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Arguments on a Hybrid Privatization of the U.S. Flood Insurance Program: A Debate Driven by Issues of Sustainability

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Abstract

All arguments considered, we suggest that expanding the sale of private flood coverage would be welfare enhancing and in the public interest. While there are several forms of "privatization" that are advocated for the National Flood Insurance Program (NFIP), we advocate here a form of privatization that reflects elements of both market competition and public-sector support. Our proposed "hybrid" privatization of the NFIP involves legislative and regulatory measures that would make it easier for private companies to offer flood insurance on their own paper. Our proposals are consistent with the developing interest for public-private partnerships to tackle thorny issues of community vulnerability and economic sustainability. Our suggestions provide insights into devising a scheme that would be efficient, equitable, and more politically palatable to all stakeholders.

INTRODUCTION

The continuing escalation of severe flooding in the United States and the consequent damage to residential and commercial properties have drawn increasing public attention to the provision and purchase of flood insurance. Currently, the National Flood Insurance Program (NFIP)—subject to policy limits prescribed by the program's enabling legislation—underwrites most flood insurance for residential properties. As the number and severity of floods have continued to rise, the NFIP has been beset by a number of problems and become a target for substantial criticism. Additionally, its sustainability in its current form is in question. Further, as more communities and homes become vulnerable to flooding, the NFIP is falling far short of its public mission to promote good flood risk management.

Recent legislation to reform the NFIP—the Biggert-Waters Act of 2012 and the Homeowners Flood Insurance Affordability Act of 2014 (HFIAA)—have produced only mixed results in fixing the program's problems and achieving

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better flood risk management. Hence, there has been increasing interest in the provision of private flood insurance as a complement to or substitute for federal flood coverage.[1] Most recently, the House passed H.R. 2874—the 21st Century Flood Reform Act (FRA)—on November 14, 2017 that contained a number of provisions that would facilitate the sale of private flood insurance.[2]

As reflected in the FRA, what was proposed is not the full replacement of the NFIP by the private sector per se, but rather a set of measures that would enable private insurers to underwrite flood insurance on a much broader scale. Among the motivations spurring the interest in private flood insurance is the belief that private insurers can employ innovations in underwriting, pricing, and coverage provisions that will enable them to offer flood insurance to some property owners at an "attractive" price.[3] There is also the view that laying off more flood risk to the private sector is a good thing and will reduce the fiscal pressures on the NFIP and its propensity to incur debt.

One can argue that private insurers can offer various welfare-enhancing innovations in flood risk assessment and the pricing and design of flood insurance policies, and there is some anecdotal evidence of such innovations already being employed. This said, private insurers seeking to offer flood insurance at a primary level face a number of challenges. These challenges include competing with the NFIP for properties that receive subsidies or that are otherwise underpriced (by the NFIP). Additionally, private insurers currently face certain restrictions in how they can modify flood insurance coverages in their policies relative to what the NFIP offers.[4]

To date, legislative efforts have sought to reduce some of these obstacles to significantly increasing the sale of private flood insurance. Importantly, the FRA would have required lenders and government sponsored enterprises (GSEs) to accept private flood insurance policies as an adequate substitute for NFIP policies if these policies are approved by state insurance regulators. Additionally, the FRA would have allowed non-admitted (surplus lines) insurers as well as mutual aid associations to offer flood insurance to homeowners and commercial buyers.

Such provisions, if enacted, would provide a substantial boost to private flood insurance. There are, however, concerns that such provisions could poten-

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[1]Opinions differ among experts as to how the NFIP should be further reformed (see for example, Brannon and Blask 2017; and Kousky 2017).

[2]The FRA incorporates many provisions of the S. 563—the Flood Insurance Market Parity and Modernization Act (FIMPPA)—which previously was the vehicle that would have been used to increase the sale of private flood insurance.

[3]An analysis by Michel-Kerjan, Czajkowski, and Kunreuther (2015) demonstrated that the NFIP, subsidies aside, underprices some properties and overprices others due to the antiquated methodology that it uses. Consequently, they infer that private insurers could offer lower prices to some homeowners than what the NFIP charges or would charge them. Most recently, FEMA has proposed new rules (Risk Rating 2.0), effective as of October 2020, that would provide for more accurate and property-specific pricing of flood insurance; this would likely raise the premiums for many homes but could also lower the premiums for others (See "Climate Advocates Cheer Trump Policy Shift on Flood Insurance." *Bloomberg*, March 18, 2018, https://www.bloomberg.com/news/articles/2019-03-18/climate-advocates-cheer-trump-policy-shift-on-flood-insurance).

[4]The Office of the Comptroller of the Currency and the Federal Deposit Insurance Corporation has recently promulgated new regulations that ease some of the current restrictions on lenders with respect to their ability to accept private flood policies as an alternative to NFIP coverage (https://www.occ.gov/news-issuances/news-releases/2019/nr-ia-2019-15.html). The implications of the proposed changes are somewhat unclear. Nonetheless, these changes appear to fall short of what has been proposed in the FRA and similar legislation.

tially result in some homeowners purchasing inadequate coverage or securing insurance from non-licensed carriers or mutual aid associations that are subject to less regulation than licensed insurers and for which there would be no state guaranty association protection should they become insolvent.[5] There are also concerns that rather than helping the NFIP, private flood insurance as contemplated under the FRA and similar proposals would undermine the program and compromise its ability to achieve its objectives.[6]

While there is a rich stream of academic literature on flood risk management and flood insurance, there has been relatively little discussion in this literature on the proper role of the private sector vis-à-vis the public sector in providing flood insurance with a few exceptions.[7] There have been some recent practitioner articles and government reports on privatizing flood insurance.[8] Generally, many of those who have written on this subject tend to favor increasing the role of the private sector in underwriting flood insurance. This article extends the current literature and, in particular, examines the potential benefits and costs of a significant expansion of private flood coverage. This examination includes a discussion of the potential benefits and costs of broadening the sale of private flood insurance in the United States as contemplated in the most recent legislative proposals.

OVERVIEW OF FLOOD RISK AND INSURANCE

To understand the motivation for and implications of private flood insurance it is helpful to briefly review flood risk and its significant rise within the last several decades. As flood risk and losses increase, there has been greater pressure on the NFIP, but this also opens up opportunities for private flood companies. We also provide a brief overview of the NFIP to provide readers with a better understanding of what private companies are offering or might offer as an alternative.

Increasing Flood Risk and Damages

The evidence suggests and a number of studies indicate that risk of floods and their costs are increasing in the United States. The incidence of damaging floods has increased significantly over the last several decades and more and more com-

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[5]For a discussion of some of the problems with legislative proposals that would facilitate greater privatization of flood insurance that some perceive, see for example, Consumer Mortgage Coalition (2017).

[6]Among these concerns is the worry that private insurers would "poach" or "cherry pick" certain properties from the NFIP that it overprices (i.e., the NFIP charges them premiums higher than what it costs to insure them). For this reason, some legislators were opposed to the FRA (see "In Capitol Hill Debate Over Future of Flood Insurance, Role of Private Market Disputed," *The Advocate*, January 13, 2018 http://www.theadvocate.com/baton_rouge/news/politics/article_65a077ee-f857-11e7-bfbc-7bf9154d2b30.html. From an economic perspective, it is problematic to justify inter-program subsidies in the NFIP. Nonetheless, this is one of several issues in the public debate over efforts to encourage the sale of private flood insurance.

[7]Two recent studies that have examined the potential for private flood insurance in the United States are Michel-Kerjan, Czajkowski, and Kunreuther (2015) and NAIC (2017). Brannon and Blask (2017) also advocate the privatization of flood insurance in the United States. Additionally, Kousky, Kunreuther, Lingle, and Shabman (2018) examine the emerging private market for residential flood insurance in the United States. Born and Klein (2019) provide a detailed examination of the issues concerning the expansion of private flood insurance.

[8]See, for example, GAO (2014), Deloitte (2014), and NAIC (2017).

munities face substantial flood risk. Born and Klein (2019) discuss the factors contributing to this trend. In some respects, the NFIP has helped to decrease flood risk, but we argue that certain provisions of the program have increased flood risk. Regardless of one's opinion on how the NFIP has affected flood risk, the fact that it has been increasing has imposed significant pressure on the program and has contributed to the issues that it faces and problems with the program as well as the interest in increasing the role of the private sector in financing flood risk.

Recent events (e.g., Hurricanes Florence, Harvey, Irma, and Maria) underscore the growing risk of severe flooding in the United States and the problem of uninsured flood losses. Table 1 shows annual flood losses for the period 1965–2017 that are adjusted for inflation and exclude losses from coastal storm surges.[9] Over the years

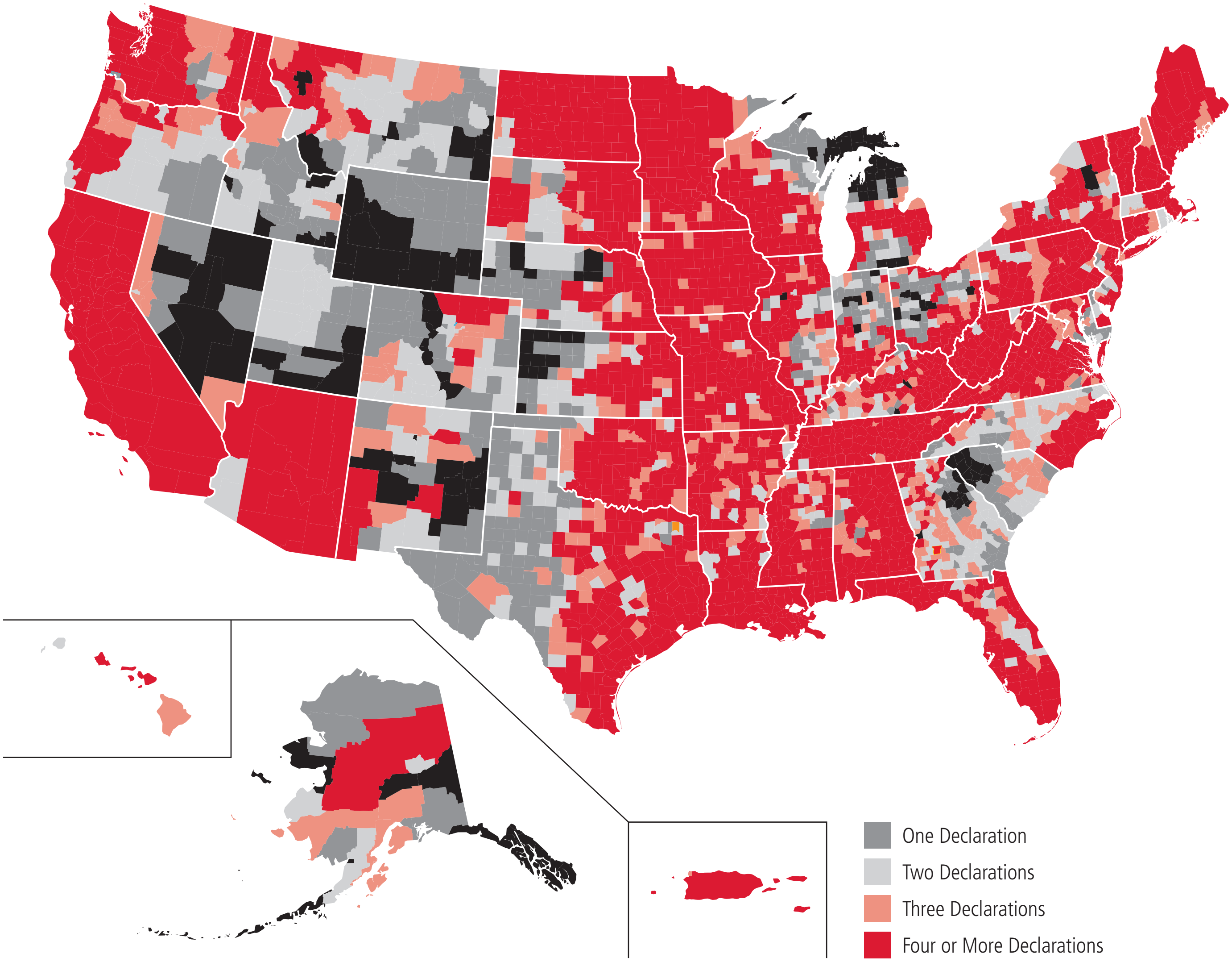
TABLE 1. Annual Flood Losses (in Millions USD) in the United States, 1965–2017* (Source: NOAA)

Year	Amount	Year	Amount
1965	7,958	1992	1,500
1966	1,126	1993	30,811
1967	3,426	1994	2,031
1968	2,882	1995	9,160
1969	6,975	1996	10,682
1970	1,601	1997	14,695
1971	1,783	1998	4,136
1972	24,977	1999	8,829
1973	9,803	2000	2,110
1974	2,787	2001	11,300
1975	6,088	2002	1,817
1976	12,252	2003	3,636
1977	4,949	2004	19,255
1978	2,473	2005	55,326
1979	11,429	2006	4,737
1980	4,544	2007	2,936
1981	2,774	2008	6,748
1982	6,409	2009	1,099
1983	9,647	2010	5,616
1984	8,869	2011	9,102
1985	1,169	2012	522
1986	13,699	2013	2,211
1987	3,214	2014	2,861
1988	489	2015	1,449
1989	2,297	2016	12,078
1990	3,391	2017	62,900
1991	3,445		

* Excludes losses from coastal storm surge.

[9] Data for flood losses from coastal storm surges are not publically available.

FIGURE 1. Flood Disaster Declarations in the United States, 1965–2003 (Adapted from USGS)



1965–1994 annual flood losses averaged $6.5 billion. Annual flood losses averaged $8.6 billion over the years 1995–2004 and $12.9 billion over the years 2005–2017.[10] These figures would be much higher if they included losses due to coastal storm surges. Several factors have contributed to rising flood losses, including but not limited to, increasingly volatile weather, economic development in flood-prone areas, compromised flood plains, and coastal erosion. We also note that many areas throughout the United States face significant flood risk and have experienced significant flood events (see Figure 1).

CoreLogic estimated that residential flood losses from Hurricane Harvey were $25 to $37 billion, of which approximately 70 percent will be uninsured (CoreLogic 2017a).[11] It estimated that residential flood losses from Hurricane Irma were $25 to $38 billion, of which about 80 percent were uninsured

[10]The Congressional Budget Office (2019) estimates annual average economic losses from floods to be approximately $20 billion.

[11]This analysis was issued shortly after Harvey occurred and has not been updated.

(CoreLogic 2017b).[12] There have been no estimates of flood losses from Hurricane Maria issued, but even if only one-third of the total estimated damages from Maria (roughly $100 billion) were caused by flooding, they would amount to over $30 billion (AIR Worldwide 2017). It is also reasonable to surmise that most of the flood damages from Maria were uninsured. CoreLogic also estimates that flood losses from Hurricane Florence will be $19 to $28.5 billion, of which about 85 percent will be uninsured (CoreLogic 2018). These recent events and estimates of flood damages highlight the problem of increasing flood risk in the United States.

The National Flood Insurance Program

Overview

The NFIP has three principal objectives: (1) to provide a source of flood insurance coverage; (2) reduce the demand for federal disaster assistance for uninsured flood losses; and (3) integrate flood insurance with floodplain management (Pasterick 1998; Moss 2002). These objectives complement each other in some respects and compete with each other in others. This relatively broad public mission has contributed to the issues and problems facing the program.

The NFIP was established in 1968 to address a perceived lack of availability of flood insurance in the private market (Pasterick 1998; and Moss 2002). We note that, at that time, there was considerable concern that uninsured flood losses arising from large events put substantial pressure on the federal government to provide disaster assistance. The belief then, rightly or wrongly, was that if flood insurance could be made readily available at a reasonable cost, it would reduce the demand for federal disaster assistance for uninsured flood losses.[13] There also was the view that it would be better for property owners to at least pay for part of their flood losses through buying insurance rather than relying on the government to bail them out.[14] A third objective of the NFIP was to integrate flood insurance with floodplain management.[15] Over time, the program has grown in size and scope and it has been modified in an attempt to remedy problems that have arisen and strengthen the program.

As of January 31, 2018, the NFIP had a little over 5 million policies in force and $1.3 trillion in insurance coverage in force (Figure 2 shows historical statistics on the number of NFIP policies and the amount of coverage in force respectively).[16] Of the policies in force, 1.5 million were building coverage only, 80,397 were contents coverage only, and the remainder provided both building

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[12]As was the case with its analysis of flood losses from Harvey, CoreLogic's analysis of flood losses from Irma was issued shortly after it occurred and has not been updated.

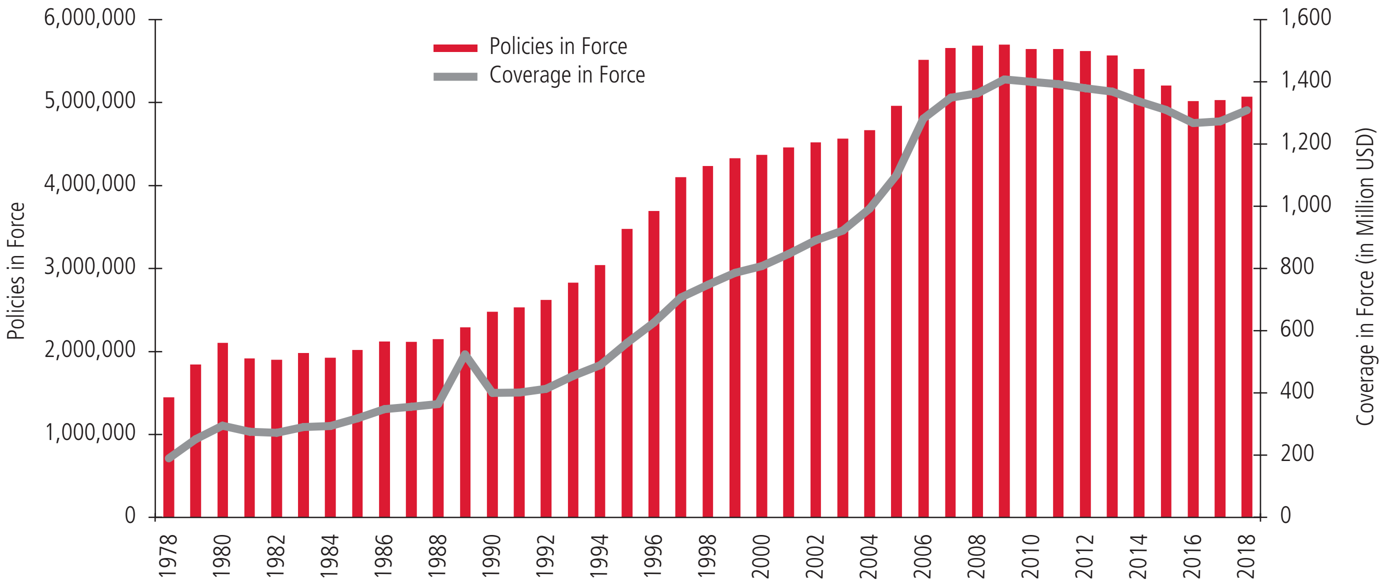
[13]The extent to which the purchase of flood insurance has reduced the demand for disaster assistance is debatable. Clearly, the NFIP has provided a source of recovery for property owners that have incurred flood losses; claims payments by the NFIP have averaged approximately $4 billion annually. Nonetheless, many flood losses are not insured and the demand for disaster assistance following major floods has continued to increase at a fast pace (Husted and Nickerson 2014).

[14]It should be noted that at that time there were proposals for a broader natural disaster insurance program that would have covered losses from floods, hurricanes, and earthquakes (Moss 2002).

[15]See Hayes and Neal (2011) for a discussion of these multiple objectives for the flood insurance program.

[16]All of these figures were obtained from FEMA's website at https://www.fema.gov/policy-claim-statistics-flood-insurance.

FIGURE 2. NFIP Policies and Coverage in Force (Adapted from NOAA)



and contents coverage. Approximately 95 percent of NFIP policies are some form of residential policy. The number of NFIP policies has dropped from a high of 5.6 million in 2011. The decrease in policies is largely due to increasing premium rates, but other factors may also have contributed to this decline (Klein 2017a).

Structure of the Program

Coverages

The NFIP provides flood policies for both residential and non-residential properties. The maximum limits available on residential policies are $250,000 for a dwelling and $100,000 for its contents; the maximum limits available on non-residential policies are $500,000 for a structure and $500,000 for its contents (see Table 2).[17] The policies provide replacement cost coverage on a dwelling and

TABLE 2. NFIP Coverages (Source: FEMA)

Building Coverage	Emergency Program	Regular Program
Single-family dwelling	$35,000	$250,000
2–4 family dwelling	$35,000	$250,000
Other residential	$100,000	$250,000
Non-residential	$100,000	$500,000
Contents Coverage		
Residential	$10,000	$100,000
Non-residential	$100,000	$500,000

[17]Renters may also buy flood coverage for their personal property up to $100,000. The same is the case for condominium unit owners who may also purchase coverage for damage to their unit that is not covered by their association.

actual cash value coverage on its contents. Unlike homeowners insurance, NFIP policies do not provide any coverage for loss of use. Deductibles typically start at $1,000 and can range up to $10,000. By comparison, hurricane/wind deductibles in homeowners insurance policies can range from 2 to 15 percent of the dwelling limit. The NFIP's policy limits have not been updated since 1994. Property owners may be able to purchase excess coverage above the NFIP limits from private insurers. Property owners also may be able to purchase full flood insurance from private carriers that may offer broader coverage than the NFIP in certain areas.

Risk Assessment and Pricing

Flood risk assessment and pricing by the NFIP begin with flood insurance rate maps (FIRMs) that indicate a given area's vulnerability to flooding as designated by its flood zone. Special Flood Hazard Areas (SFHAs) are areas where the annual probability of a flood is 1 percent or greater; these are commonly known as 100-year flood plains, although this terminology can be misleading. Areas designated as having moderate flood risk have an annual probability of flooding ranging from 0.2 to 1 percent, and areas designated as having minimal flood risk have a probability of flooding of less than 0.2 percent.

A rate per $100 of coverage is used to determine a base premium for a given property that reflects its zone and other factors, including its structural characteristics, occupancy, contents, and elevation. The premium for a given property is further adjusted by several factors to account for loss adjustment expenses, the policy deductible, underinsurance, other expenses, and some other things. The cost of flood insurance for a given home can vary from as little as $200 to $8,000 or more depending on its location and other characteristics; the average NFIP premium is about $700.[18]

Certain homes qualify for subsidized or discounted rates. Properties built before FEMA had mapped flood risk in their community receive a subsidy that can result in a premium substantially below what they would otherwise be charged—these are known as *pre-FIRM properties*. Properties that were built to code and are subsequently mapped into a higher risk zone—these are termed *grandfathered properties*—do not receive a rate increase with one exception. Properties moving into a SFHA receive a subsidized premium the first year and annual rate increases of 5 to 18 percent after the first year. Discounted rates are also available through a Preferred Risk Policy (PRP) and the Community Rating System (CRS).

Mandatory Purchase Requirement

Certain property owners in SFHAs are "required" to purchase and maintain flood insurance. Essentially, this mandatory purchase requirement (MPR) applies to properties for which there is a mortgage loan from a federally regulated financial institution or that has been purchased by Fannie Mae or Freddie Mac.[19] Under the MPR, a homeowner must purchase coverage equal to the lesser of the

[18]An analysis performed by ValuePenguin based on rate quotes from The Flood Insurance Agency revealed that the premiums charged by private insurers for a sample policy ($250,000 in dwelling coverage, $100,00 in contents coverage, $5,000 deductible) ranged from $13,576 to $14,315 in the V Zone in three states (Florida, Texas, and New Jersey).

[19]Additionally, owners who receive federal financial assistance for acquisition or construction purposes in communities that participate in the NFIP are also subject to the MPR.

outstanding loan balance on their mortgage or the maximum NFIP policy limit. Lending institutions are responsible for enforcing the MPR.[20]

The MPR was established in 1973 to increase the take-up rate for flood insurance as well as to help protect the collateral on home loans. However, there are several issues with the MPR. One issue is that it only applies to homes meeting the criteria listed above; it does not apply to homes located outside of an SFHA or even homes within an SFHA that do not have mortgage or have not received federal assistance for acquisition or construction purposes. Additionally, a homeowner can meet the MPR by buying a NFIP policy with a policy limit that is substantially below the replacement cost of their property. A third problem is lax enforcement of the MPR; it is estimated that only about 50 percent of the homes subject to the MPR actually are covered by flood insurance.[21]

The Write Your Own Program

Most of the flood coverage underwritten by the NFIP is sold and serviced through what are known as Write Your Own (WYO) companies. These are insurers that are authorized to sell and service policies on NFIP's behalf. Generally, these are insurers that also sell homeowners insurance and other property coverages. There are 60 WYO companies currently operating. These companies receive an expense allowance, incentive bonuses, and reimbursement of their claims adjustment expenses; the NFIP underwrites the cost of the claims incurred on WYO policies. Hence, WYO companies bear no risk on the policies that they write on behalf of the NFIP.

Other NFIP Functions

The NFIP performs other functions beyond just providing flood insurance that some view as essential to its mission. In addition to its flood risk assessment activities, the NFIP assists communities in flood risk management and flood risk education and outreach. With respect to flood risk mitigation, FEMA provides guidance, standards, and grants to communities to assist them in their floodplain management activities. In order to participate in the NFIP, communities must meet minimum requirements established by FEMA for flood risk mitigation and the adoption and enforcement of ordinances (e.g., building codes) for new construction and structures that are rebuilt after a flood event. FEMA also provides guidance and resources to communities that wish to adopt standards that are more stringent than FEMA's minimum requirements. Communities that adopt regulations that are more stringent can become eligible for discounts under the NFIP's CRS. Education and outreach is another critical function performed by the NFIP and FEMA. Education is provided primarily through FEMA's website (https://www.floodsmart.gov/).

Issues and Problems Facing the Program

The issues facing the program and its problems have periodically attracted the interest of the Congress and other stakeholders and have increased the interest

[20]Benton and Schiraldi (2015) provide a more detailed explanation of lenders' obligations and authorities in enforcing the MPR.

[21]"Hurricanes Highlight Failure to Enforce Flood Insurance Rules," *Bloomberg Business Week*, September 17, 2017.

in privatizing flood insurance as one option among others to increase its efficiency and potentially lead to better flood risk management. Understanding these issues and problems helps to lay a foundation for assessing proposals to increase the role of the private sector in providing flood insurance among other options. These issues and problems are summarized here and discussed in some detail by Born and Klein (2019). Most of these issues and problems are chronic in that they have been afflicting the program for many years and have yet to be resolved.[22] Many, if not most, of these problems could be fixed with appropriate reform legislation, but there has not been the political will to make the hard choices that have to be made.

Suboptimal Flood Risk Mitigation

As discussed above, flood risk and damages have been increasing substantially over the last several decades in the United States and many factors behind this trend are under human control. While the NFIP is engaged in various activities to promote good floodplain management and flood risk mitigation, some experts question whether it does enough in this regard. Further, it could be argued that certain aspects of the NFIP encourage rather than discourage floodplain management and flood risk mitigation, i.e., these aspects create or increase moral hazard. More specifically, when the NFIP underprices certain properties, it decreases the incentives of the owners of those properties to reduce their flood risk. Additionally, the NFIP's willingness to underwrite properties in very high-risk areas (e.g., coastal barrier islands) encourages rather than discourages development in these areas. Moreover, the availability and underpricing of flood insurance diminishes the incentives of communities to be more aggressive in their management of floodplains and establishing and enforcing strict flood risk mitigation standards.

Low Take-Up Rates for Flood Insurance

Too few property owners who arguably should buy flood insurance choose to do so (Klein 2017b). Additionally, some property owners who do buy flood insurance do not buy enough of it (we can call this the *underinsurance problem*). Consequently, when property owners without flood insurance (or who are underinsured) suffer flood damages, at the very least, they will suffer a large financial hit when seeking to finance the repair or rebuilding of their homes. In the worst-case scenarios, some uninsured homeowners may be unable to rebuild their homes and may consequently default on their mortgages.

As discussed by Born and Klein (2019), there are several reasons why homeowners at risk fail to purchase or maintain flood insurance on their homes:

1. Due to information problems and perception and decision-making biases, many homeowners either underestimate their risk or choose to ignore it when deciding to have flood coverage or not.
2. According to the Insurance Information Institute (2017), approximately 40 percent of homeowners incorrectly believe that their homeowners insurance covers flood losses.

[22] Michel-Kerjan (2010) identifies several of these problems and what could be done to address them.

3. Only about 50 percent of homes subject to the MPR are covered for flood (FEMA, 2014).
4. The "affordability" of flood insurance may be a problem for some homeowners.
5. There is some evidence that indicates that some homeowners believe that state or federal governments will bail them out if they have uninsured flood losses although, in fact, this is rarely the case (Kousky, Michel-Kerjan, and Rasky 2018).[23]

Problems with Flood Risk Assessment and Pricing

Accurate risk assessment is essential to securing the viability and competitiveness of any insurance program. Some experts who are familiar with the NFIP have been critical of the accuracy and timeliness of its flood risk assessment and mapping (see, for example, Michel-Kerjan, Czajkowski, and Kunreuther 2015). There also is a concern that flood maps do not exist for certain areas of the United States. Regarding the accuracy of the NFIP's flood risk assessment, one criticism is that its use of flood maps fail to reflect the actual flood risk of a specific property. There are technology and methods available to determine a specific property's flood risk that are much more accurate than the flood maps used by the NFIP. Indeed, private flood insurers are already employing these technologies (e.g., LIDAR) and methods in their pricing of coverage for a specific property. The NFIP has been working on developing more accurate flood risk assessment, but its efforts in this regard have lagged behind what it could be doing and what private insurers are doing.

Policy Provisions

The NFIP has not updated the limits on its policies since 1994. This contributes to an underinsurance problem for properties with replacement costs that exceed the NFIP limits. If the $250,000 residential dwelling limit had been adjusted for inflation, it would now be $420,000 and the $500,000 limit on non-residential structures would be $840,000. The limits for contents coverage for residential ($100,000) and non-residential ($250,000) structures would now be $170,000 and $420,000 respectively. Raising these limits consistent with inflation or the increase in the cost of repairing or rebuilding flooded homes could make flood insurance more attractive to some property owners and help to address the underinsurance problem. This said, raising these limits could also increase adverse selection and moral hazard and increase the claims payouts by the NFIP if its rates are not adjusted accordingly. Other aspects of the NFIP's policy provisions that fall short of the coverages typically provided in homeowners insurance policies include the option of covering contents on a replacement cost basis, loss of use coverage, and the option to elect higher deductibles than currently allowed.

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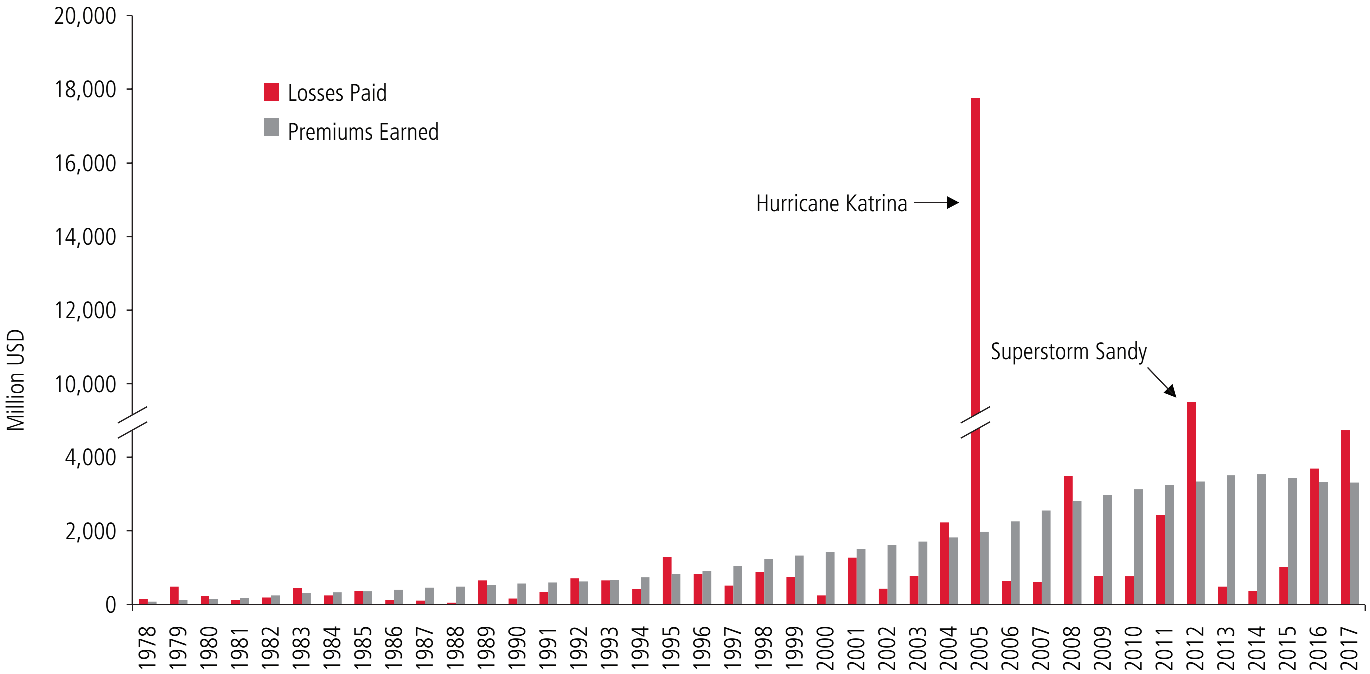
[23]The issue of whether and to what extent federal disaster assistance should be used as a means to finance flood losses is part of a broader discussion on the use of such assistance to finance losses from various catastrophic perils. Most economists believe that it is preferable to use true insurance mechanisms for financing catastrophic losses rather than ex post disaster assistance as insurance. Insurance would provide greater certainty and create incentives for homeowners to mitigate their risk. From a public policy perspective, it would be desirable to develop a coordinated government strategy to secure the sustainability of communities at risk that employs an efficient mix of private and public risk financing and management schemes.

FIGURE 3. NFIP Losses Paid and Premiums Earned, 1978–2017 (Adapted from FEMA)



Private companies can and do offer these additional coverages and options, tempered by underwriting and pricing considerations. Private insurers have flexibility here that the NFIP does not currently have.

Program Deficits and Debt

The NFIP, since 2005, has incurred significant deficits in some years and accumulated a substantial debt to the Treasury. Figure 3 shows premiums earned by the NFIP and the losses it paid for the years 1978–2016; Table 3 shows its borrowing and debt for the years 1980–2018.[24] The NFIP's accumulated debt as of December 31, 2018 was $20.5 billion (FEMA 2018). This figure would be much higher absent legislation enacted by Congress and signed by President Trump in October 2017 that forgave $16 billion of this debt.[25] The bottom line is that the NFIP has not generated sufficient income to cover all of its costs. Any insurer that underwrites catastrophic risk exposures will have many "good" years and a few very "bad" years. When the Treasury writes off NFIP debt, it creates a subsidy from taxpayers to those who have NFIP coverage.

Private insurers address this problem through various measures that include charging premiums that will be sufficient to cover their costs over an ex-

[24]As can be seen in Figure 3, the NFIP's premiums exceed its losses in most years but, in some years, the opposite is true. Indeed, 2005 (Hurricane Katrina and other storms) and 2012 (Superstorm Sandy) were particularly bad years for the NFIP with total losses paid of $17.8 billion for 2005 and $9.5 billion for 2012. Adjusted for inflation, these figures would be $22.3 billion and $10.1 billion respectively. Note also that Figure 4 only shows the NFIP's claims payments and not its total costs.

[25]"Trump Signs Bill Forgiving $16 Billion in NFIP Debt," *Business Insurance*, October 27, 2017, http://www.businessinsurance.com/article/20171027/NEWS06/912316843/Trump-signs-disaster-relief-bill-forgiving-16-billion-dollars-NFIP-debt. We surmise that the Congress and the Administration approved forgiving $16 billion in the NFIP debt so that program would not exceed its $30 billion limit in borrowing authority.

TABLE 3. NFIP Borrowing and Debt (in Millions USD), 1980–2018 (Source: FEMA Congressional Affairs)

Year	Borrowed	Repaid (or Cancelled*)	Cumulative Debt	Year	Borrowed	Repaid (or Cancelled*)	Cumulative Debt
1980	917	0	917	**2000**	345	541	80
1981	165	625	457	**2001**	600	345	335
1982	14	471	0	**2002**	50	640	0
1983	50	0	50	**2003**	0	10	0
1984	200	37	213	**2004**	0	0	0
1985	0	213	0	**2005**	300	75	225
1986	0	0	0	**2006**	16,600	0	16,825
1987	0	0	0	**2007**	650	0	17,475
1988	0	0	0	**2008**	50	225	17,300
1989	0	0	0	**2009**	1,988	348	18,940
1990	0	0	0	**2010**	0	500	18,440
1991	0	0	0	**2011**	0	750	17,690
1992	0	0	0	**2012**	0	0	17,690
1993	0	0	0	**2013**	6,250	0	23,940
1994	100	100	0	**2014**	0	1,000	22,940
1995	265	265	0	**2015**	0	0	22,940
1996	424	62	362	**2016**	0	0	22,940
1997	530	240	652	**2017**	7,425	0	30,365
1998	0	395	257	**2018**	6,100	16,100*	20,465
1999	400	381	276				

*Congress cancelled $16 billion of NFIP's debt (P.L. 115-72, Title III, 308).

tended period, properly managing their exposures, and using reinsurance and other instruments (e.g., catastrophe bonds) to help finance their catastrophe losses.[26] The NFIP did purchase a significant amount of reinsurance for the first time for the 2017 calendar year and also purchased it for 2018 and 2019. Additionally, under its 2018 reinsurance agreement, the NFIP issued catastrophe bonds providing up to $500 million in coverage for the period between August 1, 2018 and July 31, 2021.

More specifically, the catastrophe bond arrangement is divided into two tranches. In the first tranche, Hannover Re (the transformer) will reimburse the NFIP for 3.5 percent of its qualifying losses from one event between $5 billion and $10 billion. In the second tranche, the NFIP will be reimbursed for 13 percent of its qualifying losses from one event between $7.5 billion and $10 billion. The arrangement employs an indemnity trigger, meaning that any reimbursement made will be based on the NFIP actual losses and not some other index. The NFIP paid $62 million for the first year of coverage. Unlike its traditional reinsurance purchases, this arrangement applies only to flooding resulting directly or indirectly from a named storm and only covers the 50 states, the District of Columbia, Puerto Rico, and the U.S. Virgin Islands.

[26]A private insurer will not expect to generate a profit in every year, but it will seek to be profitable over the long term. The NFIP bases its premiums on its average historical losses, but does not include a loading in its premiums for catastrophic losses.

Looking forward, catastrophe bonds could prove to be an efficient means for the program to lay off more of its risk to the private sector. Generally, catastrophe bonds allow an insurer to use the financial markets to access capital absent the capacity limits of the conventional reinsurance market (Klein and Wang 2009). The NFIP has the advantage of possessing geographically diverse exposures for which an indemnity (non-parametric) trigger should work well.[27] Time will tell, but if there is a strong appetite among investors for taking on some flood risk through catastrophe bonds, the NFIP should be able to issue them at a reasonable price. The important point here is that the more that the NFIP can lay off its catastrophe risk to reinsurers and other investors, the more fiscally sound the program should be. This said, the cost of reinsurance and the issuance of catastrophe bonds will need to be reflected in what policy holders pay for flood insurance.[28]

Repetitive Loss Properties

Properties for which there have been multiple claims—"repetitive loss" properties—have become a significant problem for the NFIP. These properties account for only about 1 percent of the properties insured by the NFIP but have accounted for approximately 25 to 30 percent of its losses and $12.5 billion of its debt as of year-end 2011 (See Pew 2016; and King 2013). Private insurers would be (are) unwilling to insure these properties as they would deem them uninsurable. However, the NFIP is effectively constrained in denying coverage for these properties. Further, some of these properties still receive subsidized rates that compound the moral hazard and adverse selection problems associated with insuring them. It is likely that under any privatization scheme there would need to be some form of residual market mechanism for properties that would still be considered to be insurable but for which private insurance would be unavailable.

SUPPLY OF FLOOD INSURANCE

Born and Klein (2019) discuss the demand for, and problem of low take-up rates for flood insurance. While this is a significant problem and one that private companies may be able to help remedy, our focus here are is on the factors that affect private companies' ability and willingness to underwrite flood insurance on their own paper.[29] When the NFIP was established in 1968, very few insurance companies were willing to take on flood risk. The evidence suggests that this has dramatically changed as many private carriers are now offering private flood policies and the amount of private flood insurance written has been increasing. Nonetheless, there are questions as to how much flood risk private companies

[27]Simply stated, an indemnity trigger is base on an insurer's own losses. There are also parametric triggers that are based on some index of industry losses or storm location and intensity. The effective price of issuing a catastrophe bond (the risk premium over LIBOR) will tend to be higher as it minimizes basis risk but involves more moral hazard. Catastrophe bonds with parametric triggers tend to be less pricey for issuers as they involve little or no moral hazard, but the issuer retains significant basis risk.

[28]We view this as a good thing as it contributes to risk-based pricing by the NFIP.

[29]As we discuss in Born and Klein (2019), private companies may induce more homeowners to buy flood insurance by offering them lower premiums and better coverage than what the NFIP offers. Additionally, private companies could be more effective in their marketing efforts than the NFIP. Private companies may be the most effective in getting more low- and moderate-risk homeowners to buy flood coverage.

would be willing to underwrite and whether they would be unwilling to insure some properties.

Private Companies Ability and Capacity to Underwrite Flood Coverage

There has been only one study (Kousky, Kunreuther, Lingle, and Shabman 2018) of which we are aware that bears on questions regarding private companies appetite for writing flood insurance. This study found that while there appears to be a considerable appetite among some private carriers to write flood coverage on their own paper, they also have some concerns. These concerns include the potential concentration of their catastrophic risk in their portfolios when flood is added and how they will be treated by state regulators, among other potential challenges. Here we focus on private carriers' ability and capacity to underwrite flood insurance.

With respect to ability, it is our sense that many carriers either already have, or are rapidly acquiring, the expertise needed to properly underwrite and price flood coverage. It may not be much of a leap for companies that already write homeowners insurance in areas subject to catastrophic perils such as hurricanes to apply their knowledge and tools to flood risk. There is some evidence that, given the relatively rapid expansion of the private flood market, many carriers believe that they have the requisite expertise and tools. Insurers can also lean on the expertise of the companies that provide catastrophe modeling services and reinsurers.[30] Consequently, ability should not be problem that would greatly constrain the supply of private flood insurance.

Capacity could be more of an issue for some companies. Small companies with low amounts of surplus and/or that are not geographically diversified would not be in a position to write large amounts of coverage without large amounts of reinsurance. Even larger companies may still be concerned about assuming too much catastrophic exposure. For example, a company that already writes a large amount of homeowners insurance in areas subject to severe hurricanes may be reluctant to underwrite large amounts of flood coverage in these areas given that many hurricanes create both high winds as well as significant flooding. As is the case with small companies, large companies also could purchase the requisite amount of reinsurance or use other catastrophe loss financing devices, e.g., catastrophe bonds. Hence, capacity also should not be a problem that would constrain the supply of private flood coverage.

The Developing Private Flood Insurance Market

There is little doubt that private companies' appetite for selling flood insurance on their own paper has increased significantly in recent years. Many private companies now have the financial resources and are developing the expertise to offer flood coverage. These companies can now access data and use advanced technologies and methods to accurately assess the flood risk of specific properties. Accurate flood risk assessment allows insurers to perform the functions associated with writing flood insurance with the potential for catastrophic losses.

[30]It is our understanding that at least some of these firms do perform modeling of flood losses.

TABLE 4. Summary Statistics on Private Flood Insurance (Source: NAIC data; authors' calculations)

	2016	2017	2018
Number of Companies	42	79	112
Number of Groups	18	29	33
Direct Premiums Written (000s)	345,432	570,153	622,263
Average Number of States*	26.9	29.4	30.1
CR4 (Group Level)	91.3%	78.4%	77.2%
HHI (Group Level)	4,002	2,248	2,257

* This figure is the average number of states in which each group had direct premiums written (DPW).

These functions include policy design, underwriting, pricing, managing their risk portfolios (including purchasing reinsurance), and adjusting and paying claims.

Because the market for private flood insurance is still fairly nascent, the data on private flood insurance sales publicly available is limited.[31] Table 4 provides summary statistics on private flood insurance for insurance companies selling this coverage that reported their data to the NAIC for the calendar years 2016 through 2018; most licensed carriers would be expected to file their data with the NAIC, but this would probably not be the case for non-licensed carriers. As revealed in Table 4, there was a significant increase in the premiums written and the companies/groups writing private flood coverage from 2016 to 2018 based on the data filed with the NAIC. From 2016 to 2018, the amount of direct premiums written for private flood insurance increased from $345.4 million to $622.3 million.[32] For this same period, the number of companies selling private flood insurance increased from 42 to 112, and the number of groups (including stand-alone companies) selling private flood coverage increased from 18 to 33.

Additionally, as shown in Table 4, the degree of market concentration in the private flood insurance market measured at the countrywide level decreased significantly from 2016 to 2017 but then leveled off in 2018. The four-firm concentration ratio (CR4) decreased from 91.3 to 78.4 percent from 2016 to 2017 and decreased a little further to 77.2 percent in 2018. The Herfindahl-Hirschman Index (HHI) dropped from 4,002 to 2,248 from 2016 to 2017 and then increased slightly to 2,257 in 2018. We see a similar pattern with respect to the average number of states in which a group had direct premiums written; this figure increased from 26.9 to 29.4 from 2016 to 2017 and then increased a bit more to 30.1 in 2018. These data indicate not only a significant increase in amount of private flood insurance written by licensed carriers but also indicate substantial entry of new companies into this market and broader geographic diversification with respect to their portfolios. This said, the market for private flood insurance may be reaching a point of maturation under current conditions.

Table 5 shows the private flood direct premiums written, the market shares, and the number of states these premiums are written in by group for CY 2018 at

[31]Annual statutory financial reports filed by insurers with the NAIC and state insurance departments only began providing a breakout of private flood insurance starting with the 2016 calendar year.

[32]We note that the greatest increase was from 2016 to 2017. This may be indicating that the growth and development of the private flood insurance is tapering off as companies are tapping out their opportunities to write business and possibly running into the obstacles presented by the NFIP.

TABLE 5. Insurer Groups Writing Private Flood Insurance, 2018 (Source: NAIC and authors' calculations)

Group	DPW (000s)	Market Share	Number of States
FM Global	262,082	42.1%	51
Assurant	82,586	13.3%	51
Zurich	75,778	12.2%	51
AIG	59,759	9.6%	50
Swiss Re	34,753	5.6%	51
Liberty Mutual	19,329	3.1%	51
Alleghany	17,567	2.8%	49
Berkshire Hathaway	15,797	2.5%	43
Allianz	15,155	2.4%	51
Chubb	8,135	1.3%	47
Tokio Marine	7,854	1.3%	48
Progressive	6,070	1.0%	3
Munich Re	5,020	0.8%	37
Nationwide	2,561	0.4%	49
Palomar	2,255	0.4%	9
Cincinnati	1,934	0.3%	49
Bankers	1,749	0.3%	20
Markel	1,144	0.2%	22
Hanover	615	0.1%	37
Universal	500	0.1%	1
Axa	360	0.1%	34
Hartford	262	0.0%	40
MS & AD	259	0.0%	25
Sompo	194	0.0%	6
West Ben	169	0.0%	7
Philadelphia Contributionship	116	0.0%	4
CNA	77	0.0%	38
Centauri	70	0.0%	2
WR Berkley	65	0.0%	17
Sentry	38	0.0%	51
Heritage	7	0.0%	1
Arch	2	0.0%	6
Wayne Cooperative	1	0.0%	1

a countrywide level. We note that approximately 64 percent of the private flood insurance written in 2017 was for commercial properties; Table 5 combines private flood insurance for both residential and commercial properties (*Insurance Journal* 2018). The top four groups in 2018 were FM Global, Assurant, Zurich, and AIG. These four groups accounted for 77.2 percent of the private flood insurance written by companies reporting their data to the NAIC. Table 6 shows

TABLE 6. Insurer Groups Writing Private Flood Insurance, 2017 (Source: *Insurance Journal* 2018)

Residential		Commercial	
Group	DPW (000s)	Group	DPW (000s)
Assurant	89,827	FM Global	263,282
AIG	58,246	Zurich Re	63,829
Swiss Re	41,571	Berkshire Hathaway	27,603
Chubb	9,878	RSUI	13,225
Liberty Mutual	8,850	Allianz	11,705
Munich Re	5,299	Tokio Marine	9,388
United Surety	5,007	Western World	77,556
ASI	1,778	Liberty Mutual	66,111
Other	1,483		

the breakdown of residential and commercial flood insurance written by the major groups.

Reflected in the groups shown are a number of prominent writers of property insurance in the United States as well as less-familiar names. This indicates that writers of other property coverages are at least testing the waters with respect to the private flood insurance market and we would expect them to do so if they see opportunities to do so profitably.[33] In the underlying data used to produce these tables, we see that some of the large groups are using a number of subsidiary companies to offer private flood coverage. A cautionary note to both of these tables is that the data used and the calculations performed only reflect companies filing their data with the NAIC and hence would not reflect private flood insurance written by companies not filing their data with the NAIC.

It is also interesting to see the breakdown of private flood insurance by state in relation to the total amount of flood insurance (private plus federal) in each state for 2018, as shown in Table 7. Table 7 shows the direct premiums written for private flood insurance, federal flood insurance, and sum of the two, by state as well as private flood insurance as a percentage of the combined amount. For all states, combined, private flood represented 18 percent of the total amount of flood insurance sold in 2018.[34]

While the figures in this table do not include data from companies not filing with the NAIC nor the U.S. territories, they are interesting nonetheless. For one, they suggest that private flood coverage represents a much larger percentage of the total amount of flood insurance written than has been suggested by previous studies (e.g., Kousky, Kunreuther, Lingle, and Shabman 2018). Secondly, our calculations indicate that private flood coverage tends to account for a much greater percentage of the total amount of flood insurance written in states where

[33]Writers of other property coverages may be seeking to take advantage of economies of scope by offering both other forms of property insurance as well as flood insurance to some of their policyholders.

[34]If we use the premiums earned by the NFIP in 2017 (2018 data are not yet available) as the amount of federal flood insurance written, this percentage only falls to 17.2 percent.

TABLE 7. Private and Federal Flood Insurance Premiums Written (000s), 2018 (Source: NAIC and authors' calculations)

State	Private	Federal	Total	Percent Private	State	Private	Federal	Total	Pct. Private
Alabama	4,717	28,299	33,016	14.3%	Montana	1,108	2,781	3,888	28.5%
Alaska	726	1,535	2,261	32.1%	Nebraska	3,428	6,498	9,927	34.5%
Arizona	13,616	15,800	29,416	46.3%	Nevada	4,599	6,382	10,981	41.9%
Arkansas	2,919	10,260	13,179	22.1%	New Hampshire	1,579	7,396	8,975	17.6%
California	83,604	143,540	227,144	36.8%	New Jersey	33,571	177,710	211,281	15.9%
Colorado	6,815	13,852	20,667	33.0%	New Mexico	2,026	8,160	10,185	19.9%
Connecticut	8,556	45,603	54,159	15.8%	New York	47,240	171,710	218,950	21.6%
Delaware	1,874	14,754	16,628	11.3%	North Carolina	10,486	91,274	101,760	10.3%
DC	2,023	1,350	3,374	60.0%	North Dakota	1,809	5,239	7,048	25.7%
Florida	79,716	819,393	899,109	8.9%	Ohio	15,402	25,375	40,777	37.8%
Georgia	13,823	40,208	54,031	25.6%	Oklahoma	3,078	8,012	11,089	27.8%
Hawaii	3,511	36,705	40,217	8.7%	Oregon	6,248	16,950	23,198	26.9%
Idaho	1,686	3,382	5,067	33.3%	Pennsylvania	22,142	52,748	74,889	29.6%
Illinois	15,571	28,012	43,584	35.7%	Rhode Island	2,317	16,312	18,630	12.4%
Indiana	9,754	16,284	26,038	37.5%	South Carolina	13,703	114,511	128,215	10.7%
Iowa	9,262	10,138	19,400	47.7%	South Dakota	834	2,359	3,193	26.1%
Kansas	5,620	6,020	11,640	48.3%	Tennessee	12,190	19,775	31,965	38.1%
Kentucky	5,563	12,279	17,842	31.2%	Texas	63,227	344,755	407,983	15.5%
Louisiana	20,534	221,064	241,598	8.5%	Utah	2,712	2,193	4,905	55.3%
Maine	1,826	7,760	9,586	19.0%	Vermont	699	4,469	5,167	13.5%
Maryland	6,161	30,153	36,314	17.0%	Virginia	9,476	60,787	70,263	13.5%
Massachusetts	17,036	67,346	84,382	20.2%	Washington	12,061	24,955	37,016	32.6%
Michigan	7,287	15,329	22,616	32.2%	West Virginia	1,805	12,343	14,148	12.8%
Minnesota	6,072	5,949	12,022	50.5%	Wisconsin	5,896	9,402	15,298	38.5%
Mississippi	5,402	33,815	39,217	13.8%	Wyoming	900	1,173	2,073	43.4%
Missouri	10,054	16,764	26,818	37.5%	All States	622,263	2,838,865	3,461,129	18.0%

flood risk overall should be relatively low. This suggests that companies writing private policies may be targeting more low-risk areas than high-risk areas.

One promising trend in the data on private flood insurance is the appearance of well-established and prominent personal lines writers. At the very least, this indicates that these companies are dipping their toes in the private flood insurance market. The name recognition of these companies as well as their ability of offer other personal lines coverages could be attractive to many consumers. This bodes well for the continued expansion of this market.

SHOULD THE GOVERNMENT BE INVOLVED IN FLOOD INSURANCE?

Fundamentally, from an economic perspective, government involvement in a market or some area of human activity might be justified when there is a market failure and the government can remedy or ameliorate this failure (Skipper and Kwon 2007; Klein 2018). There are various types of market failures that could justify government provision of flood insurance. Potential candidates for such failures could include private insurers' inability or unwillingness to supply flood coverage, information problems, the existence of public goods, and externalities.[35]

As explained above, the perceived lack of availability of private flood insurance was one of the principal motivations for the establishment of the NFIP in 1968. Prior to the NFIP's establishment, there had been several major floods in prior years with large losses for insurers. Hence, at that time, many insurers may have viewed flooding as an uninsurable risk because of its catastrophic nature and, possibly, due to their difficulty in developing reasonable estimates of their potential flood losses going forward which would be necessary for accurate underwriting and pricing. Whatever may have the case back then, private insurers have shown an increasing appetite for underwriting flood insurance on their own paper. They appear to have the information and technology they need to accurately assess flood risk and set appropriate prices. It also appears that private insurers can purchase adequate reinsurance to help cover their catastrophic flood losses. Hence, the unavailability or infeasibility of private flood insurance is no longer an argument for the need for a government flood insurance program.

Would positive externalities associated with homeowners having flood insurance (or negative externalities stemming from uninsured flood losses) justify government-provided flood insurance? A strong argument can be made that such externalities exist. When homeowners do have adequate insurance to cover their losses from flood, this helps economic recovery after a flood event with benefits extending beyond the affected homeowners. For example, when flooded homeowners can repair or rebuild their properties, this helps to restore a community and preserve property values in flooded areas. On the other hand, when flooded homeowners are unable to repair or rebuild their homes after a flood event, this can hamper economic recovery and diminish property values in the affected areas. Additionally, if uninsured (or underinsured) flood losses cause some homeowners to default on their mortgages, this has negative effects on lenders.[36]

If one accepts the proposition that there are externalities associated with flood insurance, do these externalities justify the government providing it? Here again, making such an argument is problematic. There are externalities associated with many types of insurance, but they have not been used to justify a government role in providing these coverages. For example, most states require car owners to carry liability insurance on their vehicles. These requirements are intended to help ensure that drivers who cause an accident will have some source of funds to at least pay part of the damages they cause. However, no state has

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[35]There are some analogues to government-provided flood insurance in the United States. These include the federal crop insurance program, state workers' compensation funds, and the California Earthquake Authority (CEA). Regardless, these insurers coexist with private insurance (monopolistic state workers' compensation funds excepted) and questions could also be raised regarding whether there is a compelling economic justification for their existence.

[36]In an extreme scenario, such defaults could lead to the failure of one or more banks with the costs of such defaults shifted to the Federal Deposit Insurance Corporation (FDIC). To our knowledge, this has not occurred to date, but it still could be an issue going forward.

taken the step to set up a government auto insurer.[37] Instead, concerns about the availability and affordability of auto liability insurance have been addressed through regulation of insurance rates and the establishment of state residual market mechanisms.[38] The same could be done for flood insurance if it were moved to the private sector.

Further, aside from any positive externalities associated with flood insurance, it does not meet the criteria for a public good: non-excludability and non-rivalrous consumption. However, the NFIP does provide a service that does has the attributes of a public good. We argue that this is an important function of the NFIP even if its activities in this area have fallen short in terms of promoting an optimal level of flood risk management. Specifically, this service is the assistance it provides to communities for flood risk management. All property owners benefit from this service to varying degrees whether they help to pay for it or not. Since premiums charged to homeowners who buy flood insurance from the NFIP currently fund much of this assistance, moving more flood insurance to the private sector would undermine the funding for floodplain management.

However, if floodplain management is a public good, there are other ways to fund it. To the extent that private coverage reduces the NFIP's premium revenues, private insurers could be required to pay fees or assessments to the NFIP to help support this funding. The cost of these assessments could be passed through to buyers of flood insurance. Hence, anyone who has flood insurance, regardless of its source, would be required to pay for at least a portion of these services. Further, because others (e.g., other property owners) who do not have flood insurance benefit from floodplain management, there is an argument for using taxpayer funds (local, state, and/or federal) to also help pay for these services.

Even if these additional services provided by the NFIP are public goods, this does not provide a rationale for public provision of flood insurance. It is true that under the current system, the United States has chosen to use flood insurance premiums paid to the NFIP as a primary source of funding for these services, but this does not have to be the case. If flood insurance was fully privatized, other mechanisms could be used to finance these services. In sum, it can be argued that there is no economic rationale for the public provision of flood insurance.

THE BENEFITS AND COSTS OF PRIVATIZING FLOOD INSURANCE

We now turn to the primary focus of this paper, which are the potential benefits to, and the costs of, increasing the role of the private sector in the provision of flood insurance in the United States. It is also beneficial to discuss how greater privatization might be accomplished. We can use the scheme proposed in the

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[37]There are state government insurers for other lines of insurance such as state funds for workers' compensation, the California Earthquake Authority, the Louisiana Citizens Property Insurance Corporation, and the Citizens Property Insurance Corporation (Florida). The existence of these government insurers stems from a concern that private insurers have either failed to be a viable source of insurance coverage or the belief that these entities are needed to augment private insurance coverage.

[38]Most states have established residual market mechanisms (RMMs) to provide coverage for owners of vehicles that are unable to obtain coverage in the "voluntary market," but these are not the same as government insurers.

FRA as a point of reference but, to provide some context, it is helpful to review other possible arrangements. We note that the FRA, if enacted, would not fully replace the NFIP with private insurance. Rather, it would make it easier for private insurers to sell flood insurance and would potentially move a substantial amount of the NFIP's book of business to the private market.

Potential Benefits of Privatization

There are several potential benefits to privatizing flood insurance. Proponents of privatization argue that it will benefit consumers as well as alleviate fiscal pressures on the NFIP. Benefits to consumers could include lower premiums for some, enhanced incentives for risk mitigation, and coverage more specifically tailored to meet a particular homeowner's needs. Both lower premiums and better coverage could increase take-up rates among homeowners who could obtain less expensive and/or better coverage. Additionally, the more coverage that moves to the private market, the greater the pressure will be on Congress to adopt needed reforms of the NFIP. Of course, how these benefits might play out would depend on the specific details of the privatization scheme adopted.

More Accurate Pricing

Proponents of privatization believe that private carriers can substantially lower the cost of flood insurance for some (perhaps many) property owners (see, for example, NAIC 2017). As demonstrated by Michel-Kerjan, Czajkowski, and Kunreuther (2015), private companies can offer lower rates for properties overpriced by the NFIP for the same amount of coverage. Indeed, more accurate risk assessment and pricing could lower rates for some homeowners and raise the rates for others. In essence, more accurate pricing should reduce adverse selection and moral hazard and promote more optimal levels of risk mitigation. Additionally, more accurate pricing could promote greater equity in pricing from an actuarial perspective.

Better Coverage

If private insurers can adjust the provisions of their policies to reduce coverage in ways that make sense (e.g., offering higher deductibles than available from the NFIP), they can further lower their prices for some property owners. Some innovations in policy design may truly work to the benefit of some policyholders. Such innovations could include offering higher policy limits than what are available through the NFIP as well as additional coverages (e.g., loss of use coverage, replacement cost coverage of contents, etc.).

Implications for the NFIP

There is also the view that privatization will reduce the fiscal pressures on the NFIP and possibly ameliorate other problems it is having. Clearly, the less coverage the NFIP underwrites, the lower will be its claims payments, all other things equal. However, how moving properties from the NFIP to the private market will affect its fiscal condition depends on the types of properties that are moved. If private companies are good at "cherry picking" properties that are overpriced by the NFIP, this will worsen rather than improve its financial condition. It is possible that competition from private insurers will increase the pressure on the

NFIP to improve its risk assessment and pricing as well as decrease its subsidization of pre-FIRM and grandfathered properties. Such pressure could force the NFIP to take steps that would improve its fiscal condition even with the movement of some of its policies to the private market.

Options

There are several options with respect to increasing the role of private companies in providing flood insurance. Here we briefly review these options with the exception of what was proposed in the FRA and similar proposals which we will use as our "straw man"; Born and Klein (2019) discuss these options in greater detail. We divide these options into two categories: (1) partial privatization; and (2) all other options. We provide a short discussion of three possible schemes in the second category before we turn back to the first.

Other Options

We can start with the status quo, possibly with some reforms of the NFIP, as a baseline with which we can compare options in which the private sector would play a much greater role in providing flood insurance. The market for private flood insurance is already expanding under the NFIP's current framework. If the NFIP no longer subsidized pre-FIRM and grandfathered properties, private companies could more effectively compete for these properties, which would give a further boost to the private market as well as help to alleviate the NFIP's financial problems. We could take this idea to its full extent by designing and administering the NFIP so that it functions like a private company.

Full privatization is another option. Under full privatization, flood insurance would be fully assumed by the private sector.[39] Under this scenario, either the NFIP would be eliminated or function as a residual market mechanism (RMM) to cover properties that private companies would not want to insure. If the NFIP became an RMM, its pricing structure would need to be reconsidered; if its revenues failed to cover its claims payouts and other expenses, then its funding would need to be supplemented by assessments on insurers and/or general fund appropriations.[40] If the NFIP did not serve as an RMM, it is likely that the various states would need to establish RMMs for flood insurance.[41] Additionally, the NFIP's non-insurance services could be assumed by FEMA and funding sources procured for these services.

There is another potential scheme for increasing the role of the private sector in providing flood insurance that could be structured in a manner similar to the federal crop insurance program. Under this scheme, private compa-

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[39]Full privatization has not received serious consideration by Congress, but this has been proposed by conservative writers (see, for example, Brannon and Blask 2017). Further, there a number of developed countries that rely on the private sector to provide flood insurance, including Australia, France, Germany, Japan, and the United Kingdom (Michel-Kerjan, Czajkowski, and Kunreuther 2015).

[40]State RMMs for auto, home, and workers' compensation insurance generally rely on assessments on private insurers to fund any deficits they incur.

[41]Using state RMMs for flood insurance could be problematic due to the catastrophic losses that can be caused by flood events that could strain the assessment capacity of these mechanisms in smaller states.

nies would issue flood policies at a primary level and the federal government would either fully reinsure or partially reinsure these policies.[42] To the extent that private insurers bear part of the risk through partial reinsurance, they have "skin in the game" that should give them incentives to carefully underwrite and service the policies they sell. However, given that the Risk Management Agency of the Department of Agriculture essentially governs all aspects of the crop insurance program, as currently structured, it is subject to some of the same problems that afflict the NFIP, among others. For example, taxpayers heavily subsidize the crop insurance program. It is conceivable that if the NFIP's role changed to that of a reinsurer, it could be structured in a way that would mitigate at least some of the problems it currently faces (and avoid the problems of the crop insurance program).[43]

Partial Privatization

The scheme that warrants the most serious consideration is what we refer to as *partial privatization* given that this is what is in play. To focus our discussion, we use what was proposed in the FRA as our model with the understanding that it could be modified to address at least some of the concerns that it has raised. As previously noted, this bill contained several provisions that would make it easier for private companies to sell flood insurance, but it would not have eliminated the NFIP or altered its mission. It is helpful to summarize the most important provisions pertaining to partial privatization. These provisions are contained in Section II of the Bill entitled "Increasing Consumer Choice Through Private Market Development" and are as follows.

- The bill revised the financial requirements that apply to flood insurance for home loans or loan guarantees by the GSEs. Private flood insurance would be required to meet any financial strength requirements set forth by these GSEs. According to the bill, private flood insurance would include policies issued by non-admitted insurers as long as the insurer is eligible to provide insurance in the home state of the insured and complies with the laws and regulations of that state. Currently, private flood insurance must provide coverage at least as broad as coverage provided by NFIP. Hence, what constitutes acceptable coverage for the purpose of protecting the collateral on home loans and any other purposes would be determined by state insurance regulators.
- Mutual aid societies also would be allowed to sell private flood insurance, subject to state law. The bill defines a mutual aid society as an organization of members who share a common set of ethical or religious beliefs. This coverage would be deemed to satisfy the MPR.
- FEMA would be required to allow WYO companies to sell private flood insurance.
- FEMA would be required to provide data related to NFIP risks and pre-

[42]The concept of the NFIP serving as a reinsurer is discussed in GAO (2014a).

[43]Private insurers could be required to bear a significant portion of the risk at a primary level, but they would only be willing to do so if they were allowed to charge adequate premiums or received subsidies from the NFIP.

miums, including community-level data, through a publicly available data system.

The FRA would have removed several obstacles to the sale of private flood insurance. Importantly, it would have enabled private insurers (licensed or non-admitted) to sell policies that are not substantially similar to NFIP policies and would require GSEs to accept any policy approved by state regulators as meeting the MPR or their own requirements. Allowing WYO companies to offer flood insurance on their own paper is also a significant provision in that it would make it easier for these companies to cherry pick the properties for which they could offer a lower premium than the NFIP. Requiring the NFIP to fully share its data with private companies is also something that has been pushed by the industry, but something that the NFIP has been reluctant to do.

Challenges

While private companies face several challenges in writing flood coverage, we focus here on the obstacles currently created by government policies.[44] We begin with the challenges created by the NFIP's pricing of its policies. To the extent that the NFIP underprices certain properties, it makes it difficult for private companies to offer lower premiums for these properties and remain profitable (GAO 2014a). Underpricing by the NFIP occurs through the subsidies of pre-FIRM and grandfathered properties, its underestimation of the risk of certain other properties, and the lack of a catastrophe loading in its pricing structure. All of these are problems that could be remedied through reforms of the NFIP and its use of the most advanced technologies and methods available to accurately price properties. While the pre-FIRM subsidies are being phased out, the subsidies of grandfathered properties remain as well as the other inefficiencies in the NFIP's pricing methods. Hence, as long as NFIP underpricing continues, private companies will be hampered in their efforts to sell coverage to some property owners.

Another challenge faced by private insurers is the constraint on their ability to innovate in policy design. Currently, policies that meet the MPR must provide coverage similar to that provided in NFIP policies. How private insurers could design their policies to differ from NFIP policies is complicated. Clearly, there are some modifications that would be beneficial to consumers. Such modifications could include offering higher limits than the NFIP does, providing loss of use coverage, and offering replacement cost coverage on contents.[45] Another modification could be offering higher deductibles than are currently available through the NFIP. Higher deductibles could be dollar amounts or set as a percentage of the dwelling limit (e.g., 1 to 15 percent). Greater coverage would require higher premiums, and higher deductibles would lower the premium for a given property, all other things equal. Private policies could also exclude coverage for losses that are covered under NFIP policies. Offering greater coverage would not conflict with the MPR, but higher deductibles as well as additional exclusions could do so.

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[44]See GAO (2014a), Deloitte (2014), and Kousky, Kunreuther, Lingle, and Shabman (2018) for a discussion of the opportunities for and the challenges to private flood insurance.

[45]Private flood policies could (and already do in some cases) cover things that are not covered in NFIP policies, e.g., personal property in a basement.

Another challenge faced by private flood insurers is their ability to access good information on the flood risk of properties. While private companies can readily obtain the NFIP's FIRMs, the inaccuracy of these maps and the fact that many are outdated is a problem. What private companies would like to have is full access to all of the information that the NFIP has on the policies they have issued and the properties they have insured. For example, it would be helpful to a private company to be able to obtain the claims history for a property. This kind of information is available to all companies for homeowners insurance through the Comprehensive Underwriting Loss Exchange (CLUE). However, the NFIP has been reluctant to provide full access to its databases because it is concerned that such access will be used to its disadvantage. More specifically, NFIP administrators likely believe that if private companies do gain access to these data, they will use it to further cherry pick properties for which they can offer a lower rate than what the NFIP charges them. This would subject the NFIP to even greater adverse selection.

A fourth potential challenge that private insurers may face would be the constraints or mandates that could be imposed by state insurance regulators. We are not aware that this has yet become a problem, but it could become a problem in some states if private companies sought to substantially expand their sale of flood insurance. We note that regulators have sought to impose constraints on insurers offering homeowners insurance in some states, especially those that have a high exposure to hurricanes. We can only speculate as to whether state regulation would unnecessarily impede the sale of private flood insurance. All other things equal, we would not expect state regulators to prevent private companies from charging lower rates than the NFIP absent any solvency concerns. However, some state regulators could attempt to constrain the rates for high-risk properties. Additionally, some state regulators may not allow private companies to offer policies that provide less coverage than NFIP policies.

Potential Costs of Partial Privatization

Depending on how it is constructed, a privatization scheme for flood insurance could have several drawbacks or pitfalls. Here we focus on the possible drawbacks or pitfalls of the FRA's approach to expanding the sale of private flood insurance. The provisions of this bill that warrant the greatest concern from a public policy perspective are its requirements that lenders accept any private policy approved by state regulators as meeting the MPR, that they accept policies issued by non-admitted insurers and mutual aid societies, and that WYO companies be allowed to sell flood insurance on their own paper. There is also the issue of how expanding the sale of private flood coverage will affect the NFIP's ability to serve its broader public mission.

The FRA's requirement that the NFIP share its data with private companies is a concern to some, but may be difficult to condemn on an economic basis. Many legislators are also concerned that the expansion of the private flood insurance would increase adverse selection against the NFIP and undermine its ability to subsidize certain properties. However, this is not a concern that most economists would find compelling.

Requiring lenders to accept private flood policies approved by state insurance regulators as meeting the MPR could be problematic. Although there is nothing equivalent to an MPR for homeowners insurance, lenders face no statutory restrictions on the standards they set for what they will accept as sufficient coverage for protecting the collateral on home loans. For private flood insurance policies, there would not be a problem if any policies sold for the purpose of meeting the MPR provide what would be deemed adequate coverage. If this determination is left to state insurance regulators, then this a legitimate concern. Some state regulators may be more concerned about keeping the price of flood insurance low than ensuring that property owners have adequate coverage. This is more likely to be the case in states where there is a high risk of floods.

There is a similar concern with respect to allowing non-admitted insurers to sell flood insurance and requiring lenders to accept their policies as meeting the MPR and/or protecting the collateral on home loans. Many, perhaps most, non-admitted companies are financially sound and would be able to meet their claims obligations after a major flood event. The concern lies with non-admitted carriers that are not financially sound or would choose not to honor their claims obligations following a major flood. Each state determines the standards that non-admitted companies must meet to write coverage for a specific line of insurance within their jurisdiction. Some states (perhaps many) may establish fairly strict standards for these companies but some may not. As with the approval of policy provisions, there will be temptation for regulators in states with high flood risk to be more lenient with respect to the non-admitted companies they will allow to operate within their jurisdictions. Further, regulators do not have the same authority to regulate the policies, practices, and solvency of non-admitted insurers that they have with licensed carriers. Additionally, there is no guaranty association protection for the unpaid claims of insolvent surplus lines companies.

Requiring lenders to accept coverage written by mutual aid associations is also a concern. A mutual aid association essentially functions in some respects like a mutual or reciprocal insurer with some important differences. Typically, they are associated with a particular religious denomination or organization (e.g., Lutheran) and can provide various kinds of insurance coverage (e.g., home, auto, farm, etc.). The extent to which they are regulated by state insurance regulators appears to vary by state. Importantly, some of these associations operate on an assessment basis, i.e., if the premiums they collect are insufficient to cover their claims, they can assess their members to cover the shortfall. As with many non-admitted carriers, many of these associations may be viable providers of flood insurance. The concern lies with associations that may be established to provide a cheap source of flood coverage without adequate regulatory protections. Additionally, some of these associations are relatively small and would not have a large and broad pool of exposures to diversify the risk they assume.[46]

The FRA's provision that would have allowed WYO companies to sell flood insurance on their own paper raises issues. It could be argued that this would work to the benefit of some flood insurance buyers when a WYO company can offer them better coverage and/or a lower premium than what it can when it

[46]Additionally, we do not know the extent to which such associations purchase reinsurance. To determine this, we would need to be able to review their financial statements; many of these associations may not file reports with the NAIC although they would be expected to do so with their domiciliary states.

underwrites a policy on behalf of the NFIP. This said, WYO companies acquire information on their NFIP policyholders that is not available to other companies. Hence, WYO companies could exploit this information to their advantage and to the disadvantage of other insurance companies and the NFIP. This could exacerbate adverse selection against other companies and the NFIP. One way to address this issue would be to prohibit WYO companies from moving properties out of the NFIP to offer these properties their own coverage. This would still allow WYO companies to offer their own coverage to property owners who do not have coverage through the NFIP and alleviate the concerns discussed above.

The concern regarding how privatization will affect the NFIP's ability to achieve its broad public mission arises from several potential developments. One, a property owner's ability to obtain private coverage is not tied to his/her community's participation in the NFIP, which requires meeting its floodplain management requirements. Two, the loss of premium revenues to support the NFIP's activities in flood risk mapping and management would undermine its ability to support these services. However, these are problems that could be remedied through legislation and the use of other funding sources.

We then come to the issue of requiring the NFIP to share its information on its policyholders with private companies. All other things equal, such a requirement should work to the benefit of homeowners who buy or could be induced to buy flood insurance as private companies would have better information for the purposes of underwriting and pricing. We note that private insurers carefully protect the data they acquire on their policyholders as proprietary information. If enacted, this provision of the FRA will increase adverse selection against the NFIP, which will push it further into the role of serving as an RMM. Nonetheless, such a provision could work to the advantage of property owners who obtain flood coverage from a private carrier at a lower price and/or with better terms.

Additionally, there are availability and affordability concerns with full or partial privatization. With respect to availability, assuming that private companies will be unwilling to insure certain properties, there will be a need for some form of RMM. Affordability problems would be a tougher nut to crack. Some homeowners already pay high premiums for NFIP coverage and these premiums could go even higher with full privatization or reforms of the NFIP that would eliminate its subsidies and underpricing of other properties. Of course, what is deemed "affordable" is a matter of circumstance as well as debate.[47] Some would argue that high premiums for wealthy owners of high-value homes in risky areas should not be a public concern. The public concern lies with low-income owners of homes in high-risk areas. This is a concern that could be addressed through some form of taxpayer-funded subsidies for such homeowners.[48]

SUMMARY AND CONCLUSIONS

The interest in expanding the sale of private flood insurance is understandable and, in some respects, justifiable. While we have identified legitimate concerns

[47]Using some standard for what would be considered affordable, this becomes a calculation of a homeowner's premium in relation to their income.

[48]This is a topic that was addressed by a committee under the auspices of the National Research Council that issued a report that examined different options that could be employed to address affordability concerns (NRC, 2015).

with respect to some of the provisions that were in the FRA, we believe that these concerns could be addressed in a manner that will serve the public interest and benefit consumers.[49] It will be important to ensure that private companies offer policies that provide adequate coverage and are appropriately priced. This would depress the sale of private flood insurance to some extent and "faux" coverage should not be enabled. It is quite possible that the NFIP could ultimately be relegated to the role of a residual market mechanism, which will make it more dependent on some form of assessments on private insurers and/or taxpayer funding for the public services that it provides. Finally, the non-insurance functions of the NFIP need not be compromised by private flood insurance if appropriate sources of funding for these activities are secured.

The challenge is to construct a scheme that provides adequate consumer protections, secures the collateral on home mortgages, continues beneficial flood risk mitigation services, and addresses affordability and availability concerns while enabling private companies to offer good coverage at risk-based prices. In such a scheme, there will need to be an administrative and regulatory structure that achieves these objectives. Simply delegating the regulation of private flood insurance and the determination of what constitutes adequate coverage to state insurance regulators could be problematic in some jurisdictions. FEMA and other agencies (e.g., bank regulators) could set standards for coverage as well as safety and soundness standards for companies that would be allowed to sell flood insurance. The NAIC also could play a role in setting such standards and monitoring their enforcement by the states. There will also need to be some form of an insolvency guaranty mechanism administered at the state or federal level that will cover the claims of bankrupt non-admitted carriers and mutual aid associations.

Affordability concerns could be addressed through some form of means-tested vouchers funded by general tax revenues. Availability problems could be addressed by using the NFIP as a residual market mechanism. There will also need to be mechanisms that provide adequate funding of FEMA's risk mitigation activities. Such mechanisms could be supported by a combination of assessments on flood insurance premiums, property taxes, and general revenues. All of this will need to be accomplished in a politically charged environment. There are a number of issues and questions regarding privatizing flood insurance that warrant further research and analysis.

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[49]One caveat here is that some property owners that currently pay premiums that are less than their cost of coverage may not find reforms that we and others would support as being advantageous to them. As discussed earlier, there are ways to address the affordability of properly priced flood insurance for low-income households.

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