

ISSUE BRIEF

Addressing Affordability in the National Flood Insurance Program

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Addressing Affordability in the National Flood Insurance Program

Carolyn Kousky and Howard Kunreuther¹

Overview

The National Flood Insurance Program (NFIP), housed within the Federal Emergency Management Agency (FEMA), offers flood insurance to residents and businesses of participating communities. Since Hurricane Katrina in 2005, the NFIP has been deeply in debt to the US Treasury. As of July 2013, this debt stood at \$24 billion. Last July, the president signed the Biggert–Waters Flood Insurance Reform Act with overwhelming bipartisan support from Congress. This bill extended the NFIP for five years and included new provisions regarding insurance premiums designed to improve the program’s financial basis.

Historically, some classes of policyholders in the NFIP had received discounted premiums that were never means-tested. The new legislation scheduled the phase out of many of these discounts, thus moving the program towards risk-based pricing. Risk-based premiums are needed for the program to be financially self-sustaining. They are also important to emphasize to policyholders the magnitude of the risk that they face and to encourage them to invest in loss reduction measures to merit premium reductions.

Premiums are increasing for many policyholders based on this new legislation and updated flood hazard maps. As a result, many legislators are now wavering on their commitment to risk-based pricing for flood insurance because of concerns that many of their constituents will not be able to

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afford flood insurance. The legislation did not directly address this issue except to authorize a study by the National Academy of Sciences to examine affordability.

This issue brief addresses the following question: “How might the NFIP provide insurance to residents who may require special treatment, such as low-income homeowners residing in flood-prone areas, because they cannot afford the higher risk-based premiums?” We make the case that the NFIP must address affordability, but that this should not be done through discounted premiums. It is crucial that communities and homeowners obtain accurate information about the risks they face. In their recent report, New York City has recognized the importance of insurance premiums that reflect risk, stating “the City will avoid falling into a common post-disaster trap: namely, calling for subsidized coverage, which may provide short-term benefits to the insured, but contributes to other adverse long-term consequences, including encouraging high-risk behavior,” (City of New York 2013, 94).

For low- and middle-income residents who cannot afford flood insurance coverage at risk-based premiums, we propose an explicitly means-tested voucher program, building on a proposal by Kunreuther (2008), and expanded upon by Kunreuther and Michel-Kerjan (2011) and Kunreuther, Pauly, and McMorrow (2013). We propose coupling this voucher program with a loan program for investments in loss reduction measures, which would be tied to the property and made affordable by reductions in the NFIP risk-based premium.

The next section of this issue brief provides background on the NFIP and the Biggert–Waters reform bill. We then motivate the issue of affordability by examining the impact of the new legislation and new flood hazard maps in a case study of Ocean County, New Jersey. Next, we present the details on how to structure a joint voucher and loan program. The final section offers concluding thoughts.

Background

The NFIP was created in 1968, partially in response to the perception that flood insurance was not widely available in the private market. The NFIP aims to achieve financial soundness, support floodplain management, encourage community participation, and encourage households to insure against flood loss (Hayes and Neal 2011). The program was designed as a partnership between the federal government and local communities. Communities can voluntarily join the program by adopting a floodplain ordinance based on the most up-to-date maps and flood data provided by FEMA. At a minimum, communities must require that new development and substantially improved or damaged properties in high hazard areas be built at or above the level of the 100-year flood. Only then is flood insurance made available for purchase by residents in the

community. At the end of 2012, more than 5.5 million policies were in-force nationwide, representing almost \$1.3 trillion in coverage.

Currently, single-family residences can purchase up to \$250,000 of building coverage and up to \$100,000 of contents coverage. Businesses can purchase up to \$500,000 each of building and contents coverage. Prices for these policies vary by flood risk zone based on Flood Insurance Rate Maps (FIRMs) issued by FEMA. Special Flood Hazard Areas (SFHAs), where the annual risk of a flood is 1 in 100 or greater, are divided into two broad groups: A zones and V zones. V zones are subject to wave action, or storm surge, and have higher rates reflecting this higher risk of damage.

A household residing in an SFHA with a mortgage from a federally backed or regulated lender is required to purchase flood insurance for the life of the loan, but several data sources suggest that compliance with this requirement is not well enforced nationwide and that compliance varies around the country. Rates in SFHAs vary with the characteristics of the structure, such as whether the home has a basement, the number of floors, and, importantly, the height of the lowest floor relative to base flood elevation (BFE)—the estimated height of floodwaters during a 100-year flood.

Premium discounts are given to any structure that was built before FEMA had mapped the flood risk in an area (referred to as pre-FIRM structures). The discounted premiums were designed to encourage greater participation in the program by both communities and individuals, and to not penalize homeowners who would otherwise see a sudden drop in property values. These discounts were never means-tested and not targeted at lower-income households (Kunreuther 1968; Pasterick 1998; Hayes and Neal 2011). FEMA estimates that policyholders with discounted premiums are paying roughly 40–45 percent of the full-risk price, although their premiums are often higher than those structures adhering to building codes (Hayes and Neal 2011). Nationwide, FEMA estimates that roughly 20 percent of flood insurance policies nationwide receive premium discounts.

The program thus historically has had two classes of policyholders: those paying premiums based on modeling of the flood risk, and those receiving premium discounts. FEMA made the decision in the 1980s that the combined revenue from these two classes of policyholders should be enough to cover losses from the “average historical loss year,” which was calculated as the mean annual loss over the life of the program. The program was given borrowing authority from the US Treasury to cover higher-than-average loss years. In contrast, an actuarially fair premium set by a private insurance company would include consideration of catastrophic loss years in determining risk-based rates, as well as the cost of capital and the requirement to hold significant financial reserves.

Before Hurricane Katrina in August 2005, no catastrophic loss year had occurred in the program’s history that would be have been large enough to substantially alter the calculation of the average historical loss. The NFIP paid out more claims in 2005, however, than it had paid out over the entire life of the program to that point (Hayes and Neal 2011). After that event, fully including Katrina in the program’s loss experience would have increased flood insurance premiums significantly. FEMA did not want to take this step without the explicit support of Congress and, for this reason, gave 2005 a weight of only 1 percent in calculating the average historical loss year (Hayes and Neal 2011). After Katrina, the NFIP borrowing authority had to be increased to \$20.775 billion, where it stood until Hurricane Sandy. After Sandy, Congress increased the NFIP borrowing authority to more than \$30 billion. To date, the program’s debt has not been forgiven by Congress and so taxpayer money has not yet covered claims payments. Many argue, however, that such a bailout will ultimately be required given the size of the debt burden.

The deep NFIP debt following Hurricane Katrina generated broad interest in reforming the program. A consensus in Congress emerged around the need to eliminate the premium discounts to put the program on a sounder financial footing. In early July 2012, the Biggert–Waters Flood Insurance Reform Act reauthorized the NFIP program for five years through September 30, 2017; since 2008 it had been operating under multiple short-term extensions and had even been allowed to lapse. Although the legislation requires many changes, we focus here on the changes to the pricing of insurance policies.²

Under this new legislation, beginning in 2013, rates will be increased 25 percent a year until rates reflecting FEMA’s best estimate of the flood risk are reached for nonprimary residences, severe repetitive loss properties, and business properties. In addition, discounted rates will be eliminated for single-family households when a policy lapses, a property is sold, the property sustains substantial flood damage (defined as damage greater than 50 percent of the home’s value), the

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² Other provisions of the Biggert–Waters bill include the following: The cap on rate revisions was increased. Previously, the Federal Emergency Management Agency (FEMA) was allowed to increase rates by no more than 10 percent annually (averaged across classes of policyholders); the Biggert–Waters bill increases this limit to 20 percent. The lowest available deductible was raised to \$1,000 for post-FIRM (flood insurance rate map) properties with less than \$100,000 of coverage and \$1,250 for more than \$100,000 in coverage; for pre-FIRM properties, the corresponding deductibles are \$1,500 and \$2,000. The new law establishes a Technical Mapping Advisory Council to advise the program on map improvements (including improvements that address sea level rise) and a task force to align levee data from the US Army Corps of Engineers with FEMA’s levee accreditation program. Communities that are making progress on structural flood control measures to protect against the 100-year flood are to be given reduced rates. The legislation authorizes the National Oceanic and Atmospheric Administration to determine if hurricane damage is from flood waters or wind. The bill establishes a catastrophe fund into which FEMA will deposit funds during “good” years and explicitly authorizes FEMA to purchase private reinsurance. FEMA must develop a repayment plan for its debt. FEMA flood hazard mitigation grants have been combined into one program. Penalties on noncompliant lenders have been increased. Finally, the bill authorizes many studies related to various aspects of the program to inform the adoption of any more dramatic changes to program design and operation.

property is substantially improved, or a new policy is purchased.³ The GAO estimated that roughly 438,000 policies nationwide will see higher rates immediately; 715,000 policies will have their premiums remain at the current level until one of the triggers is met (GAO 2013). Starting in October 2014, routine rate revisions will also include a 5 percent assessment to help the program build a catastrophic reserve fund.

The legislation also calls for the phase out of grandfathering, a practice that enabled homeowners to keep their old premiums when a new map reclassified them into a higher-risk zone. Going forward, new rates will be phased in by increasing premiums 20 percent per year until the risk-based price is reached for properties mapped into a higher-risk zone. The affordability concerns raised over the elimination of grandfathering are causing Congress to consider proposals to delay or revise this part of the Biggert–Waters reform bill. A delay in implementing this legislation could impede the financial soundness of the NFIP and discourage policyholders from implementing cost-effective risk mitigation measures.

The Affordability Challenge: A Case Study of Ocean County, New Jersey

We motivate the voucher and loan proposal with an examination of the affordability of flood insurance in Ocean County, New Jersey. We chose Ocean County as our example since it was hard hit by Hurricane Sandy, has many NFIP policies-in-force, and also has a substantial middle-income or low-income population. However, these issues are not unique to Ocean County or coastal New Jersey. Similar concerns about the affordability of flood insurance have been raised in Boston and surrounding areas, the Outer Banks of North Carolina, southern Mississippi, southern Louisiana, and New York City (e.g., Conti 2013; Hampton 2013; Lee 2013; McCormick 2013; City of New York 2013; Wharton Risk Center 2013).

Ocean County, immediately north of where the center of Sandy came ashore, was hard hit by the storm. FEMA has estimated that roughly half the damage in New Jersey occurred in Ocean County, where 40,000 buildings were damaged.⁴ The total taxable base in Ocean County reportedly fell \$3.6 billion due to the storm (O’Neill 2013). Several communities in the county were especially devastated. Toms River residents were not allowed back for months, and an estimated 90 percent of homes were damaged. Images from Seaside Heights made headlines, particularly the iconic roller coaster in the ocean; about 60 percent of residences in the town were damaged (O’Dea 2013). Ocean County has a number of vacation and second homes. Among full-time residents, however, many are low-income or retired, such that substantial increases in

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³ Beginning with policy renewals in October, 2013, elevation certificates will be required for pre-FIRM discounted policies to ensure proper pricing.

⁴ Reported online by the Robert Wood Johnson Foundation (“‘Unprecedented Destruction’: Ocean County Public Health Continues to Respond to Hurricane Sandy”): http://www.rwjf.org/en/blogs/new-public-health/2013/03/_unprecedented_destr.html.

flood insurance rates could be a challenge. The US Census Bureau estimates that over 21 percent of county residents are more than 65 years old, in contrast to 14 percent for the state of New Jersey as a whole. The homeownership rate is over 80 percent, higher than the state average of 67 percent; the median value of owner-occupied housing units is \$284,100 compared to \$349,100 for the state as a whole. Although the 9.5 percent of county residents below the poverty line is quite close to the state average, the median household income is roughly \$10,000 less at \$60,700.

The analysis in this section uses quantitative information from the following sources: data provided to us by FEMA on NFIP policies sold in 2012, socio-demographic and economic data from the US Census Bureau’s American Community Survey⁵ at a census-tract level, and estimates of storm surge inundation from Hurricane Sandy produced by the FEMA Modeling Task Force based on US Geological Survey field data.⁶

TAKE-UP RATES AND PREMIUMS BEFORE SANDY

In 2012, more than 238,600 NFIP policies were in force in New Jersey. The vast majority of those policies were in the four counties that have ocean shoreline: Monmouth, Ocean, Atlantic, and Cape May, all of which experienced surge damage from Sandy. In Ocean County in 2012, there were nearly 53,000 policies-in-force, including slightly more than 44,000 single-family residential policies.

Still, prior to Hurricane Sandy, many households in flood-prone communities failed to purchase flood insurance. Using data from FEMA on NFIP policies-in-force in 2012, coupled with an estimate of the total households in each census tract, we calculate the take-up rate for residential policies by tract in Ocean County. Since we do not have data on the number of households located in SFHAs, take-up rates are estimated across the entire census tract.

Figure 1 shows take-up rates for residential properties in Ocean County census tracts along with an estimate of the extent of the storm surge from Hurricane Sandy. Take-up rates in the county covered the entire spectrum, based largely on proximity to the coast. Countywide, the mean take-up rate was almost 20 percent and the median was less than 2 percent. For tracts that experienced some surge, the mean take-up rate was 34 percent and the median was almost 14 percent. As seen in the figure, tracts along the ocean tended to have very high take-up rates, between 80 percent and 100 percent. It appears that those facing the highest risk of storm surge in Ocean County purchased a flood insurance policy; this may reflect the effect of the mandatory purchase requirement: a higher percentage of the area in tracts near the ocean are in a SFHA

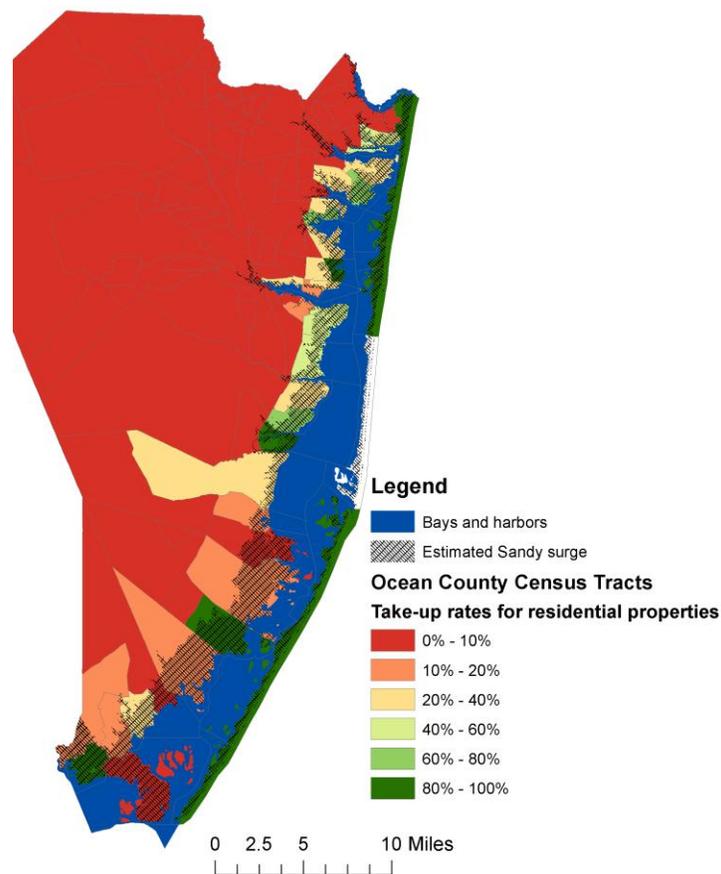
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⁵ The US Census Bureau provides GIS shapefiles that couple the American Community Survey five-year estimates to census tracts. We downloaded these data for the 2007–2011 estimates (the most recent available) for the state of New Jersey (<http://www.census.gov/geo/maps-data/data/tiger-data.html>).

⁶ Thanks to H.E. “Gene” Longenecker, III, for providing these data.

compared to tracts further inland. Note that the one tract that it is not shaded along the ocean is largely state protected lands with no properties. The land in the bay at the southern end of the map is largely not developed either.

For comparison, we find that the average take-up rate for flood insurance across the state was only 6 percent, the average take-up rate in tracts that experienced at least some surge from Sandy throughout the state was almost 15 percent, and the average take-up rate for tracts on the ocean was 75 percent.⁷ Roughly 40 census tracts (out of more than 2,000 in the state) had take-up rates quite close to 100 percent in New Jersey, and almost all of them are located on the ocean coast.

Figure 1. Take-up Rates for Residential NFIP Policies in Ocean County, New Jersey



⁷ Our calculation includes condominiums and mobile homes in both the numerator and denominator. In areas having multistory buildings, however, take-up rates among those at risk will be underestimated because residents on higher floors are counted in the denominator, but they will not be at risk of suffering flood damage. The take-up rates for high-risk households are likely to be underestimated since we do not have data on the number of structures in the floodplain by census tract and so must estimate take-up rates across the entire tract.

Prior to the phase-in of the Biggert–Waters rate changes and the adoption of new maps, median premiums in Ocean County for single-family homes were \$806 for A zones, \$3,144 for V zones, and \$376 for X zones (outside both the 100-year and 500-year flood zones). These are similar to rates nationwide. The most recent actuarial rate review provides the average annual premiums across the country: for nondiscounted policies, this is \$513 in A zones, \$3,088 in V zones, and \$417 outside of SFHAs (Hayes and Neal 2011).⁸

INCREASING RATES: BIGGERT–WATERS AND REVISED HAZARD MAPS

For two reasons, some coastal New Jersey homeowners will see their premiums increase over the next several years as the provisions of the Biggert–Waters Flood Insurance Reform Act are implemented. The first is the elimination of pre-FIRM discounts. Pre-FIRM property currently receiving a discounted rate will not be given this discount when the property is sold or if the owner lets the flood insurance policy lapse. Discounts will be phased out, as discussed above, for nonprimary residences and for property sustaining substantial flood damage (from Hurricane Sandy and future disasters). FEMA estimates that in census tracts that experienced some damage from Sandy in Ocean County, the percentage of households with major or severe damage ranges from around 10 percent to almost all properties in the Township of Toms River and the Township of Brick (New Jersey Department of Community Affairs 2013).

Data we obtained from FEMA for Ocean County, New Jersey,⁹ reveal that a total of 17,984 properties in the county currently receive a premium discount. This represents almost 34 percent of the total policies and is greater than the nationwide average of 20 percent. These data were provided to us at the community, or municipal, level. Figure 2 shows the distribution of the number of discounted policies across municipalities in Ocean County as of January 2013. The color of the tracts indicates the absolute number of discounted policies in a tract, and the figure written within each municipality is the percentage of policies-in-force that are discounted. The percentage of discounted policies is highest in South Toms River Borough at 73 percent and second highest in Little Egg Harbor Township at 57 percent. (Note that South Toms River is distinct from Toms River, mentioned above.) Whereas only 11 percent of homes in South Toms River had major or severely damaged homes, in the Township of Little Egg Harbor, it was 90 percent.

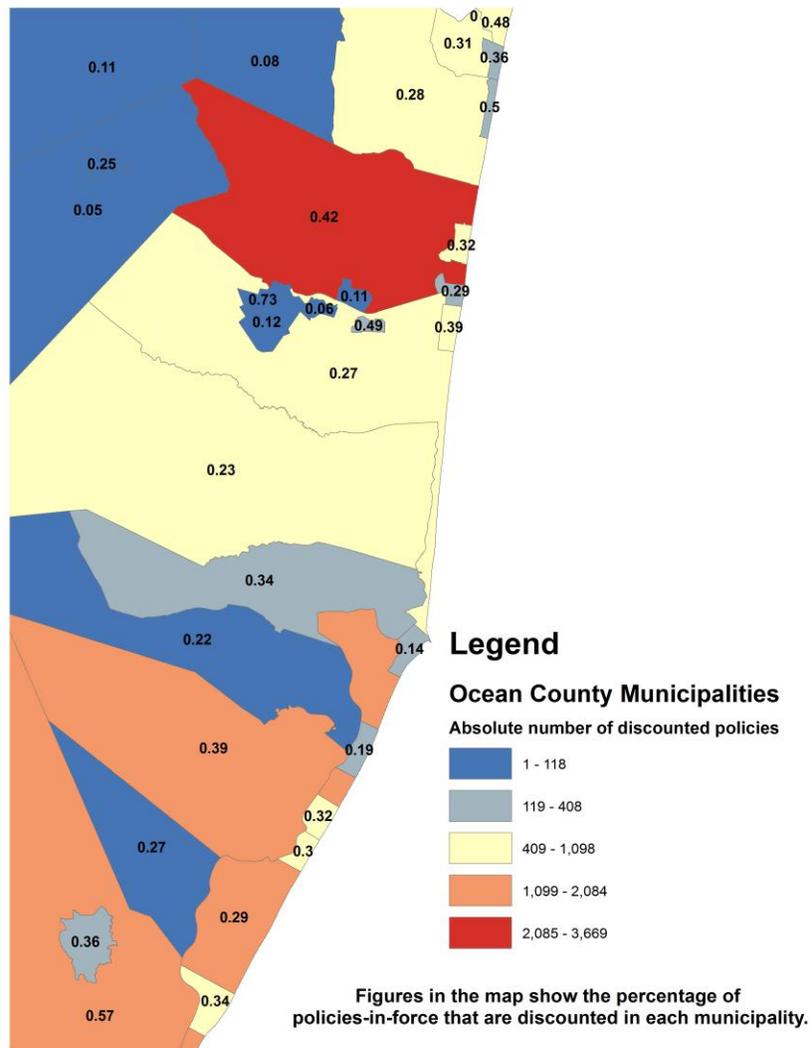
Full elimination of the premium discounts could more than double rates, on average, because, as noted above, pre-FIRM properties are estimated by FEMA to be paying 40–45 percent of full-risk rates. The median pre-FIRM annual premium for single-family homes in Ocean County in 2012

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⁸ They are also similar to the averages for the state of New Jersey. Out of all the policies in the state in 2012, the median premium for A zones was slightly more than \$1,000, the median premium for V zones was more than \$3,200, and the median premium in an X zone was \$405.

⁹ We thank Tim Scoville, Kevin Montgomery, and Michael Miles for providing these data.

was \$1,238. If we assume that this rate was 40 percent of the full-risk rate, the new premium of \$3,095 that reflects risk would be roughly 5 percent of the median income in the county, which is \$60,700. Although some families will be able to afford these changes, it will be a burden for others. Figure 3 shows the percentage of households by census tract making less than \$50,000 a year. The figure illustrates the substantial heterogeneity along the coast, with relatively high percentages of low- to middle-income households in some areas where flood insurance affordability is likely to be a concern.

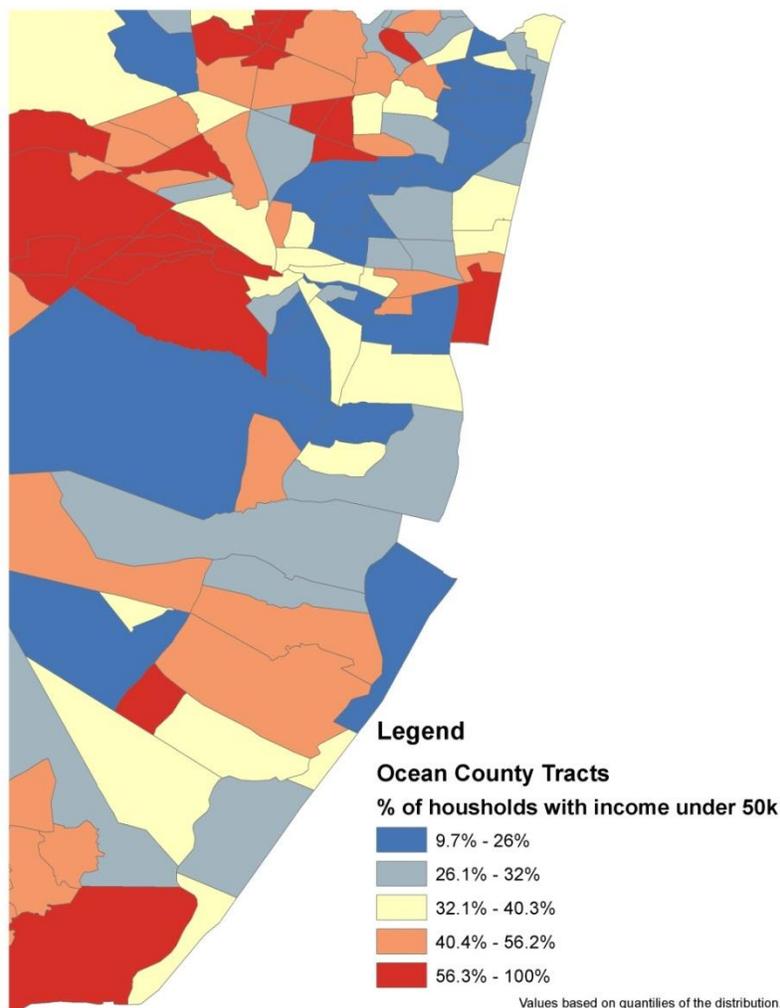
Figure 2. Discounted Policies in Municipalities of Ocean County, New Jersey



The second reason why premiums will increase for many homeowners is the adoption of the new flood maps coupled with the elimination of grandfathering under Biggert–Waters. Prior to Sandy, FEMA had been in the process of updating the FIRMs for coastal New Jersey and New York. These maps were issued on an advisory basis to guide rebuilding post-Sandy. The previous maps had not

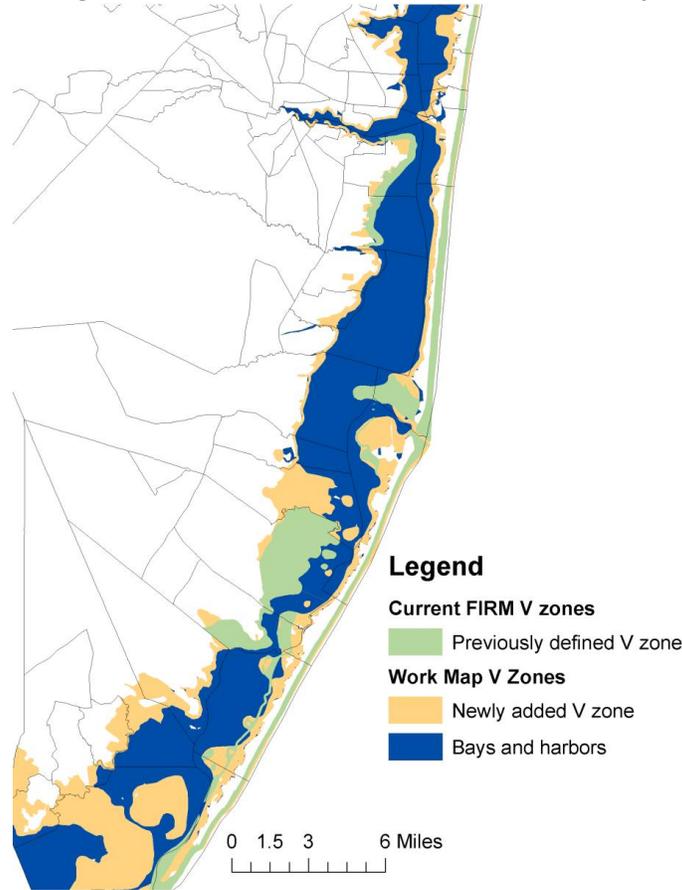
been revised in more than 25 years. The remapping incorporates more recent data, improved methodology for mapping flood hazards, and any changes in conditions since the old maps were produced. The advisory maps were conservative and showed a much-expanded SFHA. This was quite contentious because the elimination of grandfathering meant that when the maps were finalized, residents mapped into a higher zone would need to pay the higher rate. In June 2013, FEMA issued work maps for some areas, including Ocean County, which updated the advisory maps and showed a *reduced* high hazard area, as compared to the advisory maps, in almost all locations. FEMA reported that the V zone shrank in these revised work maps compared to the advisory maps in Atlantic County by 80 percent and in Hudson County by 76 percent; for Ocean County the decrease was 45 percent (CBS 2013).

Figure 3. Percentage of Households Earning Less than \$50,000 per Year by Census Tract



In Ocean County, although the entire SFHA in the work maps does not differ dramatically from that of the current FIRM, the V zones have expanded. Figure 4 shows the V zones on the current FIRM in Ocean County as well as the newly defined V zones on the work maps. In 2012, 47,755 policies were in Ocean County’s A zones and 1,140 were in V zones. Using parcel data for Ocean County,¹⁰ we calculate that 4,503 parcels intersect the V zone in the original maps, and 11,294 intersect the V zone in the work maps, an increase of almost 6,800 structures over the current FIRM.

Figure 4. V Zones on Current FIRM and Work Map



The question homeowners are asking is, “What do the new maps mean for my flood insurance premium?” Premiums vary across A and V zones and also depend on the difference between the height of the home and the estimated BFE. The new maps being released by FEMA have updated BFEs. On the advisory maps, these were referred to as advisory BFEs, or ABFEs. When the new maps are finalized, the updated BFEs will be used for rate setting. In the meantime, the state of New Jersey has required the use of ABFEs for the reconstruction of substantially damaged homes

¹⁰ These data are made available to the public online by the New Jersey Office of Information Technology and the Office of Geographic Information Systems.

to ensure that rebuilding will conform to the newer hazard information. Without precise elevation data for each property to compare to the estimated BFEs on the advisory and work maps, it is difficult to say how many homeowners will discover that their properties are below the new BFEs.

For those with so-called “negatively elevated properties,” premiums could be quite high. Using the rates set in the 2013 *Flood Insurance Manual* (FEMA 2013), we calculated annual insurance premiums for A and V zone properties at various elevations relative to their BFEs. This is shown in Table 1. We consider a post-FIRM, one- to four-family residence purchasing \$250,000 coverage. The 2013 rates include the new 5 percent catastrophe reserve charge from Biggert–Waters. The premiums for A zone properties depend on the number of stories and whether the property has a basement. The range of values for the V zone properties depends on the ratio of the amount of coverage purchased relative to the replacement value of the property. Note that FEMA does not provide premium estimates for A zone properties more than one foot below BFE or for properties in V zones more than three feet below BFE.

Table 1. 2013 NFIP Annual Premiums for a post-FIRM, One- to Four-Family Residence Purchasing \$250,000 Coverage

	<i>3 feet below BFE</i>	<i>1 foot below BFE</i>	<i>At BFE</i>	<i>1 foot above BFE</i>	<i>4 feet above BFE</i>
<i>A zone</i>	Not rated	\$2,199– \$4,483	\$778– \$1,315	\$429– \$616	\$296
<i>V zone</i>	\$13,950– \$23,150	\$8,950– \$15,925	\$6,750– \$12,050	\$4,675– \$8,725	\$2,050– \$4,150

V zones have higher rates than A zones because of the surge risk. Rebuilding is also more costly because the higher risk has led to stricter standards for building in V zones than in A zones. More specifically, A and V zone properties must be elevated to the BFE, but V zone properties must also be protected against wave action, wind, and erosion. V zone properties must be raised on pilings, whereas A zone properties could have a foundation or crawl space below BFE.

LOWERING PREMIUMS THROUGH HAZARD MITIGATION

Insurance premiums can be made more affordable through hazard mitigation, particularly by elevating the structure above BFE, as shown in Table 1. Raising a house so it is above BFE could save thousands, if not tens of thousands, of dollars on annual flood insurance costs.¹¹ Elevating a

¹¹ The NFIP currently gives reductions in premiums when homes are elevated. There are other hazard mitigation options that may be cost-effective for reducing flood damages, but for which the homeowner would not receive a discount on their NFIP premium. This is why we focus our attention on home elevation. On the costs of different flood management strategies for New York City, see Aerts et al. (2013).

home, however, can be expensive, with the actual price varying substantially depending on the size and type of property. A recent *New York Times* article estimated that the cost of elevating a house can range from \$10,000 to \$100,000 depending on its size, weight, and when it was built (Harris 2013). One company in New Jersey that elevates homes estimates on its website that the average cost is \$45,000 to \$50,000, and another New Jersey company offers a range of \$30,000 to \$100,000.¹²

Homeowners have four sources of potential government funding to assist them in elevating their properties. First, a homeowner could apply for a subsidized disaster loan from the Small Business Administration (SBA) to cover the costs of repair to his or her property after a disaster. The amount of the loan can be increased by up to 20 percent of the total disaster damage if the additional funds are used to make hazard mitigation improvements to the property, such as elevating.¹³

Second, a homeowner with an NFIP policy whose property was substantially damaged (meaning that repairs will cost at least 50 percent of the building's predisaster value) may be eligible to receive Increased Cost of Compliance (ICC) payments up to \$30,000 to cover the costs of bringing a structure into compliance with regulations in place.¹⁴ In communities that have adopted the new ABFEs, ICC funds will be available to help homeowners elevate to the required levels. In communities that have not adopted the ABFEs, however, funds will be available only to comply with the effective FIRM. Further, the total cap on claims for residential structures is \$250,000 (the coverage limit), and ICC funds are not available to cover property damage in excess of this cap.¹⁵

Third, Hazard Mitigation Grant Program (HMGP) funds are made available to states by FEMA following a presidential disaster declaration to fund hazard mitigation. Local governments can develop projects for the use of HMGP funds; they submit their proposals to the state, which prioritizes and makes awards. If a community applies for and receives HMGP funds to help homeowners elevate structures, residents of that community could potentially obtain financial assistance to help fund the costs of elevation. All HMGP projects must pass a cost-benefit test.

A fourth potential source of funds is Community Development Block Grants. The supplemental legislation passed after Sandy funneled substantial amounts of money to affected states through

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¹² See LBI House Raising's "Frequently Asked Questions" (<http://lbihouseraising.com/faqs/>) and Axis Builders, LLC's "Cost To Raise a House in NJ" (<http://www.njhouseraising.com/index.php/cost-to-raise-your-home>).

¹³ For more on Small Business Administration loans and other disaster aid available to homeowners, see Kousky and Shabman (2012).

¹⁴ Legislation passed in 2004 allowed this coverage to be used to cover the nonfederal cost-share component associated with FEMA mitigation grants, even in the absence of a flood loss.

¹⁵ If a home with coverage of \$250,000 is totally destroyed and FEMA inspections indicate that a claim of \$250,000 is warranted, no extra Increased Cost of Compliance (ICC) funds will be available for the homeowner. We thank Jeffrey Woodward of FEMA for helpful comments on the use of ICC funds.

Community Development Block Grants. Plans on the use of the funds must be developed and approved by the Department of Housing and Urban Development (HUD). If plans include elevating homes, this could be another source of funds with which homeowners might mitigate future flood damage to their properties.

Designing a Coupled Voucher and Mitigation Program

As discussed above, the NFIP has historically given premium discounts to make insurance less costly, but these were never means-tested or targeted to those for whom the affordability of insurance is a burden. Here, we propose using vouchers, rather than relying on pre-FIRM discounts and grandfathering, to address the affordability issue. We suggest coupling means-tested vouchers with hazard mitigation requirements to be financed with low-interest loans. By requiring hazard mitigation, future disaster losses would be reduced both for the NFIP and for low- and moderate-income families. We suggest limiting this program to homeowners in A and V zones. Second homes would not be eligible.

Such a voucher program has two key aspects. First, it operates in parallel with risk-based pricing in the NFIP. Risk-based premiums are essential for communicating information about flood risk to communities, developers, and residents. Second, vouchers (based on the household's income) are used not only to cover a portion of the increased insurance premium, but also to cover the costs of the loan for mitigating damage to the residential property.

We propose that the amount of the combined insurance and loan voucher be determined using a sliding scale based on annual family income.¹⁶ For instance, if income is less than \$X, it would be determined that the household could pay \$Y toward an insurance policy, an amount considered to be affordable. If the NFIP premium is higher than \$Y, the voucher would be the difference between the NFIP premium and \$Y. The federal government could cover the costs of this voucher, or a fee could be assessed on NFIP policies. A national dialogue is required to determine who should bear the costs of making flood insurance affordable to those in need.

We recommend that this system be independent of the NFIP, so it may be more appropriate to locate it within HUD, rather than FEMA. HUD already has experience operating the Section 8 Housing Choice Vouchers, and, as suggested by the Association of State Floodplain Managers (2013), that program provides a model for how such a system could work for flood insurance. In the HUD program, the Public Housing Agency determines a payment standard that is the amount needed to rent a moderately priced unit in a given housing market. Eligible families are expected to pay 30 percent of their adjusted gross income toward rent and utilities. The voucher is generally the difference between the payment standard and 30 percent of the family's adjusted

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¹⁶ One may also want to modify the size of the voucher based on total family assets.

gross income. Before implementing a voucher program for the NFIP, research would need to be conducted to identify a reasonable percentage of gross income that could be allocated to flood insurance. To illustrate how such a voucher system would operate, we assume that this percentage is determined to be 5 percent. In this case, a family earning roughly the median Ocean County income of \$60,000 a year could pay up to \$3,000 toward their NFIP policy. If they lived in a V zone with their property at BFE and an insurance premium of \$6,700, then they would receive a voucher for \$3,700.

As detailed in the last section, certain hazard mitigation measures can reduce the risk of damage to properties in a flood event and, correspondingly, reduce premiums. The much lower NFIP rates for homes elevated above BFE provide a financial incentive to invest in this mitigation measure if the annual cost of a loan to elevate a property is less than the annual savings in NFIP premiums. Many homeowners may thus elect to obtain a loan from the SBA or a private institution and mitigate their homes. If a homeowner is receiving a voucher to cover the costs of flood insurance, however, she may have a reduced incentive to take the loan and make the necessary investments in hazard mitigation because she will not reap the benefits financially of a reduced premium.

This is why we propose that the voucher program be coupled to mitigation requirements and a loan program. To be eligible for the voucher, standards would be adopted for the level of mitigation required. This could simply be compliance with the baseline floodplain management ordinances discussed above.¹⁷ Policyholders would then be given a low-interest loan, perhaps through the SBA, to invest in the necessary mitigation. This loan would be repaid via the reduction in insurance premiums, ultimately reducing the amount of the voucher over time. Examples will make this concrete.

Consider two single-family property owners, one in an A zone and one in a V zone, both purchasing an NFIP policy for \$250,000 of coverage. Assume that each property is three feet below BFE, such that the annual premium for the A zone resident is \$4,000,¹⁸ and the annual premium for the V zone resident is \$18,550. Further assume, for the sake of this example, that each homeowner is eligible for a flood insurance voucher and currently makes \$50,000 a year. Using 5 percent of gross income as our measure, these individuals would be expected to pay

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¹⁷ As stated above, we focus on elevating houses since that is a mitigation activity for which homeowners currently receive a premium discount in the NFIP. We are not aware of any study evaluating whether these premium reductions are commensurate with the reduction in expected damage from future flooding. FEMA may want to consider the cost-effectiveness of other hazard mitigation measures and provide premium discounts to reflect the reduced flood-related damage to the property and contents. The Insurance Institute for Building and Home Safety has several recommendations on their website of flood loss reduction measures such as raising electrical outlets, installing a backflow valve, and making sure the grading in the yard directs water away from the building (see: <http://www.disastersafety.org/flood/prepare-respond-recover/>).

¹⁸ Although the 2013 *Flood Insurance Manual* does not have an A zone rate for properties three feet below base flood elevation, we made a conservative extrapolation.

\$2,500 toward flood insurance. If no hazard mitigation were undertaken, the A zone resident would receive a flood insurance voucher for \$1,500, and the V zone resident would receive one for \$16,050. This is summarized in the top panel of Table 2.

Now, link the insurance voucher program to hazard mitigation. Our proposed program would be structured such that, to qualify for the insurance voucher, the homeowner would be required to elevate the house and would be given an SBA loan for this purpose. The voucher would cover the combined costs of the annual loan payment and the insurance premium in excess of \$2,500. The voucher is tied to the individual and their income level, but the loan would be attached to the property, thus not increasing the indebtedness of low-income households in a manner that would be burdensome. Assume that the requirement for receipt of the voucher is that the homeowner must elevate the property to one foot above BFE. We assume that the cost of elevation is \$25,000 for the A zone property and \$55,000 for the V zone property.¹⁹ Both residents receive a 20-year loan at a 3 percent rate²⁰ to cover these costs, resulting in annual payments of \$1,680 and \$3,660, respectively. Once the homes are elevated, annual NFIP premiums drop to \$520 for the A zone resident and \$6,700 for the V zone resident.

After elevation, no voucher is required for the A zone resident because the coupled loan payment and premium, at \$2,200, is less than the \$2,500 that the homeowner is required to pay (based on income) for insurance. The total cost to the homeowner of elevating her house is less than what she would pay for insurance (\$2,500) without mitigation. For the V zone resident, after mitigation, the combined payment for the loan and premium payment is \$10,360; the homeowner pays \$2,500 and the federal government pays \$7,860. This is summarized in the bottom panel of Table 2.

Figure 5 shows the costs of the insurance-only voucher and the combined insurance and loan voucher. It also shows the payments after the loan has been fully repaid. The savings from coupling mitigation with the insurance voucher are quite substantial, as shown in the figure and in the last row of Table 2. During the life of the loan, the total annual savings (the difference between the premium with no mitigation and the combined loan and premium after mitigation) are \$1,800 for the A zone property and \$8,190 for the V zone property.

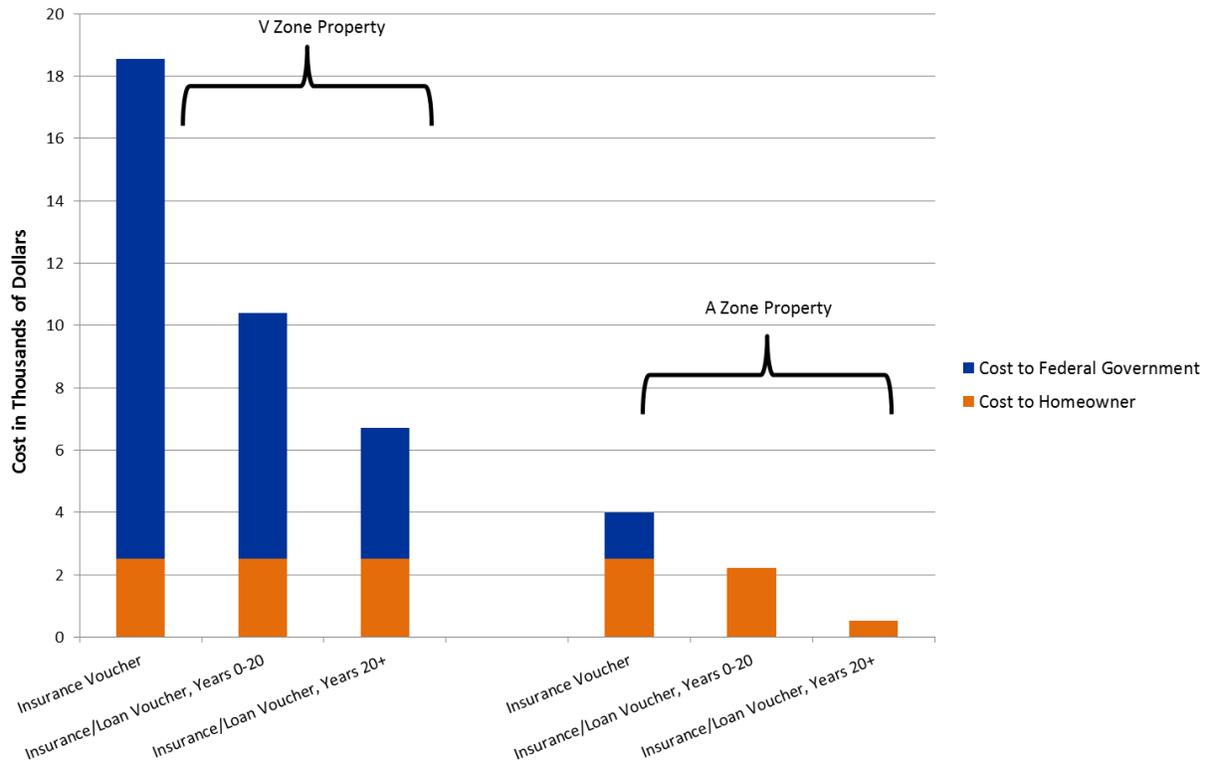
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¹⁹ Elevating at the time of new construction can be less expensive than renovating existing homes.

²⁰ These rates could vary depending on the SBA's determination of whether the individual can obtain credit elsewhere. If the SBA determines an individual can obtain credit elsewhere, the interest rate is currently 5% and is 2.5% for those unable to obtain credit elsewhere (see: <http://www.sba.gov/content/disaster-loan-program>).

Table 2. Example Calculation of Costs of Mitigation Loan and NFIP Premiums

	A zone property	V zone property
<i>Insurance voucher without mitigation</i>		
Premium 3 feet below BFE	\$4,000	\$18,550
Homeowner pays	\$2,500	\$2,500
Flood insurance voucher provided by federal government	\$1,500	\$16,050
<i>Insurance voucher with mitigation</i>		
Cost to elevate 1 foot above BFE	\$25,000	\$55,000
Annual loan payment (3%, 20 years)	\$1,680	\$3,660
Premium 1 foot above BFE	\$520	\$6,700
Homeowner pays	\$2,200	\$2,500
Combined insurance and loan voucher provided by federal government	\$0	\$7,860
Total savings from mitigation	\$1,800	\$8,190

Figure 5. Cost of Program to the Federal Government and a Hypothetical Homeowner



Combining mitigation with the insurance voucher remains financially attractive over a range of sensitivity tests—although not for all plausible values—on the numbers for our hypothetical example given in Table 2. For any assumed pre-mitigation premium in the A zone greater than \$2,200 and in the V zone greater than \$10,360, it is less expensive to pay to elevate the property and obtain the lower NFIP premium. Thus, for V zone residents close to BFE, it may not be attractive to take out a loan for further increases in elevation. That said, our example assumes that the homeowner elevates her home to one foot above BFE, but further elevation up to four feet above BFE—from several feet below BFE—can also be financially attractive as it leads to further reductions in premiums, as seen in Table 1. Linking the loan program to the insurance voucher remains financially attractive for higher costs of elevation as well. For instance, if the cost in the A zone were to increase to \$55,000 and in the V zone to \$75,000, the combined loan and reduced premium payment is still less than the premium without mitigation. It is also financially attractive for a range of loan terms.

Everyone benefits from this program. The homeowner has affordable annual payments and a safer home. The NFIP has lowered its exposure through mitigation and has improved its financial soundness through pricing that is closer to risk based. The financial institution providing the mortgage to the homeowner has a more secure investment because expected losses from a flood event are reduced. And the general taxpayer benefits from a potentially reduced need for disaster aid or bailouts of the NFIP.

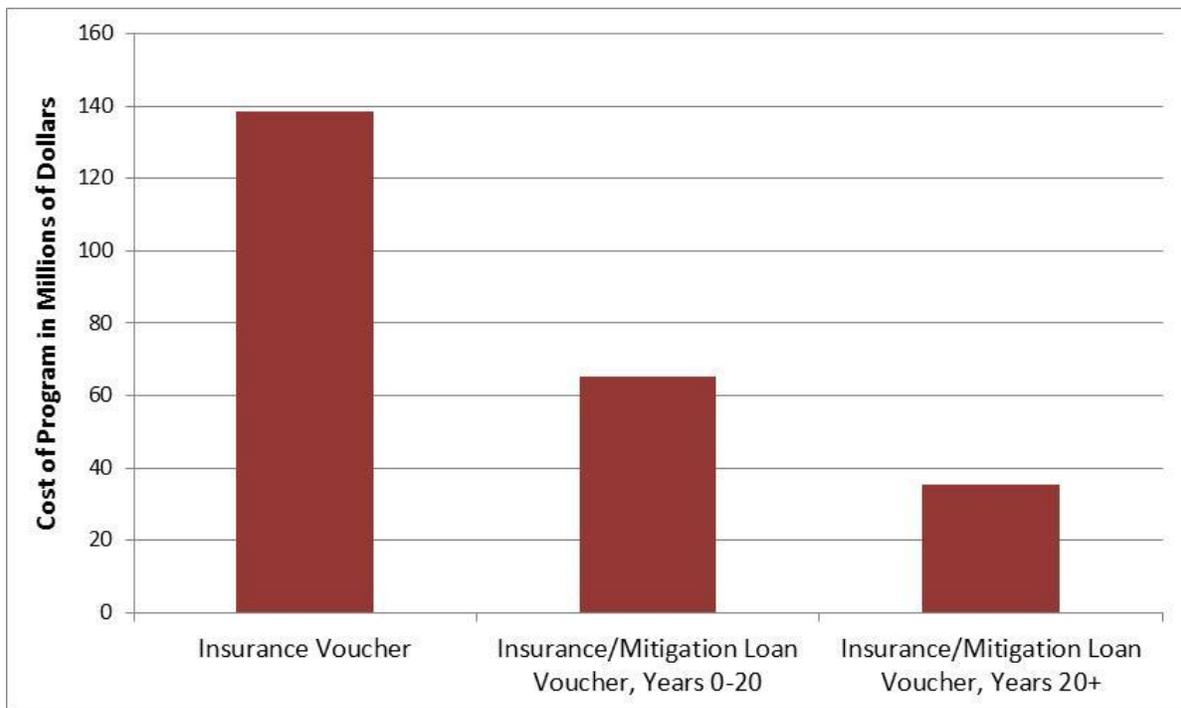
One complication to consider in the design of such a program is what would happen to a mitigation loan if the homeowner moved. We recommend that (a) the insurance voucher be tied to the policyholder and his or her income level and (b) the mitigation loan be tied to the property and thus taken over by the new homeowner. The new resident would need to apply for a voucher based on his or her income; the loan payment would be part of the mortgage.

This proposed program would need to be complemented by a broader array of policies related to flood risk management. For example, our proposal is likely to increase insurance penetration and mitigation activity by low-income individuals but it does not address community-level hazard mitigation investments. Land use regulations, building codes, warning systems, and other investments, such as constructing sea walls, dunes or levees, should be considered in the suite of policies related to managing hurricane or flood-related risks. The NFIP Community Rating System program is designed to incentivize these types of investments.

Estimating the number of homeowners nationwide that would qualify for vouchers would require a detailed analysis of income levels and the distribution of households in relation to flood risk. To get a ballpark estimate, we did a quick calculation of the cost of vouchers for low- to middle-income residents in Ocean County in census tracts that experienced at least some storm surge

from Hurricane Sandy. Using data from the American Community Survey, we identify the total number of households in various income brackets. We focus on annual income brackets less than \$50,000 a year (2011 dollars). Using the mean income of the bracket and the threshold of being able to pay 5 percent of one's income toward insurance, we calculate the amount of the voucher using the assumptions about elevation costs in Table 1. We assume a take-up rate equal to the mean of these tracts of 34 percent and assume an even split between A and V zone properties. These rough estimates of total cost are shown in Figure 6.

Figure 6. Estimates of Program Costs for Ocean County Tracts That Experienced Storm Surge



Conclusion

A challenge at the heart of NFIP pricing is who should pay for catastrophes. Part of the motivation for the July 2012 reform legislation was the notion that individuals choosing to locate in risky locations should bear those costs. When the costs of risky choices are not borne by those making the decisions, excess risk-taking could occur. Some also argued that it was inequitable to have other policyholders or the general taxpayer covering the costs of the riskiest properties.

On the other hand, however, there is a public interest in helping low- and moderate-income residents afford insurance. Insurance guarantees that households will have money to rebuild after a disaster and is important financial protection for those in hazardous locations. Further, financing rebuilding ex ante with insurance instead of ex post and off-budget through disaster aid could

lead to more prudent fiscal decisions. Although some areas at high risk for flood have high amenity values and attract affluent homeowners who can afford the necessary insurance, some risky areas are inexpensive and thus attract families that cannot afford other locations. Many argue that these households should be given assistance with insurance costs as a matter of equity. Linking such assistance to required mitigation measures will increase safety, reduce losses, and lower the financial cost of insurance vouchers. It will also reduce the financial burden on the general taxpayer.

This year has seen the introduction of several pieces of legislation in Congress all aimed at slowing or completely repealing the elimination of the discounted rates that took effect with the Biggert–Waters Flood Reform Act. It is imperative to address the issue of affordability, and, as we have argued here, this should be done in a means-tested manner separate from NFIP pricing.

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