

**Catastrophe Insurance and Regulatory Reform  
After the Subprime Mortgage Crisis**

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# Catastrophe Insurance and Regulatory Reform After the Subprime Mortgage Crisis

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## **1. Introduction**

This paper applies the long US experience with governmental provision of catastrophe insurance to the regulatory reform of the US financial system in the aftermath of the subprime mortgage crisis. Federal and state governments in the US now actively participate in providing catastrophe insurance for all major natural disasters (earthquakes, hurricanes, and floods) and terrorism. At this time, the subprime mortgage crisis is also creating catastrophic effects in US loan markets and associated goods markets that clearly require governmental intervention. The experience with catastrophe insurance markets is useful for reregulating loan markets facing severe distress because originating risky loans with highly correlated loss patterns is tantamount to writing catastrophe insurance. Part 2 of the paper summarizes the key lessons learned from catastrophes and catastrophe insurance. Part 3 applies the lessons to the regulatory reform of US loan markets in the aftermath of the subprime mortgage crisis. Part 4 provides a summary and conclusions.

## **2. Lessons Learned from Catastrophes and Government Catastrophe Insurance**

This section provides an annotated list of the key and relevant lessons learned from catastrophes and catastrophe insurance, with citations to the relevant literature (a great part of which includes contributions by Howard Kunreuther). The focus is on the lessons learned from governmental provision of catastrophe insurance. However, it is useful to start with lessons learned regarding the behavior of economic agents—individuals, firms, and government—in anticipating past catastrophes and providing emergency aid in the immediate aftermath of the events. I then turn to the lessons learned regarding catastrophe insurance and how this may help inform the regulatory reform of the US financial system.

### **Lesson 1: Limited Preparation and Mitigation in Anticipation of Catastrophic Events**

It is remarkable the degree to which individuals, firms, and governments fail to take precautions to avoid catastrophes or to mitigate their effects, even when historical precedents indicate that future events are likely. For one thing, homes and commercial structures continue to be built on earthquake fault lines and flood plains and within hurricane belts. In addition, the available insurance is often not purchased and cost effective mitigation investments are often ignored; see Kunreuther (1996, 2006) and Kunreuther and Pauly (2004). Kunreuther and Pauly (2006) also discuss possible government actions to rectify such shortcomings, including a comprehensive all-risk catastrophe insurance plan, and Jaffee, Michel-Kerjan, and Kunreuther (2008) discuss the possible role of long-term insurance. As an example of a specific failure, the World Trade Center was the focus of a serious terrorist attack eight years before the fateful attack of September 11, 2001, and yet few precautions were instituted to stop a new attack or to mitigate its effects; see Bazerman and Watkins (2004) and Kunreuther and Michel-Kerjan (2008).

In the same fashion, few precautions were taken to avoid the subprime mortgage crisis or to mitigate its effects. A clear warning sign was the bubble in US housing prices, with home prices far exceeding any normal criterion of affordability for many of the borrowing households. Anticipation of further house price increases maintained the bubble for a while, but a crash was inevitable; see Jaffee (2008a). Nevertheless, borrowers, lenders, investors, rating agencies, and government agencies either participated actively or watched with benign neglect as the bubble expanded. Of course, once the crash began, the government was immediately called.

It is a continuing behavioral question why economic agents with huge stakes ignore such warning signs, and then suffer the consequences. It could be that individuals believe “it will not happen to me” or they consider the events to be low probability and then act as if the probability is actually zero; see Kunreuther (1996) and Kunreuther, Kahneman, and Novemsky (2001). It is also possible that government bailouts are anticipated. Finally, it is possible that economic agents underestimate the magnitude of the consequences, possibly because they fail to recognize the externalities and systemic reactions the event will create, or otherwise have used an improper model to generate the loss distribution. This seems particularly relevant to the subprime crisis, where the systemic effects far exceed the direct losses on subprime mortgages.<sup>1</sup>

## Lesson 2: Government Intervention is Essential in the Aftermath of a Catastrophe

Following a catastrophe, “who you gonna call?”, the government of course; see Moss (2002). The reality is that private markets regularly fail in the face of a catastrophe, and government or associated non-profit entities are often the only available responders. This clearly applies to the emergency aid needed in the very short run, although the government response is not always effective, as was evident in New Orleans following Hurricane Katrina. In the medium run, government aid to reconstruct structures and infrastructure is often very limited, even if the conventional wisdom is to the contrary; see Kunreuther (1996) and Comerio (2006). However, reconstruction aid following the 9/11 terrorist attack and Katrina hurricane has been more substantial. Rand (2004) indicates that the government paid approximately 42 percent (\$16 billion) of the \$38 billion in total compensation for the 9/11 attack (insurance payments were most of the remainder). Garcia-Swartz and Layne-Farrar (2006) reference a range of estimates for Hurricane Katrina, with the average again indicating government funding of about 42 percent (\$42 billion) of the approximate total compensation (\$100 billion).

The subprime mortgage crisis has also elicited strong calls for government aid, and it is fair to say that the government response so far has been disorganized, ineffective, and remarkably opaque in terms of its goals and strategies. This is all the more disturbing because the dollar costs of the subprime crisis far exceed those of the past natural disasters or the terrorist attack of 9/11. Due to regulatory “forbearance”, the response to the Savings and Loan crisis of the 1980s was also inefficient. One implication is that a greater role could be assigned to well designed government insurance programs as “automatic stabilizers” to counter future financial crises.

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<sup>1</sup> As Jaffee (2008b) points out, the estimated direct losses on subprime mortgages (approximately \$400 billion) represent a one-time loss of only about 1 percent averaged across all US investment portfolios. The systemic aspects of the crisis arose because the losses were highly concentrated in the portfolios of a small number of financial firms, who were then threatened with bankruptcy, and thereby created a contagion to other interconnected financial firms and markets.

### Lesson 3: Government Catastrophe Insurance Responds to Private Market Failures

Over the last 40 years, private insurance firms have withdrawn from providing the primary coverage over the entire range of natural disaster and terrorism risks in the US.<sup>2</sup> The federal government started providing the primary coverage against floods in 1968, following on a decade of extremely heavy flooding. The state of Florida has provided the primary reinsurance against hurricanes since Hurricane Andrew in 1992 and the state of California has sponsored the state's primary earthquake coverage through a quasi public entity since the Northridge quake of 1994. Most recently, the private market for terrorism insurance stopped functioning immediately after the 9/11 attack, leading to the current system backed by federal government reinsurance.

To be sure, a fringe of private insurers remains in most of these markets, either by cherry-picking risks where the government's premiums are too high or by providing special coverage. In addition, in all the government programs, private insurance agents and firms still write, administer, and settle the insurance policies, for which they earn fees. Nevertheless, the government or a government entity always bears a significant component of the risk.

The calls for government catastrophe insurance always emphasize the negative externalities that could arise in the absence of a functioning insurance market. For example when terrorism insurance became unavailable following the 9/11 attack, there was widespread concern that construction and mortgage lending would stop at least in the urban areas that might be subject to a future attack. The 9/11 attack experience, however, also provides a caution. The Terrorism Risk Insurance Act was not signed until November 2002, which is to say more than 14 months after the 9/11 attack. Contrary to the industry's alarmist threats, real estate and mortgage activity continued at what could be considered the normal rate conditional on the slower economic growth that occurred in the overall economy.

While all the government catastrophe insurance programs have served their primary goal of providing insurance in the absence of private market alternatives, two key problems are evident:

#### 1) Limited Risk-Based Pricing and Subsidized Insurance

Governments generally fail to impose meaningful risk-based insurance premiums, which also creates a subsidy, even when the programs technically require actuarially based premiums; see Kunreuther (1996) and Kunreuther and Michel-Kerjan (2008). This feature removes the economic incentive for mitigation. In the worst cases, the government is actively encouraging people to put their homes and commercial structures in harm's way, since the cost of government insurance makes little or no distinction among locations or mitigating activities.

#### 2) Crowding Out of Private Markets

None of the private insurance markets recovered in any substantial way once the government insurance plan was created, which is not surprising given that all the programs are subsidized.

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<sup>2</sup> In most cases, insurers simply discontinued the coverage. As one case, unexpected losses bring into question what is the proper model, so ambiguity aversion may be a factor; see. Kunreuther and Hogarth (1989) and Kunreuther, Hogarth, and Meszaros (1993). Capital market imperfections provide another set of factors; see Jaffee and Russell (1997) and Froot (2007). In particular, investors may be unwilling to provide new capital for fear it will be used primarily to pay off existing losses, a form of the debt overhang problem from corporate finance.

#### Lesson 4: The Terrorism Risk Insurance Act (TRIA)

The TRIA legislation, first passed in November 2002, provides federal reinsurance for qualifying losses from a terrorist attack. TRIA provides a useful starting point for developing government reinsurance plans to cover financial catastrophes, so here I provide a summary of its key and relevant features (see Kunreuther and Michel-Kerjan (2008) for an extended discussion):

- Industry Loss Trigger

The government's terrorism reinsurance is triggered only when the industry's aggregate losses for a qualifying terrorist attack exceed a specific amount (currently \$100 million).

- Government Excess of Loss Coverage

Each insurer has a deductible amount as a percentage of its premiums written for commercial property and casualty insurance. The insurer must pay all losses up to this deductible, and must also pay co-insurance (15%) for the losses above this deductible (to an event limit of \$100 billion).<sup>3</sup> The deductible and co-insurance have the effect that private insurers will receive little or no government reimbursement except for the largest terrorist attacks; see Jaffee and Russell (2008). This leaves insurers with a strong incentive to use risk-based pricing and to induce property owners to take action to mitigate the risks where possible.<sup>4</sup> The government's reinsurance, however, is provided without charge and thus the overall program does retain an element of subsidy; the subsidy offsets the incentive for property owners to mitigate their risks..

- The "Make Available" Requirement

The legislation requires that all property and casualty insurers continue to make available terrorism coverage on the same conditions (but not the same prices) they offered prior to 9/11.<sup>5</sup> Perhaps surprisingly, the result has been a well functioning and reasonably priced market for terrorism insurance. Indeed, the industry has enthusiastically supported the program through two renewals. It is possible that the "make available" clause helped to coordinate a new diversified equilibrium in which all firms desire to participate knowing that all other firms must also participate; see Ibragimov, Jaffee and Walden (2008a).

- Crowding Out

Since the government reinsures the top tier of risk at no charge, it clearly crowds out any private reinsurance market for these risks. However, it is unclear whether any reinsurance firms would offer such coverage even in the absence of the government program. Moreover, private insurers bear the major risks below that threshold, and it could be said the government is "crowding in" the private markets, since no private terrorism insurance might exist in the absence of TRIA

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<sup>3</sup> TRIA has provisions for the US Treasury to recapture some of its expenditures by imposing surcharges on all property and casualty insurance policies in the following years. It is unclear, of course, whether these fees will be imposed in the actual event. In any case, they would apply to all policies and thus would not be risk-based.

<sup>4</sup> Kunreuther and Heal (2007) and Kunreuther and Muermann (2008) discuss models in which mitigating the terrorism risk on one property may only move the risk elsewhere, or in which effective mitigation requires coordinated action by a group of parties with interrelated risks.

<sup>5</sup> TRIA does include biological, chemical, nuclear, and radiological risks, but insurers are not required to cover these risks under the "make available" clause, and very little such coverage is available; see Jaffee and Russell (2008).

### **3. Reregulating Loan Markets in the Aftermath of the Subprime Crisis**

I now apply the lessons learned from the long US experience with catastrophes and governmental catastrophe insurance to the issue of regulatory reform in the aftermath of the subprime mortgage crisis. It is important to recognize in this context that making or investing in risky loans with possibly highly correlated losses is tantamount to providing catastrophe insurance. For this reason, the subprime mortgage crisis has created a set of conditions that strongly echo the experience following the major natural disasters and the 9/11 terrorist attack:<sup>6</sup>

- Private insurance/loan markets have systematically failed;
- The private markets and institutions are calling for government help, basing their claims in important part on the negative externalities that otherwise would affect the real economy;
- Government appears to be the only currently available and dependable remedy.

The experience with the government's catastrophe insurance programs suggests that governmental loan guarantees/insurance may provide an efficient mechanism to revive the failing loan markets. Loan guarantees would allow private market participants to continue originating risky loans and transferring them to final investors, given that the upper tail of catastrophic losses is covered by government insurance.<sup>7</sup> Loan guarantee programs may also be, and should be, designed to maintain private sector expertise in evaluating the default risks and setting the proper risk-based interest rates. In this fashion, the worst negative externalities of the subprime crisis on loan markets and associated goods markets may be eliminated, while using the available private sector expertise for loan analysis and underwriting. In addition, if the government program is designed to protect only against the largest systemic failures, it could then be maintained on a continuing basis as a low-cost automatic stabilizer against future financial catastrophes.

The details of applying governmental loan guarantees and insurance to revive loan markets is best illustrated by example, and here I illustrate the plan with an application to municipal bonds and municipal bond insurance. In the conclusions, I suggest additional applications..

#### **Government Reinsurance for Municipal Bond Insurance**

For more than 20 years, there has been an active US market to provide insurance against municipal bond default risk; see Jaffee (2008c). The insurance expedites the purchase of state and local government bonds by delegating the analysis of the underlying default risk to the insurers. Municipal bond insurers are chartered under state laws that require they be "monoline,"

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<sup>6</sup> The subprime mortgage crisis, however, has bankrupted large financial firms, whereas few insurers have been bankrupted as a result of natural disasters or terrorist attacks. Kunreuther (1996) reports that 9 insurers became bankrupt as a result of the 1992 Hurricane Andrew, and one insurer of significant size, Poe, was bankrupted by Hurricane Katrina. No insurer or reinsurer bankruptcies occurred as a result of the 1994 Northridge attack or the 9/11 terrorist attack. This indicates that the catastrophe insurers were adequately capitalized for these events..

<sup>7</sup> This is in line with an earlier plan for governmental excess of loss insurance suggested for natural disasters by Lewis and Murdock (1996). The problem could also be solved if the lenders could issue catastrophe bonds, but to date the markets for these bonds remain too inefficient for this application; see Bantal and Kunreuther (2000).

meaning that their capital is available only to pay claims against municipal bond losses.<sup>8</sup> The goal is to make the municipal bond entity bankruptcy remote from losses that might occur on other insurance lines covered by the same holding company. The chartering laws also imposed relatively high capital requirements on the firms.

In recent years, however, the insurance regulators have allowed the municipal bond insurers to provide coverage against default risks on subprime mortgage securitizations and related collateralized debt obligations (CDOs) and credit default swaps (CDS). It is unclear why the insurance regulators allowed the insurers to mix the relatively limited credit risks on municipal bonds with the high risks on subprime mortgages and their derivatives, since this clearly violated the monoline principle on which the insurers were chartered.

Worse yet, losses on the subprime mortgage derivatives now threaten the solvency of the municipal bond insurers.<sup>9</sup> The failure of these firms will have significant negative externalities in two regards. First, it will become difficult for many state and local government to issue new bonds in the absence of credible insurance. Second, many municipal bonds are held by depository institutions, motivated in part by the relatively low capital requirements allowed on bonds backed by highly rated insurers. Were these insurers to lose their high ratings, or even fail, the depository institutions would face significantly higher capital requirements. And, if the bonds and insurers were both to default, the investors would face the losses directly.

In this setting, the government is facing the question how to maintain a functioning market for municipal bonds, dependent as it is on a functioning market for municipal bond insurance. An immediate issue is how to separate the losses that are already present on the existing books of subprime and municipal bond insurance from the task of insuring newly issued municipal bonds. For this purpose, I propose a good insurer/bad insurer model, and I first consider how to insure newly issued municipal bonds (the good insurer). The basic plan is to create a new government excess of loss reinsurance program that would backstop the risk on newly insured municipal bonds.

The TRIA program already in place for terrorism risks provides a useful template. The basic feature is an excess of loss insurance contract, with a deductible high enough to place all of an insurer's contributed capital in the first loss position. The monoline bond insurers already face significant capital requirements, and these should be continued, possibly even expanded, for the newly restructured insurers.<sup>10</sup> A further refinement, and one that differs from TRIA, would make the reinsurance payouts a minimum of the insurer's actual losses (above its deductible) and a prorated share of the industry losses based on the principal amount of insured bonds. This would

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<sup>8</sup> See Jaffee (2008c) and Ibragimov, Jaffee, and Walden (2008b) for further discussions of the monoline bond regulations and the conditions under which they are consistent with welfare maximization.

<sup>9</sup> American International Group (AIG), in effect a hybrid of an insurer and an investment bank, deserves comment as well, since it has also suffered enormous losses by insuring CDO and CDS subprime mortgage risks, and without appropriate regulatory controls. As a result, the firm is currently receiving an extremely costly government bailout.

<sup>10</sup> A unique feature of monoline capital requirements is that the firms are not allowed to distribute "earned premiums" as dividends for an extended period, often 10 years. The idea is to match the holding period for the capital with the long-term recurrence rates of the catastrophe risks.

provide insurers an incentive to hold diversified—“market portfolio”—books of business, for otherwise a firm would face a basis risk whereby its actual losses might significantly exceed its reinsurance payout.

Dealing with the losses that are embedded in an insurer’s existing book of business represents a more complex problem. This has not been a problem for the existing government programs that insure natural disaster and terrorism risks because, by and large, all the extant claims had been settled by the time the government program started. The problem for the current municipal bond insurers is particularly complicated because their existing books combine moderate losses on municipal bonds with vast losses on CDO and CDS subprime mortgage derivatives. If the two lines could be separated, then it might be sensible to bailout the existing municipal bond policies, while allowing the insurer to default on its CDO and CDS policies. Indeed, had the regulators properly enforced the monoline principle, this would be an available option. In the actual case, the government must either bailout the entire firm or allow it to default on all of its policies. In the latter case, the government might still find a way to bailout worthy bondholders who face the joint default of the bond issuer and the insurer.<sup>11</sup>

#### **4. Summary and Conclusions**

This paper has proposed applying the long-standing experience with government backed catastrophe insurance (covering natural disasters and terrorism) to regulatory reform in the aftermath of the subprime mortgage crisis. The paper specifically discusses a proposal to apply the concepts of government catastrophe insurance to help maintain a functioning market for new municipal bond default insurance. The same principle could be applied, if necessary, to other loan markets, such as credit card and auto loans, if these markets were to fail. The motivation in all these cases is to forestall a negative externality through which a failure in a loan market brings down associated markets for real goods, thus enlarging the systemic crisis.

Mortgage loan markets represent even greater concerns, both because they are particularly stressed as a result of the subprime mortgage losses and because they are simply much larger in size (with approximately \$11 trillion in outstanding single-family home mortgages). As with the example of municipal bonds, there is the dual problem of how to deal with the existing losses, including mortgage foreclosures, and how to reform the market to carry on new business. Dealing with the existing losses is particularly complex, and again there is no relevant past experience from governmental catastrophe insurance plans. For new mortgages, there may well be a role for excess of loss government catastrophe insurance, in parallel with the planned offered here for municipal bonds. However, there are other existing government programs in this general area—the Federal Housing Administration mortgage insurance for low-income borrowers, and Fannie Mae and Freddie Mac. I have proposed elsewhere a plan for the reregulation of Fannie Mae and Freddie Mac under the same basic concept of a government-backed excess of loss catastrophe insurance; see Jaffee (2008d).

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<sup>11</sup> Government bailouts of entire firms are particularly costly because they indemnify all the firm’s creditors—a version of the debt overhang issue from corporate finance. This inefficiency is reflected in all of the government’s subprime mortgage bailouts. I thank Ken Froot for emphasizing for me this application of the debt overhang issue.

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