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Advisers to the Nation on Science, Engineering, and Medicine

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Affordability of National Flood Insurance Program Premiums -- Report 1

Committee on the Affordability of National Flood Insurance Program Premiums

Water Science and Technology Board
Division on Earth and Life Studies

Board on Mathematical Sciences and their Applications
Division on Engineering and Physical Sciences

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Summary

Established in 1968, the National Flood Insurance Program (NFIP) is housed within the Federal Emergency Management Agency (FEMA) and offers insurance policies that are marketed and sold through private insurers, but with the risks borne by the U.S. federal government. In July 2012, the U.S. Congress passed the Biggert-Waters Flood Insurance Reform and Modernization Act (Biggert-Waters 2012, or simply BW 2012), designed to bring several changes to 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 within NFIP policies known as "pre-FIRM subsidized" and "grandfathered." Paying the claims for these policies contributed in part to the NFIP having to borrow from the Treasury to pay for claims after Hurricane Katrina and subsequent storms. This debt also was a motivation for provisions in BW 2012 directing 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, to include "…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." The study was to inform the creation by FEMA of an affordability framework for providing assistance. 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 policy holders. Some concerns reflected the reality that purchase of the more expensive insurance, in some instances, was mandatory. Other concerns were based on the expectation that

[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 in an appendix for the reader's convenience.

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these higher premiums would depress home values. Still others were concerned that higher premiums would thwart attainment of a longstanding 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 the 2014 legislation once again called on FEMA to report back 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…

BW 2012, Section 100236, mandated that both the aforementioned FEMA affordability study, as well as a study from the National of Academy of Science (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 respective content and distinctions of those reports:

> 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.

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 Biggert-Waters 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

[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

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households.[3] 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 Biggert-Waters 2012. Chapter 3 describes the NFIP pricing practices in place when BW 2012 was passed, and how BW 2012 might increase premiums. Chapter 4 describes the demand for insurance in order to offer findings about the challenge of increasing 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.

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 subsequent implementation of the NFIP over the years that led up to passage of Biggert-Waters 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 its inception, and continuing until BW 2012, Congress sought to achieve multiple objectives for the NFIP. The objectives have been: (1) ensuring reasonable insurance premiums for all; (2) having NFIP risk-based premiums that would make people aware of and bear the cost of their floodplain location choices; (3) securing widespread community participation in the program and significant numbers of insurance policy purchases by property owners; and, (4) earning premium and fee income that covers claims paid and program expenses over time. These objectives, however, are not always compatible, and may at times conflict with one another.**
- **The premium-setting practices and procedures that were in place before Biggert-Waters 2012 were a reflection of the multiple objectives of the program 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.**

NFIP POLICY PRICING AND EFFECTS OF BIGGERT-WATERS 2012

Well established actuarial principles require that insurance premiums, combined with other income sources, yield revenues that will pay expected future claims and insurance program expenses (costs) over time. These principles also hold that premiums for an individual policy, to the

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

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extent administratively feasible, should be based on the expected claims, plus fees for each individual policy. Further, there should be no cross subsidy where one group of policy holders have higher premiums so that others will have lower premiums. Finally, premiums will 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 the coverage plus a competitive return on invested capital. The NFIP, although not a private company, still seeks to employ actuarial principles when setting premiums. However, historical precedent and congressional desire for premiums to be reasonable constrained their application. 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 pay premiums that are less than the NFIP risk-based 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 this reality, FEMA had adopted a revenue target such that all premium income equaled the claims paid on the historical average loss year (HALY). BW 2012 phases out this policy type and, as a result, FEMA no longer uses the HALY in NFIP premium setting. The increases may be especially significant for the 20 percent of properties that are eligible for pre-FIRM subsidized premiums.

The grandfathered premiums within the NFIP allow for 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, and allows for discounted premiums for some properties when the community adopts one or more NFIP- prescribed flood risk management actions. CRS-discounted premiums currently are cross-subsidized by charges levied on all NFIP policy holders and would be unaffected by BW 2012. The findings that follow are based on a review and discussion of NFIP pricing and the effects of Biggert-Waters 2012 and the Homeowners Flood Insurance Affordability Act of 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 policy holders 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 are available.**

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- **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 from offering grandfathered premiums, and from 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 over time, the result will cause NFIP premiums to increasingly violate the actuarial principle that premiums should be related to risk.**

INSURANCE DEMAND

A longstanding 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 suggests that no single strategy that will increase purchase of NFIP policies.

- **The original NFIP legislation expected NFIP premiums to be priced at reasonable levels in order to promote voluntary purchase of NFIP policies. Empirical studies now find that premium prices may affect take up rates; however, the strength of that effect is limited. The effect that available disaster aid has on insurance purchase decisions is uncertain.**
- **Studies find that people may employ intuitive thinking, as opposed to systematic consideration of the cost of premiums in relation to expected future claim payments, when choosing to forego insurance or to cancel an existing policy.**
- **Acknowledgement of intuitive thinking, combined with the limited effects of premiums charged on insurance purchase decisions, suggest that lower premiums alone may not significantly increase take up rates.**
- **Keeping NFIP premiums at reasonable levels can be part of any strategy to maintain compliance with mandatory purchase requirements and increase voluntary take up rates. A multipart strategy to motivating purchase of NFIP policies can be designed using insights from the behavioral sciences literature.**

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NFIP 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, and grandfathered policies could aid in formulating alternative strategies to provide assistance to households where NFIP risk-based premiums may not be affordable. Likewise, knowing the location of policies can provide insight into places where take up rates are low.

- **About 60 percent of the approximately 5.5 million NFIP polices are in three states—Florida, Texas, and Louisiana. The rest are distributed widely across the nation. Any effects of Biggert-Waters 2012 therefore will be more concentrated in some places, but will be realized throughout the nation.**
- **Available estimates of take up rates suggest that they are low, especially outside Special Flood Hazard Areas. Meeting the longstanding goal of widespread take up rates for flood insurance therefore would require a significant increase in purchases.**
- **The extent and location of where premium increases might result from elimination of grandfathering can be determined by further analysis of the policy data, but cannot be estimated at this time.**
- **Slightly more than 1 million NFIP policy holders—or 19 percent of all policy holders—are paying pre-FIRM subsidized rates and will see potential rate increases if the provisions of Biggert-Waters 2012 were in effect. Pre-FIRM subsidized polices are found throughout the nation, but there are areas of concentration.**

DECISIONS WHEN DESIGNING ASSISTANCE PROGRAMS TO ENHANCE AFFORDABILITY

Both BW 2012 (Section 100236) and HFIAA 2014 reflect concerns that NFIP risk-based premiums may be unaffordable for some households. In response, FEMA is directed to review this 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, maybe for mitigation actions that would reduce the risk and in turn the premium, or it may be some combination of the two.

In fact, HFIAA suggests that premiums are unaffordable if the premium exceeds 1 percent 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 (if any) of assistance provided will need to be determined.

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- **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 when designing an affordability assistance program entail tradeoffs that will have to be resolved by policy makers.**

OPTIONS FOR DELIVERING ASSISTANCE TO ENHANCE FLOOD INSURANCE AFFORDABILITY

With passage of Biggert-Waters 2012, Congress asked FEMA to increase rates, but at the same time suggest ways to make premiums affordable through direct assistance programs, based on ability to pay and with assistance being means-tested. Vouchers in particular were called out for attention. In addition to assistance with paying premiums, means-tested assistance can support mitigation that in turn 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 made in legislation, in congressional testimony, and in professional literature. The committee reviewed these proposals and concluded the following:

- **The NFIP can strive for risk-based premiums while addressing affordability by implementing a combination of policy measures to include 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 prioritizing 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 policy holders for use in paying premiums or for offsetting mitigation costs.**

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- **Currently there are only a few mitigation measures that result in lower NFIP premiums and these tend to be expensive, such as elevating homes. As a result of BW 2012, FEMA will consider whether lower cost mitigation of structures should result in lower premiums. Determining the effect of lower-cost mitigation on NFIP risk-based rates will require additional analyses.**
- **If Congress were to authorize supplements from the federal Treasury to be used for making NFIP claim payments in catastrophic loss years, this could allow for lower NFIP risk-based premiums and, in turn, less spending for an assistance program.**
- **Some policies that have been advanced as a way 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 policy holders. 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 Community Rating System. These might be particularly important in mitigation related to multi-family property.**

Choosing among affordability policy options, alone or in combination, requires an evaluation of their effects not only on premiums for households in which NFIP risk-based premiums create a cost burden, but also on NFIP net revenues, expenditures from federal general revenues, and take-up rates. This committee's second report (see statement of task and also Chapter 8) will suggest analytical protocols FEMA might use to evaluate affordability policy options.

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1

Introduction

Floods are natural phenomena in all rivers and river systems in the United States and occur with varying depths and durations, seasonally and annually. Coastal storms and their associated storm surges affect U.S. shoreline locations, especially the eastern and Gulf coasts. Riverine flooding and coastal storms are major news items nearly every year in the U.S., and in the past decade have included Hurricanes Katrina (2005) and Sandy (2012), flash flooding in Colorado's Front Range (2014), and large floods on the Missouri (2012) and Mississippi (2011) Rivers. Flooding causes property damage and may cause relocations of significant portions of communities. Coastal flooding from storm surges can damage property located along oceans and bays. Given the numerous economic advantages, as well as aesthetic values, of habitation and development in floodplains and coastal areas in the U.S., many of these areas have large populations and high-value properties. This land settlement pattern is the result of individual choices, as affected by a range of government programs and policies that have weighed the benefits of living and working in these areas along with perceptions and knowledge of flood risks. Many people living 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, etc). Some properties in areas of flood risk are second homes. In some locations, risks associated with flooding of low-lying areas have depressed property values, resulting in occupation by lower-income households.

The U.S. federal government has adopted policies that seek an appropriate balance between advantages offered by floodplain and coastal zone locations, and risks associated with human occupancy. These policies included the requirements 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 and 2004). Beginning in earnest in the 1970s, federal policies and programs have sought to encourage state and local governments to adopt floodplain management as a means to manage flood risk (such as Executive Order 11988: Floodplain Management, from

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1977[1]). Among the policy options for balancing flood risk against the benefits of location is the availability of federal flood insurance, along with encouragement for its purchase.[2] Insurance premiums can be an effective way to 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 the risk, as measured by the cost of insurance. For these results to be realized, people would have to purchase the insurance.

The National Flood Insurance Act of 1968 created a National Flood Insurance Program (NFIP), making 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 local professional staff with technical knowledge of flood risks and provides risk mapping both for premium setting and risk communication purposes. In addition, FEMA has pre-flood mitigation grant programs and post-flood emergency aid, as well as mitigation, programs. Many of these 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 and Modernization Act of 2012 (Biggert-Waters 2012, or BW 2012) the NFIP's premium setting practices have been under intense scrutiny. Understanding the cause for concerns about the NFIP requires understanding its origins. The National Flood Insurance Act of 1968 initially created an NFIP in which private insurers would offer policy coverage in partnership with the federal government. Private companies were expected to rate the risk and set premiums with NFIP technical assistance and oversight. These 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 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 re-pay the loans in years when revenues exceeded claims and expenses.

A concern at the time was that these private insurers' premiums be kept at "reasonable" levels. In practice, the desire to keep rates "reasonable" resulted in two NFIP design features affecting premiums charged. First, a fully risk-based flood premium would need to include expected claims from low probability-high damage storms that resulted in widespread damage (catastrophic loss events). Fully reflecting this possibility in NFIP policies might result in higher premium levels. The legislation stipulated that the U.S. Treasury would be prepared to serve as the reinsurer and would pay claims that were attributed to catastrophic loss events so that private

[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 twentieth century, a small number of private companies offered flood insurance in the U.S. The great Mississippi River floods of 1927, and additional riverine flooding in 1928, essentially terminated this industry, with all insurers dropping out of the market (King, 2005).

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insurers did not need to include that cost in the premiums charged. The result was that an NFIP risk-based premium for any property might not be based on the full risk for that property.[3]

A second concern regarding premium levels was that existing properties at especially high risk of flooding might require private insurers' to set premiums at extremely high levels. The NFIP was instructed by the legislation to determine a reasonable premium for those properties, less than NFIP risk-based. The private insurers would charge that 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 the 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) (see the List of Terms, which is included with the report appendices). Once a community was enrolled, these pre-FIRM subsidized premiums became available to property owners whose property was built before the NFIP map of flood risk map was prepared. The expectation was that over time, properties paying pre-FIRM subsidized premiums would 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 to provide loans and act as the reinsurer.

Within a decade, however, the original concept of partnering with the private sector was replaced by a process of the NFIP taking responsibility for rate setting, issuing policies, collecting premiums, and paying claims. After that transition, the federal Treasury was expected to make loans to NFIP as needed to honor claims in high loss years to be repaid in low loss years. As will be discussed through the report, NFIP risk-based rate setting practice proceeded as if 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 flood risk maps (Flood Insurance Rate Maps, or FIRMs) were issued. Equally important, the fundamental premise that premiums be kept reasonable in order to encourage purchase retained its level of importance in rate setting. The agency executing these responsibilities today is the Federal Insurance and Mitigation Administration (FIMA), which is located within 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" in List of Terms).

Despite efforts to keep premiums reasonable, the NFIP always has experienced a low level of insurance policy purchase, or voluntary take-up rate (see List of Terms). Over time, the desire to increase take up 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 located in the SFHA. Voluntary purchase still applies to properties outside the SFHA and who do not have such mortgages. To motivate voluntary insurance purchase, there has been enhanced marketing by the NFIP of its polices, support for building floodplain management expertise at the local level, development of the "Preferred Risk Policy (PRP)," WYO agent training, as well as other reforms (such as imposing a waiting period in order to prevent coverage purchase only right before a flood event). Although there are approx-

[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.

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imately 5.5 million policies in force today, these policies do not provide coverage for all properties in the nation's 100-year and 500-year floodplains. Among those roughly 5.5 million policies, in 2013 about 20 percent of the policy holders were still eligible to pay pre-FIRM subsidized premiums.

NFIP REFORM LEGISLATION: BIGGERT-WATERS (2012) AND H.R. 3370 (2014)

The financial obligation for paying insurance claims after Katrina and other large and catastrophic loss events in 2005—Dennis, Emily, Rita, and Wilma—was assigned to the NFIP. Since the claims greatly exceeded any available reserve, as an accounting matter the NFIP was driven into debt. As of December 31, 2013, FEMA owed the U.S. Treasury $24 billion and its borrowing authority $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 construct of the NFIP never envisioned burdensome levels of debt within the program.

Concerns regarding NFIP long-term fiscal soundness led to passage by Congress of the Biggert-Waters Flood Insurance Reform and Modernization Act of 2012. A goal of this 2012 legislation was to transition toward an insurance program with premiums that better reflected expected flood losses at all insured properties, meaning that all NFIP policies would have risk-based premiums. Toward this end, BW 2012 directed FEMA to review and report back to Congress on reforms to setting NFIP risk-based rates that would better reflect possible claims. BW 2012, Section 100236, also mandated this NAS study of Affordability of NFIP Premiums (Box 1-1).

The legislation also required the elimination of pre-FIRM subsidized premiums as well as removal of "grandfathered" premiums. The grandfathering practice allowed owners of buildings that were built in compliance with previous Flood Insurance Rate Maps (FIRMs) to maintain their original rating classification, even if the new FIRM indicated a greater risk of flooding (see List of Terms). Meanwhile, new FIRMS were being issued across the nation. Some properties that had been mapped outside the SFHA (and were often built intentionally outside) were remapped as inside the SFHA. Owners of these properties who may not have purchased an NFIP policy now may be required to purchase one and, in addition by being in the SFHA, those new polices would have higher premiums than properties outside the SFHA.

As the provisions of the Biggert-Waters 2012 legislation 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 the cost of insurance would become unaffordable. Others argued that households had followed the NFIP rules and made financial plans based on expected insurance premium levels, and that since they had followed NFIP rules, they deemed the sharp increases in premiums to be unfair. This argument was especially important to policy holders who would lose grandfathered premiums and now were having to pay more, and to policy holders that had

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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:

- 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;

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- 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 sub-contractors as necessary).

This report shall be delivered by September 20, 2015.

deliberately built outside the SFHA and now had an unexpected new insurance purchase requirement. In addition, communities where these effects might occur argued that higher premiums might depress real estate values, business profitability and, in turn, neighborhood viability. Further, Congress had heard concerns that higher insurance premiums might discourage voluntary purchases, thereby reducing the take up rate for flood insurance.

As a result of these vigorously stated concerns for affordability, subsequent legislation—The Homeowner Flood Insurance Affordability Act of 2014 (HFIAA 2014)—was passed by the U.S. Congress and signed by the president. One result of HFIAA 2014 was that grandfathering practices that had been phased out under BW 2012 were reinstated. A second result from HFIAA 2014 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, would face rates increases each year of no less than 5 percent and as much as 18 percent until the NFIP risk-based premium was reached. Finally, HFIAA 2014 left unchanged the BW 2012 requirement that pre-FIRM subsidies be phased out through 25 percent annual increases for non-primary residences, for properties that made frequent NFIP claims, and others. HFIAA 2014 also added premium surcharges on all polices to help offset the revenue lost to the program from pre-FIRM subsidies that would remain in place until all were paying NFIP risk-based premiums. The HFIAA 2014 legislation expected all pre-FIRM properties eventually to pay NFIP risk-based premiums so in the long run, the difference between HFIAA 2014 and BW 2012 is that grandfathering would be continued. Also, HFIAA 2014 left the direction in BW 2012 that FEMA review its NFIP risk-based premium setting procedures.

HFIAA 2014, as reflected in its title, did reflect concerns regarding affordability of flood insurance premiums. Affordability also was recognized within Biggert-Waters 2012 as a possible concern (Box 1-2 elaborates on the term "affordability", along with some other related terms central to this report). Both BW 2012 and HFIAA 2014 contained numerous provisions for assessments and studies, including studies regarding flood insurance "affordability." Both the 2012 and 2014 legislation mandated studies by the National Academy of Sciences (NAS), and called for related studies by FEMA. The Biggert-Waters 2012 legislation called for an "economic analysis" to be conducted by the NAS, which would, among other things, "compare the costs

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BOX 1-2
Concepts in Setting NFIP Premiums: Affordable, Reasonable, and Fair

The topics covered in this report entail the use of numerous technical terms and phrases, many from the National Flood Insurance Program itself, some from the fields of insurance and actuarial sciences, and other fields. Some of this terminology may be unfamiliar to readers, or it may have been used in inconsistent ways in writing and testimony about the NFIP through the years. Key terms are defined within each chapter of the report. The report also includes a "List of Terms" in its appendices that are specific to the NFIP. To the extent possible, those terms were taken from FEMA websites and reports. In instances in which terms had not been defined by FEMA, definitions are provided to ensure consistent meaning through the report.

A term warranting particular discussion is "affordability." This term was used in BW 2012, Section 100236 that mandated this report. It also is used HFIAA 2014 (Section 9), where it refers 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 the term affordability, use of the phrases "means-testing" and "financial ability" suggests that Congress expected the term affordability to be defined in relation to an NFIP policy holder's income or wealth. This is consistent with the understanding of the term affordable in this report.

At the same time, HFIAA 2014 asks the NFIP to "strive for" premiums that are no more than 1 percent of the policy coverage, a number that is unrelated to either the income and wealth position of the policy holder. It is not clear if this suggested 1 percent cap was offered as a definition of premium affordability, or had some other basis (e.g., to define when premium levels were "reasonable" or "fair"). In fact, the term reasonable was 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 located in an area mapped as a floodplain, but built before the flood risk was identified. Some households in this situation would not able to pay a high NFIP risk-based premium. With this understanding, a reasonable premium for properties built before an area had been mapped was calculated using less than NFIP risk-based rates.

Although a premium might be affordable if a household's income was 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 made a property location decision consistent with the applicable rules before the NFIP was created. This fairness argument was another reason that less than NFIP risk-based rates were offered when the program began, and is used to justify the practice of grandfathering.

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" (P.L. 112-141; 126 Stat. 957. Appendix A contains Section 100236 from Biggert-Waters 2012, which mandates this NAS study). This charge to the NAS was amended in the 2014 legislation, which changed the schedule and resources available for conducting the NAS project (amendments were presented in HFIAA 2014 Section 16 and are listed as Appendix B (see Section C). Appendix C contains BW 2012, Section 100236, as amended by HFIAA 2014 Section 16). The HFIAA 2014

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legislation also called for FEMA to prepare a "draft affordability framework" as described here and from 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 the 2012 and 2014 congressional legislation for NFIP reform, and in response to a request from the Federal Emergency Management Agency (FEMA), the National Research Council (NRC)[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 NRC committees, this committee was guided by its statement of task. When reading this report, it therefore is important to recognize that the language from Section 100236 in BW 2012, and as amended in HFIAA 2014 (see Appendixes A, B, and C), differs from the language in the committee's statement of task (Box 1-1). The language in the statement of task was discussed and mutually agreed upon by FEMA and the NRC, in consideration of the resources available to the NRC and the needs of FEMA.

This document is the committee's first report. Consistent with its statement of task, this report: offers alternative definitions of affordability; discusses alternative definitions of affordability and provides a framework for policymakers to use in designing assistance programs to

[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 (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.

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make flood insurance more affordable; identifies options that in principle may make flood insurance (more) affordable; and, describes possible benefits, drawbacks, and implications of these policy options for addressing affordability concerns. This report does not itself attempt to design programs or actions to promote flood insurance affordability, nor does the report describe how national flood risks might be reduced through insurance or other actions. The report also does not address the topics of how levees affect floodplain development, and NFIP insurance rates (this topic was covered in detail in a previous (2013) NRC report conducted for FEMA). This report naturally refers often to floodplains, and floodplain areas. Unless otherwise specified, "floodplain" in this report refers to the area covered by the 100-year (1 percent annual) flood (see also Appendix E for further discussion of NFIP floodplain designations).

The committee's second report will include alternative analytical procedures for FEMA to consider when the agency designs a national-level flood insurance affordability analysis. Report 2 will discuss metrics for evaluating affordability policy alternatives described in Report 1 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 an analytical protocol(s), including a sampling strategy for FEMA to implement a national study. Lessons for data and analytical needs for a national study of flood insurance affordability will be inferred via a case study (or "proof of concept" exercise) in applying different analytical processes to readily available data that have been compiled by the North Carolina Department of Public Safety, and that represent one of the nation's extensive data sets of locations of structures within floodplains and coastal areas.

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

This report contains eight chapters. Following this introductory chapter, Chapter 2 provides an overview of the NFIP history and its legacy leading up to Biggert-Waters 2012, focusing on NFIP pricing practices prior to BW 2012. Chapter 3 explains the process for setting NFIP risk-based premiums and the constraints the NFIP had to adhere to in setting those premiums. With this understanding, distinctions among NFIP risk-based, pre-FIRM subsidized, grandfathered premiums, and CRS 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 when 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, which might make flood insurance

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more affordable. Some of the options are proposed as a way to lower premiums through mitigation actions that lower risk and, in turn, premiums. Other options would directly reduce the amount paid for insurance by either cost burdened groups of property owners and renters or all policy holders. As this is the first of two reports, Chapter 8 describes briefly the objectives of Report 2 and its relationship to the findings of this report (Report 1).

The audience for this report includes FEMA; other relevant federal agencies, such as HUD; Congress and congressional staff; governors of states with flood-prone communities; mayors and citizens in 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 with NFIP implementation responsibilities, and; private sector experts including insurance companies, mapping companies, and other private sector firms that advise on flood insurance and floodplain management issues.

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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 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 legacy of that partnership when the NFIP became a fully governmental program leading up to Biggert-Waters 2012 is used to explain the motivation for provisions in BW 2012 and 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). Lacking private insurance post-flood financial aid took the form of flood disaster relief and over time the federal government was increasingly asked to provide aid to flood victims as a humanitarian action (Moss, 1999). It was in this 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 being "… 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. The proposed legislation 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). In addition, the proposed bill put a cap on coverage and hence premiums, imposed a 10 percent deductible, and authorized federal agencies that guaranteed mortgage loans to require the

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purchase of flood insurance. Thus, as originally conceived, a program for federal 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" (The American Institutes for Research, 2005). This wording suggests that Eisenhower was especially interested in homeowners' cost-sharing future disaster aid with the government. Congress responded by passing the Federal Flood Insurance Act of 1956. The act 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 abolished 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 also 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" (ibid.).

In August of 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, entitled *A Unified National Program for Managing Flood Losses*, described multiple strategies for managing flood risks. One section was "…steps toward a national program for flood insurance" concluding that flood insurance was "feasible" and could "promote the public interest" and could be used to both help victims bear the risk of floods and to discourage "unwise occupancy of flood-prone areas." Other areas for 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 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, but those who chose to locate in floodplains should understand the risk and bear the full costs of their decision.[1] This 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:

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1 The 1966 report described this "occupancy charge" as an ideal policy instrument, but for practical reasons recommended a program of flood insurance. "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."

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> 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. Dept. of Housing and Urban Development, 1966).

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

THE NATIONAL FLOOD INSURANCE PROGRAM: A BRIEF HISTORY

The National Flood Insurance Act of 1968[2] created the National Flood Insurance Program to be administered within the U.S. Department of Housing and Urban Development (HUD). Although subsequently modified many times, this act remains the foundation for the NFIP. In creating the National Flood Insurance Program in 1968, Congress identified two primary objectives. Congress declared its intention to (1) encourage state and local governments to use land-use adjustments to constrict the development of land exposed to flood hazards and guide future development away from locations that are threatened by flood hazards and (2) provide flood insurance through a cooperative, public-private program with equitable sharing of costs between the public and private sectors (42 U.S. 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, or SFHAs; see Appendix E). Once a community agreed to these 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 this partnership was the flood insurance risk pool. The U.S. Senate Committee on Banking and Currency, in a 1967 report, described the pool as follows:

> *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

2 Public Law 90-448.

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> 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 (U.S. Senate Committee on Banking and Currency, 1967).

The agreement governing the pool partnership would make private risk bearing possible, but would at the same time be designed to keep premiums reasonable.[3] In practice, the desire to keep rates "reasonable" resulted in two NFIP design features. First, the legislation gave the NFIP borrowing authority from the federal Treasury allowing the NFIP to make loans to the pool so it would be able to honor claims for non-catastrophic events. These loans would be repaid in years when premium revenues exceed claims. This was especially important for 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 re-insurer and allowed the treasury 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 federal Treasury was to be the reinsurer once claims, in a 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.[4]

A second effort to keep premiums reasonable was to base premiums 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 permitting new construction. NFIP risk-based premiums for these existing

[3] See Chapter 1, Box 1-2, for elaboration of the term "reasonable" in the NFIP policy premium context.
[4] The financial rules governing the pool could result is some premium receipts being paid for re-insurance, but as a practical matter re-insurance was being offered at no charge to the pool.

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structures would have been extremely high. The legislation deemed such premiums to be unreasonable and created two rating systems for setting premiums. Buildings located in the floodplain after flood insurance rate maps were issued would pay NFIP risk-based rates to the private member of the pool that offered the policy. A second rate structure would be used for pre-existing development so that premiums paid by owners of existing structures would be less than NFIP risk-based rates. The expectation was that over time, these properties would be lost to floods and storms, and that the need to have below NFIP risk-based premiums would phase out by that attrition.

The same 1967 report from the U.S. 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. (U.S. Senate Committee on Banking and Currency, 1967).

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 no longer were part of the portfolio, the only payments from the federal Treasury to the pool either would be for loans, or in the event of a catastrophic loss. Taken together, these two provisions provided the underlying financial structure for ensuring that premium revenues would equal claims paid plus expenses over time. The 1967 report from the U.S. Senate Committee on Banking and Currency said this:

> 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

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> 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 (U.S. Senate Committee on Banking and Currency, 1967).

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 across the nation that had no state or local offices equipped for such work.

FEMA moved to implement the NFIP without a private risk sharing partner. Instead, private "Write Your Own" (WYO) companies were engaged to act as NFIP policy servicing agents. The WYO program allowed insurance companies to sell and manage flood insurance policies in their own names, encouraging sales. These companies also would process claims but would not bear any risk or set rates.

Some provisions of the law were unchanged, however, even though the risk pool and private partnerships were no longer in effect. Communities still would have to take the floodplain management actions required to enroll in the program, before property owners in those communities would be able to 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 flood insurance rate maps (FIRMs) and flood hazard boundaries, with FEMA calculating the insurance rates. What is of significance is that 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 federal Treasury had no obligation to transfer funds each year to the NFIP (instead of to the pool) to make up for the forgone revenues from 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 in order to encourage purchase retained its level of importance in the federally administered NFIP.

Another provision that carried forward was that a loan from the federal Treasury was taken to pay claims in high loss years and was paid back in low loss years. Then, 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), requiring significant borrowing. Hurricane Ike in 2008 and Hurricane Sandy in 2012 further deepened this debt. Figure 2-1 shows debt peaking in 2009 and falling to less than $18 million 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.

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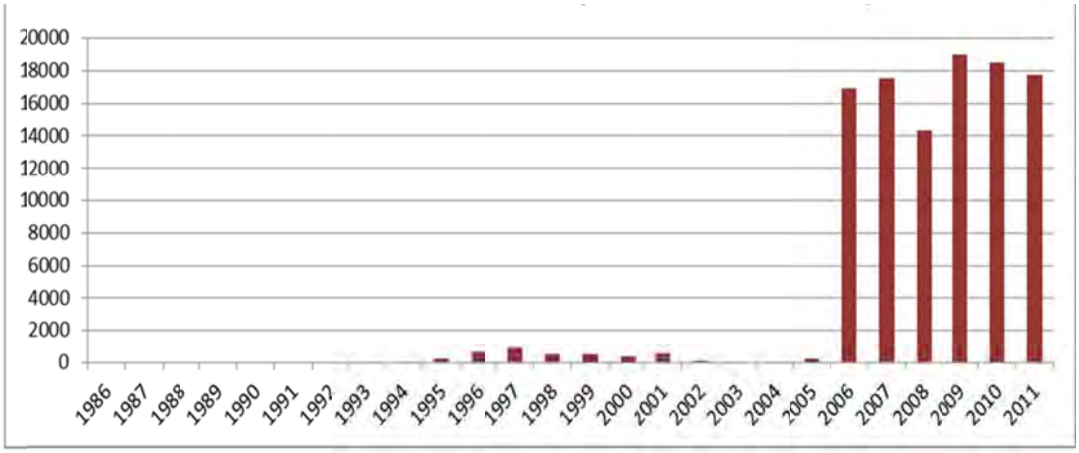

FIGURE 2-1 NFIP Cumulative Debt (millions nominal $).
SOURCE: King, 2013.

LEGISLATIVE CHANGES: BIGGERT-WATERS 2012 and HFIAA 2014

Through a number of specific provisions, Biggert-Waters 2012 emphasized the need for having premium revenues and associated fees eventually cover payouts for claims and NFIP program expenses. Toward that end, FEMA was directed to make changes to the premiums it was charging to more fully reflect risk for all classes of policyholders. FEMA was to replace the lower rates for existing properties (what FEMA had called pre-FIRM subsidized) 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 certain conditions to keep a lower rate in the event an updated flood insurance rating map showed that they were at a greater flood risk than originally thought. Under BW 2012, grandfathered rates were to be replaced immediately with NFIP risk-based rates. Other provisions within Biggert-Waters 2012 directed FEMA to review and report back on reserves and purchase of private reinsurance presumably with the costs to be to be added to (recovered by adding to) NFIP risk-based premiums.

Biggert-Waters 2012 acknowledged a concern for whether NFIP risk based premiums for all would make premiums unaffordable for some when it called on FEMA to conduct an affordability study in BW 2012 Section 100236. The FEMA study was to be done concurrent with implementation of the rate increasing reforms, so those reforms moved forward without any program of assistance in place for those policy holders who were required to purchase a policy and who might face an unaffordable premium cost increase.

As implementation of Biggert-Waters 2012 began, the premium increases became a topic of testimony and letters arguing that the proposed changes would result in premiums becoming unaffordable to many, and could cause economic disruption in communities across the nation. In response, Congress passed the Homeowner Flood Insurance Affordability Act of 2014. This law

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repealed or modified many (but not all) of the rate reform changes that were enacted in Biggert-Waters 2012. Notably, HFIAA 2014 reinstated the policy of grandfathering premiums. HFIAA 2014 did not change the sections of BW 2012 directing FEMA to review aspects of its program that might affect NFIP risk-based rates. An additional concern expressed on both laws was that the higher premiums would no longer be reasonable, in the sense that they would be so high as to discourage purchase of NFIP policies. Section 9 of HFIAA 2014 expressed a concern for "The impact of increases in risk premium rates on participation in the National Flood Insurance Program."

TAKE UP 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 costs to the taxpayer 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 a particular location (or at least the cost of living in such locations), and ensure that the floodplain occupant bore the cost of locating in places with appreciable flood risks. For these goals to be served through insurance, however, the insurance needed to be purchased.

Therefore, in designing the NFIP to help attain these broad flood risk management objectives, Congress has always emphasized the need for high take up rates, and one means toward that end is to keep NFIP premiums reasonable in order to encourage insurance purchase**.** 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, thus allowing residents to purchase coverage under the NFIP. It also was presumed that homeowners and small businesses located in eligible communities then would enroll eagerly in the NFIP.

Hurricanes in 1969 and 1972 (Camille and Agnes, respectively), however, revealed that only a few communities at risk of flooding had enrolled in the program. When Tropical Storm 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 despite $3 billion of total estimated damages (Anderson, 1974). To increase purchases in 1973, Congress passed the Flood Disaster Protection Act (FDPA) that required all properties receiving mortgages from a federally backed or regulated lender, and located in a 100-year floodplain (referred to as special flood hazard areas or SFHAs), 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 subsequent 7 years hoping to encourage participation in the program.

Nonetheless, in 1993, after large floods on the Missouri and Mississippi Rivers, it was found that only roughly 1 in 10 of the flooded structures had been insured. This low take up rate

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was part of the impetus behind subsequent passage of The National Flood Insurance Reform Act of 1994. Provisions of that bill (and that continue to today) that were expected to increase enforcement of the mandatory purchase requirement included: coverage now is required over the life of a loan; lenders must escrow flood insurance payments when already requiring escrows; lenders need to obtain a flood policy if a borrower does not; and, failure to comply with the mandatory purchase requirement can result in lenders being fined. In addition, in order to prevent last-minute purchase only when flooding was imminent, the time between purchase of flood insurance and when it goes into effect was increased to 30 days. The law also prohibited further flood disaster assistance for any property where flood insurance, after having been mandated as a condition for receiving disaster assistance, was not maintained. This measure was added in recognition of the fact that loan or grant programs, to the extent 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

Through its history, the NFIP has been asked to set premiums that are at the same time both "risk-based," and "reasonable." Different administrations and successive sessions of the U.S. Congress have placed varying emphases and priorities on these goals for premium setting. The tensions between these goals are noted in a comment from FEMA reflecting on the early years of the NFIP:

> 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 (Hayes and Neal, 2011).

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- **From its inception, and continuing until BW 2012 Congress sought to achieve multiple objectives for the NFIP. The objectives have been: (1) ensuring reasonable insurance premiums for all; (2) having NFIP risk-based premiums that would make people aware of and bear the cost of their floodplain location choices; (3) securing widespread community participation in the program and significant numbers of insurance policy purchases by property owners; and, (4) earning premium and fee income that covers claims paid and program expenses over time. These objectives, however, are not always compatible, and may at times conflict with one another.**
- **The premium-setting practices and procedures that were in place before Biggert-Waters 2012 were a reflection of the multiple objectives of the program 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.**

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3

National Flood Insurance Pricing, Policies, and Premiums

When the private-public partnership within the NFIP dissolved in 1978, the NFIP took on the role of pricing policies and bearing the risk. The congressional goals for the NFIP of high take up rates and reasonable premiums, however, continued to influence the pricing of NFIP policies from that time until the passage of Biggert-Waters 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.

NFIP PRICING AND POLICY TYPES

Actuarial Pricing Principles

Insurance requires individuals to pay premiums that are more than the expected loss (probability x damage) for coverage. Insurance is a contract that transfers the financial burdens of a (generally) low probability and 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, then the payment by the insurer indemnifies the insured for their loss up to a maximum amount specified in the policy (the policy limit) and in a manner consistent with other contractual terms such as the deductible, proof of loss, etc. 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 should an event occur. Insurance transfers that loss to another entity willing and able to accept that loss. Insurance financially protects the insured if

[1] The Homeowner Flood Insurance Affordability Act of 2014 (HFIAA 2014) changed some provisions of Biggert-Waters. The committee recognizes this, but the task of the committee still calls for a focus on the changes made by Biggert-Waters 2012. HFIAA 2014 can be considered from this perspective as a pause in implementing some of the BW 2012 reforms until FEMA completes an affordability framework and affordability study.

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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, however, and several authors have identified ideal conditions of insurability (Swiss Re, 2005; Charpentier, 2008; Kousky, 2013). These include that the risk be uncertain, random, and out of the control of the insured. Individual policyholder risks ideally also will be independent (not correlated over space and time). In the case of flood risks, these 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 this reality was the logic for the private-public partnership originally envisioned for the NFIP.

The price paid for insurance will include the expected loss, the costs to write the policy, process claims, account for uncertainty, and provide a rate of return to the insurance seller. In the United States, an important public sector role, executed through state regulation, is to ensure that the seller employs proper actuarial principles in setting premiums for specific loss covered by the policy. These principles also are used to structure the explanation of NFIP pricing. In fact, FEMA publishes an annual report called the *Actuarial Rate Review* documenting NFIP pricing practices (see Box 3.1).

The Casualty Actuarial Society (1988) defines four principles of actuarial rating. How and whether these apply to the NFIP is the initial focus of this chapter:

1. The rate should reflect the expected value of future costs;
2. The rate should provide for all costs associated with the transfer of risk;
3. The rate should provide for the costs associated with individual risk transfer; and
4. The rate should be reasonable and not excessive, inadequate, or unfairly discriminatory (NRC, 2013).

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 Write Your Own agent uses an NFIP issued Flood Insurance Manual, issued new each year, to find the price per $100 of coverage. To make use of the table, the property owner has to provide the agent with the information about the property (for example, 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 SFHA, or as outside the SFHA. Then, using the FIRM, the agent can calculate the difference between the lowest floor and the Base Flood Elevation on the FIRM. Using that difference, along with other factors, the rate per $100 of coverage for that property can be established. Part of that process includes determining which rating table applies to the particular property.

The first of these principles states that the insurance premium needs to account for the expected loss of the risk being insured. The expected loss often is referred to as the "pure premium." In the case of flood insurance, the pure premium would be the expected loss at the

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insured property. The pure premium is a future-looking estimate of these costs over the contract period of the policy. The second principle requires the premium to cover all the costs of risk transfer so the insurance company can be financially sound. The costs that are added to the premium are for administrative and operational costs, for possible errors in assessing (underestimating) risk, and for obtaining a reasonable rate of return for investors in the private insurance company. The third principle indicates that each risk be priced for itself, and that there be no cross-subsidization among insureds to the extent possible. Of note, 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 criteria, it should meet the fourth criterion of being reasonable and not excessive, inadequate, or unfairly discriminatory.

As is clear from these criteria, determining when a premium is actuarially sound can be subject to interpretation, and setting rates must 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 homogenous groupings of risk, the need to consider historical costs and claims over time, the need to be prepared to pay for catastrophic losses (losses occurring to many of the insured at the same time) with reinsurance agreements, and a regulatory environment that may require cross subsidies. For example, it might be mandated that auto insurance policies cannot vary based on age, gender, or race, even when these variables have been shown to be predictors of risk. In this case, rates are still considered actuarial, but within the confines of the law (Witt and Hogan, 1993).

NFIP Policy Types

NFIP Risk-based

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] This definition calls for actuarial principles that the rates reflect expected losses, as well as other costs of risk transfer expenses, and that there not be cross-subsidizations across the risk groups. To calculate NFIP rates FEMA models expected losses for structures that are similar in flood risk and key structural aspects (not individual properties) and then adds to the rates to account for various expenses. The same rate is applied to policies within a group or class.

More specifically, for Special Flood Hazard Areas (see Appendix E), FEMA sets rates using a hydrologic model that includes flood events of varying probabilities and relates these floods to potential damages. The damage estimates for the different flood events used are checked against claim experience and can vary by things 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

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

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BOX 3-2
Estimating Flood-Damage Relationships

In the notation of FEMA, at a given location and for a given structure type the frequency or probability that flood waters will reach an elevation of i is denoted by Probability of Elevation or (PELVi). This number is then multiplied by the "loss severity" that would occur at the structure if flood waters reached this level i (i.e. damage based on water depth in a given structure), denoted by Damage by Elevation (DELVi) (NRC, 2013). These products are summed over all possible water elevation levels to arrive at an expected loss:

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

This calculation is done for properties having 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 to determine the PELV and DELV components in the above expected value calculation is as follows: For PELV at a given location, reference is made to a collection of probability curves (called PELV curves) that describe the probability of water depth relative to the 1 percent flood depth at that location. These PELV curves give water level depth probabilities up to the 0.2 percent event (flood recurrence interval of one in 500-year event). To evaluate flood events with water inundation higher than that specified by the 0.2 percent level, the NFIP doubles the 0.2 percent depth and assumes a "catastrophic" water depth level occurs. Because this "catastrophic" water depth has a very low probability of occurring, and because there is assumed to be a relatively small incremental increase in damages incurred between the 0.2 percent water level depth, and double this depth, it is believed that this approximation will have little effect on the ultimate rate that is determined.

The damage (severity of the loss) as a function of the water depth elevation (or DELV) is second component in the expected value calculation. In a given rating zone, FEMA bases the DELV on historical damage data at different water depths in the given zone, and this value varies with structure content and location. When, based on the number and variability of claims, the NFIP's historical damage data is sufficiently credible, the NFIP data is used to develop the damage estimate. When there is no NFIP historical loss data, loss data from the U.S. Army Corps of Engineers is used. When there is NFIP historical data available, however, and it is not itself fully credible, the NFIP blends the NFIP loss data with the Corps of Engineers loss data using credibility formulas to determine the DELV entry. This is consistent with standard casualty actuarial practice in private insurance.

After the expected loss value has been calculated, it must be "loaded" to obtain the rate for the NFIP to use. The way this is done is via the formula:

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

where LADJ is a load factor reflecting loss adjustment expenses (similar to the factor k1 in the first equation), and DED is a load factor that can be thought of as adjusting the DELV to account for the deductible amount (since the loss actually paid by NFIP reflects the deductible amount).

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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 loss that might be incurred at their property in a flood, and this effects the amount that must be paid by NFIP. The value of the UINS factor is estimated by FEMA via a historical data review of insurance claims data. Incurred losses are a non-linear function of the actual loss severity with most losses being smaller and relatively fewer losses being much larger (i.e., the loss distribution is skewed). UINS adjusts the DELV to account for this non-linearity. In 2012 the value used for LADJ was 1.05 and the value used for DED was .98 (Andy Neal, FEMA, personal communication). In the denominator of the above expression, the factor EXLOSS accounts for the expected loss ratio as well as a risk contingency factor that differentiates between whether or not the structure is an a velocity zone or not. EXLOSS adjusts the rate to accommodate commissions, acquisition costs, and other costs such that the rate times the expected loss ratio is sufficient to cover the expected loss accounting for the loss adjustment expenses as well as the idiosyncratic choices by the purchaser of the deductible and underinsurance amount.

engineering judgments based on the results of the rate model and historical experience, since the cost of developing detailed frequency-magnitude relationships would be higher relative to the value of the information for rate setting that would be gained from such detailed analysis (Garcia-Diaz, 2014; Kousky and Shabman, 2014). This is especially the case for events more rare than a 500-year return period (0.02 percent probability).

Premiums then are adjusted by several factors. First is a loss adjustment factor, which covers the costs of loss adjusters and special claims investigations. Second is a deductible offset, and third is an underinsurance factor, which accounts for the fact that many policyholders do not insure to value, making lower claims more 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, since losses are more likely to occur in this range; rates are lower for coverage beyond the basic limit (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 also points out that other objectives for the program constrain their application. In its 2011 Rate Review, FEMA noted that the price of insurance should provide for 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. These depart somewhat from those noted by the Casualty Actuarial Society. The Rate Review goes on to note that in addition, "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 report raised concerns that some of the data used in this modeling were outdated or inaccurate. FEMA has been updating FIRMs and making other improvements, but certain items, such as probability estimates of floods, had not been updated in some time (Kousky and Shabman, 2014). In its response to the GAO, FEMA (through DHS) agreed with some, but not all, of the GAO report. Perhaps most telling, the DHS letter stated at the outset "While GAO raises valid concerns, DHS

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believes that the analysis does not grasp some of the generally accepted principles of insurance and actuarial rate setting…" making reference to such matters as the need to grouping when setting rates and the need to recognize other objectives of the program when setting rates (GAO, 2008). Since then, FEMA has 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 similar rating process as for full risk rated properties in the Special Flood Hazard Area just discussed. The PRP is a low rate for structures that are currently in an X zone (no grandfathering is allowed; see below) and have favorable loss history. Specifically, the 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 for separate occurrences for any amount; or, one insurance claim and two federal aid payments of each more than $1,000.

Exceptions to NFIP Risk Based Policies

Prior to passage of Biggert-Waters 2012**,** the NFIP had three main classes of policyholders that were offered coverage at less than their risk-based rate. These were: pre-FIRM properties; grandfathered properties; and those properties in communities participating in the CRS program. Each will be discussed in turn.[4]

Pre-FIRM Subsidized Policies

Pre-FIRM properties are those built before FEMA had mapped flood risk in a community (Kousky and Shabman, 2014). The pre-FIRM subsidy rate applied only to the basic limits of insurance (for buildings, the first $60,000 of coverage). It was a lower rate than risk-based for this amount of coverage and was not set according to the height of the first floor relative to the BFE, 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.

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[3] Appendix E contains details of FEMA's Special Flood Hazard Area classifications

[4] In addition, included in the 5.5 million NFIP policies are other small groups of policyholders that receive lower rates: (1) those located in a V zone with a structure built before 1981 and prior to maps that consider wave height were adopted in setting flood insurance rates (roughly 7,500 policies); (2) those structure located in an AR or A99 SFHA with levees in the course of reconstruction or construction, but given rates as if full protection was in place (roughly 25,000 policies); and, (3) when the policy holder participates in a Group Flood Insurance Policy (GFIP).

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As was explained in Chapter 2, however, such rates were offered to properties that were built prior to a community joining the program. Also recall that when the public-private partnership was in place, the federal Treasury made annual payments to reimburse the pool as needed to compensate the private sector for offering below risk-based premiums. 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 which 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). This had the effect of replacing the direct Treasury subsidy to pre-FIRM policy holders with a cross-subsidy from all policy holders.

The HALY was based on a program claims experience that consisted of high-loss years and low-loss years, but did not include any catastrophic-loss years. The program borrowed from the Treasury in high-loss years, and returned the funds in years with lower claims. As noted previously, however, Hurricane Katrina and other storms in 2005 resulted in unprecedented payments by the NFIP. In fact, the NFIP paid out more claims from 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 as such sent the program deeply in debt to the U.S. Treasury.[5] Hurricane Ike in 2008 and Hurricane Sandy in 2012 further deepened this debt.

The debt was so large that paying it back would have led to large rate increases, a step FEMA did not want to take without explicit support of Congress. In fact, there was congressional instruction that rates were not to increase more than 10 percent in any year. Furthermore, the pre-FIRM subsidy rate was required by legislation. Thus, although it violated the actuarial principle that the rate should reflect the expected value of future costs, it was not something the NFIP was willing to change without consent of Congress (Hayes and Neal, 2011). As a result of this reluctance, in subsequent years claims paid for these high-loss years were not fully incorporated in defining the Historical Average Loss Year.

Grandfathered Policies

Grandfathered properties are those that were built in compliance with the hazard map in effect at the time of construction, and are allowed to maintain a lower rate if a new map moves 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 policy holder once was paying a lower rate because they were classified as being outside the Special Flood Hazard Area, but now because of the new map, they are 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)

[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 due to events in 2005. The program carried $17.75 billion in debt with the U.S. Treasury and has repaid $1.8 billion since 2005.

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rate but instead pay an average rate, called the X zone standard rate for policies outside of 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, such as from an AE zone to a VE zone. In this case, the grandfathered structure will pay the lower AE zone rate instead of the newer but 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 one percent flood, but without changing the zone itself. As an illustration, a property that was mapped previously as being four feet above the one percent flood elevation but is now, according to the revised map, only 1 foot above the one percent flood elevation, would still be allowed to use the +4 feet rate.

Although FEMA does not have an estimate of how many properties currently are paying grandfathered rates, the program tries to recoup lost revenue from these lower rates by charging higher rates across other policies in the SFHA. This 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 (CRS) Discounts

The CRS program rewards policy holders with premium discounts if their communities adopt certain risk mitigation measures. Discounts begin at 5 percent and reach a maximum of 45 percent (note, however, that only one community in the U.S. has reached the highest discount level). These discounts apply to policies located 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 currently 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 having a CRS discount.[6] The expected discount for the April 1, 2014 rate changes was 11.8 percent, translating into a 13.4 percent load. These lower rates introduce explicit cross-subsidies into the program since the rate reductions given to communities are not constrained to be equal to the change in claims to the program. So, again, these are violations of the third actuarial principle, but this was done to promote flood risk management policies by local governments, another program objective. As with cross-subsidies for grandfathering, it is unclear whether the increased rates on other SFHA properties are enough to offset the lower CRS discounted rates.

[6] FEMA understands that some of the community actions that allow for lower rates may be of value, but will not lower claims from existing properties. For example, various community activities that make the larger community aware of flood risk (flood risk maps in local libraries) may not lead to reduction in claims by policy holders.

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Administrative Costs

One actuarial principle states that a rate should provide for all the costs of risk transfer. This 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. The NFIP charges a $20 policy fee 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 make a reasonable return on investment, something the NFIP does not need to do as a public program.

The WYO allowance, as a percentage of written premiums, is roughly 15 percent agent commissions, 2.3 percent voluntary payment of state premium taxes, and 12.5 percent to 13.5 percent company expenses. The company expense percentage is based on a 5-year industry average of the expense ratio for multiple property insurance lines, with an additional one percent for costs of a federal program. Companies also receive compensation for processing claims, which varies with the size of the claim. WYO companies also get a bonus for expanding the policy base of the NFIP (of up to 2 percent of written premiums). In 2008, FEMA did use 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, Biggert-Waters 2012 directed FEMA to make changes to the premiums it was charging to more fully reflect risk for all classes of policyholders, in effect more fully applying actuarial pricing principles.

Remove Pre-FIRM Subsidized Rates

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 over time all would pay NFIP risk-based rates. For some properties, effective on July 1, 2012, pre-FIRM subsidized premiums were to be increased at a rate of up to 25 percent per year, continuing until the NFIP risk-based rate was achieved. Properties affected by this increase included non-primary residences (e.g., second homes), severe repetitive loss

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properties,[7] business properties, and homes which, after implementation of the Act, have had substantial damage or improvements (of over 30 percent of the market value of the property). Properties that were primary residences with pre-FIRM subsidies would be allowed to keep those subsidies until: 1) flood insurance was allowed to lapse; (2) the property was sold; (3) the primary residence property sustained substantial flood damage amounting to 50 percent or more of the property value; or (44), the property was substantially improved.

To implement these changes, beginning with policy renewals in October 2013, elevation certificates were required for all pre-FIRM subsidized policies to allow for 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 are land owner expenses, there was little incentive for landowners to have such a certificate. The result was that, absent elevation data, it was not possible for FEMA to make an accurate estimate of premium increases for individual policyholders or for the impact 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

Consistent with actuarial principles, BW 2012 called for replacing grandfathered rates with NFIP risk-based rates. The effect of this provision on total program revenues, or on individual policies, cannot be estimated at this time. In any year, calculating the effect for any individual premium would require knowing the zone that the policy is currently rated for and the zone it was in before the map change, as well as 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 maps put 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 was 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.

[7] 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."

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NFIP Risk-based Rates

Consistent with actuarial principles, sections of BW 2012 directed FEMA to review the basis upon which it was setting NFIP risk-based rates, with specific attention to assuring that catastrophic loss years be fully incorporated into the NFIP calculation of the "average historical loss year." The Historical Average Loss Year concept, however, was developed to accommodate the premium revenue loss from 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 does reflect a concern that NFIP income from premiums would fall short of claims paid and expenses over time. The Act therefore requests a report to Congress on the feasibility of purchasing private sector reinsurance, and effect of such purchase on premiums and the financial condition of the NFIP. Further reflecting a concern over the ability to pay claims, the act directs the NFIP to build a reserve fund equal to 1 percent of the sum of potential exposure of all outstanding policies. Finally, related to the financial condition of the NFIP, BW 2012 asks for a report on what would be required to repay the debt within 10 years. At the present time, it is not possible to say how much these provisions would increase NFIP risk-based rates and in turn premium income. It is possible, however, to conclude that all would have the effect of significantly increasing NFIP risk-based rates across the board.

Affordability of Premiums after BW 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 when setting NFIP risk-based rates, to justify pre-FIRM subsidized rates as well as grandfathering. Biggert-Waters 2012 implicitly rejected this historic 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 over affordability of premiums when it called for an affordability report and study in BW 2012 Section 100236 (Appendix A). That report would allow FEMA to propose programs of assistance for policy holders whose income or wealth resulted in difficulty in paying increased premiums. Note that affordable premiums are defined by a different logic than reasonable premiums. Affordability was defined in relation to each policy holder's ability to pay after consideration of their income and wealth.

It is worth noting that the premium increasing provisions of BW 2012 were to go into effect upon passage of the bill, before any assistance program was studied, let alone put in place. As implementation of Biggert-Waters 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 becoming unaffordable to many persons who had mandatory purchase requirements, and could cause economic disruption in communities

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across 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 no less than 5 to 15 percent annually within a single risk class, but no more than 18 percent annually for an individual policyholder. This increase would continue annually until the premium reached its NFIP risk-based rate. Non-primary residences were not affected by HFIAA 2014; as required BW 2012 increases of up to 25 percent in annual premiums would take place until they reach their full-risk rate. Also, if the property was sold, the increase took place upon the sale. The end result was still that pre-FIRM subsidized premiums 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 lead to increasing numbers of policies violating the actuarial principle that rates should reflect risk. As the NFIP is increasingly adding a cost to non-grandfathered premiums to account for the revenue lost (cross subsidy), it is causing those premiums to be more expensive (less affordable), as well as decoupling the premiums for those properties from their risk. It is not possible to say how significant a problem this is now or will become in the future without a more complete analysis than now 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 individuals who were burdened by the cost of flood insurance. HFIAA 2014 was quite clear that any assistance should be offered in consideration of a policy holder's income or wealth, when 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 Biggert-Waters 2012 were to achieve the NFIP program goal of reasonable premiums. The rising NFIP debt stimulated congressional reform legislation, in part focused on whether NFIP premium setting practices were applying actuarial principles. BW 2012 acknowledged, and the Homeowners Flood Insurance Affordability Act of 2014 re-emphasized, a concern for whether changes called for by BW 2012 would cause premiums to be unaffordable for many policy holders.

- **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**

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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 policy holders 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 are 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 from offering grandfathered premiums, and from 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 over time, the result will cause NFIP premiums to increasingly violate the actuarial principle that premiums should be related to risk.**

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The Insurance Purchase Decision

Achieving high rates of flood insurance purchase has been a challenge for the NFIP. For this reason, Congress asked FEMA to consider the impact of increases in premiums on purchase of flood insurance when proposing an affordability framework (HFIAA 2014). This 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 on the effect of premiums on purchase decision, as well as other factors. The chapter is organized by contrasting 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 based on this literature review.[1]

RATIONAL ACTOR MODEL OF CHOICE

The rational actor choice model, found in the economics literature, posits that insurance buyers can and do estimate the probability of events (such as flooding) occurring and the adverse consequences that would result. With an assessment of possible adverse consequences in mind the individual considers whether to pay a certain premium each year in order to avoid the adverse consequences if the event does occur. As part of this thought process, the individual will consider different deductibles and coverage limits. There are important exceptions to this simple model. One exception is risk aversion. People who are averse to risk would be willing to purchase insurance at premiums that exceed the annual expected loss. To illustrate this point, suppose a risk-averse consumer is willing to pay an annual premium of $12 to insure against a loss of $100, which has a 1 in 10 chance of occurring in any year. The expected loss under this scenario is $10. The additional $2—the risk premium—reflects the extra amount above the expected loss the person is willing to pay for insurance.

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

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But risk aversion still requires the rational actor to understand insurance. It is necessary for individuals to take time and effort to carefully evaluate options and the 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.

Review of Empirical Studies

The rational actor model is most often used to formulate and then test hypotheses about the role of prices in decision making. In considering 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 the individual's perception of the generosity and timeliness of aid. So 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 a number of conceptual difficulties[2], a number of investigators have attempted to estimate how a change in the price of insurance coverage (change in premium) 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 then-U.S. General Accounting Office developed an econometric demand function for number of policies issued as a function of a number of variables, including average premium paid (after certain adjustments (GAO, 1983a). Data were obtained for the years 1978 through 1982. The result was an estimate of elasticity of policies in force with respect to average premium of -0.38. This defines a relatively inelastic relationship, in which an increase in premium level of 1.0 percent will result

[2] Specifying a price variable is a particular difficulty. 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. Further, a particular household is assigned a premium based on various structural features, the rating zone, first floor elevation relative to base flood elevation (BFE), and the chosen deductible amount. This means that any price variable is likely colinear with other variables in the demand function, thus biasing 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 really only relevant to questions about the amount of insurance coverage purchased, rather than whether insurance is purchased at all.

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in a decrease in the number of policies equal to 0.38 percent.

Later, Price Waterhouse Coopers LLP, after searching the existing literature for price effects, reviewed the GAO study (PWC, 1999). It was noted that the GAO data covered premiums ranging from $41.50 to $88.00 during the 1978-1982 period (roughly $114 to $241 in 2014 dollars) (GAO, 1983). PWC adopted the -0.38 elasticity reported by GAO for premiums in this 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, very similar to the 1983 GAO study (Browne and Hoyt, 1999). The paper also modeled total insured amount and found it to be considerably more price elastic that policies in force (-1.22). A 2000 report examined data for a sample of 11,000 properties drawn from eighteen coastal counties (selected by FEMA) and estimated price elasticity using an expected utility maximization framework (Landry and Kriesel, 2000). The model had fraction insured properties as a dependent variable, and was estimated in two ways: using weighted least squares and maximum likelihood. Neither approach, however, 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 to estimate a logistic model of flood insurance purchase (Dixon, et al., 2006). Based on results of this model, the authors estimated the elasticity of the probability of purchasing insurance with respect to price at -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 for 1,692 properties in two coastal counties in North Carolina, using these data to estimate a Tobit model of flood insurance coverage elected (Landry and Jahan-Parvar, 2008). This 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, 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, as well as responses to a household survey designed to elicit more possible explanatory variables. Price elasticities were computed for various combinations of these data sets. Using the high premium models and the largest data set, price elasticity of insurance coverage was -0.26 for non-subsidized properties and -2.09 for subsidized properties. Introducing the household-level data from the survey reduced the non-subsidized elasticity to -0.12. For the low premium alternative, three model specifications were employed 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 caution that these are upper bounds on the true effect.

A 2014 study employed 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 the state of Georgia (Atreya et al., 2014). The study is notable for several things, including the inclusion of county-level data on race, education, and age. The dependent variable is policies in force per 1,000

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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 different model specifications and three different estimation methods were used, for a total of five sets of results. Price elasticity results range 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 increased educational attainment, with increased proportion of African-American households, and with increased age.

Only a few things can be concluded from this existing 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 from various studies were in the range of -0.38 (GAO, 1983) to -0.06 (Dixon et al., 2006), although 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).
- Compared to the probability of purchasing insurance, total coverage purchased may be considerably more elastic with respect to average premium cost (Browne and Hoyt, 1999).
- The probability of insurance purchase by households subject to the mandatory insurance provision is slightly less responsive to the average premium, compared to households with no mandatory 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

Certain major flood events lead to presidential declarations and trigger the availability of federal disaster aid. Publicity surrounding this aid often sends a message that large amounts of money are being distributed, possibly creating an impression that a substantial fraction of households flood losses will be compensated. The implication of generous post-disaster grants might lead many to view flood insurance and disaster aid as substitutes. In reality, federal disaster aid is limited to specific events, uncertain, and modest in scale, and thus 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). In reality, federal disaster aid has been limited to specific events, is mostly for repair of public infrastructure or for protection against future damages, and offers little to households that are not insured (ibid.).

An empirical demonstration of this effect may be difficult to obtain. A 2000 paper included previous disaster assistance as an explanatory variable, hypothesizing that past experience with high levels of disaster aid would reduce the demand for insurance (Browne and

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Hoyt, 2000). The result, however, was a small, but statistically significant, positive relationship between disaster aid and insurance purchases. The authors attributed this unexpected result to collinearity: both disaster aid and insurance purchases are thought to be positively correlated 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 for disaster assistance in the U.S. 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 et al., 2014). A 2006 study found only a small relationship between insurance take up 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, and/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 this in or out as a factor in the demand for insurance. There have been several laboratory experiments and surveys, which ask 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 always 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 the hypothesis 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 non-financial considerations and intuitive thinking can be used to understand choices made. Intuitive thinking relies on mental shortcuts when foregoing, purchasing or canceling insurance based on reactions such as anxiety or regret, using simple decision rules (heuristics) that will be influenced by personal experience with events such as a flood and its consequences. These heuristics require less effort when making a decision than the detailed analyses implied by the deliberative rational actor decision process.

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Non-financial 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 (i.e. providing peace of mind), or to avoid regret about not having purchased a policy when a flood occurs. 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 the plane; however, if persons cannot avoid anxiety about a loss, they still may find opportunities to reduce this emotion by taking protective measures. This feeling may partially explain the demand by the few who purchase flight insurance. Similarly, individuals might pay more for insurance if they feared a specific event (e.g., house being damaged from a flood) than if they were not concerned about the event occurring even if the actual expected losses were the same. Regret and disappointment are quite different from anxiety, as they are experienced mainly after a loss occurs rather than before, but anticipation of these emotions can influence ex-ante decisions.

To illustrate, consider behavior that is often observed: homeowners purchase flood insurance after suffering damage in a flood, but 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 future flood and reducing regret should a flood occur are both important goals immediately after suffering water damage as 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 and hence they are less anxious about its consequences.

Mental Short Cuts

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 phenomena. Three selected findings from that literature affect insurance purchase decisions are presented in this section: *prospect theory*, *status quo bias* (a reluctance to consider new alternatives to the current condition), and *availability heuristic* (considering events that occurred most recently to be most likely).

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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 with 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 they enjoy 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 one has to decide on whether to renew it. In either case, the reference point is the status quo at the time of the decision: not having insurance and deciding whether to buy coverage or remain uninsured, or having insurance and deciding to renew or cancel a policy. There is evidence that many individuals are reluctant to depart from the status quo even though there may be substantial benefits to them from doing so (Samuelson and Zeckhauser, 1988). Changes in the insurance laws in Pennsylvania in 1990 and New Jersey in 1988 provided an opportunity to examine the impact of the status quo as a reference point on the choice of auto insurance policies. Both states introduced the option of a limited right to sue with accompanying lower insurance rates, but the default option for drivers varied by state. In New Jersey, motorists had to actively acquire a right to sue at a more expensive price. In Pennsylvania, however, the status quo was the full right to sue, with motorists now having an opportunity to reduce their insurance costs by giving up some of their right to sue. When offered the choice only about 20 percent of New Jersey drivers chose to acquire the full right to sue, with 80 percent maintaining the status quo of no right to sue (Machina and Viscusi, 2013). In Pennsylvania, 75 percent of the insured population retained the full right to sue. 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

There are situations in which people assess the probability of an event by the ease with which instances of occurrence can be brought to mind (Tversky and Kahneman, 1973). The availability mental short cut implies that individuals are more interested in buying insurance

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coverage after a disaster occurs because it is highly salient. Indeed, it has been found that take-up rates of flood insurance policies in the U.S. increase right after a disaster event, then slowly decline (Gallagher, 2014). The flood insurance market offers more striking empirical evidence on this point. A 2012 study examined the number of new policies issued by the program and their respective durations through 2009 for those residing in both Special Flood Hazard Areas (SFHAs) and non-SFHAs using the entire portfolio of the NFIP over the period 2000-2009 (Michel-Kerjan et al., 2012). For example, of the 841,000 new policies in 2001, only 73 percent were still in force one year later. After two years, only 49 percent of the original 2001 policies were still in place. Eight years later, in 2009, only 20 percent of them were still in place. Similar patterns were found for each of the other years between 2002 and 2008 in which a flood insurance policy was first purchased.

Although some of these individuals may have sold their homes and cancelled their policies because they moved, the large percentage decrease in the insured policies-in-force overtime can only be partially explained by migration patterns. Data from the annual American Community Survey (ACS) over the period covered by the flood insurance dataset revealed that the median length of residence was between five and six years—somewhat higher than the two to four year median tenure of flood insurance.

This finding of higher insurance purchase is often true even in cases where premiums increase after the catastrophe (unlike NFIP policies). A prime example of this behavior is the purchase of earthquake insurance following a major seismic event. Surveys of owner-occupied homes in counties in California affected by the 1989 Loma Prieta earthquake showed a significant increase in coverage (Palm, 1995). Just prior to the disaster, only 22.4 percent of the homes had earthquake coverage. Four years later, 36.6 percent had purchased earthquake insurance—a 72 percent increase in coverage. The possibility of a future earthquake was now more salient, and for this reason many individuals decided to purchase insurance to gain peace of mind. In fact, the survey data revealed that "worry that an earthquake will destroy my house or cause major damage in the future" was the most important determinant in a homeowner's decision to buy earthquake insurance (Palm, 1995).

The availability mental short cut also implies that prior to a disaster the perceived likelihood of another disaster is perceived to be much lower than experts estimate it to be (Tversky and Kahneman, 1973). 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 84 percent of the homeowners in flood-prone areas did not have insurance, even though 45 percent of these individuals were required to purchase this coverage (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 percent of NYC households that were inundated had flood insurance at the time of the disaster (NYC, 2013).[3]

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

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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 today is to reframe the probability of risk so that people perceive potential future disasters as above their threshold level of concern. Research shows that simply adjusting the time frame can have a significant impact on the perception of the risk. For example, people were more willing to buckle their seatbelts when they are told they had a one-in-three chance of an accident over a 50-year lifetime of driving, rather than a 0.00001 chance 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 convey more knowledge than telling someone there a 0.2 percent change of a flood in any year (Weinstein et al., 1996).

Suppose a person is provided with a concrete scenario highlighting the damage to property from a future flood and then the 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 then decide that they should purchase coverage rather than regret not being financially protected should 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 the take up rate than a general message framed 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 due to any cause, a counterintuitive finding since by definition "any cause" includes a terrorist attack (Johnson et al., 1993; Kunreuther et al., 2013).

IMPLICATIONS FOR ENCOURAGING PURCHASE

Support Deliberative Thinking

Two examples illustrate this option: 1) provide concrete and meaningful comparisons, and 2) remove misperceptions. First, people have difficulty evaluating low-probability risks, but they form more accurate perceptions when numbers are presented in the context of familiar situations. A raw probability number such as one in one million may be an abstract concept, but people can more readily interpret such a number if it is compared to the risk of an automobile accident (one in twenty), or lightning striking your home on your birthday (less than one in a billion).

Second, misperceptions of the likelihood and generosity of aid may be an influence on the NFIP purchase decision, although the empirical evidence is mixed. 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 misconception is to view insurance as an investment. Some insured individuals do not feel justified in continuing to pay premiums when they do not collect on their policy. These individuals view insurance as a poor investment rather

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than recognizing the fact that they have not suffered any losses for the past 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 by paying the premium. People who view insurance as an investment misunderstand its purpose.

FEMA has prepared a two-page brochure making 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 peoples understanding of the purpose of insurance. In fact, FEMA's FloodSmart program represents a significant effort to inform the public of benefits of purchasing flood insurance (FEMA, 2014a), implicit in support of deliberative thinking. In addition, a user-accessible financial decision support tool to help persons compare the financial consequences of not having insurance and relying on aid versus purchasing insurance. 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 WYO agents who can work property owners to assess the merits of aid versus insurance for their particular situation.

Choice Architecture

Households have many financial decisions to make, and with limited time. Some households will use some of that time for a deliberative process when making an insurance purchase decision. Others may use mental shortcuts. Recognizing that some (maybe many) households will use mental short cuts the goal of increasing purchase may be served by paying attention to "choice architecture" (Thaler and Sunstein, 2008). The paper argued that people's choices often depend on how choice options are presented. To illustrate, consider the situation with the NFIP mandatory purchase requirement. There has been ongoing attention to enforcement of the mandatory purchase of flood insurance for properties in Special Flood Hazard Areas having a federally insured mortgage. 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 loan sector have been only partly successful. An analysis of the sequence of decisions beginning with the property owner who may be reluctant to purchase any form of insurance for the reasons discussed, to the role of the WYO agent and whether the commission for each policy purchased is enough to encourage following up when a policy is dropped, to the lender and who owns the mortgage over time, can identify possible reasons for failures to maintain insurance and suggest policy actions to increase compliance. The focus here is on the household decision, because if households did not choose to drop insurance in the first place, enforcement would be less of a challenge.

An illustration suggests how choice architecture might result in people buying and then maintaining flood insurance. 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 and 4 years after purchasing coverage (Michel-Kerjan et al., 2012). Therefore, the illustration applies

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equally to voluntary and mandatory purchase, but here the focus is on mandatory purchase. Currently, the choice context is for households to purchase insurance in an annual basis, meaning that each year they need to evaluate whether to renew. If there has not been a flood in that year, the availability heuristic (discussed above) may work against a decision to renew. If the renewal choice was for multiple years, however, then the effect of the availability heuristic might be minimized and presenting the choice as a multiyear purchase might take advantage of the status quo heuristic (see Box 4.1).

BOX 4-1
Multi-year Flood Insurance

To reduce the likelihood that policies will be cancelled the NFIP could introduce a 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 when they may decide not to renew an annual policy lapse after it expires. Premiums for MYI policies would still be paid on an annual basis and ideally be risk-based and fixed for a pre-specified time period (e.g., five years), and regularly reviewed by a scientific body to determine if the flood risk had changed.

Those not required to purchase flood insurance would have a choice between purchasing a single year or MYI policy. Should they decide to cancel their MYI policy before it expired, 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 policies.

An MYI policy 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 currently residing in flood-prone areas could be given a means-tested insurance voucher to cover a portion of the insurance premium as well as the cost of the mitigation loan. The costs to the homeowner and the federal government would likely be decreased relative to providing vouchers that only covered the insurance premium (and 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.

SUMMARY

A longstanding 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 makes ongoing improvements to its efforts to increase take up 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).

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- **The original NFIP legislation expected NFIP premiums to be priced at reasonable levels in order to promote voluntary purchase of NFIP policies. Empirical studies now find that premium prices may affect take up rates; however, the strength of that effect is limited. The effect that available disaster aid has on insurance purchase decisions is uncertain.**
- **Studies find that people may employ intuitive thinking, as opposed to systematic consideration of the cost of premiums in relation to expected future claim payments, when choosing to forego insurance or to cancel an existing policy.**
- **Acknowledgement of intuitive thinking, combined with the limited effects of premiums charged on insurance purchase decisions, suggest that lower premiums alone may not significantly increase take up rates.**
- **Keeping NFIP premiums at reasonable levels can be part of any strategy to maintain compliance with mandatory purchase requirements and increase voluntary take up rates. A multipart strategy to motivating purchase of NFIP policies can be designed using insights from the behavioral sciences literature.**

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5

NFIP Policies: Location of Potential Affordability Challenges

Prior to Biggert-Waters 2012 the NFIP used different premium setting practices for different groups of policies: NFIP risk-based (including preferred risk), grandfathered, pre-FIRM subsidized, and Community Rating Service (CRS) discounted. Biggert-Waters 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 these pre-FIRM subsidized and grandfathered policies. Biggert-Waters 2012 also directed FEMA to report on the feasibility of purchasing private reinsurance, pay down the debt to the Treasury and take actions to build up the NFIP reserve fund. These actions may require FEMA to increase NFIP risk-based premiums, which 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 also may have negative 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 is 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 challenge if all provisions of the Biggert-Waters 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 are concentrated within a few counties, affordability policy options might be different than if those 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. This provides information such as the address of the policy, the current premium, and the zone in which the policy was rated.

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

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This is a restricted dataset that cannot be released to the public due to privacy issues. Results are reported such that privacy issues are protected (see FEMA, 2013).

- *U.S. Census geographical area*. This dataset provides the geographical boundary 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 (NFHL)*. This dataset has the flood boundaries of all of 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 using FEMA, 2013 data, acquired by AECOM from FEMA 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 mapped with a Geographic Information System (GIS). For example, in order to show locations of polices, a spreadsheet is used to summarize the Flood Insurance Policy database, which then is imported into GIS to be mapped. The spreadsheet used for this report is Excel 2010 and the geographical information system used was ArcGIS10.2.2.

The chapter is organized by first describing the current NFIP policy portfolio. The geographic distribution of policies included in each policy group then is reported. That reporting is at the state, county, or U.S. Census block group of aggregation, as needed to better understand the location of that policy group.

NFIP POLICIES IN FORCE: AN OVERVIEW

NFIP Policies in Force: An 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 different types of properties:

- single-family housing units, which account for 3,793,421 of the policies in force;
- properties containing two to four housing units, which account for 264,650 of the policies in force;
- properties containing more than five housing units, such as apartment buildings and assisted living facilities, which account for 1,192,402 of the policies in force;

[2] The information and maps describing NFIP policies presented in this chapter are derived from data provided to the Committee by FEMA. This is the most recent detailed data (October 2013; see FEMA, 2013a) 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 U.S. Census Bureau as: "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.

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- non-residential properties (buildings for businesses), and residential facilities such as hotels with short-term guests; residential Condominium Building Association Policy (this applies to condominium complexes where the individual units are separately owned). The sum of these non-residential properties is 294,156 of the policies in force.

These distinctions are important in understanding the policy database and the presentation of the data in this chapter. Of special note is that a policy may be for a property with more than one housing unit. One example would be apartments.

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 properties that have had four or more separate claim payments each exceeding $5,000, or two or more separate claim payments where the total of the payments exceeds the current value of the property.[5]

A classification of the types of policies is depicted in Figure 5.1. 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 (to be discussed separately below), and CRS discounted polices. About 20 percent of the policies pay pre-FIRM subsidized premiums.

Figure 5.1 further subdivides pre-FIRM subsidized policies into categories. Non-primary properties (designated by L) consist of single family homes (B), businesses and non-residential buildings (C), and severe repetitive loss properties (D), such that L = B + C + D. This first category covers those policies that under Biggert-Waters 2012 would see increases in rates at 25 percent per year until the NFIP risk-based premium was paid; HFIAA 2014 did not change this Biggert-Waters 2012 requirement.

The second category of policies is primary residences (M), which totals 583,141 policies. This is the category of policies that under Biggert-Waters 2012 would have seen increases in rates to the NFIP risk-based premium when the property was sold. However, the HFIAA 2014 legislation replaced that provision by requiring that rates increase by no less than 5 percent, and no more than 18 percent, 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 totals 233,434. It includes residences with 2-4 housing units (G), 5+ housing units (H), and Residential Condominium Building Association Policy units (I), such that N = G + H + I. Within the condominium category are units that are owner-occupied and units are rental properties; most of the condominium units with pre-FIRM subsidized policies are not primary residences (150,226). The total number of policies with pre-FIRM subsidized policies that would be affected by Biggert-Waters

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

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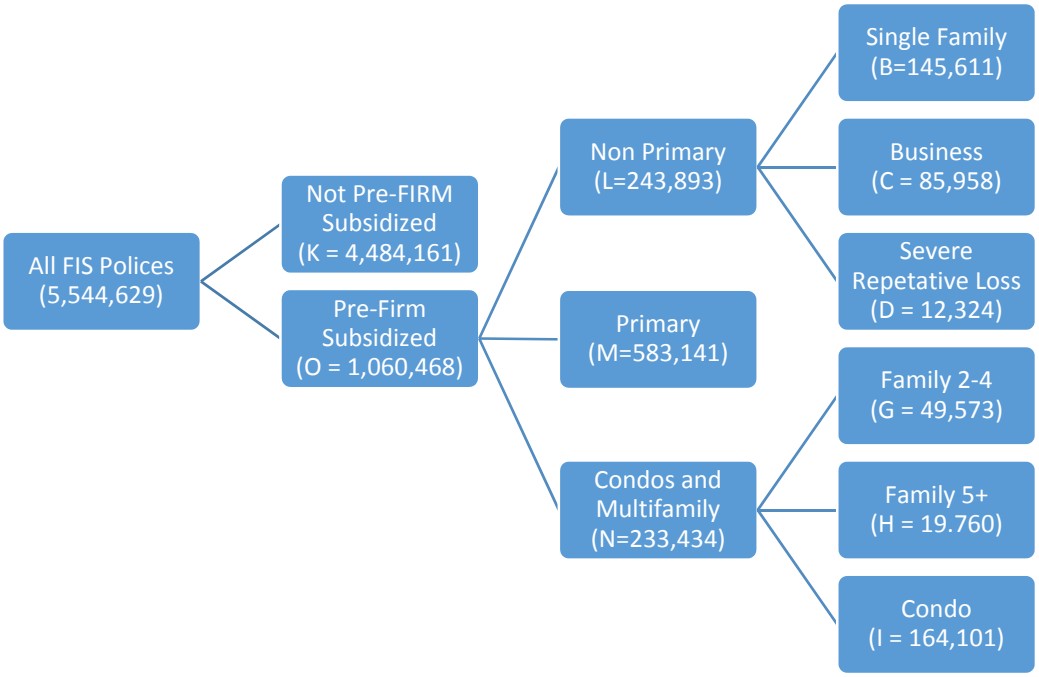

FIGURE 5.1 Classification of flood insurance policies.
SOURCE: AECOM, 2014.

2012 is the sum of categories (O = L + M + N). This total of 1,060,468 is subsequently displayed in discussions of pre-FIRM subsidized policies.[6]

All NFIP Policies

Figure 5.2 shows the distribution of all 5.5 million policies across the nation, by county. As the figure shows, NFIP polices are distributed widely, but there are areas of high concentration.

Table 5.1 also presents data on numbers of NFIP policy holders across the U.S., in tabular form and aggregated by state. The table shows the concentrations of policy holders in select areas of the U.S. For example, Florida contains 40 percent of the policies, and Texas and Louisiana together contain an additional 20 percent of all polices.

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

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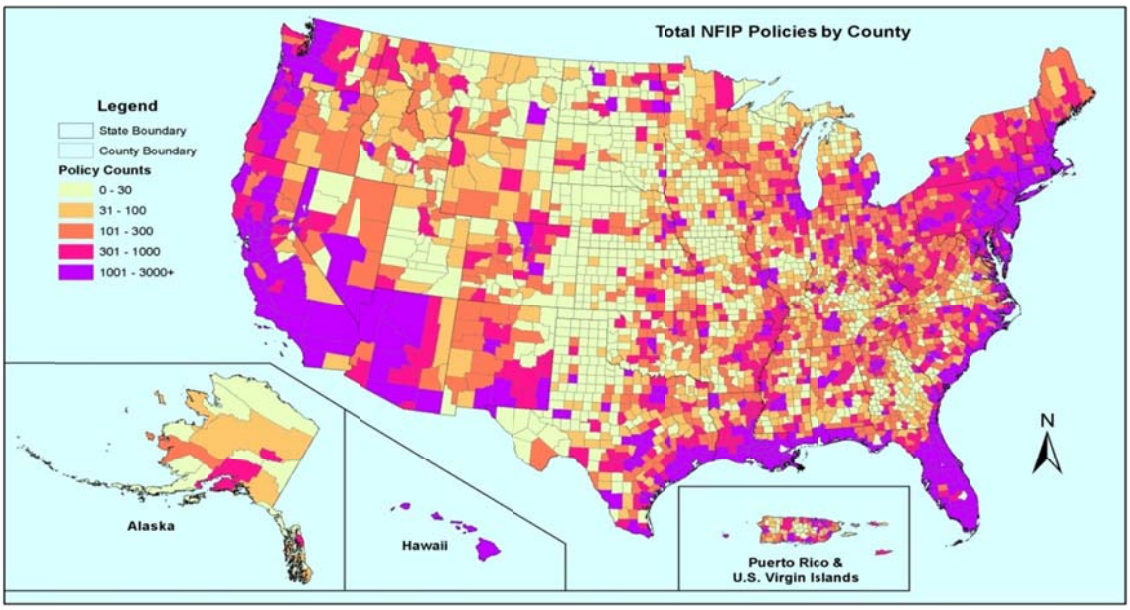

FIGURE 5.2 NFIP policies across the U.S., by county.
SOURCE: AECOM, 2014.

TABLE 5.1 NFIP Polices by State / 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

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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
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
(blank)	2,192
Grand Total	**5,544,629**

SOURCE: AECOM, 2014.

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Biggert-Waters 2012 would affect premiums levels for all these policy types, in all these places, and in different and still undetermined ways. Thus, the effects of Biggert-Waters 2012 may be concentrated in some states, but will be realized across the nation.

The approximately 5.5 million policies in force today are both inside and outside the FEMA-mapped SFHA (1 percent floodplain), but not all of the properties within the SFHA have purchased insurance. Estimating take up rates is difficult due to the lack of data on households and policies in floodplains across the country. It appears, however, that take up is particularly low in areas where purchase is voluntary, but it also seems that many who are required to purchase the coverage do not. An estimate of take up rates from a random sample of homes across the U.S. by RAND Corporation suggests that about half of single-family homes in 100-year floodplains have flood insurance, although this average masks high regional variation, with the Midwest having the lowest take up rates—20 percent to 30 percent—and the south and west having take up rates closer to 60 percent (Dixon et al., 2006). An examination of coastal properties estimated take up rates at 50 percent (Kriesel and Landry, 2004). Finally, a calculation of take up rates in census tracts (not just in the floodplain) along the New Jersey and New York coasts immediately preceding Hurricane Sandy suggests market penetration was in the range of 5 percent to 50 percent, with a few tracts along the coast having rates up to 75 percent (Kousky and Michel-Kerjan, 2012).

In July 2014, FEMA reported to Congress that there are 4.9 million housing units within the riverine or SFHA floodplain (or 1 percent floodplain) and 3.8 million housing units are within the coastal SFHA for a total of 8.7 million housing units in floodplain (Doug Bellomo, 2014, Federal Emergency Management Agency, personal communication). Recall that there are approximately 5.5 million NFIP policies in force both within and beyond the SFHA. With over 11 million housing units in the SFHA alone it would appear that many of the housing units within the nation's floodplains do not have flood insurance. These analyses, and the limited available data, suggest that meeting the longstanding goal of widespread take up rates for flood insurance would require a significant increase in insurance policy purchases.

Grandfathered Policies

Grandfathered polices[7] are created when a new version of the flood insurance rate map is released and the current policy owner wants to be rated based on the map in effect when the policy was initially purchased. For example, consider a homeowner with a house that has a first floor elevation of 52 feet. In 2008, the owner purchased flood insurance and the maps show the 100-year flood at an elevation of 53 feet based on a map dated 1983. The homeowner is charged

[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. Policy holders 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).

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an insurance rate for a first floor that is one foot below the 100-year base flood elevation (BFE). Then, in 2012 a new flood insurance rate map is released. The map now shows a 100-year flood elevation to be at 55 feet. This would be three feet above the first floor elevation of the house. The policy owner can keep the lower rates of first flood elevation one foot below (vs. three feet below) the 100-year flood elevation if certain conditions exist. Therefore, rates may increase and the design of an affordability framework would be well served by knowing the number and location of grandfathered policies.

The FEMA policy database does not contain information identifying if the current policy is grandfathered. The policy database does contain the zone that was used at the time the policy was purchased and if the elevation of the structure was obtained, that information is within FEMA's database, as well. In addition, FEMA maintains a National Flood Hazard Layer (NFHL) for areas where the paper map inventory has been converted to a digital format. National Flood Hazard Layers are available for communities that include approximately 88 percent of the U.S. population and approximately 60 percent of the land area of the continental U.S. (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 where 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 the property. The following indicators could then be used to determine if 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)
- 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 within 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 within 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 this report. FEMA has, however, made preliminary estimates of grandfathering and has concluded that, at a national level, approximately 10 percent of all policies (excluding pre-FIRM subsidized) are grandfathered (Andy Neal, Federal Emergency Management Agency, personal communication, 2014).

Policies other than Pre-FIRM Subsidized

Biggert-Waters 2012 called on FEMA to report to Congress on the possibility of making changes that might raise NFIP risk-based premiums over time. Figure 5-3 maps the distribution

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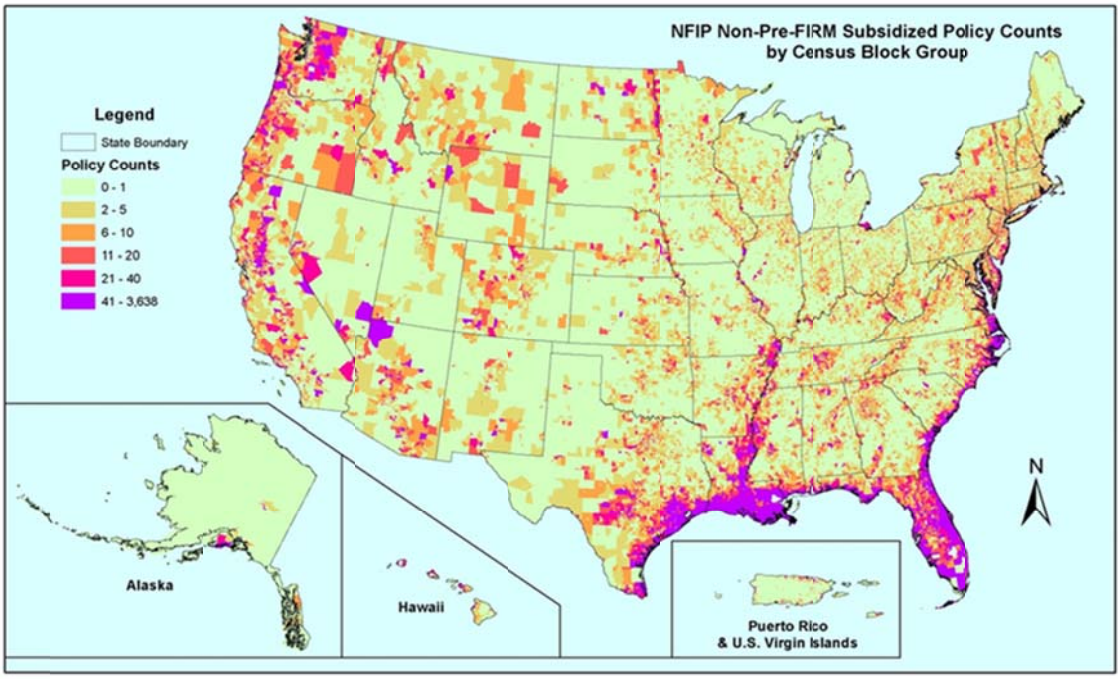

FIGURE 5.3 NFIP non-pre-FIRM Subsidized Policy Counts by U.S. Census Block Group.
SOURCE: AECOM, 2014.

of all policies other than pre-FIRM subsidized, according to U.S. 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 of policies in this group (5-3 purple shade), policies in this group are found in significant numbers in census block groups across the nation (5-3 pink and red shading).

Pre-FIRM Subsidized

Holders of pre-FIRM subsided policies may see significant increases in premiums. The spatial pattern of NFIP pre-FIRM subsidized flood insurance policies where these significant

[8] A census block group has a population of between 600 and 3000 people, or an average of 533 housing units. As of 2013, U.S. population was approximately 316 million, with approximately 133 million housing units. To assemble data on the population, the counties of the nation are assembled or subdivided into Census Tracts, of which there are currently about 74,000. These are further subdivided into Census Block Groups (220,000), and then into Census Blocks (11 million). On average across the nation, a U.S. Census Block Group contains approximately six hundred housing units (for more information see: https://www.census.gov/geo/maps-data/data/tallies/tractblock.html).

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premium increases might be realized is shown by state in Figure 5.4. The states of largest populations—California, Texas, New York, and Florida—have large numbers of pre-FIRM subsidized policies, as well as the greatest numbers of all policies. Louisiana, New Jersey, and Pennsylvania round out the top seven states of NFIP pre-FIRM subsidized policy numbers.

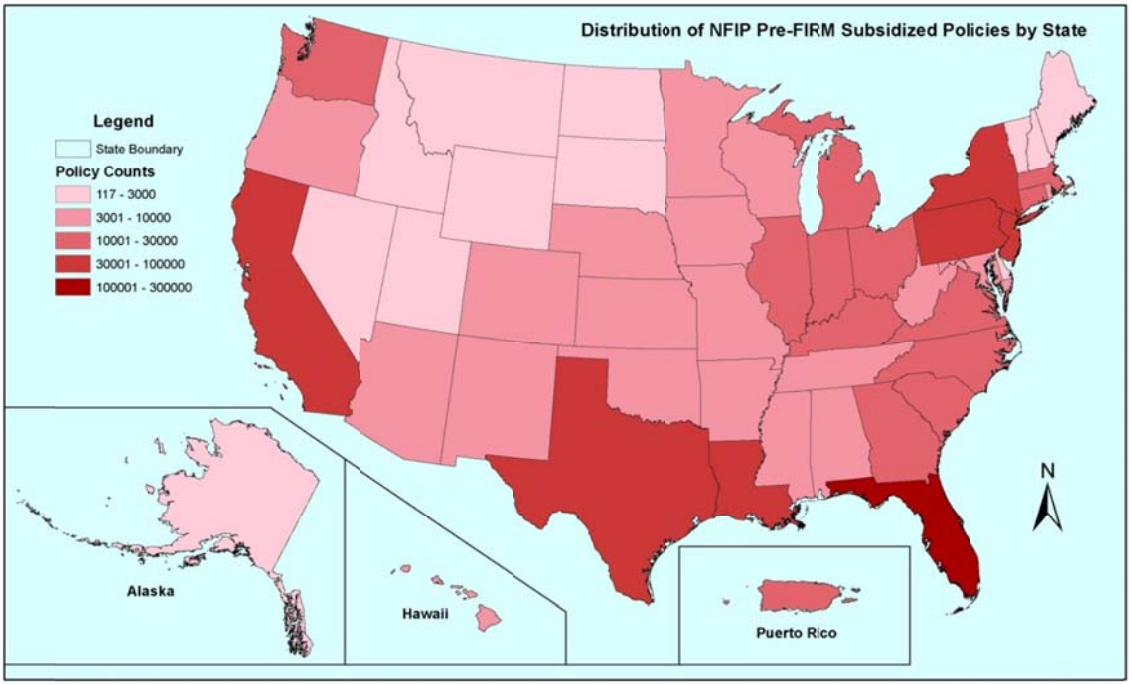

FIGURE 5-4 Distribution of NFIP Pre-FIRM subsidized policies by state.
SOURCE: AECOM, 2014.

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. This is not surprising, because the southern and western U.S. is where population growth is creating newer housing stock (and presumably built after the local FIRM was issued and when compared to the Midwest and Great Lakes region). 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, then the possible affordability problem appears to be national in scope.

An even finer level of spatial detail can be employed by allocating the policies to census block groups, then mapping the distribution of pre-FIRM subsidized policies at the census block group level (Figure 5-6). The impression from that map is that the pre-FIRM subsidized policies are spread widely, but an important calculation using the data underlying the map is that 80

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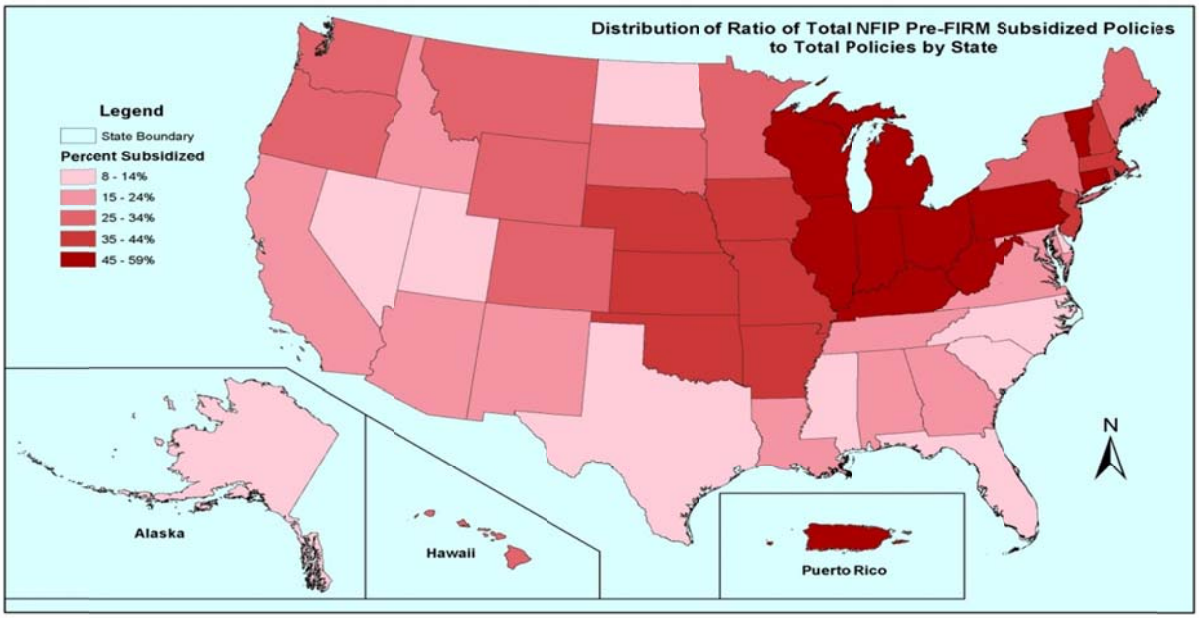

FIGURE 5-5 Distribution of the ratio of total NFIP Pre-FIRM subsidized policies to total policies.
SOURCE: AECOM, 2014.

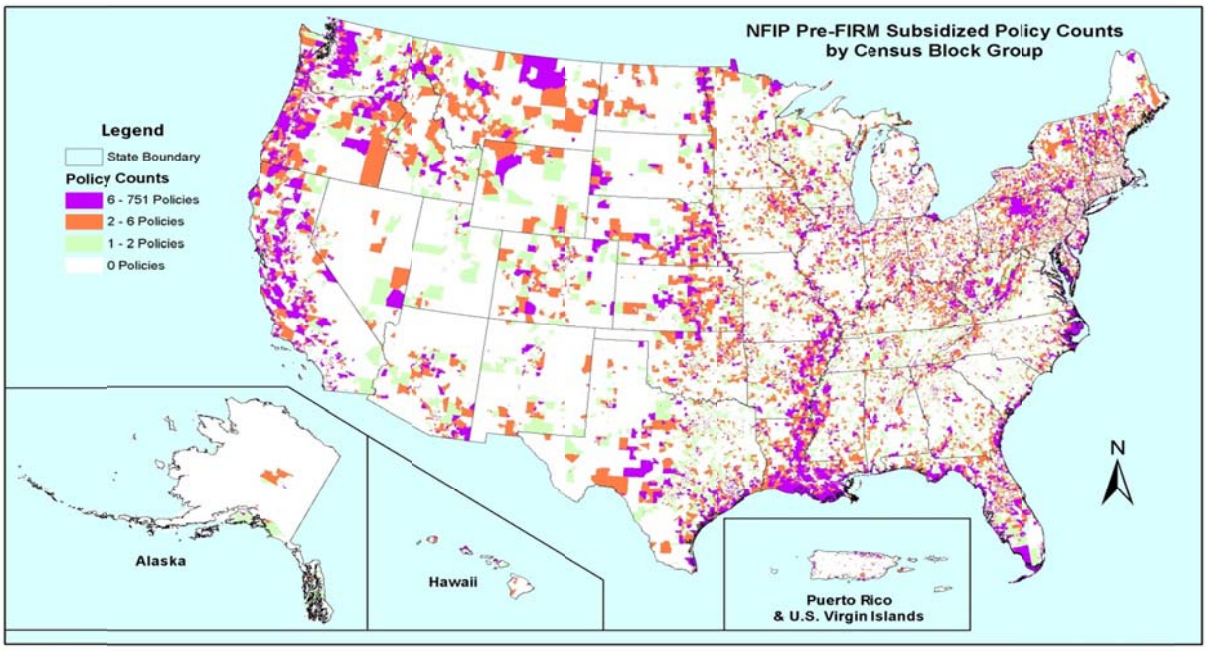

FIGURE 5-6 NFIP pre-FIRM subsidized policy count rankings by U.S. Census block groups.
SOURCE: AECOM, 2014.

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percent of NFIP polices are in concentrated within 6 percent of the U.S. Census block groups. Focusing on the purple shaded areas suggests that there may be small geographic areas (recall that an average census block group contains approximately six hundred 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 percent of the approximately 5.5 million NFIP polices are in three states—Florida, Texas, and Louisiana. The rest are distributed widely across the nation. Any effects of Biggert-Waters 2012 therefore will be more concentrated in some places, but will be realized throughout the nation.**
- **Available estimates of take up rates suggest that they are low, especially outside Special Flood Hazard Areas. Meeting the longstanding goal of widespread take up rates for flood insurance therefore would require a significant increase in purchases.**
- **The extent and location of where premium increases might result from elimination of grandfathering can be determined by further analysis of the policy data, but cannot be estimated at this time.**
- **Slightly more than 1 million—or 19 percent of the policy holders—are paying pre-FIRM subsidized rates and will see potential rate increases if the provisions of Biggert-Waters 2012 were in effect. Pre-FIRM subsidized polices are found throughout the nation, but there are areas of concentration.**

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6

Affordability Concepts and a Framework for Assistance Program Design Decisions

Section 9 of the Homeowners Flood Insurance Affordability Act of 2014 required FEMA to propose an affordability framework for the NFIP. One statement for the requested framework asks FEMA to propose options for "(2) 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, 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 their associated ways to measure 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 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," for either an individual property owner or renter, or any group

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

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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 operating social assistance programs. These concepts reflect concerns about how premium increases might affect both *willingness* and *ability* to purchase insurance. The concern over the ability to purchase was especially relevant in the BW 2012 and HFIAA 2014 language because of legal and regulatory provisions that make purchase of insurance mandatory if a property located in a Special Flood Hazard Area (SFHA) has a federally backed mortgage.

This section discusses three of the potentially many approaches to the concept of affordability: a capped premiums approach, an income approach, and a housing cost approach. These 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 later discussed, 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.[2] The cost burden measure also can be used to monitor changes over time in affordability of flood insurance and differences in affordability of insurance between different areas or types of households.

Capped Premiums Approach

In Section 16 of the Homeowners Flood Insurance Affordability Act of 2014, the U.S. 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 certain percentage of the coverage of the policy. The HFIAA 2014 legislation suggested that this threshold value be one percent. The capped premiums approach does not consider household income, assets, or expenditures on housing, food, medical care or other goods and services when 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 based on household income. For example, eligibility for public housing is limited to low- and moderate-income households

[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. Furthermore, 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.

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whose incomes do not exceed 80 percent of the median income for the county or metropolitan area in which they live. Housing assistance through rent subsidies (housing vouchers) administered by local housing authorities are generally limited to low-income households (those whose income does not exceed 50 percent of the median income of the county or metropolitan area in which it is located), and by law, 75 percent of vouchers must be provided to households whose income does not exceed 30 percent 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 percent and its monthly net income is at or below 100 percent of the applicable federal poverty guideline.

Based on 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 with income 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]

Housing Cost Approach

This approach 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 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, trash collection), and maintenance. In the case of renters, many of these 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 household income is judged to become burdensome and, thus, unaffordable. The U.S. Department of Housing and Urban Development (HUD) identifies households which experience housing costs of 30 percent or more of income as cost burdened and those who pay 50 percent or more as severely cost burdened. This affordability standard is described as follows:

[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.

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> 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 (Glaeser and Gyuorko, 2008).[4]

If policymakers were to choose the 30 percent threshold for the NFIP, for example, a household would be flood insurance cost burdened if its housing costs, inclusive of the NFIP premium, exceeded 30 percent of its income. Under this policy choice and criterion, the size of the burden would be the dollar amount beyond 30 percent of household income required to pay for housing due to the amount of the flood insurance premium. For a household already housing cost burdened—because its housing costs without flood insurance exceed 30 percent of its income—the entire NFIP premium would be viewed as a flood insurance cost burden. For a household that spends less than 30 percent of its income on housing, the flood insurance premium would be viewed as affordable as long as overall housing costs remain at 30 percent or less of income.

A chosen affordability concept and cost burden measure can be used to monitor changes over time 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 when 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 include:

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?

[4] According to national Consumer Expenditure Survey data for 2013, the share of income spent on housing is 27.9 percent for the median homeowner without a mortgage, 34.1 percent for the median homeowner with a mortgage, and 38.2 percent for the median renter (http://www.bls.gov/cex/2013/combined/tenure.pdf).

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As described below, many of these decisions entail tradeoffs involving 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. This report discusses the nature of these tradeoffs in general terms. Possible analytical methods for assessing the tradeoffs will be described in this committee's second report.[5]

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. Then, they could 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- and moderate-income policyholders? Should assistance be considered for households who have experienced dramatic increases in flood insurance policy premiums? These 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/measures or some other alternative. Once a concept and 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

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

[6] This discussion focuses on which households are eligible for assistance. However, 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 the definitions used to determine SNAP eligibility, for example, see: http://www.fns.usda.gov/snap/eligibility.
For information about eligibility for Medicaid and the Children's Health Insurance Program (CHIP) and, specifically, the use of modified adjusted gross income (MAGI), see: https://www.healthcare.gov/glossary/modified-adjusted-gross-income-magi/.

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requires a definition of housing costs, a definition of income, and a threshold identifying 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, any data needed to measure a particular household's flood insurance cost burden would have to be obtained for the household and used by the agency administering the assistance program to determine whether the household is cost burdened. Requiring data on household income and housing expenses, the housing cost approach could impose substantial reporting burden on households that have to provide such data and entail substantial administrative costs to collect, process, and verify the data. The same might be true of the income approach, although it would 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] This 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 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).

Following 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 specifying eligibility criteria face a tradeoff between providing greater assistance on average to a smaller number of eligible households or 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 be to make eligible for assistance only those policyholders who previously paid pre-FIRM subsidized or grandfathered premiums (as of a specified date, perhaps), that is, the policyholders who previously were receiving assistance. Alternatively, any household eligible for a pre-FIRM subsidized or grandfathered premium (as of some date)—regardless of whether a household purchased insurance—could be eligible for assistance under a new program. Because pre-FIRM subsidies and grandfathered

[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 was losing a pre-FIRM subsidy, data about its house that had not previously been obtained might be needed to calculate the risk-based premium.
[10] If funds are not limited, assistance costs may rise as the number of households eligible for assistance expands.

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premiums 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 likely 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 not cost burdened but previously paying 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 complete 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 those properties), especially those with mandatory flood insurance purchase requirements.[11]

Eligibility Based On Requirement To Purchase Flood Insurance

A household with a mandatory purchase requirement, and that pays a pre-FIRM subsidized or grandfathered premium, has three choices when its premium rises to a new risk-based rate: (1) discontinue compliance with the purchase requirement, (2) continue compliance and pay the higher premium, or (3) purchase a different quantity of insurance to the extent the 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 required to purchase flood insurance. Such targeting of assistance might encourage compliance among 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.

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 is over 38 percent for the median renter, 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

[11] Even with this interpretation, policymakers might choose to limit the duration (and amount) of assistance that would be provided to such households. Policymakers might 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).

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assistance to renters. However, targeting assistance to only 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 further impacted 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 costly) 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] This will be especially challenging when renters are residents of multi-family buildings, where a single premiums is paid for the entire building. There are over 233,000 such buildings (about 25 percent 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 likely provide assistance for housing costs that have nothing to do with flood insurance premiums. Some states with property tax circuit breaker programs[14] provide property tax assistance to renters based on the assumption that a portion of their rent (typically between 15 percent and 35 percent) 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 a significant amount of analysis to determine the percentage of the rent 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 at low or low-to-moderate income levels. Although policymakers can use the income approach to measuring cost burden to target assistance to any particular income class (e.g., households with income below 50 percent 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

[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 reflected that subsidy. However, the economic impact on the seller is essentially the same as the impact of the future higher insurance premiums had the property 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. On the other hand, in the absence of a sale, reduced property value may result in lower property taxes, to the benefit of the property owner.

[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] These are 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.

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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, while the housing cost approach identifies as cost burdened those households for which their housing costs, inclusive of flood insurance, exceed a specified percentage of their income. With both approaches, eligibility for assistance among cost-burdened households could be further restricted to those households with, for example, 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 (and 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.

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 for which 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, causing the elimination of pre-FIRM subsidies or grandfathering to threaten the vitality of the entire community. Policymakers could make all households in a community eligible for assistance if a specified (or higher) percentage of them would likely be eligible based on their individual circumstances. In addition to protecting the vitality of the 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

[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 the Supplemental Nutrition Assistance Program (SNAP).
[16] Assistance for undertaking mitigation activities is discussed under Decision 2: What Assistance Will Be Provided and in Chapter 7.
[17] Availability of NFIP flood insurance to property owners in a community is already conditioned on a community's willingness to adopt and enforce various regulations to reduce vulnerability to flooding (e.g., requirements to elevate new construction to the level of the 100-year flood).

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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 eligibility 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 live in communities where the prevalence of cost-burdened households likely is high, concentrating assistance where it is judged to be most needed. Alternatively, (as in a previous example), a household could be eligible if it is cost burdened or resides in a community in which most other households are cost burdened.

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 finance mitigation activities that reduce risk in ways that will be reflected in a lower insurance premium.

Decision 3: How Will Assistance Be Provided?

There are many ways for delivering premium or mitigation assistance. Discussion of a range of options can be found in Chapter 7, so 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 for delivering assistance. However, with any mode of delivering assistance, administering premium assistance to a specific target group of property owners might entail substantial costs if extensive efforts are required to verify eligibility for assistance. This 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

[18] The 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.

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tax compliance activities, but would require changes to the tax code, tax forms, and return processing procedures. Also, it would impose a burden on property owners who are eligible for assistance but are not otherwise required to file a tax return.

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. Those 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 (e.g. 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 take up ratess (see chapter 4 for further discussion). However, it also will increase the total budget for the assistance program (for a given number of property owners receiving assistance).

The central input to 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, for instance. 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, a percentage of the NFIP risk-based premium, or some combination (e.g., the lesser) of the two. 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. (e.g., a household is cost burdened if housing costs are greater than 30 percent 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.

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When 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 based on 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 over time or, at least, 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?

When 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 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 across all recipients does not exceed what is available. One possible approach in this 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/disabled status, or other household or community characteristics, with property owners at higher priority levels receiving assistance before property owners at lower levels. An alternative would be a pro rata reduction in all assistance awards based on the expected shortfall in available funds.

Making decisions about each of these matters may require development of formulas and algorithms that balance the different considerations in offering aid, introducing additional complexity into an assistance formula or algorithm. With such complexity, it can be important to maintain as much "smoothness" as possible in the formula/algorithm (Zaslavksy and Schirm, 2002). Ideally, property owners facing similar circumstances receive similar amounts of assistance, avoiding 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.

[19] Certain 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 certain number of years or after receiving a certain total amount of assistance.

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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 policy holders 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 (e.g., nationally) versus more locally (by states, tribal nations, or communities), or are shared between the 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 the assistance to the other policy holders through premium surcharges or implicit loadings. This 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. Of course, 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 more 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 are borne locally. In that 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/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 household resources of unusually high non housing expenses (e.g., medical expenses). Policymakers also will have to determine how the necessary data will be obtained from households (e.g., 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 these functions. Candidates for these various administrative activities include: FEMA; HUD; state, local, and tribal government organizations; and private insurers that administer the Write-Your-Own 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. An issue that is relevant to striking such a balance is the

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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, suggesting that it might be prudent to verify the accuracy of the data (on at least a sample basis), which is another administrative cost.[20] Strategies that seek to minimize data needs include community eligibility options and homeowner eligibility using 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 there are a large number of 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 their individual circumstances, and failing to provide assistance to cost-burdened homeowners in communities not eligible for assistance.[22] In addition, even if a community eligibility approach identifies exactly those 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 that homeowner. Community eligibility also raises the issue of whether to define a community based on census geography (described in Chapter 5) or jurisdictional boundaries. If, instead, eligibility was based on publicly available data on characteristics specific to individual homeowners, such as assessed property values, a homeowner could be eligible for assistance if the property value is less than a specific dollar amount or below a particular percentile for the community. Of course, if this criterion does not reflect the 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 these 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, in order to strike a balance between the objectives of targeting and the goal of minimizing administrative costs.

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[20] For SNAP, a quality control system has been developed to monitor the accuracy of eligibility and benefit determinations (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 based on their own circumstances. As noted previously, the 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, enabling the districts to process fewer applications and, thereby, reduce administrative costs.

[22] If an entire community is not eligible for assistance, eligibility could be determined on a household by household basis, incurring higher administrative costs.

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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 one percent 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 with income 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. These three measures reflect different subjective judgments about the cost burden of flood insurance premiums and 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 when designing a financial assistance program. The many considerations, and some policy options, when designing a means tested assistance program for an affordability framework are summarized in Table 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.**

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TABLE 6.1. Designing Targeted Assistance Programs for an Affordability Framework

Design Decisions	**Policy Options**
1. Who will receive assistance	Eligibility based on: Being cost burdened by flood insurance Loss of pre-FIRM subsidized or grandfathered premium Requirement to purchase flood insurance Housing tenure (owner or renter) Household income Mitigation Community characteristics (e.g., prevalence of cost-burdened households)
2. What type of assistance will be provided	Premium assistance to reduce the amount that a household pays for flood insurance Mitigation assistance to help a household finance mitigation activities Comprehensive assistance that includes both premium and mitigation assistance
3. How assistance will be provided (see Chapter 7)	Discounts Vouchers Tax credits and refunds Grants Loans Buyouts
4. How much assistance will be provided	Specifying a formula or algorithm for calculating the amount of each type of assistance provided Setting minimum and maximum amounts of assistance Determining the duration of assistance Prioritizing eligible households or adjusting assistance awards if assistance is not an entitlement
5. Who will pay for assistance	Allocating the costs of assistance between taxpayers and policyholders who do not receive assistance Allocating the costs of assistance between national, state, tribal, and local entities
6. How an assistance program will be administered	Specifying the entities responsible for eligibility and assistance award determinations and verifying such determinations FEMA; HUD; state, local, and tribal government agencies; private WYO insurers

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 an increase in the total cost of the assistance program is to be avoided. If instead, more generous assistance is provided, insurance take up ratess might increase, but the total cost of the assistance program might also increase and incentives to mitigate might decrease. As another

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example, when specifying eligibility criteria for assistance, more specific and accurate targeting of assistance based on policyholders' characteristics will require policyholders to provide more personal data, increasing burden on policyholders and raising administrative costs of processing and verifying data provided.

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

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7

Policy Alternatives for an Affordability Strategy

This chapter begins from a premise that some households will face NFIP 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. While Chapter 6 discussed the full range of decisions that must be made by policymakers when designing assistance programs, this chapter focuses mainly on how assistance will be provided. Three broad policy options for providing assistance are reviewed: 1) direct financial assistance to policy holders. This could be either for mitigation actions that reduce the cost of flood insurance or for the cost of premiums directly. These households would need to meet predefined eligibility and assistance criteria (as discussed in Chapter 6) before assistance was offered; 2) NFIP program reforms, which could reduce the cost of flood insurance for all policy holders through changes to NFIP structure and requirements; and, 3) Community-based programs.

DIRECT FINANCIAL ASSISTANCE TO POLICY HOLDERS

Assistance policies for individual policyholders can be for implementing mitigation measures that lower premiums, directly subsidizing the annual cost of the flood insurance premium or be a combination. 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 discussions). The direct assistance options are discussed in turn, recognizing that an affordability program may include several of them simultaneously.

Target Mitigation Grants

Even if mitigation could be implemented by policy holders to reduce premiums the cost of such actions may still be a barrier to their adoption. Modifications to existing mitigation grant programs, paid for from general federal revenues, might be made to overcome that barrier. Federal grant programs currently support mitigation (see Box 7-1). Two of these provide funding for mitigation before a disaster event occurs and two are targeted at areas that have

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BOX 7-1
Programs for Mitigating Flood Damages

Two grant programs fund mitigation before a flood: Pre-Disaster Mitigation (PDM) Program and the Flood Mitigation Assistance (FMA) Program. Annual funding for the PDM program since 2002 has ranged from a low of $25 million (in 2002 and 2013) to a high of $150 million (in 2003 and 2004). In FY14, $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 Pre-Disaster Mitigation program three times greater than what was available (McCarthy and Keegan, 2009). In 2013, FEMA received applications for more than twice the appropriations received for the Flood Mitigation Assistance 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 (CBDG-DR) administered by HUD. Both require a presidential disaster declaration and CDBG-DR requires a supplemental appropriations bill. For large disasters or multiple events in a single year, 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. HMGP requires a 25 percent state match (CDBG dollars can be used for this purpose).

experienced a disaster 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 areas for reforming mitigation grant programs to address affordability can be identified. First, FEMA elevation or buyout programs proposed 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, based on review of 11,000 previous mitigation investments, 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 that 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[2]).

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

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

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With this benefit-cost decision rule, if a property owner is paying pre-FIRM subsidized premiums and the owner is making large and frequent claims, the owner can receive mitigation assistance without regard to their ability to pay for their 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 the Congress that can be used to identify a group of households that have Pre-FIRM subsidized premiums and who would be allowed to retain those premiums (or have premiums frozen at a level consistent with the household's ability to pay).[3] These same households then would be given priority for receiving mitigation grant funding as such funding becomes available. In this way, mitigation funds are targeted to those for whom the NFIP risk-based premium creates an affordability challenge. Once mitigation funding is received, the owner of the property 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 (CBDG-DR; 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 (see Chapter 3 and discussion below). Because use of funds for these types of projects is at the state and local government applicant's discretion, these applicants could design programs to direct mitigation assistance to low income households facing NFIP risk-based insurance premiums. In fact, a portion of the CDBG funds are directed to primarily benefit low- or moderate-income households.[4] One challenge from 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. This time delay can be significant (e.g., 18 months or longer), and additional time then is required for state and local government to provide funds to the 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 (and even if the mitigation has not been implemented).

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[3] As long as this group of properties 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 properties in this group from general revenues.

4 HUD notes that this requirement can be met through uses of the funds in which the majority of beneficiaries have low or moderate income or activities that benefit an area in which over half of the population is low or moderate income. See: https://www.hudexchange.info/cdbg-dr/cdbg-dr-eligibility-requirements.

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Mitigation Loans

Mitigation measures can have significant initial costs, but any reductions in annual NFIP premiums will occur over time. Ideally, a household may consider a mitigation measure to be cost-effective when the future discounted benefits (annual reduction in premiums) exceed 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 limited access to funds for making the investment. To illustrate with an example,[5] suppose that a household faces a $4,000 NFIP risk-based premium, could implement low-cost mitigation at a cost of $25,000, and as a result the annual premium falls from $4,000 to $500 (an annual saving of $3,500). The $25,000 initial cost for 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 percent, the annual loan payments would be $1,680. The NFIP premium would fall to $500 and the total annual cost for managing the households 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.[6] This household may be able to afford the $2,180 annual payment, but not the $4,000 annual premium.[7]

Although a loan might appear to make financial sense a low income household may not have access to a private commercial loan. For this reason, funds might be allocated to a federally backed loan program that is targeted to households with limited access to commercial credit. Also, the attractiveness of a loan depends on the interest rate. Borrowing rates currently are low and a loan program could offer these low rates. If interest rates increased, 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 only be available to homeowners who met eligibility and assistance criteria based on the considerations (and as discussed in Chapter 6). [8]

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[5] 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 weights on future returns from their mitigation investment.

[6] The results will differ for the numbers used in the analysis.

[7] 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. However, the loan would be a lien on the property and the mitigation would be expected to increase the homes market value. If the property was sold the outstanding balance of the loan would be paid off at closing.

[8] For example, the Small Business Administration (SBA)already has a low-interest disaster loan program for households that need funds to repair and rebuild, and 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.

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Vouchers

This committee's task statement, as derived from BW 2012, identifies "means-tested vouchers" for the National Flood Insurance Program 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 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 with the revenues used for providing 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 the allocated funds could be used toward paying a portion of the cost of the insurance premium. Each year, the household would be informed of the cost of the insurance and the household 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).[9]

Ease of administration suggests offering the voucher through existing programs. One approach would allocate funds for the voucher to HUD through their 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 measure(s), the voucher could cover not only a portion of the resulting risk-based insurance premium, but also 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 likely would 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

Another way to lower households cost for the flood insurance premium, or for a mitigation investment that lowers premiums, is through tax deductions or credits. A tax deduction reduces how much taxable income an individual must claim on their return. An example is the mortgage interest deduction, which allows property owners to deduct the annual interest on their home loan from their income. In fact, tax deductions are used to help disaster victims. For example, for presidentially declared disasters, filers can deduct certain losses not

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

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covered by insurance or disaster aid. Eligibility for the deduction is means tested in the sense that filers must first subtract $100, then 10 percent of their adjusted gross income (AGI) from their losses (IRS, 2014a).

A tax credit, on the other hand, directly reduces the amount of taxes owed. The benefit of a deduction is determined by the filer's marginal tax rate, and any constraints on the amount that is allowed to be deducted. This reduction in taxable income is also limited to taxpayers who itemize their deductions rather than taking the standard deduction. In 2011, just under 32 percent of taxpayers itemized their deductions (IRS, 2014b). A credit, on the other hand, is independent of the tax bracket, but only benefits those who owe a positive amount of taxes unless it is in the form of refundable tax credits, where 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, since they lower the actual amount of taxes paid.

Table 7.1 shows deductions or credits could be given to policyholders based on the amount of premium paid, as well as any other eligibility criteria for determining assistance to address affordability (and discussed in Chapter 6).

Some arguments have been raised in favor and against using the tax code for social policy. On the one hand, the tax code has been criticized for not being transparent, having an uncertain impact on behavior, for introducing economic distortions, and not appropriately targeting those in need of tax relief. Some also have contended that it is inappropriate to use the Internal Revenue Service (IRS) to guide social policy. Those favoring the use of a tax code for social policy maintain that the IRS is in a good position to administer income-based policies, that certain tax incentives produce better results and are more permanent than outlays (Stead, 2006).

TABLE 7.1 Impact of Tax Deductions and Credits on Affordability.

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

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In 2013, a bill entitled the Flood Mitigation and Expense Relief Act was introduced. It offered a $5,000 tax credit to taxpayers (individuals or small businesses with 50 of fewer employees) who undertook qualifying flood mitigation expenses, held an NFIP policy, owned property that faced premium increases, and had an elevation lower than BFE or was located 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 holding 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).[10]

Disaster Savings Accounts

A tax deductible disaster savings account might be offered within the federal tax code. Pre-tax funds placed in the account could be used to cover disaster damages, hazard mitigation investments and/or flood insurance premiums. In fact, The Disaster Savings Accounts (DSA) Act (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 withdrawals for the designated uses would not be taxed.

The manner in which these 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), thus encouraging homeowners to purchase much less expensive coverage with higher deductibles. If a household could save $5,000 or $10,000 over time, they could purchase an NFIP policy that covers only damage above this threshold. As discussed in the section on higher deductibles (below), this would lower the cost of the NFIP premium.

The financial benefit to a household would depend on the policyholder's marginal tax rate with higher income individuals obtaining a larger absolute benefit than lower income families. It also would not help those with insufficient disposable income to place funds into such an account. The costs to the federal government of this measure would be the foregone tax revenue. These costs could be calculated in a manner similar to other tax-preferred accounts, such as those for health care or retirement.

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

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OTHER REFORMS

This section discusses actions that have been suggested in legislation or by stakeholders as a means to lower premiums for all policyholders[11]. These include expanding the range of mitigation measures, higher deductibles, designating the federal Treasury as a reinsurer during catastrophic loss years, enhancing the Write-Your Own agent advisory role, reducing loadings for administrative costs, and eliminating mandatory purchase.

Expand the Range of Individual Mitigation Measures that Reduce Premiums

If mitigation actions [12] lead to lower damages and expected claims, then those mitigation investments could make NFIP policies less expensive for households that implement these measures. [13] However, at the household level, there currently are only a few mitigation actions that might result in lower NFIP premiums. These include elevating a building above the base flood elevation (BFE), building a replacement structure above the base flood elevation on exactly 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 non-residential structures, dry floodproofing.[14]

As discussed in Chapter 3, NFIP premiums are based on the relation of the first floor to the base flood elevation (BFE), so that elevating the home always can result in lower premiums. Elevating a structure can be expensive, however, particularly for slab structures of large square footage. In fact, the HFIAA 2014 legislation requires the NFIP to consider mitigation measures other than elevating homes for reducing property insurance premiums.[15] One possible approach for single family homeowners that may be more affordable than elevating a structure is low-cost retrofitting of structures that experience shallow water flooding. Studies of this 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

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[11] 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 will report the results of these studies, which may include assessments of whether privatization might result in lower rates and premiums.

[12] 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 measures.

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

[14] Dry floodproofing—prohibiting water from entering the 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 limited enclosed areas or if certain requirements are met and a variance issued. For more details on floodproofing and the requirements under the NFIP (see https://www.fema.gov/national-flood-insurance-program-2/floodproofing).

[15] See Section 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, flood proofing, flood forecasting and similar measures." Section 26 directs FEMA to issue guidelines for alternative measures to elevation, to take into account these measures when calculating rates and to inform homeowners about how these methods will affect their rates.

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measures and describing their implementation (see FEMA, 2007, 2012b, 2013b). The U.S. 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 significant reductions in damages if shallow water flooding was reduced, which in turn could lead to reduced claims. For example, a 2014 study found that the median NFIP claims from 1978-2012 (in 2012 dollars) was $12,500; these lower claim amounts plausibly could be from shallow flooding (Kousky and Michel-Kerjan, 2014). One challenge for FEMA and the NFIP will be to determine whether shallow water flooding is the reason for these 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 but not limited to shallow water flooding, to be considered in setting premiums, FEMA would need to develop data and analyses that would link the expected reduction in losses from these measures to insurance premiums. A particular concern about effectiveness of any such measures is how to assure needed maintenance of the measure once implemented and reliability of human actions to activate some measures in times of flooding. 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 resulting reduction in flood insurance premiums for 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.[16] As one option for FEMA to consider, a portion of the grant funds could be set aside for lower cost alternative mitigation, still leaving the FEMA pre- and post-disaster mitigation funds to pay for elevating homes where lower cost alternatives may not be effective. This would allow a predictable source of funds for lower cost mitigation.

Encourage Selection of Higher Insurance Deductibles

As a general matter insurance premiums can be lowered if the purchaser choses 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 percent of policyholders chose the lowest possible building deductible, $500, and around 18 percent chose the second lowest deductible available, $1,000 (Kunreuther and Michel-Kerjan, 2009; Michel-Kerjan and Kousky, 2010). BW 2012 increased the minimum deductible, such that it is now $1,000.[17] Recent data reveals that 88 percent of the post-FIRM subsidized homeowners maintained the standard $1,000 (i.e. the lowest) deductible. Of the pre-FIRM subsidized homeowners, 37 percent choose a $2,000 deductible with 42 percent choosing $1,000. Although these data show

[16] The $75,000 figure may be admittedly low. Median building elevation costs for elevations through the FEMA mitigation program (2008-2013) were $166,000 (Ryan Janda, FEMA, personal communication, 2014).
[17] Current deductibles are $1,000, $1,250, $1,500, $2,000, $3,000, $4,000, and $5,000.

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that people prefer lower deductibles, they also suggest that offering a higher deductible as a default may lead to a significant number choosing keep that option, a finding consistent with a large number of empirical studies 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 percent (FEMA, 2014b). For example, a household that was paying $4000 for flood insurance with $1,000 deductible would only 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 covering the repair cost if it took the higher deductible. FEMA's Individual Assistance (IA) program does provide funds for losses incurred but not covered due to the deductible. Although these families 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. Such calculations are the result of deliberative thinking may be unlikely when an individual makes an insurance decision (Chapter 4). And even with such a calculation, there may be other considerations that go into that choice. In fact, the literature on this topic suggests that, for whatever reasons, insurance purchasers tend toward choosing 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 should they suffer a very 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 it will disappear should the loss be sufficiently high. 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 by offering such a policy would be small relative to choosing a policy with a low deductible. Whatever deductible amounts are offered by the NFIP, encouraging the consideration of, if not the choice of, higher deductibles is a possible role for the Write-Your-Own agent (the WYO agents' role in assisting homeowners is discussed in greater detail later this chapter).

Rely on Federal Treasury for Helping Pay 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, while simultaneously promoting take up and keeping premiums at levels that would not require a significant program of policy holder assistance, remains an open question. Revisiting the original 1968 legislation (Chapter 2) that created the NFIP may suggests one possible way to reconcile conflicting goals. Recall that the 1968 legislation established the federal Treasury as a reinsurer for catastrophic loss years, so that when total losses in any year exceeded a threshold level, the federal Treasury would provide the funds

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needed to honor the claims in excess of the threshold.

The logic at that time was that if the federal Treasury acted as reinsurer, NFIP risk-based premiums would be kept at reasonable levels in order to encourage purchase. In the contemporary context, proposing a similar role for the federal 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 federal government 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 based on the average of non-catastrophic historic claims years), the federal 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, these two actions could result in lower NFIP-risk based premiums and enhance affordability, and in turn lead to less spending for assistance. Congress would incur occasional costs by designating the federal government 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 federal Treasury each year to provide assistance payments to policy holders facing unaffordable premiums.

Enhance the WYO Agent Advisory Role

The WYO agent has the most direct and most frequent contact with the property owner as that owner is considering an NFIP purchase decision. Support for that program offers an opportunity for the insurance 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 when rating a property's risk), informing homeowners of mitigation programs, assisting in getting mitigation loans and choosing the deductible, to name a few examples.

For a WYO agent to provide these services would require additional work, new training, and new technology. FEMA could provide the necessary new training and technological support. For example, web-based and automated rating tables might allow the WYO agent to quickly evaluate the effect on premiums of a mitigation action, 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 these added costs to be justified. Whether the costs would be recovered through higher premiums is a matter to be determined.

Reduce NFIP Administrative Cost Loadings in Premiums

The NFIP pays a portion of premium revenue to the Write-Your-Own insurance

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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 impact of this option requires an understanding of the fees paid to WYO companies. When these costs are examined, the potential for substantial reductions in premiums through lower WYO payments appears unlikely.

WYO companies receive an allowance composed of three categories: (1) 15 percent of written NFIP premiums covers agent commissions; (2) 2.3 percent of written NFIP premiums goes to voluntary payment state premium taxes on WYO policies, even though, as a federal program, the NFIP is not required by law to make these payments; and (3) 12.5 percent to 13.5 percent 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 percent bonus.

There is little room to adjust commissions and the NFIP has entered into an agreement to pay state premium taxes since state insurance departments oversee the WYO companies. These 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, then adds an extra one percent 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 to more precisely target this number, the administrative cost of the data collection is non-trivial 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 percent higher than actual expenses (GAO, 2010). This would be a reduction in administrative costs but not a very large one, so it is unlikely to substantially address premium affordability issues and, like some other measures we discuss, would not be targeted specifically at cost-burdened households.

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

Eliminate Mandatory Purchase Requirement

Households with a mortgage from a federally backed or regulated lender located in a mapped SFHA are required to purchase a flood insurance policy. Households that have received

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disaster assistance may also be required to maintain a flood insurance policy.[18] One way of eliminating the financial burden of NFIP premiums is to eliminate this requirement. If purchase was voluntary, those who could not afford the NFIP risk-based premium would not have to incur the expense.

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

As a result, those households would need to rely on their own resources for post flood recovery. They could potentially receive federal aid, although such aid is usually limited, uncertain, and delayed (see Kousky and Shabman, 2012). In addition, the presence of uninsured properties may reduce the resiliency of the neighborhood/community, if a flood disaster were to occur. For all these reasons (as noted in Chapter 2), increased takes-up rates always have been a goal of the Congress for the NFIP. As long as take –up rates remain an objective for the program making premiums affordable, even if there is a subsidy to some, is likely to be a more viable option than making all purchase voluntary.

COMMUNITY-BASED PROGRAMS

This section discusses an affordability strategy based upon 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, developing storm water retention practices, constructing wetlands and other green infrastructure for water retention and enhanced drainage, and constructing levees or floodwalls or dunes to control flood hazards (FEMA, 2013c). Flood risk management projects have been constructed across the nation in partnership with the U.S. Army Corps of Engineers, but state and local funding alone may be used to build such projects. Some community-level mitigation measures can lead to lower NFIP premiums through modifications to FIRMs, or through the Community Rating System (CRS, and discussed below).

Community Mitigation Programs

HFIAA 2014 requires FEMA to recognize the effectiveness of community/area-wide mitigation activities when setting insurance premium rates (Section 14) and to maintain updated maps for the communities that reflect these flood risk mitigation actions (Section 27).

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

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Community-based efforts aim to direct resources to measures that may benefit clusters of structures, even multiple neighborhoods, while at the same time dispersing mitigation knowledge more broadly among community officials and residents. [19] A recent pilot project funded by FEMA and implemented by the Natural Hazard Mitigation Association (NHMA) engaged 10 communities actively involved in mitigation. The project, entitled the "Resilient Neighbors Network (RNN),"emphasizes partnerships, and recognition and rewards to motivate communities and regulatory/economic alignment (see Hayes, 2012). Many communities currently are working with FEMA to understand how best to promote and incentivize local risk reduction efforts and collaboration across communities. This effort demonstrates a commitment by FEMA to encourage self-initiated efforts in conjunction with their more prescribed Community Rating System approach.

Community Rating System

The Community Rating System (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, and that 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). 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 examining the extent to which CRS participation reduces flood claims and property damage generally find some reduction that is attributed to CRS actions, such as open space protection, higher elevation requirements, and small flood control projects (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, a few of which were considered to be a burden by some communities. For example, smaller communities with limited GIS technical capability have difficulty producing the detailed maps that FEMA requires to earn points for certain activities (e.g., improving the community's drainage). The modest premium reduction achieved for the prescribed CRS actions and the limited number of communities that have attained significant rate improvements do not suggest

[19] Community-based efforts also may help prepare against future flood-related losses due to climate change impacts such as sea level rise, and increased precipitation and tropical events stemming from possible temperature increases. These future challenges can be brought to the attention of communities through community-based efforts such as those described in this section, especially given the role of communities in land use regulations for floodplains and building codes.

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that this program, given the costs of application, will contribute significantly to the affordability of flood insurance. A recent increase in interest in the CRS by many communities, however, would suggest that they believe the CRS will help 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 of these is community-level insurance policies. A community insurance option would enable communities to purchase a group flood insurance policy on behalf of all properties at risk of flooding. The community would pay one premium for the group policy, and then recover the costs of the policy through special assessments levied on each covered property, most likely as an adjunct to the property tax (GAO, 2013). A FEMA report evaluating NFIP reform options based on assessments from expert panels concluded that a community insurance option would significantly reduce exposure to flood hazards but 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 has the potential to increase take up rates by automatically insuring all members of a participating community. On the one hand, this could exacerbate, instead of lessen, any affordability problems by forcing all members of 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 leading 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, this would translate into lower insurance costs for all residents but the reduction in premiums may again not be sufficiently large to address affordability issues. Finally, community insurance policies could shift the issue of affordability to the local level and let each community address it in the way they would best see fit. This could be achieved through cross-subsidizations in the assessments of premiums or using other community funds to offset high premiums to low and moderate-income households. Finally, community insurance could be combined with other programs discussed in this section.

SUMMARY

Section 100236 of BW 2012, as well as HFIAA 2014, make affordability of rates a focus and motivate the need for development of affordability policy options. Chapter 6 discussed the full range of decisions that must be made by policymakers, and this chapter has focused on options for how assistance might be delivered to individual policyholders or entire communities. Although these 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. Also, options may have conditions attached to

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them. For example, eligibility for a voucher for assistance in paying a premium may include a requirement to implement certain mitigation actions.

- **The NFIP can strive for risk-based premiums while addressing affordability by implementing a combination of policy measures to include 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 prioritizing 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 policy holders for use in paying premiums or for offsetting mitigation costs.**
- **Currently there are only a few mitigation measures that result in lower NFIP premiums and these tend to be expensive, such as elevating homes. As a result of BW 2012, FEMA will consider whether lower cost mitigation of structures should result in lower premiums. Determining the effect of lower-cost mitigation on NFIP risk-based rates will require additional analyses.**
- **If Congress were to authorize supplements from the federal Treasury to be used for making NFIP claim payments in catastrophic loss years, this could allow for lower NFIP risk-based premiums and, in turn, less spending for an assistance program.**
- **Some policies that have been advanced as a way 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 policy holders. 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 Community Rating System. These might be particularly important in mitigation related to multi-family property.**

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8

Future Work

In Section 100236 of BW 2012, Congress directed FEMA to cooperate with the NAS (NRC) on an affordability study. Section 100236 made reference to another section of BW 2012, calling on FEMA to develop an "affordability policy framework" and affordability policy options to mitigate any adverse effects of premium increases. These affordability policy options were to be evaluated as part of the Section 100236 study. The Homeowner Flood Insurance Affordability Act of 2014 further emphasized the interest of Congress is having FEMA submit concepts for an affordability framework (Section 9) and added time and resources to support the national affordability study called for in Section 100236 of BW 2012.

This is the first of the two reports from the NRC Committee on the Affordability of National Flood Insurance Program Premiums. This first report, among other things, 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 policy options. The following, concluding chapter summarizes briefly this report's key findings in light of objectives for Report 2.

The objective of the Biggert-Waters Flood Insurance Reform Act of 2102 was to eventually result in NFIP risk-based premiums for all policies and an NFIP financial structure that would avoid incurring large scale future debt[1]. Provisions of BW 2012 that were expected to achieve these results, as well as 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 HFIAA 2014, Section 9, called for actions that could provide assistance to those households for which NFIP risk-based premiums would be unaffordable. This 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) currently mandated to purchase flood insurance; and, where there are concentrations of these properties (Chapter 5) financial stresses on individual households may have effects on the neighborhood/community economy. A second

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

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cause for concern was that higher premiums might result in greater non-compliance with the mandatory purchase requirement and discourage voluntary purchase (Chapter 4).

In its second report, the committee will describe an analytical protocol(s) that FEMA could employ to simulate effects of different affordability policy alternatives 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 when designing an assistance programs (Chapter 6) and the policy alternatives (Chapter 7). The latter chapter presents policy alternatives that have been suggested by others, or that the committee has developed, that might make flood insurance affordable for certain policy holders. Some of the options lower premiums through mitigation actions that lower risk and, in turn, premiums. Other options directly reduce the amount paid for insurance.

As noted, Report 2 will propose, but not implement, procedure(s) for FEMA to use when conducting a national analysis of affordability policy options. The premise of Report 2 will be that NFIP risk-based premiums will be paid by all policy holders. Therefore, policy options will be proposed, for illustration only, as necessary to describe the full range computational and data needs for assessing a wide range of policy options. One example of an affordability policy option is NFIP risk-based premiums for all, with means-tested vouchers for premium assistance paid from surcharges on all policies. Another example, for illustration, might be NFIP risk-based for all, with means-tested mitigation grants from general federal revenues for the most cost-effective (premium reducing) mitigation actions.

For any policy option the analytical procedures (s) must be capable of estimating the effect of an option on different objectives, as a result of the policy being implemented. The set of objectives will be derived from the specific language of BW 2012 and HFIAA 2014, as well as this first report (Report 1). Evaluation objectives will include, but not be limited to:

- Number of households with mandatory purchase who are cost burdened by paying NFIP risk-based premiums;
- Total NFIP premiums and surcharges less claims paid and administration costs for a specified time 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 time period;
- Number of policies in force (take up rate).

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 currently available. In order to refine the estimates of data needs and costs, as an illustrative example (or “proof of concept”), the analytical protocol(s) will be tested as a proof of concept using data and readily available analytical platforms available from the State of North Carolina Department of Public Safety.

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List of Terms

Where noted by an * the definition, with some minor editing, is taken from the FEMA website https://www.fema.gov/national-flood-insurance-program/definitions#P.

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

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

Direct Physical Loss By or From Flood*: Loss or damage to insured property directly caused 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 percent annual chance flood*: A flood that has a 1 percent chance of being equaled or exceeded in any given year; also known as the 100-year flood or base flood.

Mitigation*: Taking 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 but not limited to, emergency preparedness plans, 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 NFIP. In most cases, a community is an incorporated city, town, township, borough, village, or an unincorporated area of a county or parish.

Flood Hazard Boundary Map (FHBM)*: Official map of a community issued by FEMA, where the boundaries of the flood, mudflow and related erosion areas having special hazards have been designated.

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Special Flood Hazard Area (SFHA) *: The land in the floodplain within a community subject to a 1 percent or greater chance of flooding in any given year"; also may be called the Regulatory floodplain.

Base Flood Elevation (BFE)*: The elevation of surface water resulting from a flood that has a 1 percent chance of equaling or exceeding that level in any given year.

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

NFIP Flood Zone*: A geographical area shown on a Flood Hazard Boundary Map (FHBM) or a Flood Insurance Rate Map (FIRM) that reflects the severity or type of flooding in the Special Flood Hazard Area. Zones associated with the letter A refer to flood elevations the inundation areas occurred during the 1% annual chance flood; zones associated with the letter X have a lower flood risk than those associated with A; V zones are areas where the BFE also includes storm surge and wave effects.

NFIP Flood Zone: Zones associated with the letter X have a lower flood risk than those associated with A.

Flood Insurance Rate Map (FIRM)* : Official map of a community on which FEMA has delineated the Special Flood Hazard Areas (SFHAs), the Base Flood Elevations (BFEs) and the risk premium zones applicable to the community.

Map Revision*: A change in the Flood Hazard Boundary Map (FHBM) or Flood Insurance Rate Map (FIRM) for a community which reflects revised zone, base flood or other 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, paid from general government revenues.

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

Actuarial pricing principles: A set of guidelines recognized by professional actuaries as guides for setting premiums. The rate should: 1) reflect the expected value of future claims; 2) provide for all the costs of risk transfer (insurance program administration); 3) provide for all the costs associated with individual risk transfer, by trying to avoid cross-subsidization among policyholders; 4) if the first three principles are met, premiums should not be excessive, inadequate, or unfairly discriminatory (American Academy of Actuaries, 2012).

NFIP Servicing Agent*: A corporation, partnership, association or any other organized entity that contracts with FEMA to service insurance policies as direct business.

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Write Your Own (WYO) Program*: A cooperative undertaking of the insurance industry and FEMA begun in October 1983. The Write Your Own (WYO) Program operates within the context of the NFIP and involves private insurance carriers who issue and service NFIP policies.
Rating: The guidelines used by an NFIP Servicing agent to calculate the premium for a specific property. The guidelines are found in NFIP rating tables used by NFIP servicing agents to estimates premiums for properties with different characteristics, NFIP flood zone locations, elevations and coverage levels.

Elevation certificate*: A certificate that verifies the elevation data of 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 the rating of flood insurance policies.

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

Pre-FIRM subsidized premiums: A premium made available to owners of properties that were located in a SFHA before the first FIRM 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 premiums revenues loss from these lower than NFIP full risk premiums.

Grandfathered premium*: Premiums for post-FIRM buildings built in compliance with the floodplain management regulations in effect at the start of construction will continue even if a Flood Insurance Rate Map (FIRM) revision results in a higher Base Flood Elevations (BFEs). There is a cross subsidization in the NFIP full risk rating table to offset the premiums revenues loss from these lower than NFIP full risk premiums.

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

CRS discounted premiums: Premiums discounts (reductions from the NFIP full risk premium) are available for some properties in a community if that community adopts one or more flood risk management actions. The discount varies with the community actions and is available to properties paying NFIP full risk premiums and located in the SFHA. There is cross subsidization in the NFIP full risk rating table to offset the premiums revenues loss from these lower than NFIP full risk premiums.

Mandatory Purchase*: Under the provisions of the Flood Disaster Protection Act of 1973, individuals, businesses and others buying, building or improving property located in identified areas of special flood hazards within participating communities are required to purchase flood insurance as a prerequisite for receiving any type of direct or indirect federal financial assistance (e.g., any loan, grant, guaranty, insurance, payment, subsidy or disaster assistance) when the building or personal property is the subject of or security for such assistance.

Take-up rate: The properties having an NFIP flood insurance policy as a proportion of eligible properties. Take–up rate can be affected by the mandatory purchase requirement and by voluntary purchase decisions of property owners and renters.

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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.

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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 Representatives 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’’.

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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.

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(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.

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Appendix D

Invited Guest Speakers at Committee Meetings

Federal Agencies
David Miller, Federal Emergency Management Agency, Washington, D.C.
Andy Neal, Federal Emergency Management Agency, Washington, D.C.
Thomas Hayes, Federal Emergency Management Agency, Washington, D.C.
Ryan Janda, Federal Emergency Management Agency, Washington, D.C.

Alicia Cackley, Governmental Accountability Office, Washington, D.C.
Pat Ward, Governmental Accountability Office, Washington, D.C.

Dan Hoople, Congressional Budget Office, Washington, D.C.

Todd Richardson, Department of Housing and Urban Development, Washington, D.C.
Josh Sawislak, Department of Housing and Urban Development, Washington, D.C.

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, N.C.

Nonprofit and Trade Organizations
Chad Berginnis, Association of State Floodplain Managers, Madison, Wisc.
Birny Birnbaum, Center for Economic Justice, Austin, Tex.
Steve Brown, National Association of Realtors, Washington, D.C.
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, D.C.
Tabby Waqar, National Association of Home Builders, Washington, D.C.

Research Organizations
Craig Colten, The Water Institute of the Gulf, Baton Rouge, La.

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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.
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).

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].

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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.

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Appendix F

Biographical Sketches of Committee Members

LEONARD A. SHABMAN, *Chair*, joined Resources for the Future in 2002 as a resident scholar after three decades on the faculty at Virginia Tech. His research and communications efforts are focused 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, with special focus on the Everglades, Coastal Louisiana and Chesapeake Bay. Among the specific topics related to these broader themes is 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 eight years on the NRC's 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 PhD 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 upon statistical modeling and analysis of geographically referenced datasets, Bayesian statistics, the interface between statistics and Geographical Information Systems, and statistical computing. He received an NIH Challenge Grant under the ARRA in 2009. That year he was honored with the Abdel El Sharaawi Award from the International Environmetrics Society, and in 2011 he was honored with the Mortimer Spiegelman Award from 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 from Presidency College and his Masters in statistics from the Indian Statistical Institute, both in Calcutta, and his 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 at 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

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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 at the University of Texas at Austin. He conducts research in risk management and insurance, financial risk, actuarial science, decision analysis, management science/operations management and research, statistical analysis and business applications. Dr. Brockett is an elected member of the International Statistical Institute, 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 currently 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. Professor Burby is a fellow of the American Institute of Certified Planners and has received the bi-annual Distinguished Educator award from the Association of Collegiate Schools of Planning. He is the author/co-author/editor of fourteen books and more than 150 publications on hazard mitigation, environmental management, and land use planning and management. Dr. Burby served as co-editor of the *Journal of the American Planning Association* from 1983 to 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 The George Washington University and the M.R.P. and Ph.D. degrees in city and regional planning from the University of North Carolina at Chapel Hill.

SCOTT A. EDELMAN, director of the AECOM Water Resources team within North America, has 32 years of experience devoted to flood insurance studies and floodplain mapping. Mr. Edelman has been responsible for overseeing AECOM's floodplain mapping and mitigation work for the Federal Emergency Management Agency, as well as many state and local partners, including Georgia, Alabama, North Carolina, South Carolina, Mississippi, Maryland, and California. Mr. Edelman was a key contributor to FEMA projects such as the initial Multi-Year Flood Hazard Identification Plan, developing the initial concepts for the Mapping Information Platform and contributing to Guidelines and Specifications. He has managed riverine and coastal flood insurance studies for the past 23 years, including more than 15,000 Digital Flood Insurance Rate Map panels, which represents approximately 10-15 percent of the floodplain maps in the

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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, Arizona State University. He is also a Professor of the Graduate School, and Chancellor's Professor Emeritus, in the Department of Agricultural and Resource Economics at the University of California, Berkeley. Elected to the National Academy of Sciences in 2011, Dr. Hanemann is an environmental economist who works in the areas of non-market 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 in terms of obstacles to promoting better uses of water, balancing extractive versus 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 IPCC's 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, D.C. 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 examined how individuals learn about extreme event risk, demand for natural disaster insurance, the functioning of the National Flood Insurance Program, and policy responses to potential changes in extreme events with climate change. She is the recipient of the 2013 Tartufari International Prize from 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.

HOWARD C. KUNREUTHER is the James G. Dinan Professor at the University of Pennsylvania's Wharton School of Business and co-director of the Wharton Risk Management and Decision Processes Center. He has a long-standing interest in ways that society can better manage low-probability, high-consequence events related to technological and natural hazards. Dr. Kunreuther is a Fellow of the AAAS and a Distinguished Fellow of the Society for Risk Analysis, receiving the Society's Distinguished Achievement Award in 2001. He recently served on the NRC committee on Increasing National Resilience to Hazards and Disasters. He is a coordinating lead author for the upcoming report, Integrated Risk and Uncertainty Assessment of Climate Change Response Policies, to be released by the IPCC. His most recent book is Insurance and Behavioral Economics: Improving Decisions in the Most Misunderstood Industry (with M. Pauly and S. McMorrow, 2013). Dr. Kunreuther received his Ph.D. degree in economics from the Massachusetts Institute of Technology.

SHIRLEY LASKA is Professor Emerita of sociology and founding past director of the Center for Hazards Assessment, Response and Technology at the University of New Orleans. She has

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been conducting research on the social/environmental interface, natural and technological hazards, and disaster response for 25 years. Her work includes studies on residential flood mitigation, hurricane response, coastal land loss effects, coastal fisheries, community risk assessment and risk management for coastal hazards, and evacuation of the vulnerable. Since Hurricane Katrina her work has been focused on lessons to be learned from the event, especially in the realm of community recovery and hazard resiliency. Dr. Laska is the 2008 recipient of the American Sociological Association's Public Understanding of Sociology Award for her collaboration with physical scientists and presentations on Katrina/Rita impacts. She was a member of the NRC Committee on Integrating Dam and Levee Safety and Community Resilience. She received her Ph.D. degree in sociology from Tulane University.

DAVID R. MAIDMENT is the Hussein M. Alharthy Centennial Chair in Civil Engineering at the University of Texas at Austin where he has been on the faculty since 1981. Dr. Maidment's research focuses on surface water hydrology, particularly in the application of geographic information systems to hydrology, and floodplain mapping. He has chaired or been a member of ten NRC Committees, including the Committees on FEMA Flood Maps and FEMA Floodplain Mapping Technologies. Dr. Maidment has received awards for outstanding contributions to hydrology from the American Society of Civil Engineers, the American Water Resources Association and the American Institute of Hydrology. He received his Ph.D. degree in civil engineering from the University of Illinois at Urbana-Champaign.

DAVID I. MAURSTAD is a director and senior vice-president with Optimal Solutions and Technologies, Inc., Washington, D.C., which provides management consulting, integrated information technology, engineering services, and business process outsourcing. Mr. Maurstad previously served as director of water policy and planning for a nationally recognized engineering firm specializing in flood mapping and floodplain management. He has more than 30 years of experience with the private insurance industry and federal, state, and local government. In June 2004, he was appointed by President George W. Bush to lead some of the nation's prominent multi-hazard risk reduction programs. In this role he was the federal insurance administrator charged with management of FEMA's National Flood Insurance Program. He previously served as director of FEMA Region VIII from 2001 to 2004 coordinating federal, state, tribal, and local management of emergencies through planning, preparedness, mitigation, response and recovery. Mr. Maurstad is a former Lieutenant Governor and State Senator of Nebraska and served as Mayor of Beatrice, NE. He received his B.S. degree in business administration and his M.B.A. degree from the University of Nebraska.

ALLEN L. SCHIRM is the director of methods and a senior fellow at Mathematica Policy Research in Washington, D.C. His principal research interests include small-area estimation, census methods, and sample and evaluation design, with application to studies of child well-being and welfare, food and nutrition, and education policy. For the NRC Committee on National Statistics, he chaired the Panel on Estimating Children Eligible for School Nutrition Programs Using the American Community Survey, and was a member of the Panel on the Design of the 2010 Census Program of Evaluations and Experiments, the Panel on Research on

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Future Census Methods, the Panel on Formula Allocations, and the Panel on Estimates of Poverty for Small Geographic Areas. He is a Fellow of the American Statistical Association and a former chair of its Social Statistics Section. Dr. Schirm holds an A.B. degree in statistics from Princeton University and a Ph.D. degree in economics from the University of Pennsylvania.

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