New laws and policies in the wake of Hurricane Katrina seem intended to scapegoat insurance companies rather than protect the public.

Facing Mother Nature

By Martin F. Grace and Robert W. Klein
Georgia State University

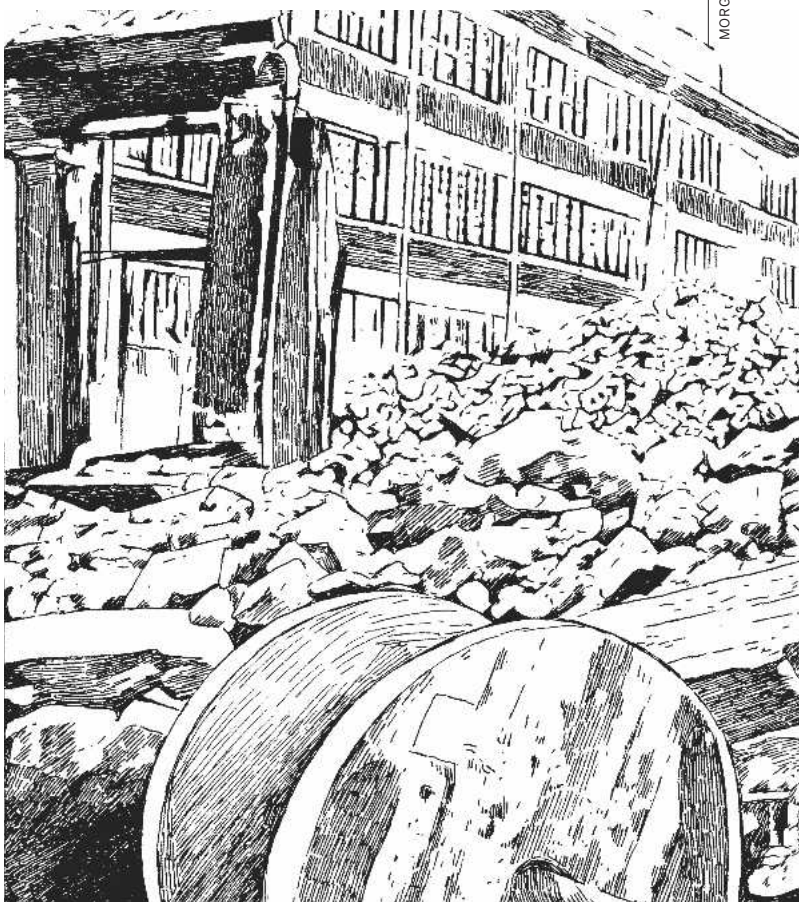
Changes in insurance markets that followed the flurry of hurricanes in 2004–2005, capped by Hurricane Katrina, have been met by a storm of criticism in Congress and state capitals. Rather than addressing the economic realities of increasing catastrophe risk with informed discussion and sound proposals and policies, politicians are attacking its messenger — the insurance industry.

Political attacks on the insurance industry are not a new phenomenon. But the current assault may rank among the most severe, misguided, and damaging campaigns ever waged, with potentially disastrous consequences for many Americans. Government's mismanagement of catastrophe risk is rooted in a climate of public ignorance and distrust of the insurance industry. That enables politicians to weave a fiction that plays well with their constituents as it sows the seeds of their and others' exploitation. There is a pressing need to correct several fallacies that infect the current debate and educate the public about the economics of catastrophe risk, the dangers posed by the current course of policy, and better solutions.

MOTHER NATURE VS. HUMANITY

One common fallacy is the belief that catastrophe perils are like other insured perils. The reality is that catastrophe perils have unique characteristics that are highly relevant to managing the risk they pose. Perils such as auto accidents are relatively stable and predictable (based on historical experience), but catastrophe perils are highly variable and impossible to predict with any degree of confidence.

The occurrence of hurricanes is determined by both long-term and short-term weather patterns. Weather scientists cannot predict exactly how many hurricanes will strike the Unit-



MORGAN BALLARD

Martin F. Grace is the James S. Kemper Professor of Risk Management at Georgia State University's Robinson College of Business.
Robert W. Klein is the director of the Center for Risk Management and Insurance Research at Georgia State University and also is a professor in the university's Robinson College of Business.

ed States in a given year, but they can calculate the probabilities of various hurricane scenarios over any defined period of time. The scientists are telling us that we are currently in a cycle of greatly increased hurricane activity, and the probability of one or more severe hurricanes occurring in a given year is much higher now than it was two decades ago.

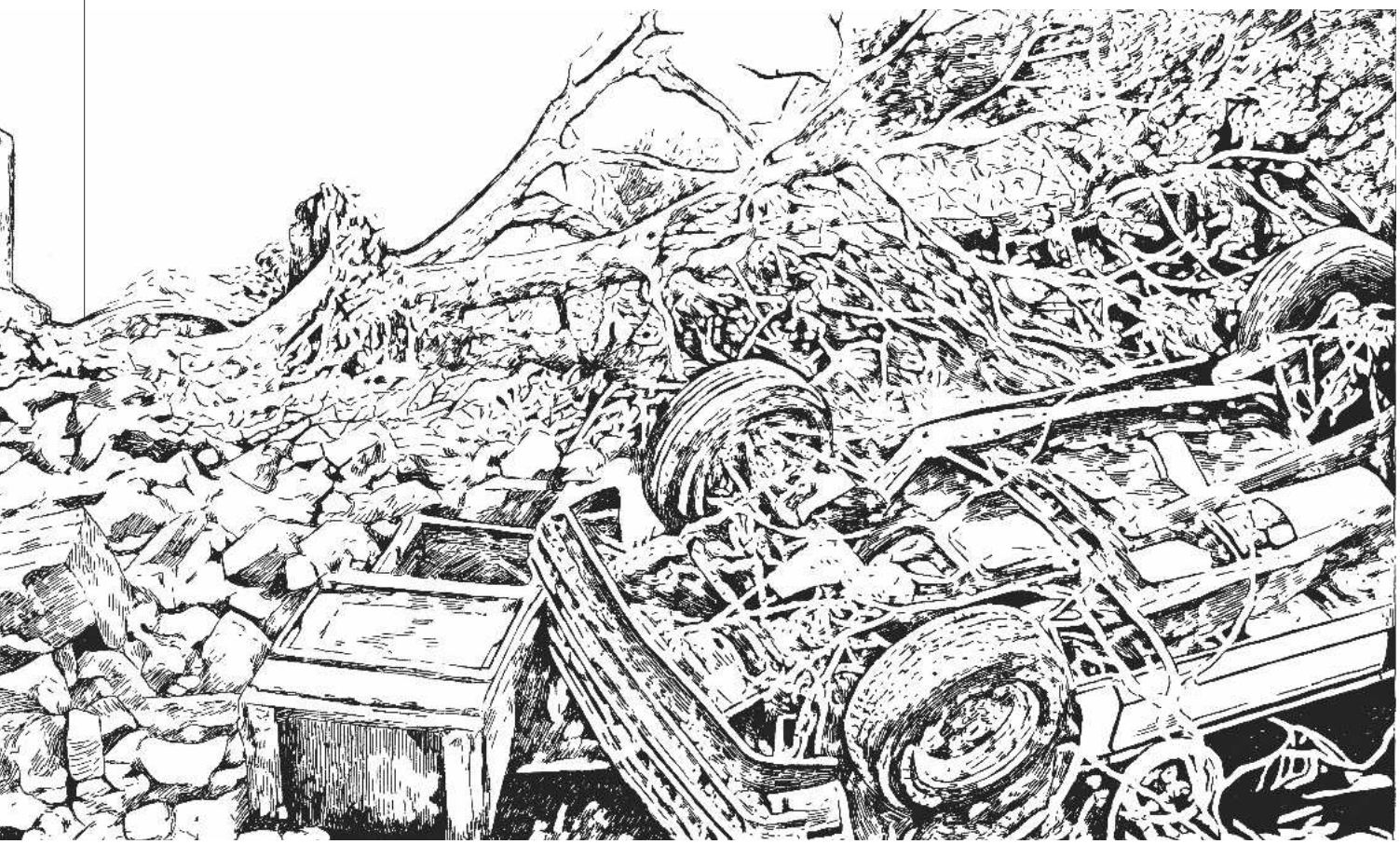
The actual occurrence of hurricanes is analogous to Mother Nature rolling weighted dice. But recent history is consistent with the scientific analysis of how the dice are weighted. Figure 1 displays the number of hurricanes striking the United States by decade for 1920–2004 and also distinguishes the number of more severe — Category 3–5 — hurricanes. Hurricane frequency and intensity increased over the first three decades of this period and then fell during the next three decades. Storm activity intensified again starting in the late 1980s and continues today. Figure 1 also reflects the variability of the number and severity of hurricanes that actually occur from year to year within any given multi-year cycle of increased (or decreased) hurricane activity.

Property losses from hurricanes are a function of both hurricane activity and the value and vulnerability of structures in their path. Because of increases in those factors, the probability of higher hurricane losses is rapidly increasing; this is reflected in historical data on insured catastrophe losses shown in Figure 2. While catastrophe losses vary greatly from year to year, it is clear that catastrophe losses on the whole (even measured in constant dollars) have increased dramatically since 1990, with several "bad years" resulting from one or more severe disasters in those years.

Total insured catastrophe losses (in 2006 dollars) were $29.3 billion in 2004 and $63.9 billion in 2005 — primarily caused by hurricanes striking the Southeast. Hurricane Katrina alone generated $41.9 billion in insured losses — almost twice the amount caused by Hurricane Andrew, which had been the most costly natural disaster prior to Katrina. As devastating as Katrina was, experts are concerned about the significant possibility of a much larger disaster that could cost in excess of $100 billion in insured losses alone.

GROWTH AND LOSSES The dramatic increase in U.S. coastal development has contributed to the rise in hurricane losses. During the previous active storm cycle of 1920–1950, coastal areas were less developed, so storms striking those areas caused less property damage. During the next three decades there was considerable economic growth in those areas, but storm activity had lessened and did not impede growth.

A 2004 National Oceanic and Atmospheric Administration study estimates that 153 million people lived in coastal counties in 2003, representing 53 percent of the U.S. population but only 17 percent of the nation's land mass. From 1980 to 2003, 33 million people were added to the coastal population, representing a 28 percent increase overall. The pace of growth has been much higher along the southern Atlantic and Gulf coasts where hurricane risk is the greatest. The NOAA study predicts further strong population growth in Southeastern and Gulf coastal areas. Indeed, Florida coastal population growth, alone, has increased by more than 11 percent just between 2000 and 2005. We should also note that Hawaii



faces significant hurricane risk as evidenced by Hurricane Iniki in 1992 and the near miss of Hurricane Flossie in 2007.

Hence, considerable development occurred when hurricane losses were relatively low and property insurance was relatively cheap. That development has continued, even after hurricane activity increased. A myopic sense of security has contributed to large movements of people and the associated property development that is now at significant risk from intensified hurricane activity. At the same time, little attention has been paid to hazard mitigation (e.g., building hurricane-resistant homes). The result is a substantial increase in the potential and actual property losses from hurricanes.

THE ROLE OF INSURANCE

It is important to review some basic principles of insuring catastrophe risk and address several fallacies that permeate the current debate. Those fallacies include:

- The pooling of risk exposures (e.g., homes) within an insurance mechanism implies that everyone in the pool should pay the same premium. Profits from insuring low-risk exposures should cover losses from high-risk exposures.
- Insurers and insurance markets are immune from competition. Unless closely regulated, insurers can charge excessive prices that will generate excessive profits. In this context, insurers are deliberately overestimating the risk of hurricanes to support inflated prices and other actions that they are taking.
- Insurers have earned excessive profits. The fact that they have earned any profits at all means that they should not be raising their prices and managing their exposures in hurricane-prone areas.
- Insurers intentionally seek to "underpay" claims, i.e., pay less than what they are obligated to pay under the terms of the policies they issue. This further contributes to their excessive profits.

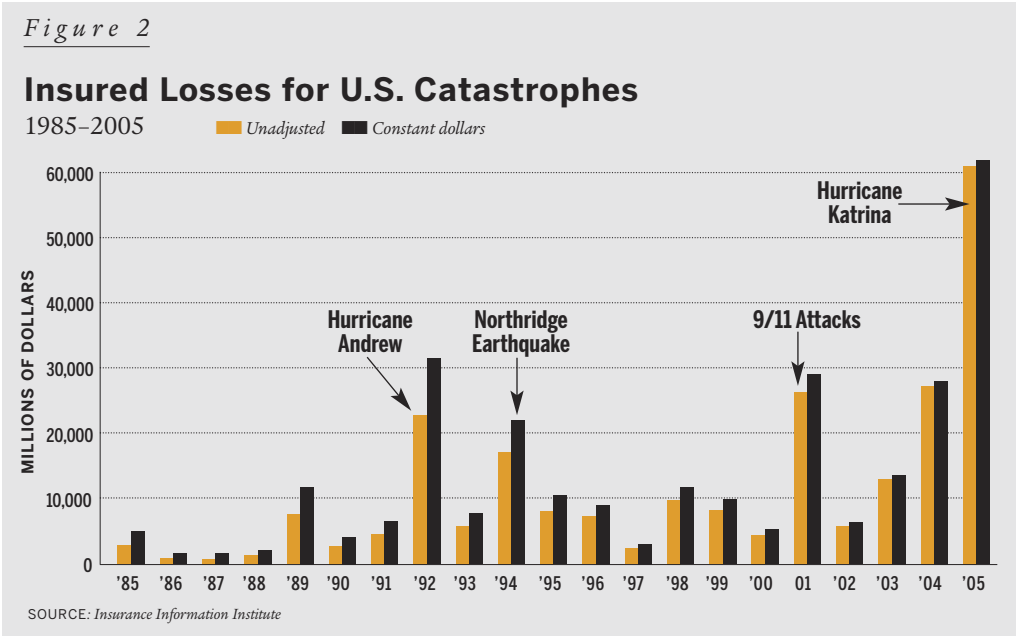
Property owners exposed to hurricane risk can manage this risk in different ways. Many prefer (or are forced by their lenders) to do so by transferring their risk to insurers. Fundamentally, any legitimate insurance arrangement to cover potential losses from a given peril must be financed with risk-based premiums that cover insurers' full cost of providing coverage, including their risk-adjusted cost of capital. This means that the premium paid by any insured should cover his or her "actuarially fair share" of the costs, i.e., high-risk insureds must pay higher premiums than low-risk insureds. This is essential to control adverse selection and moral hazard that will otherwise destroy any insurance arrangement that is not subsidized by government funds. Further, fierce competition prevents private insurers from charging higher rates to low-risk insureds to subsidize the rates for high-risk insureds or raising rates in future years to recoup losses from prior years.

Insuring catastrophe losses presents special challenges that are not associated with other kinds of perils. Insurers must deal with the fact that catastrophe losses are highly variable from year to year and the possibility that they could suffer very high losses in a given year that could easily bankrupt them. Insurers manage their catastrophe risk by controlling their exposures (e.g., avoiding large amounts of exposures in high-risk areas), holding extra capital earned in "good years" to help fund "bad years," and diversifying their risk through the use of reinsurance and other financial instruments to cover especially large losses.

Hence, in order for private insurers to be willing to commit capital to underwrite catastrophe risk, they must be allowed to manage their risk and charge what they perceive to be adequate risk-based premiums to cover all their costs, including the cost of financial diversification and the relatively high cost of capital associated with underwriting a very volatile peril. This leads to two economically desirable outcomes: the supply of private capital is maximized, and the incentives of those who benefit from coastal property are properly aligned by paying the full cost of risk for coastal property.

Contrary to popular opinion, insurers are not immune from competition. In fact, insurance markets tend to be highly competitive because of the large number of insurers and low entry barriers to insurance markets. While it is true that loss shocks and/or the reassessment of hurricane risk can cause short-term tightening of the supply of insurance, over the long term insurers cannot sustain excessive prices. Any insurer that sought to do so would lose business to opportunistic competitors who would offer lower prices and still earn reasonable profits.

Figure 2

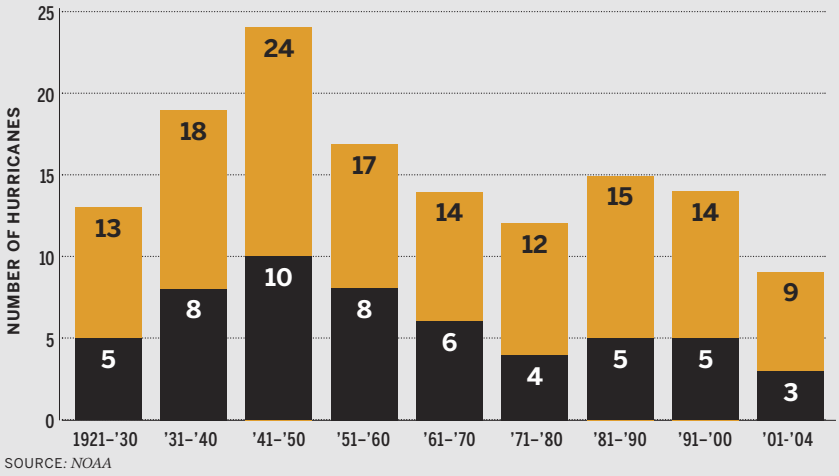


SOURCE: *Insurance Information Institute*

Figure 1

U.S. Hurricane Strikes by Decade

1821–2004



SOURCE: *NOAA*

Estimating and pricing catastrophe risk is a speculative enterprise that requires the use of sophisticated but inherently imperfect mathematical models. The models are plagued by considerable "parameter uncertainty" — modelers and insurers cannot be sure that they have exactly measured the "true" risk of hurricanes. Criticism of the models is one of the tactics used by politicians and their allies to challenge insurers' actions. While no model should be considered perfect and error-free, the firms that are putting their capital on the line need to be the arbiters of what they use to estimate and price the risk they underwrite. Ultimately, market forces and competition will drive insurers to use the most "reasonable" estimates of hurricane risk to price and manage their exposures. Several new companies have formed to mine carefully certain market niches, but the fact that venture capitalists have not jumped in to write large amounts of property insurance in hurricane-prone areas is telling in terms of their assessment of the current market price for the business.

Prior to Hurricane Andrew in 1992, insurers paid little attention to the growing risk posed by hurricanes, so insurance was relatively cheap and readily available. They generally did not use catastrophe models and did little to control their catastrophe exposures. Hurricane Andrew was a wake-up call to the insurance industry, which quickly and dramatically responded to the message. Using catastrophe models to assess their risk, insurers sought to raise their rates and adjust their exposures to reflect the new reality. However, political resistance only allowed gradual adjustments by private insurers and subsidization of government-provided insurance further undermined market price signals, especially in Florida.

By 2004, insurers believed that their overall rates and exposures were close to where they needed to be, with the exception of continued regulatory constraints on rates in the highest-risk areas. Their experience in 1992–2004 was consistent with the models they were using at that time. However, the very active storm seasons of 2004–2005 made them realize that their current models had substantially underestimated the risk they now faced. At the same time, weather scientists were warning that the hurricane cycle that had started in the late 1980s was intensifying and the probability of severe hurricanes was now much higher than it was at the beginning of the cycle.

Catastrophe models were revamped based on new information. Insurers sought to raise their rates further and cut their exposures in high-risk areas to attain new, economically sustainable positions. Coastal property owners and other interest groups vociferously protested the rate hikes — the new rates that were going into effect had finally reached a level that was negatively affecting the value of real estate in coastal areas. Politicians in Florida responded by attempting to create an insurance Disneyland (i.e., a return to the "good old days") by rolling back rates and expanding government subsidization of coastal property risk.

Florida is subject to the greatest problems because of its extensive development and its high exposure to hurricanes. But other states along the Gulf and Atlantic coasts are feeling the pinch of increased hurricane risk. Insurers are seeking to adjust their exposures and raise rates in all of these states, but not to the degree they are doing so in Florida. Northern coastal states face a significant but lower level of hurricane risk than southern coastal states. Still, coastal states besides Florida are facing increasing market and political pressures, and there is a significant danger that some may attempt to follow Florida's legislative and regulatory lead; they have already joined in calling for federal help.

MAKING TOO MUCH MONEY?

So-called consumer advocates and many politicians have strongly criticized insurers' actions, insinuating that the industry earns excessive profits and, hence, does not need to raise rates and control its catastrophe exposure. But most experts believe that insurers have under-priced catastrophe insurance historically based on models that underestimated the risk of hurricanes, and their recent actions are understandable in light of the risks they face. This is reflected in insurers' relatively low rates of return on their overall operations and their negative long-term earnings in high-risk lines like property insurance in Florida. While insurers' historical performance should not be the only basis for evaluating their management of catastrophe risk, it is symptomatic of the catastrophe risk problem.

According to industry analysts, the historical average return on equity (ROE) for the insurance industry is 14 percent, approximately the same as the *Fortune 500*. However, over the last 10 years the insurance industry's ROE was 7.0 percent compared to the *Fortune 500's* ROE of 13.4 percent. Property-casualty insurers have substantially under-performed relative to less risky industries, and homeowners insurance has been

one of the worst-performing lines of insurance.

One of the important fallacies we cited above is the common view that insurers' "book of business" is one big pot and that, as long as they are earning profits on their nationwide operations for all lines of business, they do not need to raise rates or manage their exposures in high-risk lines and geographic areas. However, this view is contrary to how insurers and other firms must run their business. In essence, each product line and "block of business," e.g., homeowners insurance in Florida, must be economically viable. Just as any firm would have to jettison or change an unprofitable product line, insurers must make sure that their operations in a particular line and area will earn a fair rate of return over the long term. Otherwise, it becomes a drag on an insurer's performance that owners and investors will not tolerate.

According to regulatory estimates, cumulative homeowners insurance profits in Florida have been negative for the period 1990–2005. Figure 3 shows that profits as a percentage of premiums varies from year to year, but the cumulative sum of profits in Florida is negative for both homeowners insurance and all lines of coverage. The few bad years have more than wiped out any profits that insurers earned in good years. Also, we should note that several Florida insurers went bankrupt or were seized by regulators after the 2004–2005 storms because they did not have national operations to bail out their Florida losses.

Writing homeowners insurance in Florida has been a losing proposition that is getting worse, not better. Hence, it is not surprising that insurers are not enthusiastic about writing large amounts of property insurance on Florida's coasts. For example, State Farm recently announced its decision to drop 50,000 policies in Florida, though regulators are challenging that decision. The reason that most have stayed at all is the size of Florida's auto insurance market and the hope that things will eventually turn around for property insurance. However, public officials are making it much harder for property insurers to stay and wait for better days.

Finally, we need to comment on insurers' payment of hurricane-related claims. Insurers are committed to satisfying their legal obligations to pay claims arising from their contracts because that is the purpose of the business they are in, and because deliberate attempts to underpay claims will result in severe regulatory and other legal sanctions, as well as reputation losses. That said, insurers also do not want to pay any more than they are legally obligated to pay, and disputes between insurers and claimants on how much should be paid are inevitable in some situations.

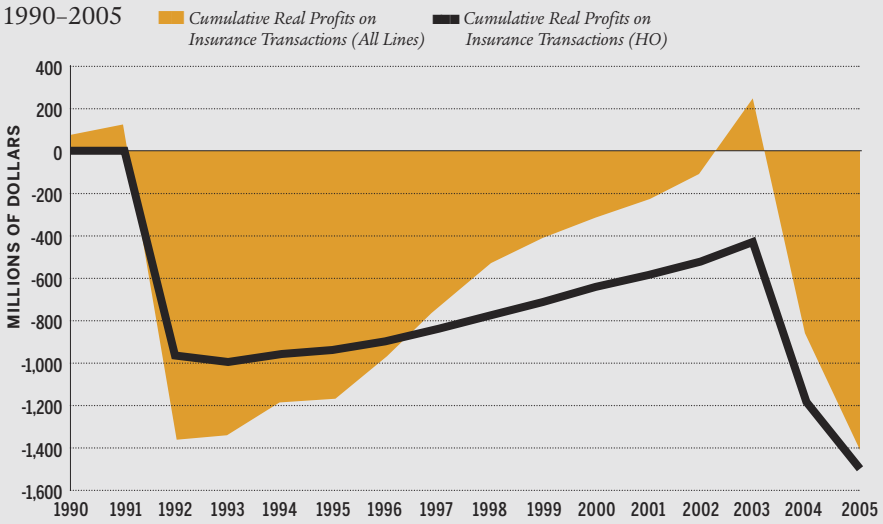
Settling claims arising from a hurricane that causes significant flooding, like Katrina, creates some special problems for claims settlement. First, the large number of claims strains insurers' claim-adjustment resources. Second, when a home suffers damages from both wind and flooding (or flooding alone), the potential for disputes significantly increases. Wind damage is covered under most homeowners insurance policies but flood damage (including storm surges from hurricanes) is excluded because of a government-industry understanding that it should be covered by the federal flood insurance program. However, most homeowners do not buy flood insurance unless forced to by lenders who hold a mortgage on their property. Hence, the many claimants without flood insurance are motivated to ascribe all or most of their damages to wind, while insurers are motivated to just pay for wind damage.

Disputes will naturally arise when the post-storm evidence does not clearly reveal the cause(s) of damage beyond any factual challenge that could be raised. Insurers are not infallible and likely have made some errors or too narrowly construed the cause of losses in some cases. However, this problem is much less significant than the allegation that insurers have deliberately and systematically sought to underpay hurricane claims on a wide scale. The more than $40 billion in insured losses from Hurricane Katrina indicates that insurers have made substantial claims payments even if some claimants do not believe they have been paid enough.

Figure 3

Cumulative Real Profit on Insurance Transactions in Florida

1990–2005



SOURCE: *National Association of Insurance Commissioners*

FLORIDA'S LEGISLATIVE DISASTER

The last fallacy that warrants correction is that the government can substantially lower the cost of hurricane insurance without large subsidies from non-coastal property owners and taxpayers. This was demonstrated by the fact that Florida's insurance subsidization schemes required substantial assessments on all insurance consumers and taxpayers in the state to

cover deficits arising from the 2004–2005 storm seasons. Despite that experience, in early 2007 Florida enacted legislation and implemented policies that further expanded and subsidized government-sponsored coverage and tightened constraints on private insurers.

The major changes in Florida essentially allow the state's insurer of last resort, Citizens Property Insurance Corporation (CPIC), to compete directly with private insurers. In the past, the CPIC's prices were mandated to be the highest in the state and its eligibility requirements were structured so that the CPIC would not undercut the private provision of insurance. Under the 2007 changes, its rates have been rolled back and a homeowner will be allowed to obtain insurance from the CPIC if its rate is lower than what the homeowner can obtain from a private insurer.

Prior to the new legislation, the CPIC had been growing rapidly in terms of the number of policies in force and exposure to loss (amount of insurance coverage written). It will grow much larger because of its restructuring. It had been projected that the new legislation will increase the CPIC's growth to a level of 1.36 million policies and over $400 billion in exposures by the end of 2007, but it now appears that this projection will be substantially surpassed. Hence, the CPIC will account for more than one-third of the state's property insurance market, but a much higher proportion of the state's high-risk coastal exposures.

In addition, the state, through its unique Florida Hurricane Catastrophe Fund (FHCF), is offering reinsurance to insurers at below-market rates through its power to assess (tax) homeowners, commercial, and auto insurance policyholders to pay for any future deficit. If significant losses occur, the FHCF can sell bonds and tax all insurance consumers, regardless of where they live in the state, to cover the deficit. A large catastrophic loss will require recapitalization, and current and future taxpayers of Florida will have to pay for the losses. Florida insurance regulators are also tightening their constraints on insurers' rates and requiring insurers to lower their rates based on the lower, subsidized cost of reinsurance from the FHCF (even if they do not buy reinsurance from the FHCF).

Florida further prohibited insurers from establishing Florida-only subsidiaries of national insurers. This prohibition is intended to extract subsidies from insurers' non-Florida operations, which is a flawed idea as we have previously explained. The purpose of single-state subsidiaries is to preserve a parent insurer's option to recapitalize a subsidiary after a major storm (or not) and make an insurer's Florida performance more transparent. While Florida has had a number of insolvencies after Andrew and the 2004–2005 seasons, none of the subsidiaries of national insurers have failed nor have they been abandoned. However, the new legislation and the attitude of the legislature may make insurers rethink their commitment to the Florida market.

The net effect of Florida's legislative and regulatory changes is to arbitrarily lower the cost of risk to Florida consumers (with coastal property owners getting the greatest benefit) and shift the additional risk to consumers of other insurance products as well as Florida taxpayers. The new policies will increase the state's reliance on smaller, unaffiliated insurers and government-subsidized insurance. This is a recipe for an economic disaster when the next major storm hits the state.

CONGRESS: BAIT AND SWITCH

Florida is not alone in assaulting the insurance industry. Many federal legislators from coastal states have attacked the industry and sought subsidies from non-coastal areas. They have criticized insurers for the settlement of Katrina claims, rate increases, and their actions to limit their catastrophe exposures.

Beyond criticism of the industry, there has been the discussion of what the federal government should do. Proposals include eliminating the industry's special antitrust status, constraining insurers' actions through state and/or federal regulation, and establishing some kind of national catastrophe plan. The most prominent proposal would make the federal government serve as a "reinsurer" to augment private insurance/reinsurance and state insurance/reinsurance funds. One objective of the plan would be to encourage more states to establish state reinsurance mechanisms like the FHCF. There is a heated debate among insurers and others as to the need for and soundness of such a plan, but there are many federal legislators who appear to be favoring the scheme.

Government insurers are notorious for failing to charge adequate, risk-based rates because of political pressure. That is why they often run deficits that are covered by people who buy insurance in the private market and by taxpayers. Indeed, one Florida ex-legislator has been quoted as saying that he expects the federal government will bail out Florida's unique hurricane reinsurance fund because of the state's political clout — a factor he suggested figured positively into the Florida's legislature's expansion of the fund. Inadequate self-funding is the all-too-common experience at both the state and federal levels. The two most prominent federal insurance programs — crop insurance and flood insurance — have continued to generate deficits that have been covered by general fund appropriations. Government insurance programs are often sold with the fiction that they will reduce the need for taxpayer-funded disaster aid. The unfortunate reality is that we get the worst of both worlds — taxpayer-subsidized insurance (i.e., a contractual entitlement) and more disaster aid. A recent working paper by David Cummins, Michael Suher, and George Zanjani estimates that the net present value of the federal government's liability for disaster aid related to natural catastrophes (over a 75-year period) is between $1.2 and $7.1 trillion.

The net effect of the federal proposals would be excessive coastal development, reduced motivation to build hurricane-resistant structures or strengthen existing ones, and a reduced supply of private insurance. Taxpayers would end up subsidizing the cost of the additional increase in the risk of hurricane losses because of federal and associated state policies.

A BETTER COURSE

The supply of catastrophe reinsurance has increased since 2005. There has also been rapid growth in securitizing catastrophe risk with other financial instruments, but the amount of such financing has fallen far short of its potential. Even at

the primary level, insurers are seeking to move to a new, sustainable equilibrium and some insurers are considering cautious expansion of their operations in hurricane-prone areas. It is not a problem of supply — investors are happy to invest in insurers, reinsurers, or catastrophe securities at the right price. The problem is one of demand. If the federal and state governments are willing to supply under-priced insurance and reinsurance as well as constrain insurers' rates, who will be motivated to pay for adequately priced private capital?

The quickest and best solution would be to remove the constraints on private markets. The government could help by allowing insurers to set aside reserves to fund future catastrophe losses with the same kind of tax treatment that other kinds of loss reserves receive (most European countries allow catastrophe reserves). It also could make it easier to issue financial instruments (e.g., cat options, cat bonds, etc.) in the United States to cover catastrophe risk with the kind of appropriate tax treatment that they receive in other countries.

For those committed to the idea of a government reinsurer (whether its need is demonstrated or not), one might propose that it issue pre-event catastrophe bonds rather than engage in post-event borrowing and assessments that run a greater risk of taxpayer subsidies. Government purchase of catastrophe options also might be more feasible given that its portfolio of exposures would be aligned with the parametric triggers (e.g., total losses for a region or the United States) that would be used for such options. Private insurers and reinsurers could help to facilitate the aggregation of exposures (servicing policies as well as underwriting lower layers of risk) and ceding higher risk layers through adequately priced excess-of-loss reinsurance contracts with a government reinsurer.

The primary advantage of this approach would be that the government would pay for the cost of issuing catastrophe bonds (and/or options) up front, which in turn should be reflected in the premiums paid by those (e.g., property-owners) who ultimately receive the protection. There is precedent outside the United States for this approach: pre-event financing is used by the multi-country Caribbean Catastrophe Risk Insurance Facility. We can learn from innovations such as this and from the policies and institutions of other countries. Indeed, proposals for alternative plans have already begun to surface that may offer more economically sound approaches to pooling and diversifying catastrophe risk.

CONCLUSION

Homeowners insurance, especially in light of recent trends in hurricane frequency and severity, must be priced in accordance with the insured risk and associated costs. Further, any legitimate insurance arrangement, public or private, must manage its catastrophe exposure so that it can afford to pay its claims obligations if a disaster occurs. State and federal legislators do not appear to acknowledge this reality. In fact, Florida's insurance woes will not be solved unless and until the government allows private insurers to manage their risk and price coverage in a manner that will achieve a viable and sustainable property insurance market.

Florida's response to the increased frequency and severity of hurricanes has been to effectively ignore or grossly underestimate the risk. As a result of Florida's policies, hurricane losses will be further understated and regulated prices will be lower. Again, this short-sighted approach will likely yield even greater potential losses and a resulting loss of private market willingness to underwrite catastrophe risk in the state, with rippling adverse effects on other types of insurance. Other states may follow Florida's lead.

Federal legislative efforts in natural disaster financing may encourage the states to take on even more risks. According to a recent survey, state government assumption of exposures has grown from $57 billion in 1990 to $600 billion in 2007. The growth may be partially based on the states' hope for a federal program to bail them out after a disaster. That hope will likely grow if a flawed federal catastrophe program is enacted.

There are private market solutions to the problem of managing and insuring catastrophe risk. Private catastrophe financing would work better if the government did not constrain and compete against it. Tax-deferred catastrophe reserves like those European insurers employ to manage their long-term catastrophic risk would encourage private market participation, as well as the encouragement of catastrophe risk financing instruments. Allowing insurers to earn long-term profits consistent with the risks they face would also encourage insurers to increase the supply of insurance.

Private market solutions should be fully exploited before government financing of natural disaster risk is considered. Further, any government financing mechanisms that are instituted should be confined to fill a gap that private markets cannot fill (if such a gap is clearly demonstrated). Those mechanisms should be fully financed by risk-based premiums paid by those who receive the benefit of government protection, not subsidies from other insurance buyers and taxpayers. Such policies would promote more efficient management of catastrophe risk and avoid subsidies of excessive risk-taking in coastal areas. R

Readings

- "After the Storms: Property Insurance Markets in Florida," by Martin F. Grace and Robert W. Klein. Georgia State University working paper, Dec. 18, 2006.
- "Facing Mother Nature: Economics v. Politics," by Martin F. Grace and Robert W. Klein. Georgia State University working paper, June 26, 2007.
- "Federal Financial Exposure to Catastrophic Risk," by J. David Cummins, Michael Suher, and George Zanjani. Working paper, July 31, 2007.
- "Increased Hurricane Risk and Insurance Market Responses," by Martin F. Grace, Robert W. Klein, and Zhiyong Liu. *Journal of Insurance Regulation*, Vol. 24 (2005).
- "The 2007 Review of the Insurance Securitization Market," by Morton N. Lane and Roger G. Beckwith. *Trade Notes* (Lane Financial LLC), April 20, 2007.