7 or A14). This is the base floodplain where the FIRM shows a BFE (old format).
AH	Areas with a 1% annual chance of shallow flooding, usually in the form of a pond, with an average depth ranging from 1 to 3 feet. These areas have a 26% chance of flooding over the life of a 30-year mortgage. Base flood elevations derived from detailed analyses are shown at selected intervals within these zones.
AO	River or stream flood hazard areas, and areas with a 1% or greater chance of shallow flooding each year, usually in the form of sheet flow, with an average depth ranging from 1 to 3 feet. These areas have a 26% chance of flooding over the life of a 30-year mortgage. Average flood depths derived from detailed hydraulic analyses are shown within these zones.
AR	Areas with a temporarily increased flood risk due to the building or restoration of a flood control system (such as a levee or a dam). Mandatory flood insurance purchase requirements will apply, but rates will not exceed the rates for unnumbered A zones if the structure is built or restored in compliance with Zone AR floodplain management regulations.
A99	Areas with a 1% annual chance of flooding that will be protected by a Federal flood control system where construction has reached specified legal requirements. No depths or base flood elevations are shown within these zones.

High Risk - Coastal Areas

In communities that participate in the NFIP, mandatory flood insurance purchase requirements apply to all of these zones:

ZONE	DESCRIPTION
V	Coastal areas with a 1% or greater chance of flooding and an additional hazard associated with storm waves. These areas have a 26% chance of flooding over the life of a 30-year mortgage. No base flood elevations are shown within these zones.
VE, V1 - 30	Coastal areas with a 1% or greater chance of flooding and an additional hazard associated with storm waves. These areas have a 26% chance of flooding over the life of a 30-year mortgage. Base flood elevations derived from detailed analyses are shown at selected intervals within these zones.

Undetermined Risk Areas

ZONE	DESCRIPTION
D	Areas with possible but undetermined flood hazards. No flood hazard analysis has been conducted. Flood insurance rates are commensurate with the uncertainty of the flood risk.

SOURCE: FEMA's Map Service Center, available online at https://msc.fema.gov/webapp/wcs/stores/servlet/info?storeId=10001&catalogI=10001&Id=-1&content=floodZones&title=FEMA%2520Flood%2520Zone%2520Designations [accessed March 2015].

Appendix F

Biographical Sketches of Committee Members

LEONARD A. SHABMAN, *Chair,* joined Resources for the Future in 2002 as a resident scholar after 3 decades on the faculty of Virginia Polytechnic Institute and State University. His research and communications efforts focus on programs and responsibilities for flood and coastal storm risk management, design of payment for ecosystem services programs, and development of evaluation protocols for ecosystem restoration and management projects, especially in the Everglades, coastal Louisiana and Chesapeake Bay. Among the specific topics related to those themes are applied research on permitting under Section 404 of the Clean Water Act, creating market-based incentives for water quality management and provision of ecosystem services, and design of collaborative water management institutions. He served for 8 years on the National Research Council Water Science and Technology Board, has chaired or been a member of several NRC committees, and has been recognized as an Associate of the National Academy of Sciences. Dr. Shabman holds a Ph.D. degree in agricultural economics from Cornell University.

SUDIPTO BANERJEE is professor and chair of Biostatistics at the University of California, Los Angeles. His research, dissertation advising and mentoring activities focus on statistical modeling and analysis of geographically referenced datasets, Bayesian statistics, the interface between statistics and geographical information systems, and statistical computing. He received a National Institutes of Health challenge grant in 2009. In the same year he was honored with the Abdel El Sharaawi Award of the International Environmetrics Society, and in 2011 received the Mortimer Spiegelman

Award of the American Association of Public Health. He is an elected fellow of the American Statistical Association and an elected member of the International Statistical Institute. Dr. Banerjee received his B.S. degree from Presidency College, an M.S. degree in statistics from the Indian Statistical Institute (both in Calcutta), and M.S. and Ph.D. degrees in statistics from the University of Connecticut.

JOHN J. BOLAND is an engineer and economist and is professor emeritus in the Department of Geography and Environmental Engineering of Johns Hopkins University. His fields of research include water and energy resources, environmental economics, benefit-cost analysis, and public utility management. Dr. Boland has studied resource problems in more than 20 countries, has published more than 200 papers and reports, and is a coauthor of two books on water demand management and three more on environmental management. He has served on several NRC committees and is a founding member and past chair of the Water Science and Technology Board. Dr. Boland received his Ph.D. degree in environmental economics from Johns Hopkins University.

PATRICK L. BROCKETT is the Director of the Risk Management and Insurance Program and the Gus S. Wortham Memorial Chair in Risk Management and Insurance of the University of Texas at Austin. He conducts research in risk management and insurance, financial risk, actuarial science, decision analysis, management science and operations management and research, statistical analysis, and business applications. Dr. Brockett is an elected member of the International Statistical Institute and a fellow of the Institute for Risk Management, the American Statistical Association, the Institute of Mathematical Statistics, and the American Association for the Advancement of Science. In 2006, he received the American Risk and Insurance Association Outstanding Achievement Award for furthering the science of risk management through promotion of education, research, and communication during his tenure as editor of the *Journal of Risk and Insurance*. He is the editor of the *North American Actuarial Journal*. Dr. Brockett received his B.S. degree in mathematics from California State University-Long Beach, and his M.S. and Ph.D. degrees in mathematics from the University of California, Irvine.

RAYMOND J. BURBY is professor emeritus of city and regional planning at the University of North Carolina at Chapel Hill. He is a fellow of the American Institute of Certified Planners and has received the biannual Distinguished Educator Award of the Association of Collegiate Schools of Planning. He is the author, coauthor, and editor of 14 books and more than 150 publications on hazard mitigation, environmental management,

and land use planning and management. Dr. Burby served as coeditor of the *Journal of the American Planning Association* from 1983–1988 and was an associate editor of the *Natural Hazards Review*. He has served on NRC committees on pipeline safety, dam and levee safety, and lessons from Hurricane Katrina. His research interests include federal and state hazard mitigation planning mandates, integration of hazard mitigation plans with local comprehensive plans, and improvements in code enforcement to create disaster resilient communities. Dr. Burby holds an A.B. degree in government from George Washington University and M.R.P. and Ph.D. degrees in city and regional planning from the University of North Carolina at Chapel Hill.

SCOTT A. EDELMAN is the director of the AECOM Water Resources team for North America. He has 32 years of experience devoted to flood insurance studies and floodplain mapping. Mr. Edelman has overseen AECOM's floodplain mapping and mitigation work for the Federal Emergency Management Agency and many state and local partners, including Georgia, Alabama, North Carolina, South Carolina, Mississippi, Maryland, and California. He was a contributor to such FEMA projects as the initial Multi-Year Flood Hazard Identification Plan, developing initial concepts for the Mapping Information Platform, and contributing to Guidelines and Specifications. He has managed riverine and coastal flood insurance studies for the last 23 years, including more than 15,000 digital Flood Insurance Rate Map panels, which represents approximately 10-15% of the floodplain maps in the nation. Mr. Edelman is a licensed professional engineer in five states. He served on the NRC Committee on Floodplain Mapping Technologies. He received his B.S. degree in civil engineering from Pennsylvania State University.

W. MICHAEL HANEMANN, NAS, is a professor of economics and holds the Wrigley Chair in Sustainability at the School of Sustainability of Arizona State University. He is also a professor in the graduate school and Chancellor's Professor Emeritus in the Department of Agricultural and Resource Economics of the University of California, Berkeley. Elected to the National Academy of Sciences in 2011, Dr. Hanemann is an environmental economist who works in nonmarket valuation, water economics and policy, and climate change. A focus of his current research on water is the distinctive physical and institutional features of water, the evolution of water rights and institutions in the American West, legacy effects with respect to obstacles to promoting better uses of water, balancing extractive vs in-stream uses of water, and adapting water rights to face the challenges of climate change. He is a lead author and coordinating lead author in Working Group III of the Intergovernmental Panel on Climate Change

Fifth Assessment Report. He received his Ph.D. degree in economics from Harvard University.

CAROLYN KOUSKY is a fellow at Resources for the Future in Washington, DC. She has published numerous articles, reports, and book chapters on the economics and policy of natural disasters and disaster insurance markets. Her research focuses on decision-making under uncertainty, natural resource management, and individual and societal responses to natural disaster risk. She has evaluated the demand for natural disaster insurance, the functioning of the National Flood Insurance Program, policy responses to potential changes in extreme events with climate change, and how individuals learn about risk. She is the recipient of the 2013 Tartufari International Prize of the Accademia Nazionale dei Lincei. She holds a B.S. degree in Earth Systems from Stanford University and a Ph.D. degree in Public Policy from Harvard University.

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