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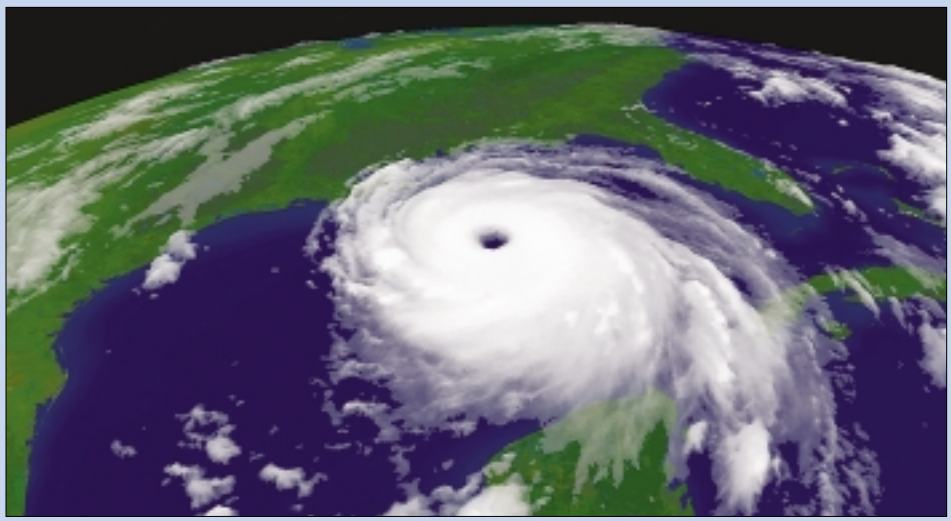

Preparing for Future "Katrinas"

ROBERT E. LITAN

While policymakers and leaders continue to debate the rebuilding of Gulf areas devastated by Hurricane Katrina, a much greater loss looms on the horizon. Katrina exposed more than problems with poverty, emergency management, and infrastructure. The storm also illustrated the inability of private insurance markets to handle large-scale losses. "Mega-catastrophes" are catastrophic events, like Katrina, whose costs are so large and unpredictable that private insurers either are unwilling to insure against them, or charge premiums so high that significant numbers of customers do not want or cannot afford the insurance.

Without policy solutions, federal taxpayers in particular face unnecessarily large burdens for future disaster relief. The time has come for the federal government to convert what is *de facto* insurance—relief provided "after the fact"—into a formal re-insurance system that assesses the cost of catastrophic risks before such events occur. This policy brief includes proposals to establish an independent federal office to operate a catastrophic reinsurance program. In short, the federal government should formally acknowledge and implement what it already has become: an insurer of last resort for mega-catastrophes.

The devastating 2005 hurricane season—especially the three large hurricanes that struck the Gulf Coast and Florida (Katrina, Rita and Wilma)—has graphically demonstrated how dangerous nature can be. Add in the storms of 2004, and the last two hurricane seasons account for seven of the twelve most costly natural disasters in American history, as shown in Table 1.

The best estimates suggest that the private insurance industry—primary insurers and reinsurers—will pay out approximately $50 billion for Katrina alone, making it the single costliest insured event in U.S. history. To date, the federal government has committed another $85 billion for disaster cleanup and reconstruction. A substantial portion, well over $10 billion, has gone and will go to individuals and businesses that did not have private insurance. Much of the rest of it will go to state and local authorities to rebuild infrastructure—roads, schools, levees, and so forth. These authorities, too, had no insurance other than the expectation of federal disaster relief, which in fact has been forthcoming in record amounts.

Yet as high as they are, the costs for Katrina could be dwarfed by other possible natural catastrophes in the future: earthquakes in the West (California, Seattle) or Midwest (along the New Madrid fault) and perhaps multiple category 4 or 5 hurricanes (like Katrina or worse) in the Gulf or on the East Coast, including a possible direct hit as far north as New York. Table 2 provides an illustrative list of property damage to private residences and buildings alone (excluding public infrastructure) from possible future "mega" hurricanes and earthquakes.

The huge storms of 2004 and 2005, and the possibility that the future could bring worse, make it timely for policymakers to take steps *now* to reduce the costs of future mega-catastrophes, both to society as a whole and to U.S. taxpayers, who in the past have shouldered much of the costs of cleanup and repair from these events, and if policy is not changed, will continue to do so in the future.

INSURANCE FOR MEGA-CATASTROPHES: WHY THE MARKET FAILS

Modern economies are built on insurance, which protects people and firms from infrequent but potentially highly costly events. Without insurance, many firms would not take the risks of selling their products or hiring employees, while most lenders would not extend mortgages on homes.

Private insurance is provided by both primary insurers, the firms from which end-users buy their coverage, and by reinsurers, who protect the primary insurers (if they want to buy the coverage) against worst-case losses, by event or over a given time period, such as a year. There is also a fledgling market in catastrophe securities, which operate much like reinsurance, except that the buyers of these "CAT" bonds assume the worst-case risks that primary insurers otherwise would bear (the CAT bond market has never developed as rapidly and fully, however, as many supporters in the 1990s had hoped).

Mega-catastrophes are catastrophic events, like Katrina, whose costs are so large and unpredictable that private

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insurers either are unwilling to insure against them, or charge premiums so high that significant numbers of customers do not want or cannot afford the insurance. A brief summary of some key insurance principles helps to explain why this market failure occurs.

Insurers cannot stay in business for long unless the premiums they charge cover the claims of their policyholders. Moreover, market forces require insurers to charge premiums that reflect the risks of claims by their policyholders. Individuals or firms with higher risks of claims—in the property market, those that live in catastrophe-prone areas, for example—should pay higher premiums than those who live in relatively danger-free areas. If this were not the case—that is, if insurers required higher-risk customers to subsidize lower-risk customers—then insurers who provided coverage only to low-risk policyholders could underprice their competitors and capture just these customers, driving out their competitors in the process.

Insurers, therefore, put their customers in different risk groupings and charge them premiums according to the risks they present. For any risk group, insurers will tend to set premiums equal to the expected claims of the group plus a "risk load," which typically is a multiple of the expected loss. The risk load reflects the uncertainty surrounding the expected loss estimate itself; for example, the less experience insurers have with any particular risk class, the less reliable is any estimate of the expected loss.

More important, at least for purposes of this brief, the risk load also reflects "timing risk," or the risk that a very costly event will occur well before sufficient premiums have been collected to fund the claims associated with it. For a small enough set of policyholders, timing risk is a costly nuisance for an insurer. But if an event can affect a large portion of an insurer's customer base, then timing risk, in a worst case, can threaten the solvency of the entire company. That is why, if it is sufficiently large, timing risk can induce insurers either to withdraw from selling insurance to particular classes of high-risk customers, or if they stay in the market, to sell coverage only at substantial multiples of expected loss. But at such high prices, customers may not choose to purchase or may not be able to afford the insurance.

Table 1.
Twelve Costliest Insured Catastrophes in the United States
(Costs in billions of 2005 dollars)

Year	Event	Cost
2005	Hurricane Katrina	50+
1992	Hurricane Andrew	21
2001	9/11 Terrorist Attacks	20
1994	Northridge Earthquake	16
2004	Hurricane Charley	8
2005	Hurricane Wilma	4–10
2004	Hurricane Ivan	7
1989	Hurricane Hugo	6
2004	Hurricane Frances	5
2004	Hurricane Jeanne	4
2005	Hurricane Rita	3–6
1998	Hurricane Georges	3

Sources: Insurance Information Institute, RMS, AIR Worldwide, and Equecat for Wilma and Rita.

The huge storms of 2004 and 2005, and the possibility that the future could bring worse, make it timely for policymakers to take steps now to reduce the costs of future mega-catastrophes, both to society as a whole and to U.S. taxpayers.

In effect, this has already happened to some degree in California. After the Northridge earthquake in 1994, the California legislature created a state-sponsored insurer, the California Earthquake Authority (CEA), to sell the insurance. Nonetheless, only 14 percent of California residents currently choose to purchase the insurance (from the CEA or private insurers), down from 33 percent several years ago. A major reason why more do not buy the insurance is that it can be sold at affordable premiums only with very high deductibles, typically 15 percent of the value of the property (although homeowners can pay much higher premiums for a policy with a 10 percent deductible). Small deductibles can be important in encouraging sound risk-avoiding behavior by the insured, but when deductibles get too high, they reflect the fact that insurers have effectively withdrawn from a significant portion of the market.

Portions of the Gulf Coast and East Coast are now seeing evidence of insurance market failure in the wake of the 2004 and 2005 hurricane seasons. In 2002, the Congressional Budget Office reported that the risk load in property insurance markets was typically five to seven times the expected loss. But after the 2004 and 2005 hurricane seasons, and especially Hurricane Katrina, both the expected losses from future storms and the timing risk look much greater for any given insurer or reinsurer. As a result, some insurers are no longer selling new property policies to customers in hurricane-exposed areas, while rates and deductibles are rising for all those who can obtain coverage. Reinsurance rates, in particular, appear to have soared.

The failure of property insurance markets matters, not only to those who cannot find or afford coverage, but also to all Americans. This is because when private insurance is not available or is not voluntarily purchased, then U.S. taxpayers foot much of the bill for uninsured losses due to natural catastrophes in the form of federal disaster relief. Of course, disaster relief is an understandable humanitarian response following each horrible event. But over the long run, a policy of providing disaster relief to uninsured individuals and firms is inefficient, because it fails to encourage those in harm's way to purchase private insurance and to take steps to reduce their loss exposure—by either relocating or upgrading their structures to better withstand hurricane or earthquake forces. As a result, both social and federal costs of disasters are higher than they otherwise should be. Furthermore, if private insurance is available but not bought by those harmed by natural disasters, and the government ends up providing relief after disasters, then taxpayers in lower risk areas end up subsidizing individuals who choose to live in regions of the country that are prone to catastrophe risk. This is not fair.

Thirty-two states have attempted to address catastrophe risks by establishing or sponsoring "residual markets facilities" that sell property insurance, typically at subsidized rates, to those who cannot obtain it from private insurers. While such facilities may temporarily improve insurance coverage, and thus relieve the federal government of some responsibility for disaster costs, subsidies distort the market by reducing incentives for

individuals to mitigate their loss exposures and thus, in the long run, raise disaster costs. In addition, as private insurers withdraw from the market or price their coverage at much higher rates, increasing numbers of residents will turn to the subsidized residual markets facilities, thereby aggravating these distortions.

After Hurricane Andrew in 1992, the state of Florida required primary insurers to remain in the state (with limited ability to shed existing customers), and further required them to purchase reinsurance from a state-sponsored catastrophe reinsurance fund. The Florida "CAT fund" has worked as well as could be reasonably expected so far, but is limited to covering up to $15 billion in damage—a figure that any future mega-hurricane (such as those shown in Table 2) could easily exceed. Indeed, at this writing, after the 2005 hurricane season, the Florida CAT fund is now out of money and must raise new funds from higher premiums. Similarly, earthquake coverage provided by the CEA in California is capped at roughly $7 billion (which might not be enough to cover insured losses in a future major quake, even though only small portions of California residents purchase the insurance).

Katrina has exposed more than just the poverty that lay hidden within New Orleans; it also illustrated the failure of private insurance markets to deal adequately with the costs of future mega-catastrophes. If nothing is done, society as a whole, and the federal government (taxpayers) in particular, face potentially much larger burdens for future disaster relief than is necessary.

A LAYERED APPROACH TO BEARING LOSSES DUE TO MEGA-CATASTROPHES

The time has come for the federal government to convert what is *de facto* insurance—disaster relief provided *after the fact*—into a formal reinsurance system that assesses the costs of catastrophic risks *before* the events themselves occur. Specifically, the proposal here is for the federal government to:

- establish an independent office, much like the Comptroller of the Currency, but related to the Treasury Department, for operating a catastrophe reinsurance program;

- to sell and charge a premium for reinsurance to primary insurers,

Table 2.
Potential Property Losses Due to Various Possible Future Mega-Catastrophes
(Loss in billions of 2005 dollars)

Event	Loss
Hurricanes:	
Category 5 in Houston	40
Category 5 in Tampa	65
Category 5 in Miami	155
Category 5 in New York area (including New Jersey And Long Island)	96
Earthquakes:	
7+ in Los Angeles	140
8+ in San Francisco	200
7.5+ New Madrid (St Louis/Memphis and other Areas)	90

Note: Losses are for both residential and commercial properties, but only those on-shore (the loss estimates do not include covered losses to offshore energy facilities and other marine exposures). Insured losses as a fraction of total losses are likely to be much less for earthquakes due to low take-up rates for earthquake insurance.

Source: AIR-Worldwide (supplied to the author).

A policy of providing disaster relief to uninsured individuals and firms is inefficient, because it fails to encourage those in harm's way to purchase private insurance and to take steps to reduce their loss exposure.

reinsurers, and state catastrophe insurance plans/funds for annual catastrophe losses above a specified threshold (with the premium revenue deposited in a special account, like the premiums collected for federal bank deposit insurance, that cannot be raided for other purposes);

- to set the premium on sound actuarial principles, giving credit to states that have and that enforce building codes and zoning rules that cost-effectively minimize exposures to catastrophe losses.

In short, the federal government should formally acknowledge and implement what it has already become—an insurer of last resort for mega-catastrophes. But to ensure that the government's involvement is and remains a last resort, the proposed reinsurance should explicitly cover only those losses that private insurers, reinsurers and state insurance plans cannot reasonably handle without entailing a significant risk of market failure that has already occurred in California and is now occurring in the wake of the 2005 hurricane season.

For this purpose, federal catastrophe insurance can be modeled on federal terrorism insurance, whose coverage kicks in only after losses exceed a certain percentage of premiums (originally 15 percent, and as revised, 20 percent by 2007). For state plans in particular, the "attachment point" that would trigger federal claims could be defined in probabilistic terms (such as a 1-in-50 or 1-in-100 year event), with which actuaries in the industry are familiar and comfortable. Policymakers need not worry that the insurance office would become a large bureaucracy. Florida's CAT fund, which currently sells and charges for reinsurance in that state, operates with just a few people. A federal effort, modeled along the same lines, could operate with perhaps no more than 100 full-time staff, and contract for actuarial services with any one or all of the well-recognized actuarial firms in the field.

Unlike federal terrorism insurance, which foregoes up front premiums and requires insurers to recoup only a limited portion of any payments the federal government may have to make, the proposed catastrophe insurance program would collect premiums in advance, which over time would fund the payouts. If catastrophes forced payouts to exceed premiums in the early years, the program would require insurers (and thus their policyholders) to recoup the excess payout, though spread out over a number of years (at the discretion of the treasury secretary). Thus, the federal program would be designed to operate over the long run without subsidy (unlike the current system of ad hoc disaster relief, which inherently acts as a subsidy of disaster-related costs).

At bottom, there are three key advantages of a federal catastrophe reinsurance program. First, and perhaps most important, the federal government has no timing risk, since in extreme cases it can borrow money (as it has done in the wake of the 2005 hurricane season). Accordingly, the federal program can charge risk loads that are well below those in the private sector, with the savings passed on to consumers, making catastrophe coverage more affordable and ensuring its availability.

Second, by setting premiums in advance and providing for full recoupment of any early excess payouts, the proposed program would reduce the need for future disaster relief.

Third, by explicitly tying premiums to risk and to the implementation of effective loss mitigation programs at the state and local levels, the program would provide an important, and potentially powerful incentive, for state and local officials and for individual homeowners to take cost-effective steps to minimize their exposure to catastrophe losses. To supplement these efforts, the federal government also should consider ways to implement a concept proposed by Wharton Professors Paul Kleindorfer and Howard Kunreuther to make it easier for individuals to finance mitigation efforts. Such steps typically require capital outlays up front—for example, bracing water heaters and tying foundations to their structures (in the case of earthquake) or strengthening garages and reinforcing connections between roofs and residential structures (in the case of hurricanes)—that many homeowners may not have the cash on hand to finance. To remedy this, Fannie Mae and Freddie Mac—the two principle housing "government-sponsored enterprises" —could be required to extend their mortgage guarantees to securities backed by "mitigation loans" taken out separately, or added to the initial mortgage when the house is purchased (and the upgrades are made).

To be sure, there are other details in designing any federal reinsurance program that must be ironed out. Interested readers can review them in my longer paper on this subject. But two subjects in particular deserve mention in closing.

First, even with federal reinsurance, property coverage may still be too expensive for low-income individuals in high-risk areas to afford. Those states that have addressed this problem have done so by establishing residual markets facilities, which almost always provide insurance at subsidized rates. These plans are not effective ways to target low-income residents, however, since the coverage tends to be available to all residents in a state, including those with high incomes who do not need subsidies. Recent reports indicate, for example, that owners of homes valued at $1 million or more account for just 2 percent of policyholders but roughly 10 percent of the loss exposure of Florida's residual markets facility, Citizens Property Insurance Corporation. This inequity could be avoided if state legislatures instead provided direct subsidies to low income residents for the purchase of property insurance, while the state insurance plans (if they are maintained) charge actuarially

The federal government should formally acknowledge and implement what it has already become—an insurer of last resort for mega-catastrophes.

A National Guard helicopter surveys the damage of hurricane Katrina.

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appropriate rates. The subsidies could be financed by a small surcharge on all property insurance policies sold in a state (while the subsidies themselves could be limited to existing residents so as not to artificially encourage people from other states to move to high-risk states and thereby increase the need for the subsidies). The federal government might encourage such direct subsidy systems through the insurance rates it charges for its catastrophe reinsurance.

Second, it has long been the case that insurers are unable to deduct for federal income tax purposes any reserves they may set aside to cover future catastrophe losses. Given the frequency and severity of recent storms, this policy is outdated. However, to change it would result in an immediate loss of federal tax revenue, at a time of already high budget deficits. In contrast, a properly designed federal reinsurance program over the long run should be budget-neutral. Furthermore, changing the tax treatment of catastrophe reserves still would not address the timing risk problem that is inherent in the private provision of property coverage in high-risk areas. Thus, if policymakers had to choose between changing the tax laws to allow expensing of catastrophe reserves or establishing a reinsurance program, the view here is that they should choose the latter.

CONCLUSION

The government may be unable to control nature, but it can and should take measures to minimize the damage it can cause and to allocate the costs for repair and reconstruction following natural catastrophes in a fair and efficient manner. The proposal advanced here would achieve these goals. The silver lining to the horrible events of 2005 is that they have created a unique window of opportunity for policymakers to address a problem that has long needed attention. It is time to seize this opportunity—before the next hurricane season.

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