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8 Courting Disaster? The Transformation of Federal Disaster Policy since 1803

David A. Moss

8.1 Introduction: Disasters in America, 1543–1993

Natural catastrophes have always plagued the residents of what are now the United States. One of the earliest disasters on record dates to 1543, when the explorer Hernando de Soto witnessed the full fury of the Mississippi River. According to Garcilaso de la Vega (1951, 554), who chronicled de Soto's voyage, "That which previously had been forests and fields was converted now into a sea, for from each bank the water extended across more than twenty leagues [about sixty miles] of terrain. All of this distance was navigable in canoes and nothing was visible except the pine needles and branches of the highest trees." The flood of 1543 surely affected the Native Americans who lived and hunted in the Mississippi valley at that time. But the human significance of this type of disaster was transformed as the density of population and settlement increased sharply with the arrival of the Europeans, the founding of a new nation, and the rapid economic growth seen in the nineteenth century. As a congressional task force subsequently observed, "Floods are an act of God; flood damages result from acts of men" (*Unified National Program* 1966, 14).

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By 1927, the year of another massive flood in the lower Mississippi valley, the region was crowded with homes, farms, and other businesses. Once again, the river swelled to about sixty miles in width, inundating over 16.5 million acres of land in 170 counties (a land area roughly the size of Ireland). Several hundred people lost their lives as a result of the 1927 flood, over half a million were left temporarily homeless, and damages were estimated at $300 million, or almost $3 billion in 1993 dollars (American National Red Cross 1929, 10, 120–21; Daniel 1977, 10).[1]

When the next great flood struck the upper Mississippi region in 1993, the economic effect was even greater. An estimated 20 million acres flooded or were too waterlogged to support crops, leading the Soil Conservation Service to state with only some exaggeration that "it was as though a sixth Great Lake, centered around northern Iowa, had sprung up in the Midwest" (Phillips 1994, 18). The 1993 flood inflicted considerably less human misery than its predecessor in 1927: thirty-eight lives were lost and fifty-five thousand persons displaced. Yet the economic effect of the 1993 flood was much greater. Analysts estimated overall damages at between $12 and $16 billion (National Oceanic and Atmospheric Administration 1994, pp. 1.4–1.5; Facts on File 1993; Freivogel 1993; Sheets 1993, 67; *Sharing the Challenge* 1994, 16).

Of course, floods are only one type of natural disaster. Those organizations—both public and private—charged with aiding disaster victims must also address hurricanes, tornadoes, earthquakes, mudslides, and numerous other calamities. But the great Mississippi floods just described provide an ideal baseline against which to measure changes in public expectations and government responsibilities in the United States in time of disaster.

In response to the massive Mississippi Flood of 1927, the federal government and the American National Red Cross organized the biggest disaster-relief effort in U.S. history to that time. As was customary, Calvin Coolidge, president of the United States, was also president of the American National Red Cross.[2] On 22 April 1927, he announced:

> The Government is giving such aid as lies within its power. Government boats that are available are being used to rescue those in danger and carry refugees to safety. The War Department is providing the Red Cross with tents for housing refugees. The National Guard, State and local authorities are assisting. But the burden of caring for the homeless rests upon the agency designated by Government charter to provide relief in disaster—The American National Red Cross. For so great a task additional funds must be obtained immediately.
>
> It therefore becomes my duty as President of the United States and President of the American National Red Cross to direct the sympathy of our

1. There is some dispute over the number of flood-related fatalities in 1927. At the time, officials insisted that fatalities numbered fewer than 10, but Daniel has since estimated the number at between 250 and 500 (see also Koenig 1993).

2. See the discussion below of the founding and evolution of the American National Red Cross.

> people to the sad plight of thousands of their fellow citizens, and to urge that generous contributions be promptly forthcoming to alleviate their suffering. (American National Red Cross 1929, 13)

As Coolidge suggested, the federal government and the Red Cross worked together in the relief effort, but the latter carried most of the financial burden. Federal assistance remained limited mainly to the lending of government equipment and personnel and to placing the bully pulpit of the presidency at the disposal of private fund-raising efforts. Although Coolidge refused to call a special session of Congress as some representatives from the affected states urged, he did direct his commerce secretary, Herbert Hoover, to help run the relief effort and ordered the rest of his cabinet to assist when necessary. Through various agencies, the federal government spent about $10 million (or 3.3 percent of total damages) on relief. The Red Cross, by comparison, collected $17.5 million in cash donations as well as another $6 million in in-kind contributions. It also provided emergency services, including food and shelter, to more than 600,000 flood victims over a fourteen-month period (see Lohof 1968, esp. 122, 169–70, 185; American National Red Cross 1929, 10–13).[3]

Herbert Hoover viewed the efforts of the Red Cross in 1927 as enormously successful. By today's standards, the dollar amounts were minuscule and the reimbursement rates small. Together, the states, the federal government, and the Red Cross covered only about 13 percent of total damages. But, by the standards of the time, the effort appeared herculean. Hoover declared that the Red Cross had "become the one guarantee to the American people that loss of life shall be prevented in calamity and that suffering shall be mitigated to the utmost degree" (quoted in American National Red Cross 1929, 145). Writing his memoirs a decade later, Hoover recalled with pride the relief efforts of 1927. Obviously dismayed by President Franklin D. Roosevelt's expansionary New Deal policies, Hoover noted that private sources had provided the bulk of assistance in 1927. "Those were the days," he wrote nostalgically, "when citizens expected to take care of one another in time of disaster and it had not occurred to them that the Federal Government should do it" (Hoover 1952, 2:126).

By 1993, however, Hoover's worst fears appeared to have been realized since just about everyone expected the federal government to bail out the victims of that year's Great Mississippi Flood. By late July, President Clinton had declared all of Iowa and multiple counties in eight other midwestern states federal disaster areas. With the passage in August of Public Law (PL) 103-75 (*Emergency Supplemental Appropriations* 1993), a large emergency supplemental appropriation, a host of federal agencies ranging from the Army Corps of Engineers to the Federal Highway Administration swung into action. Most important of all was the Federal Emergency Management Agency (FEMA), which oversaw much of the relief effort.

3. The affected states added roughly another $10 million in relief appropriations.

As the emergency requests made their way through Congress beginning in July, there was no significant disagreement about whether the federal government should undertake a massive relief effort. Instead, legislators mainly debated how the bailout should be financed. "What is at stake here," Representative Gerald Solomon (R-New York) stated, "is a very important principle, and that is whether we are willing to find other means to pay for these disaster assistance costs or whether we will simply let them add to the deficit. That is how we got in this awful sea of red ink that we are in today" (*Congressional Record* 139 [22 July 1993]: H5001).

Three House members sponsored "pay-as-you-go" amendments to the Midwest aid bill that sought to offset disaster spending with cuts to other government agencies. Representative Jim Slattery (D-Kansas) proposed a 1 percent across-the-board reduction in fiscal 1994 discretionary spending, while Representatives Timothy Penny (D-Minnesota) and Jim Nussle (R-Iowa) suggested trimming roughly $3 billion from the budgets of a variety of federal agencies, including the FBI, the Coast Guard, OSHA, and NASA (*Congressional Record* 139 [22 July 1993]: H5002, H5006). In support of cost-offsetting measures, Representative Mac Collins (R-Georgia) declared, "At a time of tight budgets, spending Federal dollars to help those flood victims is more important than spending 900-plus million dollars on direct aid to Russia or spending $1.9 [billion] on a space station or $300 million on additional health care benefits to illegal aliens and spending millions of taxpayer dollars on the National Endowment for the Arts" (*Congressional Record* 139 [20 July 1993]: H4783). But, as other members of Congress maintained, these were not necessarily programs that the government should sacrifice just because a flood had struck unexpectedly in the Midwest.

Stalled on 22 July by a bipartisan coalition of fiscal conservatives, the aid bill came again to the House floor the following week. This time, members from flood-stricken districts helped push it through without any pay-as-you-go provisions. The human tragedy that was unfolding simply overwhelmed arguments about fiscal responsibility. Said one congressman, "If you ask the American in the Midwest who is paddling towards his living room or watching his business go down the drain whether he wants us to sit here today and have a budget discussion or whether he wants to pass disaster aid, I submit he would say, 'I want disaster aid'" (Albert R. Wynn [D-Maryland], quoted in Krauss 1993). Cognizant of mounting public pressure, the Senate quickly followed the House and approved the disaster-aid bill on 4 August.

By this point, the package had swelled from President Clinton's initial $2.5 billion request to $6.3 billion, or about half of total estimated damages. Representatives from the affected states sympathized with President Clinton's concerns about the deficit but insisted that their constituents were in the midst of a crisis and that $2.5 billion was not nearly enough to help them (see Hegger 1993; "Clinton Pressed for Additional Flood Aid" 1993; Freemantle 1993).

The increase to $6.3 billion resulted from a long list of additional pleas for assistance, most of which seemed perfectly reasonable under the circumstances. Senators Tom Harkin (D-Iowa) and Christopher Bond (R-Missouri), for example, succeeded in changing the formula for calculating crop-loss payments to farmers. Their more generous provisions added nearly $1 billion to the package. Said Senator Harkin, "Now I say it's time to quit letting OMB twist our tails. . . . Agriculture is all there is."[4]

Although no serious opposition to the relief appropriation ever emerged, the congressional debate nonetheless revealed considerable discomfort with the direction of federal disaster policy. As has been mentioned, some lawmakers expressed concern that the cost of federal disaster relief was becoming unmanageable. Robert C. Byrd, chair of the Senate Appropriations Committee, repeatedly cautioned his colleagues against fiscal excess, asserting that "disasters are not spending opportunities" (quoted in Dewar 1993).

Others worried that a knee-jerk federal policy was rewarding personal irresponsibility on the part of home- and business owners in floodplains and other disaster areas. As Representative Fred Grandy (R-Iowa) observed, "We're basically telling people, 'We want you to buy insurance, but if you don't, we'll bail you out anyway'" (quoted in Benenson 1993). By this logic, the federal government was contributing to a potentially enormous moral hazard problem. Representative Patricia Schroeder (D-Colorado) asked on the House floor, "As we watch this tremendously awful flood scene unravel in the Midwest . . . and we look at the terrific debt, we are going to have to make some very difficult choices. One of the main choices will be: Do we help those who took responsibility, got flood insurance, put up levees, tried to do everything they could; or do we help those who did not do that, who risked it all and figured if all fails, the Federal Government will bail them out?" (*Congressional Record* 139 [19 July 1993]: H4760).

Politicians from the affected states showed little patience with such questions. "This is not a time for debating the fine points of long-term policy," exclaimed Governor Mel Carnahan of Missouri. "We have acted in other disasters, whether they be hurricanes, whether they be earthquakes, whether they be other floods. We even acted to help Kurdistan and the savings and loans" (quoted in Hegger 1993). Victims of the Mississippi Flood, he maintained, deserved no less. Echoing these sentiments, Governor Jim Edgar of Illinois

4. Originally, Senators Thad Cochran (D-Mississippi) and Robert J. Dole (R-Kansas) had sought to win support in Congress for a much bigger increase in farm payments by agreeing to make the changed formula retroactive to 1990. Farm disaster assistance had been cut from forty-two to twenty-one cents per dollar lost in 1990 in order to address budget constraints. The Clinton administration rejected the Cochran-Dole initiative on the grounds that it would cost an additional $3.4 billion. According to the *Washington Post,* Harkin and Bond won administration support for their less costly proposal, which included no retroactive payments, "after phone calls to the White House" (Dewar 1993, A19; see also "$5.7-Billion Disaster Relief Bill Is Approved" 1993; "Senate Committee OKs Aid Bill" 1993).

asserted that the Great Flood was "just as serious a problem for the country as war. I don't think anyone is expecting 100 percent reimbursement, but it has to be adequate" (quoted in Freemantle 1993).

In the end, warnings about fiscal excess and moral hazard proved no match for the politics of relief in the middle of a catastrophe. The massive appropriation was passed overwhelmingly in both houses of Congress, and President Clinton did not hesitate when given the opportunity to sign it.[5]

The key question now, in the aftermath of the 1993 flood and several other record-breaking catastrophes of the last few years, is whether federal disaster policy can be rationalized or, alternatively, whether the politics of relief will remain as uncontrollable in the future as they have been in the recent past. With federal disaster spending since the mid-1970s averaging about $7 billion annually (in constant 1993 dollars), and with every indication that the figure will rise in the years ahead, policymakers in Washington have good reason to be concerned. The remainder of this paper will offer some perspective on the problem by examining the history of federal disaster relief, surveying how disaster policy actually works today, and suggesting a practical proposal for reforming the system.

8.2 A Brief History of Federal Disaster Policy

8.2.1 Ad Hoc Relief, 1803–1947

The first known instance of the federal government providing relief to disaster victims dates to 1803, when Congress granted the victims of a fire in Portsmouth, New Hampshire, an extension on the repayment of customhouse bonds. Between 1803 and 1947, various floods, earthquakes, and fires prompted at least 128 specific legislative acts offering ad hoc relief. In most cases, the acts authorized the purchase and distribution of provisions and medical supplies (see *Congressional Record* 96, pt. 9 [7 August 1950]: 11900–11902). Despite the frequency of such legislation, the federal government did not view disaster relief as an ongoing federal responsibility. More often than not, the federal government provided no assistance at all in the aftermath of a disaster.[6] In the mid-1880s, for example, President Grover Cleveland vetoed a bill that would have appropriated $10,000 for the distribution of seed to the victims of a severe drought in Texas. He explained:

5. The House of Representatives passed the emergency supplemental appropriation bill by a vote of 400 to 27 on 27 July. The bill was then favorably reported to the full Senate by a unanimous 29 to 0 vote of the Senate Appropriations Committee on 30 July. The full Senate passed the bill by a voice vote on 4 August, and President Clinton signed it into law (as PL 103-75) eight days later.

6. Whereas between 1803 and 1947 the federal government provided disaster relief, on average, less than once per year, between 1977 and 1993 it provided assistance, on average, for thirty-four disasters per year (see *Federal Disaster Assistance* 1995, table 1.1, p. 5).

> I can find no warrant for such an appropriation in the Constitution; and I do not believe that the power and duty of the General Government ought to be extended to the relief of individual suffering which is in no manner properly related to the public service or benefit. A prevalent tendency to disregard the limited mission of this power and duty should, I think, be steadfastly resisted, to the end that the lesson should be constantly enforced that though the people support the Government, the Government should not support the people. . . . Federal aid in [cases of misfortune] encourages the expectation of paternal care on the part of the Government and weakens the sturdiness of our national character, while it prevents the indulgence among our people of that kindly sentiment and conduct which strengthen the bonds of a common brotherhood. ("President Cleveland's Veto Statement" 1887)

Clara Barton, who traveled to Texas during the drought and reported that relief efforts there could be handled out of local resources, supported Cleveland's position (Barton to Cleveland 1887; see also Hurd 1959, 77–78). Barton, then in her sixties, was herself a major figure in the history of American disaster relief. She had founded the American National Red Cross in 1881 and, more than anyone else, was responsible for transforming it into a quasi-public disaster agency.[7]

In 1905, Congress passed a bill designating the American National Red Cross the official agent of the federal government in providing disaster relief. Ever since its founding, the Red Cross had raised and distributed private funds to aid the victims of disasters. But, after 1905, these services became the organization's legal responsibility. Congress had appropriated no new funds but simply assigned to this volunteer association the task of raising relief aid through private means (see Hurd 1959, 111–12). The biggest test of America's quasi-public system of disaster relief came twenty-two years later, during the Great Mississippi Flood of 1927. As has been mentioned, the Red Cross carried most of the burden in a large-scale cooperative relief effort that included state and federal agencies.

8.2.2 Flood Control

Although Congress appropriated only $10 million for relief and reconstruction associated with the 1927 flood, it spent nearly $300 million the following year on flood-control projects along the lower Mississippi (Lohof 1968, 243–44). Indeed, it was at this point in time that flood control began to be accepted primarily as a job for the federal government.

Communities had historically employed flood-control works such as levees to protect low-lying property. Through most of the eighteenth and nineteenth centuries, individual proprietors, towns, and states had assumed responsibility for levee construction and maintenance. But their uncoordinated efforts some-

7. Barton spelled out her understanding of the role of her organization in Barton to Cleveland (1886).

times worked at cross-purposes and frequently made the situation worse: in channeling floodwaters away from one person's land, a levee usually pointed it in the direction of a neighbor's. By 1879, the need for improved navigation and flood control on the Mississippi had prompted the federal government's direct involvement. Established that year as a permanent agency of the War Department, the Mississippi River Commission focused specifically on regulation and coordination of private-sector efforts.[8]

Over subsequent decades, a series of devastating floods sparked debate over the extent to which the federal government should assume responsibility for providing protection. Local Midwest businessmen, among others, lobbied for a sustained financial commitment.[9] Congress passed the first flood control act (PL 64–367) in 1917 and a second six years later. Both acts authorized flood control as part of the Mississippi River Commission's work, appropriating roughly $10 million annually for such projects. Still, the legislation emphasized local responsibility.[10] The Mississippi River Commission worked with the U.S. Army Corps of Engineers to repair and strengthen levee systems. As early as 1926, the Corps' chief of engineers had claimed that these improvements made for a safe navigation channel and could now "prevent the destructive effects of floods" (quoted in Daniel 1977, 6). The historic Mississippi River Flood of 1927 may have proved him wrong, but it did not shake confidence in the efficacy of flood control. Indeed, it spurred increased federal participation and the building of ever bigger and better works.

Following the $300 million appropriation in 1928, Congress formally declared flood control a federal responsibility in the Flood Control Acts of 1936 and 1938. The 1938 act authorized 100 percent federal financing of dams and reservoirs. Focused on the reclamation of land for agricultural and commercial enterprises, the Army Corps of Engineers concentrated its efforts on structural approaches to flood protection such as reservoirs, levees, channels, and the diversion of major rivers.[11]

8.2.3 Toward a Permanent Federal Role in Disaster Relief, 1947–93

Meanwhile, the federal government had begun taking more responsibility for disaster relief. In the wake of several natural catastrophes during the 1930s, the Federal Relief Administration and the Federal Civil Works Administration

8. On the history of flood-control efforts, see Daniel (1977, 5–7), Lohof (1968, 214–44), and Hoyt and Langbein (1955, 138–61).

9. In 1913, e.g., Midwest businessmen presented their case for federal involvement at a congressional hearing on the subject. "There is not now any question," they declared, "as to the right and duty of the National Government to make necessary appropriations for the care and regulation of the water highways of the country—its own property" (see *Mississippi River, Hearings on H.R. 1749* 1913, 31).

10. Local authorities were to contribute not less than one-third of the cost of construction and repair (see "A Brief Chronology" 1928).

11. By 1993, the Army Corps of Engineers maintained about 275 levees in the Mississippi region alone (see Facts on File 1993, 624 E3; see also Koenig 1993, 1A).

received authority from President Franklin Roosevelt to distribute surplus federal property to state and local governments and to repair damaged roads and bridges. Congress formalized this practice in 1947 when it passed the first general disaster relief act. In the event of a disaster, local governments could turn to the War Assets Administration or the Federal Works Administration. These agencies processed requests and arranged for the delivery of surplus federal property.

The major turning point in government involvement, however, came in 1950 with the passage of PL 81-875. (For a chronology of federal disaster legislation, see table 8.1.) Known as the Disaster Relief Act of 1950, the law created a permanent relief fund and gave the president broad discretionary power to decide what constituted a disaster eligible for federal aid. While the Red Cross continued to manage the distribution of relief to private citizens and businesses, the federal government now assumed responsibility for the repair and restoration of local government facilities.[12]

Through the 1950s and early 1960s, the federal government broadened and refined the contours of the 1950 law—in most cases with little debate or controversy. The 1951 Kansas-Missouri Flood, for example, led Congress to authorize emergency housing for disaster victims. Several years later, rural communities, unincorporated towns, and state facilities became eligible for federal assistance, as did Guam, American Samoa, and the Trust Territory of the Pacific Islands. Relief acts passed in 1964 and 1965 in response to disasters in multiple states (including a severe earthquake in Alaska, floods in the Pacific Northwest, and Hurricane Betsy in the Southeast) increased federal contributions to highway reconstruction and expanded federal loan programs, such as those of the Small Business Administration (SBA) and the Farmers Home Administration (FmHA) (see Office of Emergency Preparedness 1972, 1:168–70).[13] A proposed 1966 disaster relief bill to expand the range of federal assistance prompted a number of congressmen to declare that the time had come for the federal government to provide relief on a "uniform, nationwide basis" (*Congressional Record* 112, pt. 20 [17 October 1966]: 27096–27097). Indeed, step by step, the federal role in disaster relief had been transformed. Whereas in 1953 Red Cross assistance outpaced federal spending on disasters by a ratio of 1.6 to 1, by 1965 federal disaster aid exceeded Red Cross spending on disasters by nearly 8 to 1 (Dacy and Kunreuther 1969, table 2-1, p. 32).[14]

12. On the legislative history of federal disaster relief, see esp. May (1985, 17–47); Popkin (1990); *Federal Disaster Assistance* (1995, 99–102); Office of Emergency Preparedness (1972, 1:167–73); and Kunreuther (1973, 3–21).

13. Kunreuther (1973, 9) maintains that the earthquake in Alaska "marked a turning point in the federal government's role in disaster relief. The severity of the damage caused concern that, unless the SBA liberalized its [loan] policy, many individuals would not qualify for a disaster loan because of their inability to pay off their old mortgages and other debts and still make monthly payments to the SBA."

14. In calculating total federal spending on disasters in 1953 and 1965, a subsidy rate on SBA loans of 33 percent was assumed.

Table 8.1 Federal Disaster Legislation, 1950–94

1950, PL 81-875	Disaster Relief Act: Created permanent relief fund; authorized federal funding for repair of local government facilities
1951, PL 82-107	Amendment to 1950 law: Authorized federal emergency housing
1953, PL 83-134	Amendment to 1950 law: Permitted donation of federal surplus property such as cots, hardware, lumber, and plumbing supplies to state and local governments for distribution to individuals
1962, PL 87-502	Amendment to 1950 law: Extended federal assistance eligibility to state facilities in addition to Guam, American Samoa, and the Trust Territory of the Pacific Islands
1966, PL 89-769	Disaster Relief Act: Extended federal assistance eligibility to rural communities, unincorporated towns, and villages Federal funding for damage to higher-education facilities Affirmed authority of Office of Emergency Preparedness to coordinate all federal disaster relief programs Special loan provisions
1968, PL 90-448	National Flood Insurance Act: Provided for federally subsidized insurance along with federal reinsurance provisions Permitted sale of policies by private-insurance agents
1969, PL 91-79	Disaster Relief Act (limited to 15 months): Funding for debris removal from private property Distribution of food coupons Unemployment benefits for disaster victims Temporary housing for disaster victims SBA, FHA, VA loan revisions
1970, PL 91-606	Disaster Assistance Act: Codified existing disaster legislation and added the following: Grants to individuals for temporary housing/relocation Funding for legal services Community payments for tax loss
1974, PL 93-288	Disaster Relief Amendment: Distinguished emergencies from major disasters Emphasized disaster-mitigation programs
1980, PL 96-365	Federal Crop Insurance Act: Made all commercial crops part of the program Introduced premium subsidy Permitted private-insurance companies to sell federal crop insurance
1988, PL 100-707	Stafford Act: Constituted principal federal authority for providing disaster relief (expansion of original 1950 authorization)
1994, PL 103-325	NFIP Reform Act: Tightened flood-insurance purchase requirements Expanded mitigation incentives
1994, PL 103-354	Federal Crop Insurance Reform Act: Offered catastrophic coverage for a $50.00 administrative fee per crop, per county Provided additional coverage at subsidized rates

Source: Adapted from Office of Emergency Preparedness (1972, vol. 1, table 1) and May (1985, tables 2.1, 2.3).

The trend of growing federal involvement accelerated further during the early 1970s. In a presidential message on disaster assistance in April 1970, Richard Nixon announced: "As we move into a new decade, one of the nation's major goals is to restore a ravaged environment. But we must also be ready to respond effectively when nature gets out of control and victimizes our citizens" ("Message from the President" 1970, 6). The country had experienced twenty-nine major disasters in 1969, requiring an allocation of roughly $150 million from the President's Disaster Relief Fund. It was the largest appropriation for disaster relief since the enactment of PL 81-875 nineteen years earlier ("Message from the President" 1970, 1).

Responding to the devastation of Hurricane Camille and other catastrophes of 1969, Congress passed the 1970 Disaster Relief Act (PL 91-606). This legislation aimed to establish a permanent and comprehensive program of federal assistance, one that covered both private and public losses. Through the 1960s, federal disaster relief had gradually expanded to include funding for the repair of damaged higher-education facilities, debris removal from private property, and unemployment compensation and food coupons for hard-pressed disaster victims. The federal government had also increased the availability of SBA and FmHA disaster loans. The 1970 act not only codified this diverse disaster legislation but also charted new territory. Strongly emphasizing relief for individual victims, it mandated grants for temporary housing and legal services. Authorization for the permanent repair of public facilities (as opposed to the earlier restriction to temporary repair) and a focus on hazard mitigation constituted other key features of the act. An amendment that followed in 1974 established a two-tiered system distinguishing emergencies from major disasters and stepped up incentives for disaster-mitigation efforts. It expanded the president's authority to provide immediate relief and enlarged the category of public facilities eligible for repair and restoration. The 1974 amendment also made available a wider range of assistance for states and individuals.[15]

By the mid-1970s, federal disaster legislation provided an overall structure for public and private assistance. It did not, however, mandate a detailed agenda for response. Issues such as the division of responsibility among federal, state, and local authorities, or even among agencies within the federal government, remained open-ended and loosely organized. Successive administrations therefore focused on streamlining relief efforts as well as on implementing mechanisms for cost containment. In 1978, President Carter established the Federal Emergency Management Agency (FEMA) to coordinate disaster programs distributed across a host of government agencies, including the Departments of Agriculture, Commerce, Labor, and Housing and Urban Development.[16]

15. On legislative developments through 1974, see Office of Emergency Preparedness (1972) and Kunreuther (1973) as well as the key federal acts: PL 81-875 (1950), PL 89-769 (1966), PL 91-79 (1969), PL 91-606 (1970), and PL 93-288 (1974).

16. On the origins of FEMA, see *Federal Disaster Assistance* (1995, 94–97).

Table 8.2 **Federal Dollars Obligated for Disaster Assistance, Fiscal Years 1977–93 (in millions of constant 1993 dollars)**

Fiscal Year	Number of Disasters[a]	Comprehensive Emergency Management Component				Total[b]
		Preparedness	Mitigation	Response	Recovery	
1977	53	176	2,004	175	5,592	7,947
1978	40	189	2,102	211	14,849	17,351
1979	53	313	2,136	507	10,262	13,218
1980	30	220	1,818	38	7,748	10,167
1981	16	380	1,644	31	13,181	15,235
1982	26	81	1,567	31	4,247	5,926
1983	20	109	1,525	42	1,787	3,463
1984	40	105	1,565	48	2,368	4,086
1985	19	93	1,466	28	1,329	2,916
1986	30	78	1,368	82	1,733	3,261
1987	25	77	1,424	55	1,515	3,072
1988	17	77	1,415	28	743	2,262
1989	29	72	1,431	252	6,327	8,082
1990	35	66	1,447	282	4,792	6,586
1991	39	69	1,425	70	1,230	2,794
1992	48	65	1,450	678	4,461	6,654
1993	58	62	1,290	476	4,828	6,656
Annual average	34	131	1,593	199	5,117	7,040

Source: Federal Disaster Assistance (1995, table 1.1, p. 5).

Note: Table excludes civil defense preparedness expenditures and federal disaster-insurance-program costs, except for flood-hazard-mapping activities of the NFIP. Complete fiscal year 1977–93 obligation data were not available for every disaster-related program/activity.

[a]Number includes both major disasters and emergencies.

[b]Totals may not add because of rounding.

From 1977 to 1993, federal disaster spending varied from year to year but averaged about $7 billion in constant 1993 dollars (see table 8.2). Although disaster relief looked very much like an entitlement, it did not technically qualify as one. Unlike mandated AFDC or Medicaid programs, federal disaster assistance depended almost entirely on discretionary year-to-year and emergency congressional appropriations (see table 8.3).

8.2.4 Federal Flood and Crop Insurance

As the federal role in disaster relief expanded in the 1960s and 1970s, so did interest in federal disaster insurance, specifically against flood and crop damage. Policymakers emphasized the self-financing nature of such programs and their potential to curb expensive supplemental relief allocations each time a disaster struck. Flood insurance was of particular interest since most private insurers excluded flood damage from their general property and casualty policies. Knowing that individual flood risks in a given geographic area were often highly correlated, insurers feared that catastrophic flooding could wipe them

Table 8.3 **Supplemental Appropriations for Disasters, Fiscal Years 1970–94 (millions of dollars)**

Fiscal Year	Current Dollars	Constant 1993 Dollars	Fiscal Year	Current Dollars	Constant 1993 Dollars
1970	305	1,098	1983	25	36
1971	485	1,659	1984	153	210
1972	61	198	1985	419	553
1973	2,805	8,682	1986	547	702
1974	384	1,105	1987	109	136
1975	32	345	1988	55	66
1976	242	588	1989	1,207	1,388
1977	904	2,033	1990	2,850	3,143
1978	3,308	6,924	1991	0	0
1979	1,452	2,793	1992	6,063	6,224
1980	2,797	4,935	1993	3,474	3,474
1981	233	373	1994	8,412	8,245
1982	131	195			
Average					2,204

Source: Federal Disaster Assistance (1995, table 5.1, p. 77).

out. William G. Hoyt and Walter B. Langbein wrote in 1955 that floods "are almost the only natural hazard not now insurable by the home- or factory-owner, for the simple reason that the experience of private capital with flood insurance has been decidedly unhappy" (p. 104).

Reformers argued that a federally backed insurance program would succeed where private insurers had failed by spreading flood risks nationwide and providing the necessary financial reserves. It would also strike a better balance between the need for federal assistance in large-scale disasters and private responsibility. As disaster experts Douglas Dacy and Howard Kunreuther remarked in the late 1960s when Congress was debating this issue, "It is our hope that the flood insurance bill before Congress will be swiftly passed and eventually extended to cover other natural hazards, enabling the federal government to withdraw from its paternalistic role in relation to the private sector" (1969, 235).

The National Flood Insurance Act of 1968 (PL 90-448) offered coverage for residential and business properties. It particularly emphasized preventive efforts such as zoning regulations and building codes in order to minimize potential flood damage. For the most part, premiums corresponded to actual risk. Exceptions were made for structures erected before an area's identification as a flood zone, in which case subsidized rates applied. Over the years, the National Flood Insurance Program (NFIP) successfully encouraged better flood protection. But it did not entirely meet the goals of its original proponents. The program suffered from low subscription—except among those at highest risk. Because there were few mechanisms to require homeowners in floodplains to

purchase insurance, many chose to remain uninsured and simply hope for the best. According to Benenson (1993, 1861), as few as one in five mortgageholders in flood-zone areas participated in the NFIP.

Repetitive-loss cases for buildings erected before the cutoff date of 1974 presented another serious problem. As long as damage from a single flood never exceeded 50 percent of the property's value, owners qualified for subsidized insurance. Such a provision allowed the Rulos family in Grafton, Illinois, to file four flood-insurance claims after buying a home in 1978. According to the Senate Task Force Report, repetitive-loss cases as of 1993 amounted to 2 percent "of the properties covered by flood insurance policies but accounted for 53 percent of the claims paid and about 47 percent of the dollars paid from the Flood Insurance Fund" (*Federal Disaster Assistance* 1995, 63).[17]

Federal crop insurance marked another significant attempt by lawmakers to take up the slack of private-insurance companies as well as to reduce the effect of natural disasters on the nation's farm economy. After a number of private companies failed trying to provide multiperil crop insurance during the first two decades of the twentieth century, Congress began to show interest in sponsoring a federal initiative. The idea came and went until the mid-1930s, when severe droughts transformed public crop insurance into a potent political issue. At President Roosevelt's initiative, federal crop insurance was finally enacted in 1938 under the Agricultural Adjustment Act. Part of a larger agricultural stabilization plan, the insurance program initially proved quite limited, covering only selected crops in selected counties. Over the years, however, Congress broadened the crop-insurance program and also supplemented it with substantial ad hoc farm-disaster payments. These ad hoc payments, which seemed to reward the uninsured, came under increasing fire in the 1970s.

Like the earlier flood-insurance legislation, the Federal Crop Insurance Act of 1980 (PL 96-365) attempted to eliminate ad hoc disaster payments by stressing coverage under a public-insurance program. To encourage higher levels of participation, the 1980 act introduced a premium subsidy as well as coverage for all commercial crops in all agricultural counties. But these changes did not have the desired results. After 1980, fewer than half of eligible farmers purchased crop insurance. Since generous ad hoc payments continued to be made to the uninsured in the aftermath of disasters, many farmers must have reasoned that even a subsidized insurance policy made little sense for them. As a result, the crop-insurance program was plagued by low participation and high costs. In 1993, farmers' premiums ($563 million) covered only 30 percent of total program costs (i.e., indemnities of $1.514 billion plus administrative costs of $355 million). The difference constituted a large federal subsidy to farmers. (See tables 8.4 and 8.5.)[18]

17. "On the Disaster Dole" (1993) cites slightly different figures. It states that, although "repetitive loss cases" amount to only 3 percent of all claims, "they account for more than a third of all payments."

18. For details on federal crop and flood insurance, see *Federal Disaster Assistance* (1995, 13–15, 112–15, 118–20). On crop insurance, see also Goodwin and Smith (1995, esp. chap. 3).

Table 8.4 **National Flood Insurance Program Income and Costs, Fiscal Years 1977–93 (in millions of constant 1993 dollars)**

Fiscal Year	Total Income[a]	Insurance Program Expenses		Administrative Expenses[c]	Total Government Cost[d]
		Loss and Loss Adjustment	Other[b]		
1977	200	157	107	182	182
1978	221	307	98	194	194
1979	263	767	127	187	187
1980	272	517	280	138	138
1981	365	189	172	96	995
1982	416	243	167	69	559
1983	431	647	103	90	146
1984	501	488	148	88	140
1985	476	230	150	73	336
1986	536	354	192	67	115
1987	601	183	137	66	0
1988	544	73	188	63	0
1989	701	614	195	59	0
1990	710	353	217	58	0
1991	698	240	219	59	0
1992	728	488	207	53	0
1993	763	985	226	58	0
Average	$496	$402	$173	$94	$176

Source: Federal Disaster Assistance (1995, table 1.8, p. 13).

[a]Total income includes premiums, investment income, other income, and federal policy fees.

[b]Includes underwriting expense, interest expense, and adjustments and deferrals.

[c]Includes salaries and expenses and floodplain-management expenses.

[d]Figures represent appropriations for NFIP expenses. For fiscal years 1977–86, government costs consisted of administrative expenses and repayments of past loans from the Treasury. Beginning in fiscal year 1986, the NFIP has been required to pay all program and administrative expenses from the insurance fund.

8.3 Disaster Policy in Perspective: The Transformation of Public Risk Management in the United States since 1960

As should be clear from the brief history just offered, federal disaster policy represents an intricate patchwork of disparate programs and commitments. The first major piece was the Disaster Relief Act of 1950, which committed the federal government to a permanent role in disaster assistance. The patchwork grew most rapidly, however, during the late 1960s and early 1970s as program after program was added and expanded. This was the time when the federal government extended its standard coverage to include not only public casualties of disasters (such as schools, town halls, and so on) but private businesses and individuals as well. To cite just one example of the change, the number of subsidized home loans provided by the Small Business Administration (SBA) to disaster victims rose from only 11 in 1953 to 1,540 in 1963 to a peak of 195,762 in 1973 (data courtesy SBA). The average size of an individual disas-

Table 8.5 **Crop-Insurance Program Income and Costs, Fiscal Years 1977–93 (in millions of constant 1993 dollars)**

Fiscal Year	Premium Paid By: Farmer	Premium Paid By: Government	Indemnities[a]	Excess Losses[b]	Administrative Cost	Total Government Cost[c]
1977	204	0	319	117	45	162
1978	213	0	311	98	48	146
1979	181	0	92	−88	46	−42
1980	277	0	538	263	67	330
1981	532	75	763	155	168	398
1982	462	136	505	−94	192	234
1983	323	93	632	215	176	484
1984	463	134	893	295	244	673
1985	453	132	873	289	270	691
1986	382	115	771	273	255	643
1987	369	91	516	56	224	371
1988	385	124	1,261	751	280	1,155
1989	654	220	1,308	434	407	1,061
1990	697	235	1,142	212	396	843
1991	585	207	1,010	217	348	772
1992	581	202	1,003	219	341	762
1993	563	198	1,514	753	355	1,306
Average	431	115	791	245	227	588

Source: Federal Disaster Assistance (1995, table 1.9, p. 14).

[a]Indemnities are the costs of payments to farmers for crop losses.

[b]Excess losses are indemnities minus total premiums (figures may not add because of rounding).

[c]Total of premiums paid by the government, excess losses, and administrative costs (figures may not add because of rounding).

ter loan (in constant dollars) remained remarkably stable from the 1950s to the 1990s. What increased—and increased dramatically—beginning in the late 1960s was the number of citizens covered by such federal disaster policies as the SBA loan program (see figure 8.1).

In fact, the dramatic expansion of federal disaster relief after 1960 was part of a broader transformation of risk-management policy in the United States. As I have argued elsewhere (see Moss 1996, 1998), the state and federal governments had always engaged in various forms of risk management. Until about 1900, most risk-management policies provided security for businesspeople against risks that were thought to discourage investment and trade. Limited liability for corporate shareholders and bankruptcy law are two notable examples of what I have labeled *Phase I* risk-management policies. Beginning mainly after 1900, a new set of risk-management policies emerged, offering security to the American worker against a variety of industrial hazards, including on-the-job accidents, unemployment, and loss of income in old age. Social insurance legislation and countercyclic fiscal policy stand out as the primary policy innovations of *Phase II. Phase III* commenced around 1960

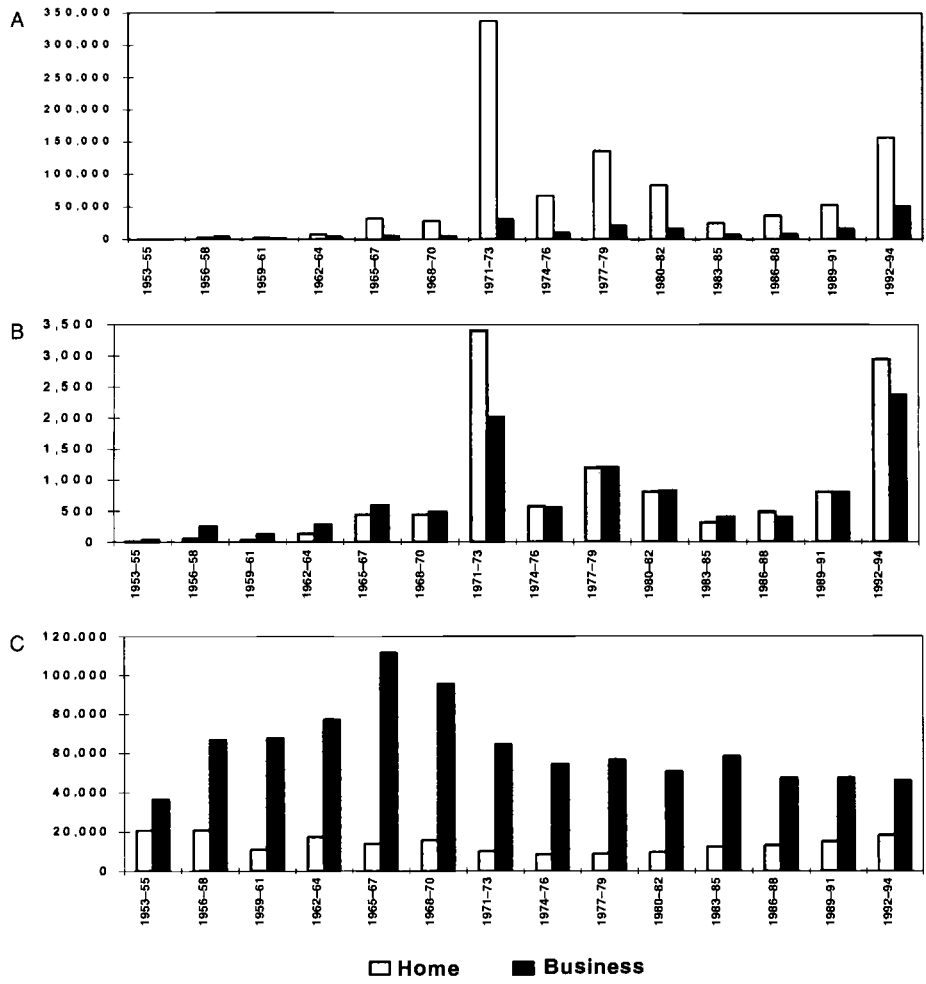


Fig. 8.1 Historical profile of SBA disaster loans: *A*, Number of SBA disaster loans; *B*, Total value of SBA disaster loans (in millions of constant 1987 dollars); *C*, Average size of SBA loans (in constant 1987 dollars)

Source: David Moss and Julie Rosenbaum, "The Great Mississippi Flood of 1993," case no. 797-097. Boston: Harvard Business School, 1997. Copyright © 1997 by The President and Fellows of Harvard College. Reprinted by permission. Data courtesy the Small Business Administration.

and involved an extension of risk-management policy to protect not only business and labor but also citizens more generally. The expansion of federal disaster relief after 1960 represents one of the many changes associated with Phase III. Some of the others include a transformation of product-liability law, the rapid growth of consumer protection and environmental regulation, and an explosion of federal financial guarantees (see table 8.6).

Table 8.6 **The Three Phases of Risk-Management Policy in the United States**

	Phase I: Creating a Secure Environment for Business	Phase II: Creating a Secure Environment for Workers	Phase III: Creating a Secure Environment for All Citizens
Period 1, prior to 1900	Property rights Common internal currency Deposit insurance (state legislation) Limited liability Bankruptcy law Fixed exchange rate		National defense[a] Local poor relief[a]
Period 2, 1900–1960	Deposit insurance (federal legislation)[b] Crop insurance[b] Foreign-investment insurance	Workplace safety regulation Workers' compensation Old age insurance Unemployment insurance Macroeconomic stabilization policy[b] Disability insurance	Product-safety laws (esp. foods and drugs) Federally insured mortgages (FHA and VA)
Period 3, since 1960	Company bailouts Country bailouts	Occupational safety and health regulation Pension regulation and insurance	Dramatic expansion of: Federal disaster relief[b] Health, safety, and environmental protection Federal insurance[b] Other federal financial guarantees[b] Means-tested "welfare" programs[a] Liability law

Source: Moss (1996, exhibit 1).

[a]Status as a "risk-management" policy uncertain.

[b]May fit into more than one phase.

The transitions from Phase I to Phase II to Phase III were, in my view, primarily a consequence of the rapid rise in income that industrialization generated. The primary objectives of Phase I risk-management policies were heightened economic activity and resource mobilization, two important sources of economic growth. Once national income had increased sufficiently, however, the goal of economic security—at first just for workers but ultimately for everyone—began to rival economic growth as a dominant social objective. That is, rising incomes induced a relative change in social priorities, which in turn drove the transformation of risk-management policy (Moss 1996).

A broad consideration of public risk management and its historical evolution in the United States helps explain not only why the federal government became so deeply involved in disaster relief but also why it did so in particular during the second half of the twentieth century. One part of the explanation has to do with the nature of disaster risk. While the public sector has historically managed many different types of risk, those that threaten victims with financial devastation have always proved especially attractive to lawmakers. Indeed, the vast majority of risk-management policies address relatively low-probability, high-consequence events. A short list of such policies includes limited liability for corporations, bankruptcy discharge, workers' compensation, unemployment insurance, deposit insurance, and pension insurance. Of course, disaster policy also addresses the threat of low-probability, high-consequence events. Howard Kunreuther (1993) has suggested that private markets deal poorly with such risks (see also Camerer and Kunreuther 1989). It may be that this market weakness accounts, at least in part, for policymakers' notable interest in them—and in disaster relief in particular.

A second part of the explanation for the federal government's increased role in disaster relief relates to the nature and pressures of Phase III. The enactment of new risk-management policies, and the expansion of existing ones, accelerated sharply after 1960. Between 1966 and 1980, Congress enacted a broad array of health, safety, and environmental legislation.[19] Over the same years, the maximum insured bank deposit under federal deposit insurance was increased tenfold, from $10,000 to $100,000 (U.S. Department of the Treasury 1991, table 2). In 1968, the same year that federal flood insurance was established, Congress also created federal crime insurance (ostensibly for areas

19. Some of the highlights include the National Traffic and Motor Vehicle Safety Act of 1966, which created the National Highway Transportation Safety Administration (NHTSA); the National Environmental Policy Act of 1969; President Nixon's 1970 Executive Order creating the Environmental Protection Agency (EPA); the Occupational Safety and Health Act of 1970, which established the Occupational Safety and Health Administration (OSHA); the Clean Air Act of 1970; the Clean Water Act of 1972; the Consumer Product Safety Act of 1972, which established the Consumer Product Safety Commission; and, several years later, the Comprehensive Emergency Response, Compensation, and Liability Act (CERCLA) of 1980, which has come to be known as Superfund. Between 1960 and 1980, the number of pages in the *Federal Register*—a favorite index of the regulatory explosion publicized by critics—increased more than fivefold, from 14,479 to 87,012 pages. On the increase in pages, see Koepp (1987, 50).

inadequately served by private carriers) and federal riot reinsurance (Greene 1976, 1979; *Federal Disaster Assistance* 1995, 112–21). The following year, Congress set up the Overseas Private Investment Corporation (OPIC), which offered political risk insurance to American businesses investing abroad (Robin 1984, 936–37). The Pension Benefit Guaranty Corporation, which insured workers against pension-fund failures, was established in 1974; and between 1970 and 1973 most states created insurance-guaranty funds to protect property and casualty policyholders against insurance-company insolvencies. Meanwhile, total public spending on social welfare in the United States surged, jumping from 11.5 percent of GDP in 1965 to 19.1 percent of GDP ten years later. The share of public social welfare spending in national income has remained roughly stable since then (Bixby 1993, esp. table 2, p. 74).[20] Many other examples could be provided, ranging from the transformation of product-liability law during the 1960s and early 1970s to the establishment of Fannie Mae, Freddie Mac, and Sallie Mae over roughly the same period (see Moss 1996, esp. 36–70).

The critical point here is that the rush of new risk-management policies after 1960 reflected a fundamental shift in public expectations about the role of government. Americans increasingly expected protection against an ever-widening array of hazards and, at the same time, were becoming more and more comfortable with federal insurance and other forms of public risk management.

What was distinctive about Phase III from the policymakers' standpoint was that security for the individual had become an end in itself—an apparent consequence of the nation's extraordinary postwar affluence.[21] During Phase I, policies that protected businesspeople against adverse risks no doubt advanced the security of some individuals. Bankruptcy-discharge provisions, for example, were often justified in the nineteenth century as relief measures for overextended debtors. But the primary purpose of these policies was to encourage those receiving protection to engage in trade and investment and thus to advance economic growth for the whole society. Although security for the individual was certainly an important motivation for worker-protection policies during Phase II, there nonetheless remained a broader objective as well—namely, social stability. Particularly after the First World War and during the

20. Total public spending on social welfare includes expenditures on social insurance (including Medicare), public aid (including Medicaid), other health and medical programs, veterans' programs, and housing as well as child nutrition and a number of other small categories. Social insurance and public aid, which experienced the most dramatic increases, accounted for 44 percent of the total in 1965 and over 56 percent of the total in 1975.

21. Indeed, John Kenneth Galbraith's *The Affluent Society* appeared in 1958. In it, he articulated much of the logic that would define Phase III. With only a touch of hyperbole, he explained that "the notion, so sanctified by the conventional wisdom, that the modern concern for security is the reaction to the peculiar hazards of modern economic life could scarcely be more in error. Rather, it is the result of improving fortune—of moving from a world where people had little to one where they had much more to protect" (Galbraith [1958] 1984, 87).

Great Depression, many social reformers worried that worker insecurity threatened the very existence of democratic capitalism.[22] Only in Phase III did protection of the individual against adverse risks become, by itself, a primary and sufficient justification for far-reaching security legislation (see Moss 1996, esp. 72–74).

The path of federal disaster policy over the last thirty to forty years is thus entirely consistent with broader developments associated with Phase III. The takeoff period in federal disaster spending came in the late 1960s and early 1970s, as Congress began for the first time to assume ongoing responsibility for assisting individual victims of natural disasters. In the absence of long-term public opinion polls on this subject, it is impossible to offer direct empirical evidence regarding changes in public expectations about the government's role in time of disaster. But it seems clear that public expectations increased enormously. As shown in figure 8.2, the federal government covered 6.2 percent of total damages after Hurricane and Flood Diane in 1955, 12.8 percent of damages after the Pacific Northwest Floods of 1964, and 48.3 percent of damages after Tropical Storm Agnes in 1972.[23] Since then, it has been common for the federal government to cover roughly half of uninsured losses stemming from major disasters.

The dramatic shift in public expectations is also evident in the politics of disaster relief. As we have seen, the massive bailout of 1993—which would have been inconceivable forty years earlier—faced almost no opposition whatsoever when it was passed in the wake of a calamity.[24] Americans had come to expect and demand public compensation for the victims of natural disasters just as they had come to expect and demand public compensation (or at least publicly mandated compensation) for a wide range of man-made hazards, from workplace accidents to pension-fund failures. Indeed, rising expectations drove the transformation of public risk management under Phase III, which involved, among other things, a transformation of federal disaster policy after 1960.

22. For example, the economist John R. Commons declared at a convention of government officials in 1919, "[U]nless the capitalistic system begins to take care of the security of the laborer, begins to make jobs as secure as investments, then there is a serious question, with the growing number of wage earners who have no capital of their own, whether that system can continue to exist" (see Commons 1919, p. 4, frame 818).

23. In none of these disasters were privately insured losses as a fraction of total estimated losses very large. The ratio of privately insured to total losses was 0.6 percent in the case of Hurricane and Flood Diane in 1955, virtually zero in the case of the Pacific Northwest Floods of 1964, and 4.9 percent in the case of Tropical Storm Agnes in 1972. These particular disasters were selected in part to allow a comparison of federal coverage across time for events in which private-insurance coverage was low (see Dacy and Kunreuther 1969, table 2-4, p. 46, and table 2-2, p. 35; Kunreuther 1973, table 3, p. 16).

24. In fact, public expectations regarding disaster relief have increased to such an extent that FEMA now feels compelled to instruct citizens that the federal government's responsibility in this area is not unlimited. In its *Citizen's Guide to Disaster Assistance* (1993), e.g., the agency highlights six common misconceptions about federal disaster policy. The first two misconceptions are that "the Federal government has total responsibility for disaster recovery" and that "the objective of Federal disaster assistance is to 'fix everything'" (see pp. 1–7).

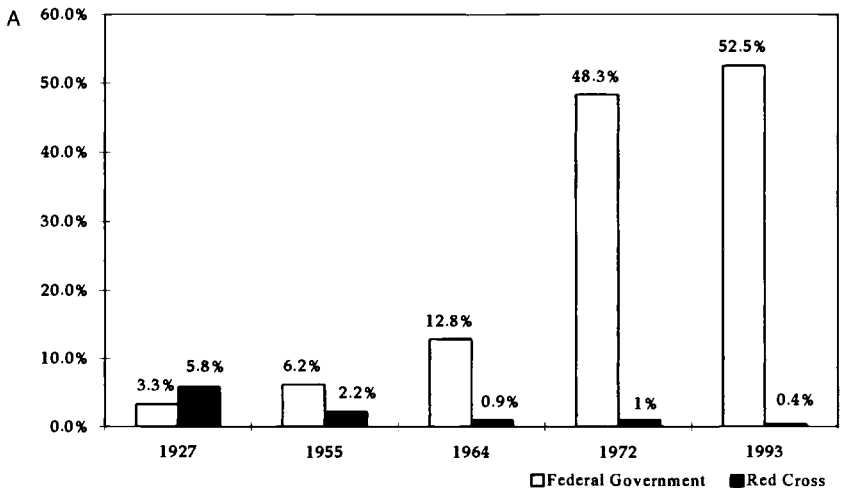


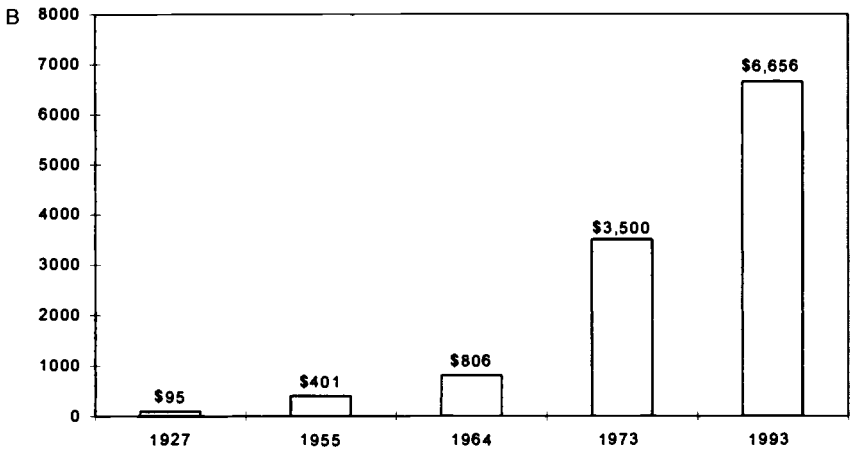
Fig. 8.2 Federal coverage of major natural disasters: *A*, Coverage rates—ratio of disaster spending to total estimated damages (in percentages)—on five major disasters, federal government and the Red Cross; *B*, Federal spending on major natural disasters, millions of 1993 dollars (1973 and 1993 fiscal years, not calendar years)

Source: David Moss and Julie Rosenbaum, "The Great Mississippi Flood of 1993," case no. 797-097. Boston: Harvard Business School, 1997. Copyright © 1997 by The President and Fellows of Harvard College. Reprinted by permission.

Panel A: The 1927 data pertain to the Mississippi floods of 1927. For estimates of total damages ($300 million), federal spending ($10 million), and Red Cross spending ($17.5 million), see Lohof (1968, 122, 185, 169). The 1955 data pertain to Hurricane and Flood Diane, and the 1964 data pertain to the Pacific Northwest Floods. For estimates of total damages ($832 million, $462 million), federal spending ($51.8 million, $59.4 million), and Red Cross spending ($18.3 million, $4.2 million), see Dacy and Kunreuther (1969, table 2-4, p. 46, and table 2-2, p. 35). The 1972 data pertain to Tropical Storm Agnes. For estimates of total damages ($2 billion), federal spending ($965 million), and Red Cross spending (1 percent of damages), see Kunreuther (1973, table 3, p. 16) and May (1985, table 7.7, p. 149). The 1993 data pertain to the Mississippi floods of that year. For estimates of total damages ($12 billion) and federal spending ($6.3 billion), see Facts on File (1993) and *Emergency Supplemental Appropriations* (1993). Data on Red Cross spending courtesy of the American Red Cross.

8.4 Federal Disaster Policy in Action: The Great Midwest Flood of 1993

Once federal lawmakers committed themselves to meeting high public demands in the area of disaster relief, how exactly did they go about assisting the victims? As a rule, major catastrophes overwhelmed the annual budgets allocated to government agencies providing relief. In such cases, after declaring a federal disaster, the president made an official request for supplemental appropriations (see table 8.3 above). In 1993, the record flooding in the Midwest triggered an enormous flow of funds (see table 8.7). Although numerous federal agencies took part in the relief effort, FEMA oversaw much of the operation and alone administered over $1 billion in disaster assistance. FEMA ac-



Panel B: In estimating federal spending on all major disasters in 1927, it was assumed that the amount expended on the Mississippi floods that year accounted for the vast majority of all federal disaster spending. Estimates of total federal spending on major disasters for 1955 ($73.9 million) and 1964 ($180.8 million) are based on Dacy and Kunreuther (1969, table 2-1, p. 32). Estimates of total federal spending for fiscal year 1973 ($1,170.1 million) are based on Kunreuther (1973, table 2, p. 14). Estimates of total federal spending for 1993 are from *Federal Disaster Assistance* (1995, table 1.1, p. 5). GDP deflators were used to convert these nominal figures into 1993 dollars. *Note:* In estimating federal spending on individual disasters (panel A) and total federal spending on all major disasters (panel B) for 1955, 1964, 1972, and fiscal year 1973, only the subsized portion of federal loans was included. It was assumed that the approximate subsidy on loans equaled one-third of their face value. Naturally, the full value of federal grants was included in each calculation. There was no need to estimate the subsidized portion of federal loans in either 1927 or 1993. Little if any of the federal spending in 1927 was devoted to loans, and by fiscal year 1993 the federal government had changed its accounting system for disaster spending so as to include only the subsidized portion of federal loans.

cepted applications for cash grants of up to $11,900 each from individuals and families without access to other disaster aid. It also provided temporary housing assistance, unemployment compensation, food, legal services, and crisis counseling (see *Federal Disaster Assistance* 1995, 152–53).

Housing grants, which covered rent and minor repairs to flood-damaged homes, helped Shirley Bornman deal with her extensive property loss. Made homeless when waters rose to the roof of her house, she received from FEMA $240 per month, guaranteed for eighteen months or until she was better settled. Bornman relied as well on payments from her NFIP policy, administered by FEMA. She had paid roughly $400 per year to insure her house for $45,000 and the contents for $12,000. Bornman, however, was not typical of most floodplain residents. Only about 11 percent of the Midwest flood victims had flood insurance, and claims payments from the NFIP totaled only $297.3 million (see Sheets 1993, 67; *Sharing the Challenge* 1994, 27).[25]

25. For 1993 participation rates, see *Federal Disaster Assistance* (1995, 160).

Table 8.7 **Federal Disaster Spending for the Midwest Flood of 1993 (millions of dollars)**

Federal Department/Agency	Budgetary Resources					Obligations by Fiscal Year		
	Resources Provided in Emergency Supplemental 1 (August 1993)	Additional Assistance for This Disaster from Base Appropriations	Total Resources Available					
			Amount	% Public[a]	% Private[b]	1993	1994	1995
USDA	3,117.2	1,021.7	4,138.9	0	100	677.1	2,203.1	1,024.0
Commerce Department	201.0	0.0	201.0	100	0	6.3	27.6	167.1
HUD	500.0	0.0	500.0	0	100	125.0	353.6	21.4
Transportation Department	212.0	0.0	212.0	100	0	42.0	133.7	36.3
Army Corps of Engineers	305.0	12.0	317.0	100	0	71.2	178.3	67.5
SBA[c]	398.7	294.9	693.6	0	100	301.5	234.8	0.0
FEMA	1,233.5	0.0	1,233.5	75	25	322.3	680.4	230.8
Other	332.8	49.1	381.9	67	33	92.7	234.0	54.9
Totals	6,300.2	1,377.7	7,677.9	24.9	75.1	1,638.1	4,045.5	1,602.0

Source: Data courtesy of the Office of Management and Budget. Also consulted: Agriculture Department, Commerce Department, HUD, Transportation Department, Army Corps of Engineers, SBA, and FEMA.

[a]Proportion of "Total Resources Available" targeted at public-sector recipients. Estimated by author.

[b]Proportion of "Total Resources Available" targeted at private-sector recipients. Estimated by author.

[c]Amounts for the SBA refer to the face value of its disaster loans. The subsidy rate for 1993 SBA flood loans was estimated at approximately 20 percent of face value.

Local communities also turned to the federal government. FEMA's public assistance programs helped rebuild infrastructure, including state and local government buildings, roads, and water-treatment plants. States and municipalities were also eligible for debris removal and emergency-work funds as well as community disaster loans in the event of substantial tax-base loss. Overall, public-sector relief accounted for one-quarter of federal spending on the 1993 flood (see table 8.7).

In Des Moines, the municipal waterworks suffered $12 million in physical damages and restoration expenses as a result of the flooding. Through the Fireman's Fund insurance company, the waterworks had added an endorsement to its general policy to provide $10 million in flood coverage. This extra insurance, which was not available for residential properties, had cost $2,000 per year. It proved critical that summer in restoring the plant. For expenses not covered by the insurance policy—such as the cost of sandbagging the levee and rent for temporary office space—the waterworks relied on FEMA's cost-sharing program for local governments. Although the standard cost-sharing arrangement obliged states to pick up 10 percent and local communities 15 percent of the cost of rebuilding public facilities, President Clinton waived these requirements in 1993, insisting on a combined state and local contribution of only 10 percent. In the case of the Des Moines waterworks, the state of Iowa picked up the entire 10 percent not covered by the federal government. With nearly all the direct property damage and restoration expenses covered through a combination of public and private sources, the only significant cost to the waterworks was $2 million in lost revenue.[26]

Another large chunk of federal disaster aid in 1993 went to farmers in the form of Department of Agriculture crop payments, FmHA loans, and Soil Conservation Service grants. Initial estimates set agricultural damage from direct flooding at over $2.5 billion, but, in the end, agricultural damage probably ran considerably higher than that. Those farmers with federally subsidized crop insurance qualified for compensation once their losses exceeded 35 percent of expected production. Those without insurance, however, collected almost as easily, qualifying for aid when losses were greater than 40 percent (*Sharing the Challenge* 1994, 16, 22; *Emergency Supplemental Appropriations* 1993, 1697). Technically, a farmer could combine a price-support payment, a crop-disaster payment, and a crop-insurance payment to recoup as much as 90 percent of the value of his crops (Freivogel 1993; Sheets 1993, 67). Congress's emergency appropriation allocated almost $2.5 billion to the Commodity Credit Corpora-

26. Telephone interview with Tamera Mason, Des Moines Water Works, May 1996. On cost-sharing arrangements between federal, state, and municipal governments, see "More Aid Arranged" (1993, A10). Once again, after the Northridge Earthquake of 1994, President Clinton increased the federal share for rebuilding state and local facilities from the standard 75 percent to 90 percent. Even that increase left California governor Pete Wilson disappointed since Wilson wanted the federal government to fund 100 percent of public reconstruction efforts (see Reeves 1994, 15A).

tion to relieve stricken farmers. Because ruined land from sand and debris compounded crop loss, Congress also appropriated $400 million to the Soil Conservation Service for soil repair. Ultimately, over half of all federal disaster spending on the 1993 flood covered agricultural losses (see table 8.7).

Tom Waters was one of the many farmers hit hard by the Midwest Flood of 1993, which stormed through the network of levees that usually protected his farmland near the river. That year he had planted twelve hundred acres of corn, soybeans, and wheat. By the end of the flood, only nine acres remained above water. Not only did Waters lose his crop, but sand deposits and holes filled his fields. Because federal all-peril crop insurance for floodplain farms was very expensive, Waters had opted against it. He was eligible for federal crop-disaster payments, however, which covered over three-fourths of the approximately $35,000 in material expenses that he incurred planting his 1993 crops. (In a typical year, he would have received roughly $80,000 after harvesting and selling them.) For help with his damaged fields, Waters turned to the Soil Conservation Service's cost-sharing program. The agency awarded just over $17,500, which covered 64 percent of the cost to remove debris, plow under sand, and level farmland. The remaining 36 percent Waters had to provide out of his own savings.[27]

The Small Business Administration's (SBA) loan program for both individuals and businesses constituted yet another important component of federal disaster relief. To ease the effect of flood loss, businesses small and large could apply for two types of disaster loans: one covered property damage and the other economic injury resulting from lost profits. In the wake of the flooding, Congress raised the disaster-loan limit from $500,000 to $1.5 million. By 15 November, seventy-five businesses had been approved for loans over $500,000 (*Small Business Administration Disaster Assistance* 1994, 7). Although the SBA charged a 4 percent interest rate in most cases, companies with substantial liquid assets or other available credit paid 8 percent. Individuals, too, were entitled to SBA loans for help in repairing damaged homes and recovering property. Like businesses, they simply needed to show ability to repay. The cost to the government of these subsidized interest rates was substantial—perhaps as much as one-third the face value of the loans (see, e.g., *Budget of the United States Government* 1996, 927).

One recipient of an SBA disaster loan in 1993 was Jeff Weber of Iowa, who lost both his home and his business to floodwaters. Inundation was so severe that for almost fifteen days he had to travel six-tenths of a mile by boat to reach the structures. Weber owned and ran a small business rebuilding automobile parts. Because of the number of waterways and the network of dams and levees in the region, government floodplain agencies had considered the area a low-risk zone for flooding. Relying on that information, Weber had not seen it necessary to take out flood insurance on the business. To satisfy the mortgage

27. Telephone interviews with Tom Waters, May 1996.

company when he bought his home, however, he had been required to purchase minimal flood insurance on that structure. This ultimately covered about 50 percent of the damage to his home. To stretch the insurance dollars, Weber had done almost all the rebuilding on his own. Like other individuals in the region, he also relied on help from private charitable organizations. While these organizations did not provide actual funds, their volunteers offered moral support and badly needed manpower to clean away the layers of sludge and dirt deposited by churning floodwaters. FEMA entered the scene early on to make preliminary damage estimates. Determining that Weber was not eligible for grant-in-aid programs, FEMA officials passed his file onto the Small Business Administration for a disaster loan. He qualified for both a home and a business loan. Concerned about going into debt, he took only a small loan for the house to cover approximately 10 percent of the damage; but he accepted a much larger one for his business. The SBA loaned the money in installments and required receipts to ensure that payments were spent in accordance with the loan terms. Because of serious structural damage, Weber ended up erecting a new building to house his office. Again, he did most of the work himself to avoid heavy labor costs. He subsequently took out flood-insurance policies on both his business and his home.[28]

On top of SBA loans, allocations for levee repair, health and environmental hazards, and highway and rail reconstruction rounded out federal relief expenditures. In addition, the federal government forwent revenue by permitting disaster-related tax write-offs—although much smaller ones than it had allowed in the 1970s. Prior to 1982, individuals could deduct damaged property minus salvage value and insurance or other reimbursements. The tax-code revision of 1982, however, instituted the \$100/10-percent rule, which held that the only nonbusiness casualties qualifying for deductibility were unreimbursed losses exceeding \$100 *and* 10 percent of one's adjusted gross income. The 1982 rule meant that a propertyowner with, for example, an adjusted gross income of \$40,000 could deduct only \$900 on an uninsured loss of \$5,000 (i.e., \$5000 minus \$100 minus 10 percent of \$40,000).

8.5 Federal Disaster Policy: Problems, Prospects, and Proposals

8.5.1 Problems

As should be clear from the discussion presented above, disaster policy represents a sizable federal commitment—and one that has begun to set off a few alarm bells in Washington. Just about everyone agrees that disaster victims deserve some sort of public help in their time of need. But there is considerable disagreement over just how far the federal government should go. Soon after the Northridge Earthquake of early 1994, which brought forth at least \$12

28. Telephone interview with Jeff Weber (a pseudonym), December 1995.

billion in federal disaster expenditures (Critzer 1995), the U.S. Senate established a task force to study federal disaster policy. In a letter accompanying their final report, the task force's cochairs, Senators John Glenn and Christopher Bond, suggested that the nation's disaster policy, though serving an important public purpose, had finally begun to run up against real budgetary constraints: "In creating this Task Force, the Senate found that the policy underlying such federal disaster assistance was rooted in historical precedent and the American tradition of helping friends and neighbors who have been plagued by these unfortunate tragedies. At the same time the Senate noted that the growing cost of disaster assistance—six major emergency supplemental appropriations Acts totaling over $17 billion since fiscal year 1988—must be reconciled with the current budgetary restraints imposed on discretionary spending and our budget reduction goals" (*Federal Disaster Assistance* 1995, vii).[29] The senators might have mentioned that the amount that Congress appropriated for relief and reconstruction in the aftermath of the Northridge Earthquake just about equaled what the federal government spent annually on the AFDC program. Clearly, disaster relief had become a significant budget item.

Looking forward, it appears that budget pressures stemming from federal disaster policy are likely to intensify in the future. There are two basic reasons for this. First, high public expectations about the federal government's disaster responsibilities contribute to a powerful political dynamic in Congress while dampening personal responsibility among citizens. Second, growing uncertainty about the likelihood and potential costs of future natural disasters threatens to drive many private insurers away from catastrophe coverage, thus leaving the federal government with a larger potential pool of uninsured losses to address.

As this paper has attempted to demonstrate, public expectations about federal disaster relief have strengthened considerably since the 1960s. Indeed, public expectations are now so elevated that few politicians dare raise objections to a massive appropriation in the aftermath of a catastrophe. Disaster spending has become a political sacred cow. According to a survey conducted in 1995 for the Insurance Research Council, 87 percent of Americans either strongly approved (51 percent) or moderately approved (36 percent) of the federal government providing disaster relief (Insurance Research Council 1995, 63–67). The political dynamic evident in Congress in the wake of the 1993 flood demonstrated the power of these attitudes at a moment of crisis. Again and again in the aftermath of disasters, representatives from the affected states have insisted that their constituents deserve no less than what other vic-

29. A subsequent passage in the same letter reads: "There is no question Americans traditionally, and selflessly, have given themselves, their time, and their support to help fellow citizens who have suffered as a result of these catastrophes. That indeed is a hallmark of this country. And we should expect—and deserve—as much from the federal government. But just as our response to disasters must be swift, it must also be cost-effective, especially in an age where federal dollars are increasingly hard to find" (*Federal Disaster Assistance* 1995, x).

tims received in the past and that the particular nature of their disaster might justify even more. Federal catastrophe coverage has thus been subject to a ratcheting-up process from disaster to disaster, whereby coverage rates occasionally increased (particularly in the late 1960s and early 1970s) and only very rarely declined (see fig. 8.2 above and fig. 8.3).[30]

One important consequence of all this is that the federal government now lacks credibility when it threatens to withhold relief ex post from those individuals who fail to follow certain rules or meet particular criteria ex ante. At the time of the 1993 flood, for example, many farmers in the affected area were upset about a federal rule that denied soil-repair grants to anyone involved in three or more disasters over the previous twenty-five years. They proceeded to petition their representatives for help. In the end, Congressman Harold Volkmer (D-Missouri) persuaded the Agriculture Department to rescind the disqualification and make all farmers eligible. The failure of federal policymakers credibly to commit obviously generates a moral hazard problem. Citizens who feel confident that the government will pay are more likely to forgo insurance coverage and to live in more hazard-prone areas.[31] By increasing the level of uninsured disaster losses that the federal government will find itself politically bound to compensate in the future, the credible-commitment and moral hazard problems together form a vicious circle that ought to alarm federal policymakers.

Federal lawmakers also have reason to worry about new disaster-related findings within the scientific community that could lead to dramatically increased federal expenditures in the years ahead. Traditionally, it had been assumed that disaster experience over the recent past constituted a reasonable basis for assessing the likelihood of disasters in the future. If a particular region experienced four major hurricanes over the previous twenty years, then the probability of a major hurricane hitting the region in any future year was thought to be about one in five. But, according to Anthony H. Knap, director of the nonprofit Bermuda Biological Station for Research, "Assessing the historical frequency of natural catastrophes has certain inherent weaknesses. For example, the cycle of natural processes may be longer than the time period in

30. In 1993, e.g., one representative from Illinois reminded his colleagues on the House floor what he had done to support the victims of other disasters in the past: "Let me also tell my colleagues that when this gentleman was asked to come to the aid of California in their disaster, for the disaster in Florida and the disaster in Texas, I marched up that Hill to help American people in need. Today what we get are theories about how to pay for it" (*Congressional Record* 139 [22 July 1993]: H5005). Of course, disaster relief has always been subject to logrolling in Congress. In 1965, in an effort to assure disaster relief for his constituents, Senator Long remarked on the floor of the Senate, "[A]s I have told the senator [Proxmire] privately, if his State should ever be visited with a similar disaster, he could count on my vote to help provide for his people" (quoted in May 1985, 21).

31. In fact, the most hazard-prone states (such as California, Florida, Hawaii, and Texas) have, for quite some time, experienced much faster population growth than has the nation as a whole. Florida, e.g., experienced a population growth rate of 43 percent between 1980 and 1994, as compared to only 15 percent nationally (see Dunleavy et al. 1996, 5).

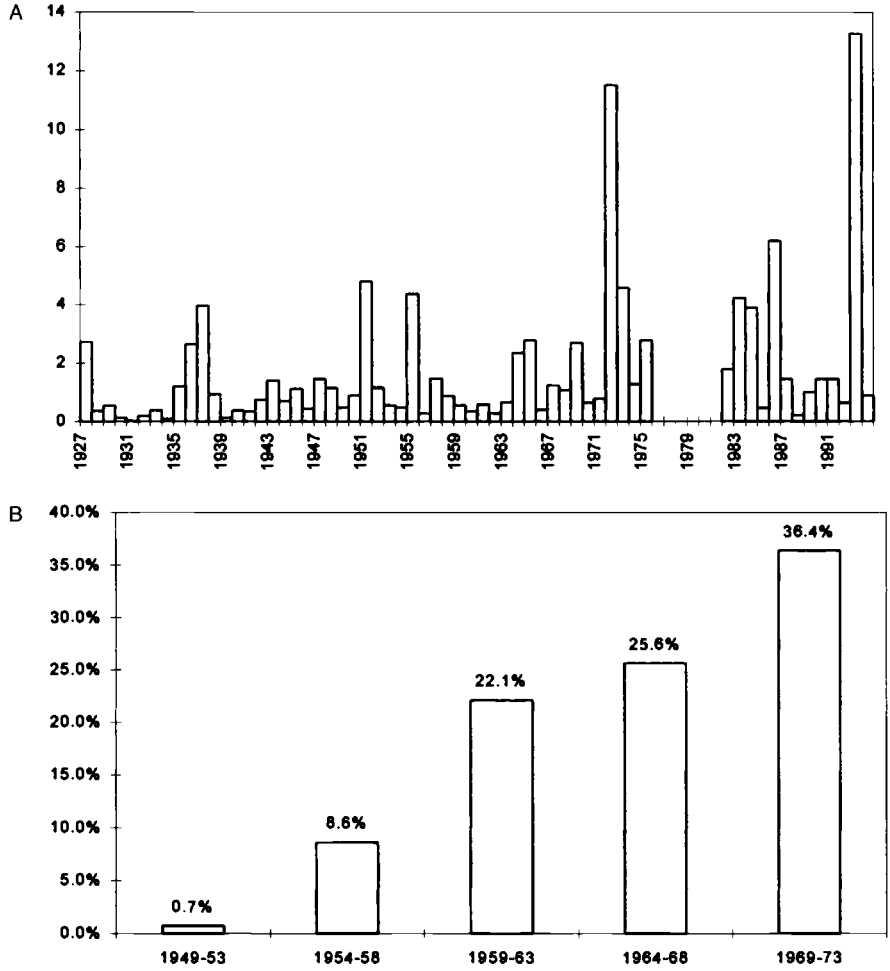


Fig. 8.3 Flood damage and federal relief: *A*, Flood damages in the United States, 1927–94 (in millions of 1987 dollars); *B*, Federal flood relief subsidies as a fraction of total flood damages in the United States, 1949–73

Sources: David Moss and Julie Rosenbaum, "The Great Mississippi Flood of 1993," case no. 797-097. Boston: Harvard Business School, 1997. Copyright © 1997 by The President and Fellows of Harvard College. Reprinted by permission.

Flood-damage estimates for 1927–75 are from *Climatological Data* 28, no. 13 (1977): 117. Flood-damage estimates for 1982–92 are from U.S. Army Corps of Engineers, *Annual Flood Damage Report to Congress for Fiscal Year 1992* (1993, fig. 2, table 10); data for 1993 and 1994 are from U.S. Army Corps of Engineers, *Annual Flood Damage Report to Congress for Fiscal Year 1994* (1995, table 4). A GDP deflator was used to convert nominal dollars to 1987 dollars. Data on the subsidized portion of federal flood-relief spending for 1949–73 are from Abeles, Schwartz (1978, table 4, pp. 9–10).

Note: In panel A, data are not available for 1976–81.

which they were observed. In addition, the past record may be inaccurate because of technical limitations at that time. Finally, human activity perturbs the global climate, perhaps changing the course of the cycles" (quoted in Banham 1995, 27). Richard T. Gordon, an applied physicist and scientific consultant to Chubb, offers a similar warning: "Insurers are making huge assumptions that the past will be the key to the future. We have at hand about 110 years of recorded observations of global climate activity. I can tell you with certainty that we have not seen the range of climate variation in that time. When you talk geologic time scales, 110 years just does not register. That means there are hurricanes out there that we have not seen in the past 110 years" (quoted in Banham 1995, 27).

Although a clear consensus has yet to form within the scientific community, many researchers are now suggesting that natural catastrophes are likely to come more frequently and strike with greater intensity in the years ahead. William Gray, a Colorado State University meteorologist, is predicting dramatically increased hurricane activity. Believing that we are now coming out of a twenty-year cycle of relative calm, Gray maintains, "Inevitably, long stretches of destruction will return. . . . Florida and the East Coast will see hurricane devastation as they have never experienced before" (quoted in Catalano 1995, 66; see also Cowen 1994). Meanwhile, several groups of seismologists have recently announced the existence of an "earthquake deficit" in California. Because the Los Angeles basin experienced many fewer earthquakes over the past two hundred years than would have been expected on the basis of geological science, these seismologists are anticipating increased earthquake activity in the future (see "Grievous Faults" 1995; Monastersky 1995). Finally, the biggest scientific question mark of all, global warming, threatens to generate more floods, droughts, and fires as well as hurricanes and other windstorms over the very long term. Gerhard Berz, a meteorologist who runs the technical research division at Munich Re, offers an almost apocalyptic warning: "The increased intensity of all convective processes in the atmosphere will force up the frequency and severity of tropical cyclones, tornadoes, hailstorms, floods and storm surges in many parts of the world, with serious consequences for all types of property insurance" (quoted in Leggett 1993, 29).[32]

Naturally, such scientific predictions have enormous implications for private insurers. And, since the federal government tends to pick up a large portion of uninsured disaster losses, any change in insurance coverage necessarily has significant implications for federal policy as well.

Before 1989, no natural disaster in the United States had ever caused more than $1 billion in insured losses. Hurricane Hugo shattered that record, increasing it by a factor of four. Even after Hugo, however, U.S. insurers tended to

32. Many analysts also cite demographic shifts—namely, domestic migration into coastal states, which are generally more prone to disasters than inland states—as another factor that will contribute to increased natural catastrophe losses in the years ahead (see, e.g., Dunleavy et al. 1996, 4–5; Durham, Johnson, and Winston 1995, 20).

assume that the worst possible windstorm would not cause damages to insured property in excess of $8 billion. Hurricane Andrew, which struck on 24 August 1992, transformed those expectations literally overnight. In the words of Phillip Longman, "This one storm alone blew apart Florida's private insurance market and even much of its fail-safe regulatory apparatus" (1994, sec. 1). The most costly disaster in American history, Andrew inflicted $15.5 billion in insured losses, which was about 50 percent more than all the premiums collected for property coverage in Florida over the previous 22 years. Estimates vary, but Andrew probably caused at least another $10 billion in uninsured losses (see Murphy 1995; Gastel 1996a; Longman 1994, sec. 1; Leggett 1993, 28; Ferrara 1995). Less than a year and a half later, insurers were blindsided once again when the Northridge Earthquake in southern California generated claims totaling $12.5 billion—a figure over three times larger than what the insurers had received in earthquake premiums over the previous twenty-five years (Quackenbush 1996; see also Gastel 1996b).

The one-two punch of Andrew and Northridge forced insurers to reassess their exposure to catastrophes nationwide and to begin taking a closer look at the newly emerging scientific research on natural disasters. Says Richard Gordon, "If in fact the past is not a good guide to what will happen in the future, the entire underwriting basis of what insurers are doing is flawed. That's a scary thought when you think of the billions of dollars that are at stake" (quoted in Banham 1995, 27).

Indeed, growing doubts about their ability to predict future catastrophic events on the basis of past experience has frightened quite a number of insurers. Many property and casualty companies, including the two biggest providers of homeowner's insurance, Allstate and State Farm, began to control their exposure in states like Florida and California by sharply limiting new coverage. Beginning in the fall of 1995, for example, State Farm stopped writing any new policies at all in Florida and worked to limit its operations in California and North and South Carolina as well as selected areas in Texas and Louisiana. In October 1996, Nationwide (the nation's fifth largest home insurer) announced a dramatic reduction of new sales of homeowner's insurance across the entire eastern seaboard and down through the Gulf of Mexico. Explaining the policy, which would affect sales from Maine to Texas, Nationwide's president declared, "Prudence requires us to diligently manage our exposure to catastrophic losses." Said the chief financial officer, "Nationwide Insurance possesses great financial strength—and we intend to keep it that way" (quoted in Treaster 1996).

The dramatic rise in disaster losses after 1989, along with mounting questions about the validity of predicting the incidence and severity of natural catastrophes on the basis of recent experience, had clearly shaken private insurers. Indeed, many simply decided to get out before it was too late. Reacting to Nationwide's announcement in October 1996, Jack Weber of the insurance industry's Natural Disaster Coalition acknowledged, "Finding companies that

will write policies in coastal areas is becoming increasingly more difficult. And the trend appears to be accelerating" (quoted in Treaster 1996).[33]

8.5.2 Prospects and Proposals

Proposals for reform have emerged at both the state and the federal levels. For their part, legislators in the most disaster-prone states have attempted to assure an adequate supply of catastrophic insurance coverage for their citizens. In the immediate aftermath of Hurricane Andrew, officials in Florida imposed a moratorium on insurance-policy nonrenewals and cancellations, thus frustrating the plans of most insurers to reduce coverage sharply in the state. In order to accommodate the demand for new policies, Florida lawmakers also established the Residential Property and Casualty Joint Underwriting Association (JUA), which became an insurer of last resort. On 30 June 1996, the JUA was servicing over 910,000 policies, making it the second largest property insurer in the state. Florida's insurance commissioner, Bill Nelson, insisted at that time that the state's strategy for solving the insurance problem was "going in the right direction" but nonetheless acknowledged, "We're in a crisis" (Navarro 1996). Since Andrew, Florida homeowners had experienced a 72 percent increase in insurance premiums, and most property insurers were still trying to limit coverage in the state wherever possible ("American Insurance" 1993; Navarro 1996; Gastel 1996a; Longman 1994).

A similar drama unfolded in California after the Northridge Earthquake of early 1994. The Northridge catastrophe convinced most insurers that providing earthquake coverage in California was simply too risky. Because of a state law requiring all home insurers to offer earthquake policies to their customers, many insurers felt compelled to get out of the homeowner's market altogether. California's insurance commissioner, Chuck Quackenbush, announced in 1995 that the "entire insurance industry . . . is engaged in a panic run for the border" (quoted in Keohe 1995).[34]

In order to address the mounting insurance crisis, California officials initially authorized the state's FAIR (Fair Access to Insurance Requirements) Plan to offer residential property and earthquake insurance. Originally created to provide insurance in "underserved" areas, such as inner-city communities, the FAIR Plan was transformed after the Northridge Earthquake into a property insurer of last resort, analogous to Florida's JUA. Insurance Commissioner Quackenbush, however, was uncomfortable with the idea of allowing the FAIR

33. In a recent article, Jaffee and Russell (1997) attributed the reluctance of private insurers to cover natural catastrophe risk to their unwillingness "to hold large amounts of liquid capital." This unwillingness, in turn, is attributed to a variety of "institutional factors," including accounting requirements, taxes on reserves (retained earnings) as well as on the interest income that they generate, and the threat of takeover that generally comes with large holdings of cash.

34. In the fall of 1995, Quackenbush explained to lawmakers in Washington, "The threat of earthquakes has resulted in a virtual shutdown of the market for new homeowners insurance policies. Companies representing 93 percent of the market have either stopped or restricted the sale of new homeowners policies" (quoted in Phinney 1996; see also Wood 1996, 4).

Plan to become, by default, one of California's largest insurers. Like the JUA in Florida, the FAIR Plan in California was funded in large measure on a post-assessment basis. In the event of a major catastrophe, losses in excess of premium revenue would be imposed on the state's private insurers according to their share of the residential market. As an alternative, Quackenbush advocated the creation of a specialized earthquake-insurance pool that would be funded primarily by the state's insurers. When he scaled back the FAIR plan to its original mission on 1 June 1996, many critics charged that he was playing politics, trying to create a crisis in order to force the enactment of his proposals for a new state agency. Whatever Quackenbush's true motivation, his decision certainly increased the pressure on lawmakers, and they quickly fell into line.

At the beginning of September 1996, state lawmakers approved the establishment of the California Earthquake Authority (CEA) and authorized it to sell earthquake policies. The legislation allows insurers willing to commit funds to the CEA to discontinue their own earthquake coverage. Commissioner Quackenbush expects that, if necessary, the CEA would be able to cover even a major disaster through a combination of premiums and insurance-company contributions. Individual claims would likely be less than they would be under traditional earthquake coverage since CEA policies (known by some as "minipolicies") have high, 15 percent deductibles and cover very little beyond structural damage to the home itself. Damage to pools, driveways, patios, and so on would no longer be covered. Most of the big insurance companies doing business in California supported the legislation because it would cap their liability. An analyst at Merrill Lynch, for example, estimated that the creation of the CEA would limit Allstate's earthquake exposure to $900 million. Of course, the state of California has implicitly accepted responsibility for losses that cannot be paid for out of both CEA premiums and the ex ante commitments of private insurers (Kersnar 1996; Scism 1996; Quackenbush 1996).

In addition to these state efforts, three distinct reform initiatives have emerged at the federal level. One of the three, and the only one on which Congress has already taken action, aims at increasing participation in the federal government's flood- and crop-insurance programs. Legislation enacted in 1994 to reform the National Flood Insurance Program (NFIP) increased incentives for flood-mitigation efforts and tightened enforcement of flood-insurance requirements. Among other things, it prohibited federal disaster relief to persons living in flood-prone areas who had failed to maintain required insurance. It also established penalties for banks and other regulated lenders that extended loans to borrowers without flood insurance. The law changed as well the NFIP's waiting period for new flood-insurance policies from five to thirty days. The old provision had allowed homeowners during the 1993 Midwest Flood to purchase insurance even when danger proved imminent.[35] Congress also

35. See *Congressional Quarterly Weekly Report* 51 (30 October 1993): 2985; 51 (6 November 1993): 3053; 51 (11 December 1993): 3371; and 52 (7 May 1994): 1130. See also the outline of PL 103-25 in *United States Code Congressional and Administrative News* 5 (1994): 2025–35.

sought to reduce the need for large emergency-disaster payments to farmers by enforcing participation in the federal crop-insurance program. The 1994 reform act required a minimum level of participation while providing lower premium rates and better coverage to farmers. At the same time, it made enactment of future supplemental disaster appropriations by Congress much more difficult. In addition to repealing the authorizing legislation for farm-disaster payments, the act restricted Congress's ability to circumvent budget-control regulations by designating farm-disaster appropriations as emergency spending (*Federal Disaster Assistance* 1995, 14–15, 120–21).[36]

A second approach to reform, originally advocated by the insurance industry's Natural Disaster Coalition and considered by Congress in 1995, would have established a national equivalent to the California Earthquake Authority. The new private entity, to be known as the Natural Disaster Insurance Corporation (NDIC), would be financed and administered by a consortium of private insurance companies. The NDIC would sell disaster coverage through these private insurers and would bear all the associated risk. Much like the CEA, the NDIC would effectively cap the disaster liability of private insurers. In the event of a major catastrophe or series of catastrophes that exhausted the NDIC's available resources, the NDIC would (under the original proposal) be authorized to borrow from the U.S. Treasury. Unlike the law that established the CEA, however, the proposed NDIC legislation would require all homeowners with federally assisted mortgages and living in earthquake- and hurricane-prone regions to purchase a minimum level of catastrophic coverage. Currently, over 90 percent of homeowners have mortgages that are in one way or another federally assisted (see Phinney 1996; Emerson and Stevens 1995; Lochhead 1995).

A third reform initiative at the federal level, put forth by the Clinton administration, aims to strengthen and expand the catastrophe reinsurance market by having the U.S. Treasury sell disaster-contingent claims on the open market. These contracts would pay off in the event of natural disasters causing at least $25 billion in insured damages. Once the $25 billion trigger was reached, each contract would pay $1 million for every additional billion dollars in damages, up to a maximum of $25 million. Presumably, insurers and reinsurers would buy these contracts to cover their exposure in the event of a megacatastrophe like Andrew or Northridge. Administration officials insisted that the contracts

36. Many farmers became aware of the full significance of these changes only after another Midwest flood struck in 1995. The 1994 legislation compelled the farmer Tom Waters to pay an annual registration fee amounting to a few hundred dollars for the minimum required level of crop insurance. Although the 1995 flood took about half his corn acreage, he received no federal disaster payments that year—a notable departure from previous years. Nor did he receive any crop insurance since his overall yield remained just above the level that would have triggered benefits. While in theory he could have purchased additional crop insurance from the federal government (i.e., beyond the minimum level required), he had chosen not to do so because he regarded the premiums as exorbitant. In fact, Waters insisted that the legislative change of 1994 had constituted a major step in the wrong direction. "I pay $200 [in compulsory registration fees] every year for basically no coverage," he said. "It just makes me sick" (telephone interview with Tom Waters, May 1996).

would carry no federal subsidy (see Brostoff 1996; Gastel 1996a; see also D'Arcy and France 1992).

Unfortunately, all these initiatives, at both the state and the federal levels, are plagued by serious problems. The main interest of the state governments at this point is to assure the availability of homeowner's insurance, which is essential to the maintenance of healthy real estate markets. One approach, adopted by legislators in both Florida and California, has been for the states to provide insurance directly. But the simple fact is that each of the various states is poorly positioned to diversify catastrophic risks. In addition, each lacks the financial wherewithal to cover the losses stemming from a megacatastrophe, such as a $75 billion hurricane in Florida, a $70 billion earthquake in Los Angeles, or a $100 billion earthquake in the New Madrid region of the Midwest. Even California's Chuck Quackenbush acknowledges that, in the event of a megadisaster, federal support would be necessary (see Phinney 1996).

On the federal level, Congress's attempts in 1994 to increase participation in the government's flood- and crop-insurance programs certainly represented steps in the right direction. But there remains a serious question about the credibility of the federal government's threat to withhold assistance from victims lacking federal insurance. The politics associated with disaster relief highlighted earlier in this paper suggest that federal commitments are often abandoned in the midst of major crises, when public sympathy for victims is high. The true test of the 1994 reforms will come only after the next major flood.

The proposed Natural Disaster Insurance Corporation (NDIC) suffers from at least three significant flaws. First, any attempt to charge actuarially fair rates will likely mean prohibitively high rates in several regions of the country particularly prone to disaster activity. The historical record suggests that the NDIC will face enormous pressure to cross-subsidize rather than charge prohibitively high rates in certain regions, such as southern California. From a public policy standpoint, however, it would seem that such cross-subsidization should properly be left to lawmakers. Second, the NDIC will almost surely have to rely on federal financial support in the event of a megacatastrophe. But, again, prudence would suggest that, if the federal government is going to back the NDIC and implicitly underwrite its activities, then the federal government ought to have substantial control over its operations. Third, the NDIC proposal suffers from a credible-commitment problem comparable to that facing the flood- and crop-insurance reforms enacted in 1994. According to the NDIC's chief legislative sponsors, "Those who refuse to buy [insurance] coverage would no longer be eligible for federal assistance to rebuild their homes should a natural disaster strike" (Emerson and Stevens 1995). As we have seen, however, such a threat could well prove empty in the wake of a major disaster.

When asked to review the NDIC proposal, policy analysts at the Congressional Budget Office (CBO) drafted a memo on 2 February 1996 warning in the strongest possible terms about the first two problems noted above. On the issue of rate setting, the CBO analysts observed that "the goal of pricing poli-

cies at rates that are both affordable and (as required in the bill) actuarially sound might be incompatible." In fact, they questioned whether it was possible to identify actuarially sound rates at all, given the enormous uncertainties regarding disaster forecasting. They also expressed a great deal of concern that the NDIC's obligations would become contingent liabilities of the federal government. "While we cannot estimate the exact budgetary impact of H.R. 1856," the analysts wrote, "we are concerned that this bill could obligate the federal government to cover the costs of a major natural catastrophe. Tens of billions of dollars of insurance company liabilities could be shifted onto the federal government with highly uncertain prospects of repayment." Although the federal government would not be legally obligated to assume these liabilities, the memo noted, federal lawmakers would likely feel compelled to do so given the NDIC's federal charter and obvious public purpose. Unlike Fannie Mae and other government-sponsored enterprises, however, the NDIC "would be completely unregulated. That could require the federal government to assume responsibility for the NDIC's actions without the ability to regulate its rates and underwriting standards" (Congressional Budget Office 1996).[37]

Finally, the Clinton administration's recommendation that the Treasury Department offer disaster-contingent-claims contracts addresses only one part of the overall problem. The biggest advantage of the proposal is that it would allow insurers and reinsurers to hedge their bets on megacatastrophes. If, as has sometimes been argued, insurers and reinsurers are risk averse to high-consequence, low-probability events such as natural disasters, then the proposed contract would increase overall market efficiency by allowing the insurers and reinsurers to manage their extreme downside risk. Thus, to the extent that private markets for natural catastrophe risks are failing on account of risk aversion among insurers and reinsurers, the administration's proposal represents a valuable solution.

There is, however, another important reason for the failure of this market. The widespread perception that disaster activity is likely to increase and intensify in the years ahead has led insurers to demand catastrophe premiums—particularly in the most disaster-prone areas—that both policyholders and regulators view as prohibitive. If the high prices that insurers wish to charge are the result, not primarily of risk aversion on their part, but rather of their assigning high probabilities to the likelihood of major disasters, then the administration's proposal would be of little help.[38] It may well be that insurers are exiting the market for natural catastrophe risks simply because they are unable,

37. As a result of this and many other strong criticisms of the NDIC proposal, the Natural Disaster Coalition withdrew it in early 1996 and has since put forth a number of more modest reforms (see, e.g., Gettlin 1996, 8, 112).

38. The fact that only a very small volume of instruments similar to those proposed by the administration trade privately on the Chicago exchange represents further evidence that there may not be much of a market for nonsubsidized contracts of this kind. On disaster futures and options traded on the Chicago Board of Trade, see Zolkos (1996), Petch (1996), and "Disastrous Bonds" (1996).

for political reasons, to charge what they believe to be actuarially fair prices for these risks. Clearly, the introduction of disaster-contingent-claims contracts would affect neither the actual likelihood of major catastrophes occurring nor the actuarially fair premium rate for catastrophe insurance.

The broader problem is that many propertyowners living in disaster-prone areas would probably choose not to insure against catastrophe risks if faced with actuarially fair premiums. State officials have attempted to address this problem by regulating prices and restricting the opportunities of insurance companies to exit the market. But, even if regulators permitted actuarially fair premiums to be charged and the market were thus allowed to work, many people would end up without insurance because they would view the price as unaffordable. And the government, for its part, would remain liable for a large share of these uninsured catastrophe losses because of high public expectations about federal disaster coverage. The primary limitation of the administration's proposal to introduce disaster-contingent-claims contracts, therefore, is that it fails to address the inherent conflict between actuarial fairness and the affordability of catastrophe premiums in disaster-prone areas.

A secondary limitation concerns the issue of revenue neutrality, which the program's proponents insist is both possible and necessary. Given that a natural disaster causing over $25 billion in insured damages has never occurred, it is difficult to believe that anything but the roughest or most fanciful of probability estimates could be assigned to the likelihood of such a disaster actually striking. As a result, policymakers would probably come under intense political pressure to accept low-end risk estimates in setting the government's reservation price in order to make the contracts more affordable.[39]

So long as it is understood that a government subsidy would likely be involved, the proposal to create disaster-contingent-claims contracts should be seen as a constructive reform initiative. By affording insurers and reinsurers a means of protecting themselves against megacatastrophes, the proposed financial instrument might encourage increased private coverage of natural disaster losses. It would do this by addressing the inherent risk aversion of insurers and reinsurers to a particular set of high-consequence, low-probability events. However, unless the subsidies were quite large, private insurers would probably continue to find it impossible to offer catastrophe premiums that were both actuarially fair and economically affordable in the most disaster-prone regions of the country. The proposed contracts obviously would not be very efficient vehicles for cross-subsidizing disaster risks. But, since the politics of disasters in the United States appear to demand a significant degree of cross-

39. Congressional Budget Office (1996) suggests a similar critique: "While the Administration intends to price the contracts so that the net cost to the taxpayers over time is zero, CBO is uncertain whether it would be possible to establish a premium rate to an options contract that would have no present-value cost to the federal government. A triggering event must hit $25 billion before the contracts pay out; however, there has never been a catastrophe of that size, and it is extremely speculative to predict the likelihood of that which has never occurred."

subsidization, the administration's proposal cannot be viewed as anything like a complete remedy. Indeed, the ideas developed in this paper would suggest that a more comprehensive reform is required.

8.5.3 The French System of Catastrophe Coverage: A Model for the United States?

Perhaps the most successful national disaster policy in the industrialized world belongs to the French. Unlike the United States, which suffers many different types of natural catastrophes every year, France is plagued mainly by floods. But, much like their American counterparts, the French have come to expect a substantial state role in disaster relief. In fact, as early as 1946, the French Constitution established the principle of "solidarity and equality of all French towards the burden resulting from natural disasters." The same clause was incorporated into the Constitution of 1958. Until 1982, private insurers in France offered precious little coverage of natural catastrophe risks, but the government typically provided ad hoc assistance in the aftermath of disasters. Although concerns mounted in the 1970s about the rising expense of public disaster relief, it was not until major floods struck southern France in late 1981 that lawmakers were driven to overhaul the system and introduce a comprehensive natural disaster policy.[40]

The 1982 disaster law mandated that every non-life-insurance policy in France include comprehensive disaster coverage along with a corresponding surcharge fixed as a percentage of the base premium. Except for automobile insurance, property and casualty insurance is not compulsory in France; but, since 1982, every policy sold has had to include legally specified disaster provisions. The surcharge was originally set at 5.5 percent but increased to 9 percent the following year. The 9 percent surcharge remains in effect today on all policies except automobile insurance, for which the surcharge has been fixed at 6 percent since 1985. The 1982 law also permitted private insurers to pass on, at their discretion, between 40 and 90 percent of their catastrophe risk (and, of course, the corresponding premiums) to a state-guaranteed reinsurer, the Caisse Centrale de Réassurance (CCR). A stop-loss provision of the reinsurance contract, covering the retained portion of the risk, is triggered when the private insurer's annual losses from covered catastrophes reach 150 percent of the annual catastrophe premiums that the insurer chose to retain. Although private insurers are not required to reinsure their catastrophe risks through the CCR, most have opted to do so. In recent years, private insurers in France have chosen to retain approximately 60 percent of catastrophe risk and pass on the remainder (along with all the risk above the stop-loss trigger) to the CCR.

As the relatively high private retention levels suggest, the system has, so far at least, performed remarkably well. Except for the first year of operation (be-

40. Most of the material presented here on French disaster policy is drawn from Dreyfus (1995). See also Kielmas (1996).

fore the surcharge was increased to 9 percent) and 1994 (a year of exceptionally high disaster activity in France), catastrophe-reinsurance premiums paid to the CCR have always exceeded the CCR's catastrophe payments. In fact, annual payment-to-premium ratios of under 50 percent are typical for the CCR's catastrophe-reinsurance program. To date, the state guaranty on CCR reinsurance has never been triggered. The French government still appropriates emergency funds in the aftermath of many large disasters to cover an assortment of uninsured damages, but the private-public insurance system now covers the vast majority of losses. Overall, the system established in 1982 enjoys broadly based support—notably from policyholders, private insurers, and public policy makers. "While both the French direct insurers and the CCR agree that there is room to improve the program," reports one business publication, "no one challenges the basic tenets that led to the plan." The report adds that the system "is considered an unqualified success by both buyers and insurers" (Kielmas 1996).

The analysis of U.S. disaster coverage provided in this paper suggests that a system similar to that now working in France could be established with some benefit in the United States. Under such a system, the federal government would require that specific coverage against natural catastrophes be included in every property-insurance policy; it would mandate a premium surcharge to pay for the additional coverage; and it would establish a federally guaranteed reinsurance program allowing private insurers to cede most of the risk and the associated premiums to the federal government.

Because the United States suffers, on average, from more natural catastrophes and from a wider assortment of them than does France, such a policy would require several modest departures from the French model so as to better suit the American context. Instead of fixing the natural catastrophe surcharge at a flat percentage of base premiums (e.g., 9 percent in France), the U.S. system might provide for some variation across regions. Citizens living in the most disaster-prone areas would pay the highest surcharge and citizens living in the least disaster-prone areas the lowest. Some cross-subsidization would still be necessary to make catastrophe insurance affordable in disaster-prone areas, but there would be no need to establish a single, flat-rate surcharge as in France. The basic surcharge could vary, for example, between 5 and 20 percent and average about 13 percent of base premiums. The surcharge on automobile insurance might be set at two-thirds of the basic surcharge, as in France. Presumably, the catastrophe surcharge would not be applied at all to unrelated property and casualty lines, such as liability (both automobile and nonautomobile), workers' compensation, and accident and health.

If this schedule of surcharges had been applied between 1977 and 1993 to the relevant lines of property insurance, annual receipts would have been enough to cover all private insurance payments for natural catastrophes as well as all federal disaster payments and still leave a cumulative surplus of nearly $2 billion at the end of the period. If these surcharges had been applied to all

property and casualty lines, the surplus at the end of 1993 would have totaled $148 billion. Indeed, if only half the basic surcharge (i.e., 6.5 percent for non-automobile insurance and 4.33 percent for automobile insurance) had been applied to all property and casualty lines, the cumulative surplus would have reached nearly $4 billion at the end of 1993 (see table 8.8). Clearly, a basic surcharge could be selected that would pay for catastrophe losses in the United States. Federal policymakers would have to decide which lines to include in the tax base and how much of a buffer they wished to build against potential megacatastrophes.[41]

American policymakers might also consider requiring private insurers to reinsure through the federal reinsurance agency with little if any flexibility on private-retention levels. For example, the U.S. law might require private insurers to retain 30 percent of natural catastrophe risk and to obtain reinsurance coverage for the next 70 percent, along with stop-loss protection on the retained risk, from the designated federal reinsurance agency. This departure from the French model would help prevent American insurers from capturing the program's implicit cross-subsidies for themselves. Given the much greater variation in disaster vulnerability across regions in the United States as compared to France, a flexible public-reinsurance program would offer American insurers enormous opportunities for gaming the system and cherry picking risks.

Naturally, a number of disadvantages would be associated with the adoption of even a modified version of the French system. For one thing, the federal government would be explicitly assuming yet another large contingent liability. But, since the federal government already stands as the implicit guarantor of both insurance companies and state-guarantee funds in the event of a mega-catastrophe, it may be reasonable to offer an explicit guaranty in return for some steady revenues in the form of premiums. Another apparent disadvantage is that cross-subsidization benefits those living in dangerous areas and penalizes those living in safe areas, thus creating a significant moral hazard problem. But, again, since some level of cross-subsidization (and, in turn, moral hazard) is inevitable given public expectations about federal bailouts of disaster victims, it seems reasonable for the government to move from ex post to ex ante subsidies in return for revenues.

Perhaps the most serious problems associated with the proposed plan involve administrative issues. For example, how exactly would the federal government build a reserve fund? It is quite possible that annual surpluses in the proposed reinsurance fund would simply be raided rather than saved. Alternatively, democratically elected lawmakers might view reinsurance-fund surpluses as evidence that premiums were too high rather than as an indication

41. As has been mentioned in the text, the French system allows only one exception to the general rule of a flat 9 percent catastrophe surcharge on all non-life-insurance policies. The exception relates to the surcharge on automobile-insurance policies, which is 6 percent, or two-thirds of the basic surcharge.

Table 8.8 **Financing Options for a French-Type Catastrophe System in the United States: Three Possible Scenarios (in millions of current dollars)**

Year	Private-Insurance Loss Payments for Natural Catastrophes (1)	Federal Disaster Payments (2)	Total Public and Private Disaster Payments (3)	Revenues from 13% Basic Surcharge Applied to Property Lines Only[a] (4)	Revenues from 13% Basic Surcharge Applied to All Property and Casualty Lines[a] (5)	Revenues from 6.5% Basic Surcharge Applied to All Property and Casualty Lines[a] (6)
1966	111	N.A.	N.A.	1,151	2,403	1,201
1967	327	N.A.	N.A.	1,237	2,593	1,297
1968	135	N.A.	N.A.	1,362	2,839	1,419
1969	256	N.A.	N.A.	1,545	3,195	1,597
1970	450	N.A.	N.A.	1,741	3,582	1,791
1971	173	N.A.	N.A.	1,976	3,857	1,928
1972	215	N.A.	N.A.	2,237	4,274	2,137
1973	376	N.A.	N.A.	2,443	4,648	2,324
1974	696	N.A.	N.A.	2,611	4,977	2,488
1975	513	N.A.	N.A.	2,826	5,538	2,769
1976	271	N.A.	N.A.	3,398	6,744	3,372
1977	423	3,536	3,959	3,996	8,089	4,044
1978	646	8,311	8,957	4,601	9,180	4,590
1979	1,703	6,873	8,576	5,072	10,128	5,064
1980	1,177	5,765	6,942	5,428	10,727	5,364
1981	714	9,507	10,221	5,682	11,123	5,561
1982	1,529	3,976	5,505	6,023	11,599	5,800
1983	2,255	2,420	4,675	6,334	12,095	6,048
1984	1,548	2,983	4,531	6,955	13,109	6,555

1985	2,816	2,210	5,026	8,465	16,086	8,043
1986	872	2,544	3,415	9,943	19,772	9,886
1987	946	2,463	3,409	10,563	21,603	10,802
1988	1,409	1,882	3,291	10,955	22,519	11,259
1989	7,642	7,031	14,673	11,065	23,140	11,570
1990	2,825	5,974	8,799	11,435	24,185	12,092
1991	4,723	2,640	7,363	11,745	24,685	12,343
1992	22,970	6,481	29,451	11,902	25,049	12,525
1993	5,620	6,656	12,276	12,763	26,649	13,325
1994	17,010	N.A.	N.A.	13,493	27,665	13,833
1995	7,795	N.A.	N.A.	14,423	28,596	14,298
Cumulative surplus, 1977–93[b]				1,861	148,672	3,802

Sources: Data courtesy of Property Claim Services; *Federal Disaster Assistance* (1995, table 1.1, p. 5); *Best's Aggregates and Averages—Property-Casualty* (1996, 191–94).

Note: N.A. = not available.

[a]The basic surcharge applies to nonautomobile policies. Automobile policies are assessed at two-thirds of the basic surcharge.

[b]Sum of potential revenues (in cols. 4, 5, or 6) minus sum of actual payments (col. 3), assuming no interest charges or receipts.

of prudent preparation for large future catastrophes. After all, the American electorate has consistently demonstrated its interest in having both high benefits and low taxes.

Nonetheless, the proposed system offers sufficient advantages over the current system to justify serious consideration. Most important, it would stabilize what is now a dangerously unstable system of natural disaster coverage—one in which insurance companies are running for cover, individual states are setting up financially fragile funds of their own, and the federal government is finding itself unable to resist costly bailouts of the uninsured.

As has been argued throughout the paper, this instability stems from two sources—one associated with the economics and the other with the politics of natural disasters. On the economics side, growing uncertainty about disaster forecasting combined with a vague perception that disaster activity is likely to increase in the future has left private insurers skittish. Presumably, insurers would be willing to sell plenty of natural catastrophe coverage in disaster-prone areas at some price, but a sufficiently high price would, in all likelihood, not only offend state regulators but also lead many propertyowners to dismiss catastrophe coverage as simply unaffordable. As a result, the markets for catastrophe risks in disaster-prone areas are contracting. On the political side, powerful public expectations have forced the federal government to cover a large fraction of uninsured disaster losses. The federal burden seems likely to increase in the future as a result of both the inherent moral hazard problem and a contracting private market for natural catastrophe risks. Since public subsidization of propertyowners in disaster-prone areas represents a political reality in the United States, the relevant question is not how to eliminate subsidies but rather how to cross-subsidize most efficiently.

A modified version of the French system would be well suited to address this complex web of economic and political problems. First, it would rationalize the market for disaster risk. By requiring disaster coverage to be a part of every property-insurance policy and establishing a federal reinsurance program, the proposed policy would not only make insurance against natural catastrophes available to all (or nearly all) propertyowners but also eliminate the need for market-distorting regulations at the state level, such as those found in Florida and California. Equally important, the stop-loss feature of the proposed reinsurance contract would transform what is now paralyzing uncertainty into manageable risk by shifting the liability for potential megacatastrophes from private insurers to the federal government. In this sense, the stop-loss provision represents a substitute for the proposed disaster-contingent-claims contracts because both address the problem of risk aversion on the part of insurers and reinsurers. The federal government is best positioned to reinsure the extraordinary risks associated with megacatastrophes because it boasts the deepest of all financial pockets.

The second basic advantage of the proposed system is that it would streamline what is now a rather chaotic federal disaster policy. An earmarked source

of funds would become available to the federal government to compensate disaster victims, and cross-subsidization, which already exists, would become far more transparent and predictable. As has been noted, such cross-subsidization would necessarily create a moral hazard problem. But it is hoped that a substantial (say, 30 percent) retention requirement would lead private insurers to refuse coverage altogether for property in extremely hazardous areas. Perhaps most important, once a publicly sponsored program to make disaster insurance widely available was in place, the federal government might find itself more credible when it threatened to withhold relief from those relatively few who remained uninsured.

Clearly, the proposed system would not be perfect. Nor would it completely address the problem of natural disasters. The state and federal governments would still have to provide emergency assistance to disaster victims outside the reinsurance framework, and some particularly disaster-prone sectors of the economy—such as agriculture—probably would have to be dealt with separately, or at least on different terms. But I believe that the system proposed here would address many of the key problems highlighted throughout this paper. Above all, it would provide a framework for managing the two factors that have contributed most to a chaotic federal disaster policy: high and rising public expectations about automatic federal disaster relief, on the one hand, and the insurance industry's mounting uncertainty about (and fear of) megacatastrophes, on the other.

References

Abeles, Schwartz & Assoc. 1978. *History of federal expenditures on pre- and post-disaster assistance relating to property acquisition: A report submitted to the Department of Housing, Policy Development and Research.* New York, March.

American insurance; still waters. 1993. *Economist,* 16 October, 93.

American National Red Cross. 1929. *The Mississippi Valley Flood disaster of 1927: Official report of the relief operations.* Washington, D.C.

Banham, Russ. 1995. A changing world: Science, business and risk prediction. *Risk Management* 42, no. 4 (April): 21–31.

Barton, Clara. Letters to Grover Cleveland, 13 November 1886 and 19 February 1887. Grover Cleveland Papers (microfilm ed., ser. 2, reel 41), Presidential Papers Microfilm, Library of Congress.

Benenson, Bob. 1993. Insurance finds few takers. *Congressional Quarterly Weekly Report* 51, no. 29 (17 July): 1861.

Best's aggregates and averages—property-casualty. 1996. Oldwick, N.J.: A. M. Best Co.

Bixby, Ann Kallman. 1993. Public social welfare expenditures, fiscal year 1990. *Social Security Bulletin* 56, no. 2 (Summer): 70–76.

A brief chronology of what Congress has done since 1824 to control the floods of the Mississippi. 1928. *Congressional Digest* 7 (February): 44–45.

Brostoff, Steven. 1996. Alternative disaster bill proposed. *National Underwriter: Property and Casualty/Risk and Benefits Management Edition,* 25 March, 3.

The budget of the United States government: Fiscal 1996. 1996. Washington, D.C.: U.S. Government Printing Office, June.

Camerer, Colin F., and Howard Kunreuther. 1989. Decision processes for low probability events: Policy implications. *Journal of Policy Analysis and Management* 8, no. 4 (Fall): 565–92.

Catalano, Peter. 1995. Hurricane alert! Expert predicts wave of killer hurricanes. *Popular Science* 247, no. 3 (September): 65–70.

Clinton pressed for additional flood aid. 1993. *Buffalo News,* 18 July, 1.

Commons, John R. 1919. Industrial relations. Address to the International Convention of Government Labor Officials, Madison, Wis., 3 June. In the microfilm ed. of the John R. Commons Papers, 1859–67, State Historical Society of Wisconsin, Division of Archives and Manuscripts, reel 17, frames 815–24.

Congressional Budget Office. 1996. Memorandum from Rachel Robertson, David Torregross, Kim Kowalewski, Perry Beider, Tim VandenBerg, and Pepper Santaluela (Congressional Budget Office) to Bill Hughes (House Committee on Transportation and Infrastructure). Washington, D.C., 2 February.

Cowen, Robert C. 1994. A sound method for forecasting hurricanes. *Christian Science Monitor,* 20 December, 13.

Critzer, Tess. 1995. U.S. insurers learn how to cope. *Insurance Industry International,* May, 11.

Dacy, Douglas, and Howard Kunreuther. 1969. *The economics of natural disasters: Implications for federal policy.* New York: Free Press.

Daniel, Pete. 1977. *Deep'n as it come: The 1927 Mississippi River Flood.* New York: Oxford University Press.

D'Arcy, Stephen P., and Virginia Grace France. 1992. Catastrophe futures: A better hedge for insurers. *Journal of Risk and Insurance* 59, no. 4 (December): 575–601.

Dewar, Helen. 1993. For Senate foes of spending, flood disaster spells relief. *Washington Post,* 5 August, A19.

Disastrous bonds. 1996. *Economist,* 31 August, 60.

Dreyfus, Jean-Marc. 1995. The C.C.R. (Caisse Centrale de Réassurance) and the reinsurance of natural disasters in France. Typescript. [In the possession of David A. Moss.]

Dunleavy, Jeanne H., Robin Edelman, Daniel J. Ryan, and C. Brett Lawless. 1996. *Catastrophes: A major paradigm shift for P/C insurers.* Oldwick, N.J.: A. M. Best, 25 March.

Durham, Wayne, Steve Johnson, and Julian Winston. 1995. Crisis in the wind—why action is needed now to prepare for tomorrow's "killer hurricanes." *CPCU Journal* 48, no. 1 (March): 17–34.

Emergency Supplemental Appropriations for Relief from the Major, Widespread Flooding in the Midwest Act of 1993. 1993. 103d Cong., 1st session. *U.S. Code Congressional and Administrative News* 3:1697.

Emerson, Bill, and Ted Stevens. 1995. Natural disasters: A budget time bomb. *Washington Post,* 31 October, A13.

Facts on File. 1993. *World News Digest,* 26 August, 624 E3.

Federal disaster assistance: Report of the Senate Task Force on Funding Disaster Relief. 1995. Washington, D.C.: U.S. Government Printing Office.

Federal Emergency Management Agency. 1993. *A citizen's guide to disaster assistance.* Washington, D.C.

Ferrara, Peter. 1995. Privatize federal disaster relief? *Washington Times,* 7 April, A18.

$5.7-billion disaster relief bill is approved, sent to Clinton. 1993. *St. Petersburg Times,* 7 August, 5A.

Freemantle, Tony. 1993. "Flood summit" centers on aid; Clinton asked for funds, not troops. *Houston Chronicle,* 18 July, A1.

Freivogel, William. 1993. Flood of money: Federal aid is sometimes uncoordinated and arbitrary. *St. Louis Post-Dispatch*, 26 September, 1B.

Galbraith, John Kenneth. [1958] 1984. *Affluent Society.* Boston: Houghton Mifflin.

Gastel, Ruth. 1996a. *Catastrophes: Insurance issues.* Insurance Information Institute Reports. New York, October.

———. 1996b. *Earthquakes: Risk and insurance issues.* Insurance Information Institute Reports. New York, October.

Gettlin, Robert. 1996. Passage of disaster bill faces difficult future. *Best's Review: Property-Casualty Insurance Edition* 97, no. 2 (June): 8, 112.

Goodwin, Barry K., and Vincent H. Smith. 1995. *The economics of crop insurance and disaster aid.* Washington, D.C.: American Enterprise Institute Press.

Greene, Mark R. 1976. The government as an insurer. *Journal of Risk and Insurance* 43 (3 September): 393–407.

———. 1979. A review and evaluation of selected government programs to handle risk. *Annals of the American Academy of Political and Social Sciences* 443 (May): 129–44.

Grievous faults. 1995. *Economist*, 21 January, 79–80.

Hegger, Susan. 1993. Carnahan, Edgar, 4 other governors press Clinton for relief. *St. Louis Post-Dispatch*, 28 July, 9A.

Hoover, Herbert. 1952. *The Memoirs of Herbert Hoover: The cabinet and the presidency, 1920–1933.* New York: Macmillan.

Hoyt, William G., and Walter B. Langbein. 1955. *Floods.* Princeton, N.J.: Princeton University Press.

Hurd, Charles. 1959. *The compact history of the American Red Cross.* New York: Hawthorn.

Insurance Research Council. 1995. *Public attitude monitor, 1995.* Wheaton, Ill., November.

Jaffee, Dwight M., and Thomas Russell. 1997. Catastrophe insurance, capital markets, and uninsurable risks. *Journal of Risk and Insurance* 64, no. 2:205–30.

Keohe, Louise. 1995. California halts insurance "panic." *Financial Times*, 29 July, 3.

Kersnar, Scott. 1996. California earthquake insurance crisis boils over on FAIR plan. *National Mortgage News*, 10 June, 6.

Kielmas, Maria. 1996. French reinsurer Caisse Centrale de Réassurances accustomed to battling with forces of nature. *Business Insurance*, 7 October, G2.

Koenig, Robert L. 1993. Upper Mississippi lacks coordination of flood control. *St. Louis Post-Dispatch*, 29 August, 1A.

Koepp, Stephen. 1987. Rolling back regulation: A debate rages over how much freedom should be given to industry. *Time*, 6 July, 50–52.

Krauss, Clifford. 1993. The Midwest flooding; House approves flood relief after fight on deficit. *New York Times*, 28 July, A1.

Kunreuther, Howard. 1973. *Recovery from natural disasters: Insurance or federal aid.* Washington, D.C.: American Enterprise Institute.

———. 1993. Ambiguity and government risk-bearing for low probability events. In *Government risk-bearing: Proceedings of a conference held at the Federal Reserve Bank of Cleveland, May 1991*, ed. Mark S. Sniderman. Boston: Kluwer Academic.

Leggett, Jeremy. 1993. Who will underwrite the hurricane? *New Scientist* 139, no. 1885 (7 August): 28–33.

Lochhead, Carolyn. 1995. Talks begin on disaster insurance. *San Francisco Chronicle*, 19 October, A10.

Lohof, Bruce Alan. 1968. Hoover and the Mississippi Valley Flood: A case study of the political thought of Herbert Hoover. Ph.D. diss., Syracuse University.

Longman, Phillip. 1994. The politics of wind. *Florida Trends* 38, no. 4 (September): 30–40.

May, Peter J. 1985. *Recovering from catastrophes: Federal disaster relief policy and politics.* Westport, Conn.: Greenwood.

Message from the president relative to disaster assistance. 1970. 91st Congress, 2d sess., H. Doc. 91-323.

Mississippi River, hearings on H.R. 1749, a bill to prevent floods on the Mississippi River and improve navigation thereon. 1913. Washington, D.C.: U.S. Government Printing Office.

Monastersky, Richard. 1995. Los Angeles faces a dangerous quake debt. *Science News* 147, no. 3 (21 January): 37.

More aid arranged. 1993. *New York Times,* 24 September, A10.

Moss, David A. 1996. Government, markets, and uncertainty: An historical approach to public risk management in the United States. Working Paper no. 97-025. Harvard Business School, October.

———. 1998. Public risk management and the private sector: An exploratory essay. Working Paper no. 93-073. Harvard Business School, February.

Moss, David A., and Julie Rosenbaum. 1997. The Great Mississippi Flood of 1993. Case Study no. 797-097. Harvard Business School, 10 February.

Murphy, Susanne. 1995. Testimony on behalf of Bill Nelson, hearings on the Natural Disaster Protection Partnership Act of 1995 before the Subcommittee on Water Resources and Environment of the Committee on Transportation and Infrastructure. 104th Cong., 4th sess., 18 October.

National Oceanic and Atmospheric Administration. 1994. *The Great Flood of 1993: National disaster survey report.* Washington, D.C., February.

Navarro, Mireya. 1996. Florida facing crisis in insurance. *New York Times,* 25 April, A16.

Office of Emergency Preparedness. 1972. *Report to Congress: Disaster preparedness.* Washington, D.C.: U.S. Government Printing Office.

On the disaster dole. 1993. *Newsweek,* 2 August, 24.

Petch, Trevor. 1996. Developing options. *Financial Times,* 9 September, 7.

Phillips, Steven. 1994. *The Soil Conservation Service responds to the 1993 Midwest floods.* Washington, D.C.: U.S. Department of Agriculture, November.

Phinney, David. 1996. Congress considers dramatic changes in earthquake disaster assistance. Washington, D.C.: States News Service, 1 March.

Popkin, Roy S. 1990. The history and politics of disaster management in the United States. In *Nothing to fear: Risks and hazards in American society,* ed. Andrew Kirkby. Tucson: University of Arizona Press.

President Cleveland's veto statement. 16 February 1887. 49th Congress, 2d sess., Ex. Doc. 175.

Quackenbush, Chuck. 1996. On firmer ground. *San Diego Union-Tribune,* 6 October, G5.

Reeves, Richard. 1994. Californians: Let others pay. *Dallas Morning News,* 24 January, 15A.

Robin, Patricia McKinsey. 1984. The bit won't bite: The American Bilateral Investment Treaty Program. *American University Law Review* 33 (Summer): 931–58.

Scism, Leslie. 1996. California plan to sell quake policies is likely to reduce risks for insurers. *Wall Street Journal,* 4 September, A4.

Senate committee OKs aid bill. 1993. *Des Moines Register,* 31 July, 7.

Sharing the challenge: Floodplain management into the 21st century: Report of the Interagency Floodplain Management Review Committee. 1994. Washington, D.C.: U.S. Government Printing Office, June.

Sheets, Ken. 1993. After the flood. *Kiplinger's Personal Finance Magazine* 47, no. 10 (October): 67–71.

Small Business Administration Disaster Assistance Programs Hearings. 1994. Washington, D.C.: U.S. Government Printing Office.

Treaster, Joseph B. 1996. Insurer curbing sales of policies in storm areas. *New York Times*, 10 October, A1.

Unified National Program for Managing Flood Losses. 1966. 89th Cong., 2d sess., H. Doc. 465.

U.S. Army Corps of Engineers. 1993. *Annual flood damage report to Congress for fiscal year 1992.* Washington, D.C.

———. 1995. *Annual flood damage report to Congress for fiscal year 1994.* Washington, D.C.

U.S. Department of the Treasury. 1991. *Modernizing the financial system: Recommendations for safer, more competitive banks.* Washington, D.C., February.

Vega, Garcilaso de la. 1951. *The Florida of the Inca.* Translated by John Grier Varner and Jeannette Johnson Varner. Austin: University of Texas Press.

Wood, Daniel B. 1996. Lack of earthquake insurance rattles home-buyers. *Christian Science Monitor*, 3 June, 4.

Zolkos, Rodd. 1996. Reinsurance alternatives await in capital market. *Business Insurance*, 14 October, 1, 62–63.

Comment

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Florida is a microcosm of the problem that the insurance industry faces nationally.

There are four entities in Florida that deal with managing catastrophic risk in some fashion postevent: the Florida Hurricane Catastrophe Fund, the Florida Wind Pool, the Florida Residential Property and Casualty Joint Underwriting Association,[1] and the Guarantee Fund. In making sure that all these obligations are met, the first layer of defense is the ability of the securities to assess the industry on the basis of market share. The second is the ability to assess—particularly in the case of the Catastrophe Fund—all policies in force for a period of twenty years after the event. Florida has, therefore, in effect created an assessable mutual company. And I'm not talking only about homeowner's policies. I'm also talking about general liability policies, automobile policies, umbrella policies, whatever. The whole lot—except for workers' compensation—can be assessed to support catastrophe risk in the state. This is not what people think that they are getting when they contract for insurance coverage. Unfortunately, as Moss's paper makes clear, the market in this state is attempting to spread over a single state a risk of catastrophe exposure too great to be so diversified.

Florida presents us with a wonderful test case for the arguments surrounding the issues of affordability and availability of catastrophe insurance. In the wake

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1. This is the third largest homeowner's writer in the state of Florida. The last time I looked, it had about 925,000 policies in force, and, as the industry would complain, it is not the highest-cost provider. It bills itself as a residual market; however, it competes with the private sector.

of Hurricane Andrew, the Florida Commission on Hurricane Catastrophe Models was created (with the support of academics as well as industry practitioners and modeling companies). One of the early crises with which the commission was faced was whether the insurance commissioner would be forced to accept the rates for wind that the models produced. The rationale advanced in Tallahassee by Commissioner Nelson was that he was not going to give up control of the rate-setting process. What Florida presents us with, therefore, is an example of the political process standing in the way of market-clearing pricing.

I would also like to address the issue of cancellation and nonrenewal laws in the United States, which are poorly understood by many people. How long do you think that it would take, say, the Hartford Insurance Company to cancel all its business in New York's Nassau and Suffolk Counties? It would take fifty years (assuming that all policyholders pay their premiums) because an insurer can cancel only 2 percent of its policies per year in New York State. What has happened is that the state's insurance commissioner has expanded the FAIR Plan—and is, in fact, proposing to expand coverage further, to all downstate counties. Again, the market-clearing mechanisms of the private sector have been badly hindered by the regulatory process, and this problem is compounded as one moves across the country.

Another issue with which I have been struggling since coming to this conference is one involving the law of large numbers, where the loss of the few falls on the shoulders of the many. When does one cross from where the law of large numbers works to where it presents instead the problem of discrimination and cross-subsidization? Basic underwriting theory is a process of discriminating between good risks and bad. Unfortunately, that is not an easy thing to do. Moss raises the issue of cross-subsidization, and I myself believe that this is an issue that our society as a whole must address, but I am not sure of the proper forum in which to address it.

Specifically, the problem is whether the people of North Dakota should pay more for insurance so that the people of Palm Beach County can build expensive homes at the shore. I do not know how we can resolve this debate unless the country is prepared to accept coverage that is mandated at the point at which the mortgage originates. There is a clear conflict inherent in the operation of McCarran Ferguson, which delegates insurance regulation both to the states and to the federal government—the authority of the federal government extending only to those matters not explicitly delegated to the states. The insurance commissioners in North Dakota, Michigan, and Massachusetts therefore have a stake in the game in Florida. And the people clearly believe in them—not one elected insurance commissioner was not reelected in the most recent round of elections.

Moss's paper does a wonderful job of tracing the expansion of our society's expectations—pointing out that the nation as a whole is indeed prosperous enough to fulfill those expectations if it so desires. As far as the issue of federal involvement in the financing of catastrophe insurance is concerned, I believe

that the proposed catastrophe bonds, Treasury catastrophe notes, and similar devices are excellent ideas because with them one develops a transparent price for the tail end of the distributions of losses. The reinsurance community does support such a development. We may, however, be expecting too much. This country works on a pay-as-you-go basis. And nothing will change unless a different political will is brought to the process than has been evinced heretofore.

In conclusion, I think that it will unfortunately take a major calamity to rationalize the system. Only then will the interested parties—the private sector, the consumer, the state regulator, and the federal regulator—recognize that they all must give up something. I don't say that this is a good way to solve the problem, but it may be the only way.

Comment R. Glenn Hubbard

David Moss's illuminating paper considers the current state of federal disaster policy from a historical perspective. In a sweeping discussion of the evolution of federal disaster-relief policy since 1803 (when Congress assisted the victims of a fire in Portsmouth, N.H.), Moss highlights the rapid expansion of federal intervention after 1960. Arguing that this expansion is consistent with broader trends in government intervention in risk management, he suggests that expectations about intervention constrain the potential for rationalizing disaster policy. If unchecked, these expectations and constraints may lead to an exit of private insurers, further increasing disaster costs to taxpayers. Moss's paper closes by describing potential reforms and suggesting that the French policy of government reinsurance of natural catastrophe risks may serve as a good model for U.S. disaster policy in the future.

After describing the setting of the problems considered by Moss, I will organize my remarks in three areas: (1) lessons from political economy, (2) lessons from social insurance design, and (3) the role of private markets in disaster-risk management. While I will not discuss them in any detail, I recommend Moss's historical descriptions of disaster policy to anyone interested in the development of this increasingly costly area of federal intervention.

The Setting

Costs of property catastrophes in the United States have reached unprecedented levels in the 1990s. Total insured losses from natural disasters amounted to $75 billion between 1989 and 1995, where as they were only $51 billion for the whole of the period between 1950 and 1988 (see Borden and

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Sarkar 1996). In addition, two developments suggest that high costs will remain for the foreseeable future. First, rising catastrophe-related costs offer some evidence that catastrophic risk has increased significantly in recent years. Second, rapid population growth in catastrophe-prone areas indicates a continuing trend toward increased costs of catastrophes. These developments do not bode well for private insurers. As a point of reference, U.S. primary-insurance-industry capital is about $20 billion (Canter, Cole, and Sandor, in press). This greater exposure raises the question of what role the federal government should play in disaster insurance or, more broadly, in disaster policy.

Federal intervention has grown in ad hoc phases and in systematic phases. Prior to the 1920s, federal responses were largely minor and coordinated with the Red Cross. Following the disastrous Mississippi Flood of 1927, the federal government increased spending on flood relief and effectively assumed responsibility for flood-control projects (see also the popular account in Barry 1997). The Federal Disaster Act of 1950 authorized a permanent relief fund with broad discretion (giving future officials the opportunity to feel their constituents' pain). This scope for intervention was expanded further by the 1970 disaster relief act. In tandem with relief polices, federal disaster insurance expanded in the 1960s and 1970s. The National Flood Insurance Act of 1968 and the Federal Crop Insurance Act of 1980 tried to substitute a federally backed insurance program for ad hoc disaster relief, but participation by propertyowners was poor. In 1978, the Federal Energy Management Agency (FEMA) was created to coordinate disaster programs distributed across several government agencies and to consolidate the management of escalating spending.

The Great Midwest Flood of 1993 was the proverbial watershed event in federal disaster relief, with FEMA overseeing the expenditure of more than $1 billion of disaster insurance (compared to the $10 million spent by the government in response to the 1927 flood). The Clinton administration requested additional payments to communities, small businesses, and farmers.

The problems emerge from this evolution of federal disaster relief and insurance policy. First, potential budget costs are significant, in the light of a federal commitment with no clearly articulated limits. Second, past government behavior makes statements that aid will not be forthcoming to individuals not meeting particular criteria or following prescribed rules not credible. Third, the combination of an expanding federal commitment and increased uncertainty about catastrophe risk may lead to widespread exit by private insurers putting further pressure on federal disaster intervention.

These concerns have led to proposals at the state and federal levels. Florida and California have established insurers or reinsurers of last resort, although states are poorly equipped to diversify catastrophe risks. At the federal level, 1994 legislation tightened enforcement of flood-insurance requirements in the National Flood Insurance Program, although credibility issues remain. The insurance industry has suggested the creation of the Natural Disaster Insurance

Corporation (NDIC), to be financed and administered collectively by private insurance; the NDIC would cap private insurers' disaster liability and would be authorized to borrow from the U.S. Treasury in the event of severe catastrophes. The Clinton administration proposed selling disaster-contingent claims on the open market, but the administration's proposal does little to encourage the development of private markets. The historical record suggests, however, that pressure for cross-subsidization across regions and credibility problems will limit the potential for success of the scheme.

Outside the United States, Moss identifies the French Caisse Centrale de Réassurance (CCR) as a possible model for reform. Mapping the scheme to the U.S. setting, a CCR-like approach would suggest the following. The federal government would require that specific coverage against natural catastrophes be included in every property-insurance policy. In addition, a premium surcharge would be mandated to pay for the additional coverage. Finally, such a plan would establish a federally guaranteed reinsurance program, allowing private insurers to cede most of risk (and premiums) to the government. I will return to this proposal in the context of social insurance below.

Lessons from Political Economy

As Moss's paper makes clear, economic analysis of government disaster policy must address "political economy" as well as "optimal policy" considerations. Historical developments in the U.S. banking industry offer some guidance for the present case. In the late nineteenth and early twentieth centuries, losses (generally by smaller, poorly diversified banks) in particular regions of a state generated political pressure for redistribution within a state—in the form of state deposit-insurance schemes (see, e.g., the discussion in Economides, Hubbard, and Palia 1996). The subsequent failure of state insurance schemes in the presence of larger banking crises ("catastrophes") led to political pressure for federal cross-subsidization (among banks and among regions of the country) of risk bearing through federal deposit insurance.

As is by now well known, the government assumption of bank deposit-risk management through deposit insurance failed key tests of insurance design. The presence of large amounts of insured or effectively insured deposits created the potential for moral hazard precisely when adverse shocks to industry capital appeared (as in the savings-and-loan industry in the early 1980s and the banking industry in the late 1980s). Moreover, it is difficult to motivate U.S.-styled deposit insurance as simply a response to a market failure.

Lessons from U.S. banking regulatory experience have shaped present banking-regulation proposals and offer guidance for casualty insurance. Chief among these are the importance of risk-based pricing and an expanded role for private markets in reinsurance of deposits to ensure market discipline. Economists generally argue that a public lender of last resort (such as the Federal Reserve in the United States) can be the final "catastrophic" reinsurer.

For disaster policy, experience of the political economy of banking regulation suggests the need to be wary of excessive cross-subsidization of risk and the need to encourage the develop of private reinsurance and market discipline.

Lessons from Social Insurance

Sidestepping the political economy of intervention, how might we set up a "social insurance" approach to disaster policy? The basic problem is that of systematic risk—in this case, the chance of a major catastrophe or series of major catastrophes that might bankrupt the private-insurance industry.

Social insurance principles suggest a way of organizing thoughts about deposit insurance. First, to mitigate the free-rider problem so endemic to disaster insurance, coverage for individuals and businesses must be (credibly) mandatory. Second, deductibles and coinsurance should align incentives for risk management by the insured. Third, private-sector reinsurance should be mobilized to pool risks across insurers in different regions with different exposures to catastrophic risks. Fourth, as in the banking analogy, the government's role would be limited to that of a lender of last resort. In the insurance context, this amounts to the combination of a catastrophic payment (mandatory insurance) with a deductible and coinsurance. The "lender-of-last-resort" role would replace ad hoc interventions.

To be successful, such a scheme based on social insurance principles must develop strong markets for private reinsurance. I say this for two reasons. First, private-reinsurance markets offer market discipline in the pricing and management of catastrophic disk. Second, absent well-functioning and deep private-reinsurance markets, the temptation for ad hoc government intervention in a disaster with large private losses becomes great, undermining the credibility of overall disaster policy.

Enhanced Role for Private Markets

The key to the improvement of private catastrophe insurance and reinsurance markets is the development and promotion of property-catastrophe-risk financial instruments ("securitization") of risk. In addition to the desirability of liquid financial markets for risk management, insurers have few additional avenues of assistance. Escalating prices for reinsurance combined with lower coverage amounts have made it more difficult for insurance companies to mitigate their risk through reinsurance. In addition, state regulatory restrictions limit (and in some cases prevent) companies from increasing premiums and reducing coverage in response to higher costs of reinsurance.

Since 1992, several financial instruments have emerged to securitize property-catastrophe risk. These instruments include exchange-traded options and futures, over-the-counter insurance products, and insurance swaps. As a consequence, individuals or businesses can take positions on the occurrence and cost of property catastrophes. Insurance companies can hedge their ex-

posure by transferring property-catastrophe risk to a wide pool of willing investors.

While securitization represents an important and necessary development in enhancing the private sector's role in catastrophe management, instrument-design issues remain. Catastrophe-risk exposures can be specified by, for example, location, disaster type, and time of year. One must also sort out which participants bear which type of investment risk (i.e., among liquidity risk, basis risk, credit risk, adverse selection, or moral hazard). The most successful financial instruments will be those with low costs imposed by these investment risks.

For example, property-catastrophe options (traded on the Chicago Board of Trade [CBOT]) offer one approach. Most trades create "call spreads" comparable to purchasing a layer of insurance. The options offer minimal credit risk (given the role of the CBOT clearinghouse) and basis risk (unless for an insurance company because the payoff is based on aggregate industry claim payments). Adverse selection is minimized by the use of standardized instruments; moral hazard is mitigated by the use of an industry-based index. These advantages notwithstanding, liquidity risk remains a concern because of the low trading volume; many analysts believe that higher volume and lower liquidity risk are likely in the future (see Borden and Sarkar 1996).

Catastrophe bonds (or "act-of-God" bonds) are an example of an over-the-counter instrument. Such bonds create a link between the repayment and the catastrophe with variable coupon and principal repayments. As with the exchange-traded projects, liquidity risk remains a problem. Unlike the exchange-traded products, credit risk must be borne. While basis risk is nonexistent, the customized nature of the bonds could lead to adverse selection (if only the riskier insurance companies issue the bonds) and moral hazard (if the repayment is related to the issuer's individual catastrophe costs).

Finally, property-catastrophe swaps to be traded on the Catastrophic Risk Exchange (CATEX) are at an early stage of development. The swap is a bilateral agreement with reciprocal reinsurance between two insurers. Units of exchange are standardized by specifying "equivalent" risks and exposures. It is too early to assess the liquidity risk associated with these products. Counterparty credit risk must be borne. Basis risk, adverse selection, and moral hazard depend on the attributes of the individual swap design.

To summarize, recent market developments suggest that private markets can play a larger role in property-catastrophe risk management. Risks can be spread across a broader pool of individuals and business. These developments can reduce the effect of catastrophes on the insurance industry as a whole.

Conclusion

David Moss's interesting and readable paper highlights the need for economists, industry leaders, and policymakers to rethink federal disaster policy in

the United States. The history of federal involvement in disaster insurance and relief—combined with experience with government intervention in risk management in other industries—leads one to be concerned about the need to maintain healthy private markets for managing risk. Lessons from both the political economy of regulation and social insurance design point out the need for well-functioning private-reinsurance mechanism. Recent developments of financial instruments for managing property-catastrophe risk offer an encouraging sign for private-insurance and -reinsurance markets in the future.

References

Barry, John M. 1997. *Rising tide: The Great Mississippi Flood of 1927 and how it changed America.* New York: Simon & Schuster.

Borden, Sara, and Asani Sarkar. 1996. Securitizing property catastrophe risk. *Current Issues in Economics and Finance* (Federal Reserve Bank of New York) 2 (August): 1–6.

Canter, Michael S., Joseph B. Cole, and Richard L. Sandor. In press. Catastrophe options on the Chicago Board of Trade: A new asset class for the capital markets and a new hedging tool for the insurance industry. *Financial Derivatives and Risk Management.*

Economides, Nicholas, R. Glenn Hubbard, and Darius Palia. 1996. The political economy of branching restrictions and deposit insurance: A model of monopolistic competition among small and large banks. *Journal of Law and Economics* 40 (October): 667–704.