Redistributional Impacts of the National Flood Insurance Program

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Abstract This study examines the redistributional impacts of the National Flood Insurance Program (NFIP) using a national database of the premium, coverage, and claim payments at the county level between 1980 and 2006. We focus on two general classes of progressivity measures which include the net redistributive effect of the program and the departure from proportionality in the NFIP structure. Our findings indicate that the net redistributive effect of program is positive and significant, implying that NFIP is equity-enhancing although the effects are quite small. The departure from proportionality indicates that the payouts, not the premiums, are the source of the net redistributive progressivity of the NFIP. We find no evidence of NFIP disproportionally advantaging richer counties.

Keywords Gini index, NFIP, redistributive effect, departure from proportionality

JEL Classification D31, G22, Q54, R38

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1. Introduction

Damage from flood events is not covered by homeowners insurance policies and flood insurance is not widely available on the private market. Flood coverage is offered federally, however, through the National Flood Insurance Program (NFIP), established by the National Flood Insurance Act of 1968. Under current provisions, if communities choose to adopt minimum floodplain management policies, their residents become eligible for flood insurance backed by the federal government. The goal of the NFIP is to contain the rising cost of damage caused by floods and to provide economically feasible relief to victims to help fuel recovery (Pasterick 1998). The NFIP is currently managed by the Federal Emergency Management Agency (FEMA) within the Department of Homeland Security. As of April, 2010, there were almost 5.6 million policies-in-force nationwide.

The NFIP has been the subject of renewed interest in recent years. Unprecedented losses associated with Hurricane Katrina and the other storms of the 2005 hurricane season sent the program deeply into debt, drawing the attention of people living in floodplains, insurance companies, and lawmakers. The NFIP was not designed to cover catastrophic loss years and its current debt to the U.S. Treasury from the 2005 claims—almost $19 billion—has raised concerns about the program's long-term financial solvency.[1] The NFIP will be unable to repay its debt given the current structure of premiums. Should Congress forgive it, taxpayers will bear the costs of returning the NFIP to solvency. In addition to debating debt forgiveness, lawmakers are also considering a wide range of other reforms to the program to address both financial

[1] Although NFIP is supposed to be funded with premiums collected from policyholders rather than with tax dollars, the program is, by design, not actuarially sound (see section 2 for more details). The program is not structured to build a capital surplus, is likely unable to purchase reinsurance to cover catastrophic losses, cannot reject high-risk applicants, and is subject to statutory limits on rate increases (GAO 2010).

soundness and concerns about who is and who should bear the burden of flood and hurricane costs.

Debate has emerged regarding the redistributional impacts of the program. Little is known about who benefits from the NFIP and who bears the cost within the program. Some media accounts and advocacy groups have argued that the NFIP routinely subsidizes some of the wealthiest and most irresponsible property owners. They suggest that the program disproportionately benefits wealthy households and owners of vacation homes, many of them expensive waterfront property owners. Others have suggested that the program is a form of assistance for the poor who could not afford to purchase flood insurance at private market rates. Since these two arguments are countervailing, in this study we provide empirical evidence to make an assessment of the overall redistributional impacts of the NFIP.

This study applies advances in the measurement of income inequality to the study of the redistributional impacts of the NFIP. We focus on two general measures of progressivity which include the net redistributive effect of the program and the departure from proportionality in the NFIP structure. This study uses a unique national database of the total dollars of premium, coverage, and claims paid per county per year in the U.S. from 1980 to 2006. Our findings indicate that the net redistributive effect of the NFIP is positive and significant, implying that NFIP is equity-enhancing although the effects are quite small. The flood insurance premiums are strictly proportional to total county income for all years. In no year do we find a statistically significant departure from proportionality for premiums. In contrast, the claim payments appear to be mildly progressive. This finding suggests that the claim payments, not the premiums, are the source of the net redistributive progressivity of the NFIP.

The next section of the paper offers background on the NFIP relevant to understanding its redistributional impacts. Section three discusses our data while the fourth section presents our methods. The fifth section summarizes the results, and the sixth section concludes with a discussion of our findings and some important caveats to our conclusions.

2. Background on the NFIP

The NFIP was created in 1968 out of a concern that private companies were not willing or able to cover flood risk due to the catastrophic nature of losses, spatial correlation, and adverse selection. It was thought a government program could overcome these challenges. As stated in the introduction, the NFIP was designed as a partnership between the federal government and local communities. FEMA maps the flood hazard in participating communities on Flood Insurance Rate Maps (FIRMs). Local governments can then adopt baseline regulations in high-hazard areas and, in exchange, the federal government provides insurance to homeowners and businesses. Homeowners can purchase up to $250,000 of building coverage and up to $100,000 of contents coverage. Business-owners can purchase up to $500,000 each of both building and contents coverage.

Concerns about the costs of flooding and low take-up rates led Congress in 1973 to make the purchase of flood insurance mandatory for property-owners in 100-year floodplains with a mortgage from a federally backed lender. While take-up rates remained low in the early years of the program, they have grown steadily over the decades. Still, following major flood events, concern is often expressed that many at-risk homeowners remain without coverage. An estimate of take-up rates in 100-year floodplains by RAND Corporation found high regional variation, with the south and west having the highest take-up rates of around 60%, while in the Midwest,

take-up rates are only around 20-30% (Dixon et al. 2006). The NFIP is also highly concentrated geographically, with 40% of all policies-in-force nationwide located in Florida and close to 70% of all policies being located in just five states: Florida, Texas, Louisiana, California, and New Jersey (Michel-Kerjan and Kousky 2010).

There are two types of policies in the NFIP: actuarial polices and discounted policies. For both types of policies, rates for flood insurance vary by the flood zone indicated on the FIRM and structural characteristics of the property. Currently 78% of all policies-in-force are what FEMA calls "actuarial," meaning they are priced using hydrologic models that include catastrophic loss year scenarios.[2] The remaining 22% of policies are discounted. These are sometimes referred to as subsidized policies, but it is important to note that these are not subsidized by the general taxpayer. Rather, the discounted policies prevent the program from developing a catastrophe reserve. In 1981 it was decided that the combined revenue from the actuarial and the discounted policies should be enough to cover losses from the "average historical loss year." After a series of rate increases on the discounted policies, this was achieved in 1986. Due to the discounted policies, therefore, the program does not build up a capital reserve to cover high loss years, such as 2005.

The largest portion of the discounted policies is referred to as "pre-FIRM." These are structures that were built before the FIRM for a community was available and thus received discounted rates to encourage communities to join the program, to have homeowners cover at least some of the costs of flood losses (it was felt that if they were charged full rates, they would be so high that individuals would not insure and thus require more disaster aid), and to not force the abandonment of otherwise economically viable structures through high premiums (Hayes and

[2] The GAO, however, recently reported that the data used is in some cases out-of-date or inaccurate and thus might be preventing the program from charging appropriate premiums (GAO 2008).

Neal 2009). Post-FIRM, new construction is charged actuarial rates.[3] Subsidized properties become required to pay actuarial rates when they are damaged at half the property value or when improvements increase their value by 50 percent or more (CBO 2007). It was, therefore, thought the subsidy would phase out quickly as structures were damaged or improved, but modern construction techniques have extended the life of buildings (Pasterick 1998, CBO 2007).

After Hurricane Katrina, the NFIP paid out more in claims than had previously been paid over the entire life of the program (Hayes and Neal 2009). This caused the NFIP to borrow heavily from the Treasury. Its debt is currently at over $19 billion. While the NFIP has borrowed from the Treasury in previous years, it was always a small enough amount that it could subsequently be repaid. The program is unlikely, though, to be able to repay the current debt from Katrina. Should it then be forgiven by Congress, it would create a subsidy from the general taxpayer to the program, particularly those policyholders with discounted premiums.

3. Data

This study utilizes data on total claims paid, the number of policies-in-force, and the total premium intake at the U.S. county level from 1980 to 2006, which allows for a county-level analysis of how claims compare to premiums. Table 1 shows the descriptive statistics of the variables by states. Total premium intake during the period was about $29.5 billion while the total claims payments were about $32 billion. The top five states in terms of total paid claims – Louisiana, Florida, Mississippi, Texas, and Alabama – represent about 78% of the total claim payments for the nation as a whole. Louisiana has the highest claim payments which total $15.3 billion or 47.7% of the total claim payments, followed by Florida ($3.4 billion or 10.7% of the

[3] The subsidy applies only to the first $35,000 of coverage on the building and $10,000 on contents, although the mean and median claims in 2004 were below these limits (CBO 2007).

total payments) and Mississippi ($2.7 billion or 8.6% of the total payments). This finding is largely driven by the unprecedented loss of the 2005 hurricane season on the Gulf Coast.[4] When we exclude the year 2005, the ranking changes to Florida (19.1%), Texas (17.8%), Louisiana (11.6%), North Carolina (5.0%), and Pennsylvania (4.5%). The top five states in terms of the premium payment – Florida (34.7%), Texas (9.2%), Louisiana (9.0%), California (7.7%) and New Jersey (5.7%) – represent about 66% of the total amount. In 2006, more than 40% of the total NFIP policies-in-force were in Florida.

Table 2 shows the summary statistics by year. The number of NFIP policies has increased by about 170% between 1980 and 2006, an average increase of 6.3% per year. The premium intake has steadily increased over time, from rising prices and more policies-in-force, while the claim payment appears to be highly correlated with the occurrence of historical hurricanes.[5] Hurricanes Charley and Ivan each made a landfall in Florida and Alabama in 2004, followed by Hurricanes Katrina and Rita along the Gulf Coast in 2005. The claim payments in 2004 and 2005 and represent 6.9% and 54.5% and of the total claims paid from 1980 to 2006, respectively. The average premium paid in 2006 was $473. The average premium per policy between 1980 and 2006 is about $312, and the average claim per policy during the period is approximately $295.

Total personal income by year for each county is used in the analysis of the redistributive impact of NFIP.[6] Between 1980 and 2006, about 94% of U.S. counties had at least one NFIP policy-in-force and 80% of the counties filed at least one claim. Counties with at least one

[4] The Congressional Budget Office estimated the value of capital stock destroyed by Hurricanes Katrina and Rita in the range of $70 billion to $130 billion, and the State of Louisiana estimated that the economic damage to the state alone could reach $200 billion (US Government Accountability Office 2007).
[5] Damage from hurricanes comes from storm surge, wind, and flooding. The NFIP does not cover wind damage, only flood losses from the storm surge and intense rainfall. During Katrina, flooding was also caused by levee failures.
[6] Source: Regional Economic Information System, Bureau of Economic Analysis, U.S. Department of Commerce.

policy had on average a total personal income of $1.9 billion whereas counties without a policy had a total personal income of $2.3 billion. Counties that filed claims had an average total personal income of $2.2 billion and counties that did not file claims had, on average, total personal income of $0.8 billion. The personal income for counties both with and without the claims filed exhibited high variation - the standard deviation of personal incomes for claimant counties is about $7.4 billion while for non-claimant counties approximately $5.4 billion. The highest total personal incomes for claimant and non-claimant counties are $212 and $88 billion, respectively. The lowest total personal incomes for claimant and non-claimant counties are $9 and $3 million each.

4. The Measurement of NFIP Progressivity

In this study, we adapt the well-established tools of tax progressivity to evaluate the equity implications of the NFIP. Modern tax progressivity theory has at its roots Musgrave and Thin (1948), who were attempting to quantify an equitable approach to reducing taxes in the early post war period. More recent developments in measurement of progressivity are well-summarized by Lambert (2002). In their most general form, tax progressivity measures are based on the familiar Lorenz curve measure of inequality and its associated concentration curve.

The most commonly used measure of progressivity focuses on the net redistributive effect of a fiscal action such as taxes, transfers, and other government programs. This net redistributive effect, which is often referred to as residual progression, measures the equalizing effect of the fiscal action. A fiscal action that improves upon the underlying income distribution is progressive, while a fiscal action that results in greater inequality is regressive. Alternatively, there are well-established measures of the departure from proportionality, also based on the

Lorenz curve. This departure from proportionality, also known as liability progression, measures the share distribution of the policy effect across units with varying pre-policy income. Thus increases in progressivity are associated with enhanced departure from proportionality for pre-policy income distribution.[7] The above measures of net redistributive effect and departure from proportionality are used for our analysis of the NFIP.

We begin by defining the Lorenz curve and its related concentration curve. Let $0 \le F^{-1}(p) \le \infty$ be the inverse cumulative distribution function of *x*, and without loss of generality, let $\tau = F^{-1}(p)$. Following Bishop, Chow and Formby (1994), the Lorenz ordinates of *x* (for our analysis, x represents pre-NFIP county income) and the concentration ordinates of *y* (post-NFIP county income) can be written as follows:

$$(1) \qquad L(\tau; x) = \mu_x^{-1} \int_0^{\tau} x f(x) dx = \mu_x^{-1} \int_0^{\infty} x I_{\tau}^{x} dF(x) = E\left[x I_{\tau}^{x}\right] / E[x],$$

where μ_x is the mean of x, $I_{\tau}^{x} = 1$ if $x \le \tau$ and $I_{\tau}^{x} = 0$ otherwise,

$$(2) \qquad C(\tau; y) = \mu_y^{-1} \int_0^{\tau} \int_0^{\infty} y f(x, y) dy dx = \mu_y^{-1} \int_0^{\infty} \int_0^{\infty} y I_{\tau}^{x} f(x, y) dy dx = E\left[y I_{\tau}^{x}\right] / E[y].$$

$L(\tau; x)$ represents the proportion of pre-NFIP (total) county income received by counties with incomes *x* less than or equal to τ. $C(\tau; y)$ indicates the proportion of post-NFIP (net) county income (pre-NFIP county income – premiums + payments) received by counties with incomes *x* less than or equal to τ. Hence, the post-program concentration curve is constructed by arranging post-NFIP incomes in order of ascending pre-NFIP income. A premium or payout concentration curve, $C(\tau; z)$, orders premiums or payouts (z) by pre-program income. In the absence of any program induced rerankings, the Lorenz and concentration curves are coincident.

[7] In case of taxes, the crucial difference in these classes of measures is that the net redistributive effect is influenced by the magnitude of taxes relative to income (tax height), while departure from proportionality is scale invariant. When the level of tax height varies across time, these two measures can tell very different stories about changes in tax progressivity, but both are valid and offer some insight into changes in tax progressivity.

Following Kakwani (1976) and Jakobsson (1976), the net redistributive effect of the flood insurance program is positive if:

(3) $L(\tau; x) - C(\tau; y) \geq 0$

with one strict inequality prevailing at some τ. Similarly, there is a progressive departure from proportionality of the flood insurance premiums if:

(4) $C(\tau; z) - L(\tau; x) \geq 0$

with one strict inequality prevailing at some τ.

The final issue to be considered in this section relates to which of the many indices of net redistributive effect (*RE*) and departure from proportionality (*DP*) to use to evaluate the flood insurance program. A frequent choice is the indices based on the familiar Gini coefficient of inequality and its associated concentration index.

Given a continuous distribution $F(x)$, the covariance definition of the Gini index is

(5) $G_x = \frac{2}{\mu_x}\int_0^\infty xF(x)dF(x) - 1 = (2/\mu_x)\,\mathrm{cov}\{x, F(x)\}$

and the associated concentration index for $y = g(x)$ is

(6) $C_y = \frac{2}{\mu_y}\int_0^\infty g(x)F(x)dF(x) - 1 = (2/\mu_y)\,\mathrm{cov}\{g(x), F(x)\}$.

The net redistributive effect is measured as twice the area between the Lorenz curve for pre-program county income and the concentration curve for post-program county income:

(7) $RE = G_x - C_y$.

The departure from proportionality is measured as twice the area between the Lorenz curve for pre-program income and the concentration curve for premiums or payments:

(8) $DP = C_z - G_x$.

Finally, we note that these measures of progressivity are based on sample data. Inference tests for both the *RE* and *DP* measures are provided by Bishop et al. (1994; 1998).

5. Results

We begin our analysis of NFIP progressivity by examining the net redistributive effect (*RE*) on an annual basis for years between 1980 and 2006. Table 3, Column 1 provides the Gini coefficient of pre-NFIP county income for selected (single) years. The Gini is a measure of inequality ranging from 0 to 1; the closer the Gini to 0, the more equal the income distribution. Table 3, Column 2 provides the concentration index of post-NFIP county income (pre-NFIP county income – premiums + payouts). Note that a concentration index differs from the Gini only in the ordering of incomes—here, post-NFIP county income is ordered by pre-NFIP county income. The reason for using the concentration index is to eliminate policy induced re-rankings.

Column 3 in Table 3 provides the net redistributive measure of progressivity, which is the difference between Columns 1 and 2. One advantage of the *RE* measure is its intuitive interpretation. A point estimate of 0.005 for *RE* implies that, on average, 0.25% of income is being redistributed from high-income counties to low-income counties. We find positive and significant progressivity estimates 1985, 1990, and 2006, indicating that the NFIP is progressive. In none of the years considered do we find the NFIP to be regressive. When we examine every single year between 1980 and 2006, we find that in nearly half of the years (13 out of 27) examined the *RE* effect is positive and significant. In sum, we find no evidence that the NFIP disadvantages poorer counties using annual data.

It is interesting to ask which part of the NFIP provides the progressivity findings in Table 3. To address this question we look at premiums and claim payments separately. In particular,

we measure the departure from proportionality of each of these two items. To measure the departure from proportionality we subtract the Gini coefficient of pre-NFIP county income (shown in Column 1 of Table 3) from the concentration index of premiums or payouts (not shown). The net effect of this procedure is presented in Table 4.[8]

Table 4, Column 1 provides our estimates for selected (single) years for premium proportionality (*DP*). The absence of statistical significance implies that the NFIP premiums are indeed proportional to county income.[9] Column 2 provides the *DP* estimates for payouts. Unlike the *DP* index for premium, the positive estimates indicate the progressivity. In two of the seven cases we find a significant and progressive departure from proportionality. This suggests that the payouts, not the premiums, are the source of the net redistributive progressivity of the NFIP.[10]

Finally, we are interested in progressivity estimates of the pooled data using five year samples because the annual findings could be less meaningful when dealing with a catastrophic risk. A summary of these findings is reported in Table 5. Beginning with the *RE* effect in Column 1, we find that in four out of the five periods considered the NFIP is progressive. Columns 2 and 3 show that premiums and claim payments are either neutral (proportional) or progressive, never regressive. In addition, we find that unlike the annual data, the pooled estimates do indicate that the premiums can also be progressive (positively depart from proportionality).

This finding of more progressivity with five year averages could be attributed to the following observations. First, pooling the data, in essence increasing sample size, reduced the

[8] The concentration index of premiums or payouts is available upon request.
[9] We tested for premium proportionality in each year between 1980 and 2006—none of our estimates were statistically significant.
[10] The *DP* index also has an intuitive interpretation. A value of 0.15 for *DP* implies that 7.5% of the premium burden is being redistributed from low-income counties to high-income counties.

standard errors. It appears that the reduced standard errors contributed to more findings of "progressive" in Table 5. Second, the five year data, unlike the one year samples, included at least one major hurricane season which allowed an adjustment within the NFIP structure over time. The number of insurance policies and premiums tends to increase substantially after massive flooding events. For example, prior to Hurricane Floyd in 1999 many people in eastern North Carolina were not aware that they lived in a floodplain and many homeowners did not have flood insurance. After Hurricane Floyd, sales of flood insurance policies in North Carolina increased by 24 percent in the following years (FEMA 2002).[11] Our results indicate that such dynamic adjustment within the NFIP could be reflected in the pooled data. Finally, in the most recent period examined (2001-2006, excluding Katrina), the NFIP is found to be entirely progressivity neutral.

6. Discussion and Caveats

This study offers evidence on the redistributional impacts of NFIP using the county level data from 1980 to 2006. Our results indicate that the net redistributive effect of program is positive and significant although the effects are quite small. Furthermore, we find that the insurance premiums are strictly proportional to income while the claim payments appear to be mildly progressive. Thus, if anything, the program slightly advantages lower income counties and provides no significant redistributive benefit to higher income counties.

A number of caveats, however, are in order. First, our findings are by no means a complete measure of the redistributional impacts of the NFIP as we have no information about

[11] Hurricane Floyd directly affected over two million people and resulted in one of the largest peacetime evacuations in US history. The Federal Emergency Management Agency (FEMA) reported that more than 60,000 homes across North Carolina were either damaged or destroyed, and the total amount of damage was estimated to be about $6 billion, most of it caused by flooding (FEMA 2002).

the individual income of policyholders. We can thus only make statements about aggregate redistributional impacts at the level of the county. Our findings would hold for individuals as well, if the income of those buying insurance was symmetric around the income of the county population. While ours is a useful first-order assessment, the largest redistributional impacts in the program are likely between those policyholders paying discounted rates and those paying actuarial rates. Unfortunately, the income of those subsidized homeowners is unavailable. More detailed analysis of the redistributional impacts at the individual level is warranted since claims payments are concentrated on a few policies. Around 30% of claims payments are made to only about 1% of policyholders—these are the so-called repetitive loss properties. FEMA has estimated that around 90% of repetitive loss properties were constructed pre-FIRM (King 2005) and thus are also paying subsidized rates for their insurance.[12]

Second, we have examined the redistributional impact of the programs premiums and claims, not any infusion of taxpayer dollars. If Congress chooses to forgive the NFIP's debt, this will create a cross-subsidy from the general taxpayer to policyholders in the program that have been paying rates that did not include a catastrophe loading to cover an event like 2005. Understanding the redistributional impacts of this debt forgiveness would require comparing the income of the general taxpayer to policyholders in the program.

Finally, it is worth emphasizing that assessing redistributional impacts of a catastrophic risk over a short time period could be misleading. With low-probability risks like floods, there will be many years with no flood damage and then there could be a devastating year like 2005. Payments for these catastrophic events will have a dominating influence. For a flood event that has an annual probability of 1 in 100 or 1 in 500, a few decades is not enough data to accurately

[12] Efforts have been made to bring these structures into compliance with floodplain regulations, to remove them completely, and to reduce the amount of the subsidy. Severe repetitive loss properties are being transferred to the NFIP Servicing Agent's Special Direct Facility (SDF). The properties are eligible for special mitigation grants.

assess whether the prices are matching the risk. It just so happened that Katrina hit many low-income communities, leading to high payments in these areas. Should next year bring a devastating storm to West Palm Beach, Florida, the impact of claims payments might look much more regressive. In our own analysis we find the NFIP to be progressivity neutral in the most recent period examined (2001-2006, excluding Katrina).

If the risks of flooding can be accurately modeled, then an insurance program should not have any redistributional impact. Premiums paid should be proportional to the value of the insured structure and the risk that it faces. The NFIP, however, is a government program and its pricing and policies has been subjected to political pressure. This first-order analysis suggests that this influence has not been directed disproportionally at helping higher income communities, as some critics of the NFIP claim.

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Table 1. NFIP Policies-In-Force, Coverage, and Claims by State from 1980 to 2006

State	Policies-in-force as of 2006	Premium ($ million)	Coverage ($ billion)	Number of Paid Claims	Claim Payment ($ million)
ALABAMA	53,573	267.7	75.7	24,706	867.2
ALASKA	2,667	21.8	6.9	248	3.8
ARIZONA	34,766	207.7	68.3	2,167	24.6
ARKANSAS	16,868	94.3	18.1	3,075	33.5
CALIFORNIA	276,099	2,273.8	761.0	28,188	469.9
COLORADO	17,059	129.7	35.3	926	7.8
CONNECTICUT	35,004	323.8	78.3	9,282	104.6
DELAWARE	23,081	128.8	42.2	2,428	49.4
D. OF COLUMBIA	1,511	2.4	0.9	50	1.4
FLORIDA	2,220,841	10,229.3	4,218.9	138,087	3,408.7
GEORGIA	87,478	445.7	154.4	8,776	163.2
HAWAII	55,333	244.5	90.3	2,279	62.3
IDAHO	7,334	35.7	12.5	405	4.7
ILLINOIS	47,890	366.8	78.7	21,368	201.0
INDIANA	28,773	205.4	37.5	7,691	81.9
IOWA	10,591	85.3	14.6	4,729	61.1
KANSAS	10,550	83.3	16.1	3,728	53.6
KENTUCKY	21,827	168.5	31.3	13,217	192.4
LOUISIANA	505,336	2,665.1	809.2	288,635	15,256.6
MAINE	8,073	71.6	15.4	1,977	25.3
MARYLAND	64,341	305.8	106.7	9,379	222.8
MASSACHUSETTS	48,833	449.1	99.2	16,370	241.4
MICHIGAN	26,474	206.5	44.3	5,800	38.4
MINNESOTA	8,475	69.6	16.1	5,937	96.1
MISSISSIPPI	78,068	331.4	91.3	41,594	2,742.6
MISSOURI	24,149	210.5	38.8	27,523	405.3
MONTANA	3,541	24.4	6.0	632	4.0
NEBRASKA	11,985	95.0	19.7	2,195	19.2
NEVADA	16,419	92.8	32.6	956	37.3
NEW HAMPSHIRE	7,660	47.0	10.1	1,696	26.7
NEW JERSEY	218,291	1,693.3	475.4	54,411	674.4
NEW MEXICO	15,145	76.8	18.1	478	7.8
NEW YORK	134,331	1,020.9	256.0	44,372	485.6
N. CAROLINA	131,858	674.3	228.4	43,536	746.8
N. DAKOTA	5,183	50.6	12.0	5,642	124.7
OHIO	39,198	271.7	50.5	12,682	170.2
OKLAHOMA	14,454	114.1	26.5	6,724	99.8
OREGON	31,175	166.4	50.9	3,040	59.7
PENNSYLVANIA	66,883	621.9	127.5	37,955	710.4
RHODE ISLAND	14,957	142.0	30.4	1,673	29.0
S. CAROLINA	192,176	900.6	372.6	17,236	424.4
SOUTH DAKOTA	2,888	21.4	4.8	1,112	13.5
TENNESSEE	20,366	116.9	29.7	4,753	58.9
TEXAS	628,346	2,708.3	1,074.9	123,044	2,655.3
UTAH	4,195	20.4	6.2	485	4.9
VERMONT	3,263	28.2	5.2	660	6.6
VIRGINIA	104,456	529.0	186.0	23,003	433.3
WASHINGTON	34,127	208.3	60.1	7,111	132.8
WEST VIRGINIA	22,028	163.6	25.1	16,992	243.4
WISCONSIN	13,362	96.0	19.0	2,949	27.9
WYOMING	2,529	16.6	4.4	163	1.2
TOTAL	**5,453,810**	**29,525.0**	**10,093.9**	**1,082,065**	**32,017.5**

Note: The column for policies-in-force shows the number of policies as of 2006 while the other columns display cumulative counts between 1980 and 2006.

Table 2. NFIP Policies-In-Force, Coverage, and Claims from 1980 to 2006

Year	Policies-in-force	Premium ($ million)	Coverage ($ billion)	Number of Paid Claims	Claim Payment ($ million)	Average Premium per Policy ($)	Average Claims per Policy ($)
1980	2,022,621	156.5	98.3	41,715	229.9	77.4	113.7
1981	1,897,135	255.2	101.7	22,088	122.4	134.5	64.5
1982	1,883,920	352.9	106.9	32,489	197.3	187.3	104.7
1983	1,965,154	382.3	117.5	51,110	437.7	194.6	222.7
1984	1,913,825	418.6	124	27,485	253.9	218.7	132.7
1985	2,002,389	450.4	139.5	36,562	359.7	224.9	179.6
1986	2,100,991	515.4	155.2	12,900	123.4	245.3	58.7
1987	2,103,354	564.2	164.7	12,358	99.3	268.2	47.2
1988	2,133,693	586.5	175.2	7,431	49.7	274.9	23.3
1989	2,279,336	629.5	264.7	35,570	653.4	276.2	286.7
1990	2,461,648	669	212.9	14,720	167.6	271.8	68.1
1991	2,516,359	733	222.3	28,526	353.3	291.3	140.4
1992	2,599,268	795.4	235.8	44,126	704.2	306	270.9
1993	2,802,958	884.3	266.7	35,917	658.4	315.5	234.9
1994	3,013,262	997	294.6	21,565	411	330.9	136.4
1995	3,445,414	1,132.80	345.7	62,122	1,284.10	328.8	372.7
1996	3,657,417	1,265.20	389.1	51,208	805	345.9	220.1
1997	4,056,970	1,496.50	460.2	30,277	518.8	368.9	127.9
1998	4,187,246	1,652.90	495	54,552	855.3	394.7	204.3
1999	4,276,543	1,700.60	531.1	46,932	745.4	397.7	174.3
2000	4,319,121	1,705.40	564.4	16,276	251.2	394.9	58.2
2001	4,409,613	1,720.70	608.4	43,296	1,272.20	390.2	288.5
2002	4,471,422	1,782.80	650.3	25,214	431	398.7	96.4
2003	4,512,539	1,876.90	688	36,389	766	415.9	169.7
2004	4,599,101	2,013.10	760.6	55,046	2,193.70	437.7	477
2005	4,892,316	2,210.70	871.5	211,695	17,441.70	451.9	3,565.10
2006	5,453,810	2,577.20	1,049.20	24,496	632.1	472.5	115.9
TOTAL	**3,184,349***	**29,525.00**	**10,093.90**	**1,082,065**	**32,017.50**	**311.7***	**294.6***

Note: All states and the District of Columbia are included in the data. The asterisks denote the average values from 1980 to 2006.

Table 3. Measures of the NFIP Progressivity (1980-2006)

Year	Gini and Concentration Indices		Progressivity Index
	Pre-NFIP Income (1)	Post-NFIP Income (2)	Net Redistributive Effect (*RE*) (3)
1980	0.7781	0.7786	-0.0002
	(.0128)	(.0130)	(.0045)
1985	0.7829	0.7701	0.0128*
	(.0125)	(.0133)	(.0042)
1990	0.7947	0.7879	0.0068*
	(.0121)	(.0126)	(.0019)
1995	0.7909	0.7899	0.0010
	(.0111)	(.0124)	(.0080)
2000	0.8000	0.7983	0.0017
	(.0110)	(.0112)	(.0011)
2005	0.8000	0.7757	0.0243
	(.0109)	(.0206)	(.0193)
2006	0.8029	0.7985	0.0044*
	(.0110)	(.0114)	(.0022)

Notes: Post-NFIP Income = Pre-NFIP Income – Premiums + Total Payments. Column 3 is Column 1 minus Column 2. Positive numbers denote progressive flood insurance program. Standard errors are in parenthesis. The asterisks denote significance at the 5% level. Years with progressive flood insurance program are 1982, 1984, 1985, 1986, 1990, 1993, 1996, 1997, 1998, 1999, 2002, 2003 and 2006. Other years are proportional.

Table 4. Measures of the NFIP Proportionality (1980-2006)

Year	Premium Proportionality (*DP*) (1)	Payout Proportionality (*DP*) (2)
1980	– 0.0158	0.0069
	(.0209)	(.0492)
1985	– 0.0225	0.1119
	(.0224)	(.0645)
1990	– 0.0217	0.1522*
	(.0185)	(.0354)
1995	– 0.0154	-0.0025
	(.0186)	(.0456)
2000	– 0.0015	0.1438*
	(.0167)	(.0365)
2005	– 0.0243	0.2539
	(.0193)	(.2101)
2006	– 0.0010	0.0704
	(.0176)	(.0036)

Notes: Premium (payment) proportionality is measured by subtracting the Gini index of total county income (Table 3, Column 1) from the concentration index of the premium (payment). Standard errors are in parenthesis. The asterisks denote significance at the 5% level.

Table 5. Flood Insurance Progressivity: Five Year Time Periods

Periods	Net Redistributive Effect (*RE*) (1)	Premium Proportionality (*DP*) (2)	Payout Proportionality (*DP*) (3)
1981-1985	Progressive	Progressive	Progressive
1986-1990	Progressive	Progressive	Neutral
1991-1995	Progressive	Progressive	Neutral
1996-2000	Progressive	Neutral	Progressive
2001-2006	Neutral	Neutral	Neutral

Note: The year 2005 was excluded in the 2001-2006 period.