



Should Governments Provide Catastrophe Insurance?

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The tragic consequences of Hurricane Katrina have given renewed importance to the analysis of the appropriate role of government in the provision of catastrophe insurance. Even before Katrina, the impending expiration of the Terrorism Risk Insurance Act of 2002, (TRIA), had set in motion an active debate on this question. This act made the US Federal government the temporary re-insurer of certain terrorism risks, and led to divided opinions before it was actually extended.

Many industry observers are now claiming that only the government can provide insurance

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against catastrophe risks. The following statement is typical:

The insurance industry is designed for those things that happen with great frequency and don't cost that much money when they do. It's the infrequent thing that costs a large amount of money to the country when it occurs—I think that's the role of the federal government.

—Edward M. Liddy, President Allstate, as quoted in the Wall Street Journal in 2005.

To the contrary, we argue that these rumors of the death of private insurance markets are greatly exaggerated. It is true that profitable provision of catastrophe insurance requires significantly more sophisticated capital planning than the underwriting of standard lines such as, say, auto insurance. For auto insurance, it is virtually certain that current losses can be paid out of

current premiums. With catastrophes, however, when the “big one” hits, current premiums will not suffice, and payment of losses will require access to capital, either accumulated ahead of time in the form of reserves, or obtained after the fact. This need to access capital markets is the distinguishing feature of the catastrophe line, and clearly presents many challenges, but it is not grounds in itself for handing the business over to governments.

That said, it must be noted that capital markets are not perfect. The occurrence of some catastrophic events will cause such large capital drains that it will be difficult even for the most skilled capital market manager to replenish surplus quickly. During such periods of capital market stress, there is a role for the government. We will argue that market imperfections can be

overcome by governments providing temporary liquidity to the insurance industry in exactly the same way that central banks provide temporary liquidity to the banking industry.

CATASTROPHES: ARE PRIVATE INSURANCE MARKETS VIABLE¹

What exactly is a catastrophe? In human terms, a large number of injuries and deaths is the key factor; indeed, this alone is sufficient to define catastrophes for many developing countries. In terms of the insurance industry in developed countries, catastrophes refer to events that create large and multiple losses over many insured risks, albeit on an infrequent basis. A threshold of about \$1 billion in insured losses due to a single event might define the lower bound. Paradoxically, modern insurance markets were born of a catastrophe, the Great Fire of London of 1666. This event destroyed ¼ of England's GDP and led to the creation of England's first fire insurance company, the Fire Office.

Today, following a sequence of high profile natural and man-made catastrophes, private insurers have shown an increasing reluctance

to underwrite this type of risk, and in many countries public agencies have stepped in to fill the breach. In the United States, flood, earthquake, hurricane, and, for the moment, terrorism insurance, are provided wholly, or in part, by public agencies. Private markets do exist, but they are small and selective in the risks underwritten. For example, only 1/3 of the residential earthquake policies in California are written by private insurers who are not members of the state run California Earthquake Authority. According to a 2004 report of Swiss Re, in many parts of the developed world, public provision of catastrophe insurance has become the norm.

But why should a low-probability, high-cost, risk of this nature be uninsurable in private markets? The answer to this question has little to do with risk markets and a great deal to do with capital markets. For catastrophe risk, the pattern of loss over time means that it is simply not possible to match losses in each year with premiums received in that year. But, taking the long view, it is difficult to see why this presents a problem.

A 100 year flood causing \$50 billion in damage, for example, has expected losses of

\$500 million per annum. This is well within the approximately \$400 billion carrying capacity of the United States domestic property casualty industry, not even counting the additional carrying capacity of foreign re-insurers such as Lloyds, Swiss Re and Munich Re.² This "actuarial" view that catastrophe risks are insurable is further supported by the fact that at one time or another, insurance against all catastrophes in the United States was readily available, often at a very low price. In every case, market collapse was sudden, following hard on the heels of some catastrophic event, the Mississippi floods of 1927 for flood insurance, the Northridge earthquake for California earthquake insurance, Hurricane Andrew for Florida hurricane insurance, and the terrorist attacks of 9/11 2001 for terrorism insurance.

This before and after pattern, with insurance readily available before the loss, but not available at all afterward, suggests something of a panic reaction. After all, following a catastrophic event, actions are usually taken (levee strengthening, increased airport security, for example) which lower the probability or the consequences of a subsequent event. Of course, insurers may have

misjudged the magnitude of the loss, but even when losses far exceed the expected amount, these incremental losses must still be multiplied by very small probabilities, and a suitable (perhaps even large) upward revision of premiums should be sufficient to maintain profitability. This would enable insurance companies to continue underwriting at least part of the risk, and, with the improved sophistication of catastrophe loss modeling, it should be straightforward to justify an increase in premiums to regulators based on the revised estimates of expected losses. Of course, there is the obvious problem that a catastrophic event depletes insurance company reserves. But again, given that catastrophe insurance remains a profitable business at the appropriate price,³ external financial markets should be available to replenish the capital stock.

This capital restocking process is the key to the successful operation of this line, and it is not free of practical difficulties. In prior work we have noted a number of these (see our 1997 paper). For example, providers of new monies will be rightly concerned that their capital will be used to pay off existing claims. Again, under current United States law, the interest on capital

reserves is taxed even though it is expected to be used to pay claims, a problem pointed out by Scott Harrington and Greg Niehaus. These and other difficulties, however, can be overcome. In particular, catastrophe bonds, instruments whose principal is cancelled in the event of a loss, have already proven capable of financing earthquake and wind risk and are beginning to be used to finance terrorism risk. Cancellation of the finals of the FIFA World Soccer Cup in 2006, for example, is insured by a catastrophe bond for \$260 million issued by Credit Suisse. The market for such instruments is still not large (\$1 billion per annum), but many obstacles to their acceptance (for example, the receipt of an investment grade rating from the bond rating agencies) have been overcome and it would be sensible public policy to remove the remaining obstacles.

The increased sophistication of both catastrophe risk modeling and catastrophe financial engineering make it all the more difficult to explain the reluctance of most insurers to write this line. Of course, there are exceptions. Warren Buffett, the owner-manager of the Berkeley Hathaway insurance companies,

has, on several occasions been willing to write catastrophe insurance contracts rejected by other companies. This raises the question of the extent to which professional managers of publicly traded firms decline to write this line because they fear putting their own jobs in jeopardy or they feel the need to provide Wall Street with a smooth earnings pattern. A catastrophic event can put a significant dent in the earnings of any quarter in which there is a loss, and accounting rules prevent this loss from being smoothed, as we pointed out nearly a decade ago.⁴

Of course, for firms writing catastrophe lines, some down quarters are to be expected. The question is whether or not financial markets recognize the temporary and idiosyncratic nature of these losses, and set the stock-market price for these firms accordingly. Several studies have found, for example, that the effect of a catastrophic earthquake on the market value of property-liability insurers can actually be positive, perhaps because market investors anticipate firmer premium levels in the future. Rodge Shelor and his coauthors documented that the 1989 Loma Prieta earthquake had a positive impact on insurance firm value. Likewise,

Thomas Aiuppa et al. also demonstrated positive insurer share price reaction to that event. William Kennedy and Reinhold Lamb found that property liability insurers experienced a significant positive reaction immediately after the Northridge earthquake. Aiuppa et al., on the other hand, documented that earthquake-exposed firms sustained their value and non-earthquake-exposed insurers declined in value immediately after the Northridge earthquake. A recent analysis of post 9/11 effects by David Cummins and Christopher Lewis confirms the absence of clear negative effects, “The immediate effect of the attack was a general decline in insurance stock prices. However, during the period after the first post-event week, the stock prices of insurers with strong financial ratings rebounded while those of weaker insurers did not, thus providing support for the flight to quality hypothesis.” All of which suggests that the fears of the professional managers are more imagined than real.

With respect to the insurability of catastrophe risk, when these risks are priced to yield a reasonable profit, and assuming that creative financial engineers can find ways to raise the

capital necessary to fund losses, there is no obvious reason why private insurance markets should not be able to provide this product.

DESIGNING A PUBLIC CATASTROPHE INSURANCE PROGRAM

If private market catastrophe insurance is commercially viable, permanent government programs which provide lower-cost public substitutes would crowd out the market alternative. This suggests that the design of Government interventions needs to be examined very carefully. As critics of the National Flood Insurance Program (NFIP) have pointed out, subsidies are legislated into this program (up to \$10,000 per policy). In addition, the failure to require this program to maintain actuarially computed reserves against future losses makes the system an insurance scheme in name only. The program was backstopped by a line of credit with the United States Treasury of \$1.5 billion, some of which was used in 2004. Since losses from Katrina will clearly greatly exceed this limit, those who bought this flood insurance are now almost as dependent on taxpayer largesse as those who did not.⁵

Two design principles would help to avoid these problems.

1) Direct participation by the private markets should be encouraged as much as possible. Government programs should support, not replace, private markets.

2) When government programs are required, they should mimic as far as possible the structure of private market outcomes.

GOVERNMENT PROGRAMS SHOULD SUPPORT, NOT REPLACE, PRIVATE MARKETS

TRIA, the Government terrorism reinsurance program, was explicitly and properly legislated as a stop-gap measure designed to allow the private market to get back on its feet. But, since the government reinsurance facility is provided without charge, it has necessarily crowded out the corresponding elements of the private terrorism reinsurance market. Not surprisingly, elements of the real estate and insurance industries lobbied hard to ensure that the program was renewed at year-end 2005.

It is quite possible, however, to design temporary catastrophe assistance programs which support private markets rather than

destroy them. As pointed out above, many of the problems faced by private markets stem from the abrupt loss of capital caused by a catastrophic event. Clearly, Governments can offer temporary loans to replenish capital, allowing private insurers breathing time to access private sources of capital. There is an obvious analogy with the banking industry. The Federal Reserve System stands ready to loan reserves to banks in temporary difficulties, and this has allowed the private banking system to flourish in the face of its own catastrophic risk of bank runs. To be sure, the Federal Reserve takes precautions to ensure that these loans will be repaid: the Fed requires the borrowing bank to post high quality collateral, and, if a bankruptcy does occur, the Fed is at the front of the creditor line. In this sense, the Federal Reserve provides only a liquidity facility; bank supervision for safety and soundness is mainly carried out by the Comptroller of the Currency and state banking departments (for state chartered banks).

The same argument can be made with respect to private insurers. The federal Government can offer to make loans at market

rates to illiquid insurers, these loans being treated as qualifying reserves until such times as they are replaced with external capital.⁶ This arrangement does not require that the Government enter the business of catastrophe insurance. It simply extends the existing “lender of last resort” function from the banking industry to the insurance industry. If private insurers know that they can always replenish their reserves following a loss, straightforward profit maximization considerations would overcome at least a substantial part of the reluctance to write catastrophe lines. Thus, the principle here is to provide temporary liquidity to otherwise sound insurance firms, just as the Federal Reserve already does for the banking industry.

And just as the Federal Reserve does not want to send good money after bad, there will need to be some supervision of insurance company’s safety and soundness. How this supervision is to be divided between state regulators (there is currently no Federal regulation of the insurance industry), private rating agencies, and any new Federal agency will clearly depend on the details of how this new program is administered.

USING THE MARKET AS THE MODEL FOR PUBLIC INTERVENTION

But what if this is not enough? What if private insurers, even with the guarantee of instant access to capital at market rates, still refuse to write catastrophe lines? Then we face the need to structure a public alternative. In designing public catastrophe insurance programs, it is important to note what they are not suited to achieve. First, they certainly cannot eliminate the actual deaths, injuries, and losses to tangible property; indeed, by reducing the incentive of the private sector to protect itself against possible losses, government programs may cause the actual losses to rise. Second, lobbyist’s claims to the contrary, subsidized public catastrophe insurance programs are not necessary to guarantee full employment. Standard stabilization weapons, such as monetary and fiscal policy, can achieve that goal, despite the arguments of Glenn Hubbard and Bruce Deal in support of a permanent extension of TRIA.

Public catastrophe insurance programs should properly be thought of as substitutes for the much more expensive alternative of after the fact *ex gratia* payments as administered

by State and Local relief agencies, the Federal Government through FEMA and a host of other public agencies, and private agencies such as the Red Cross. This desire to aid one's neighbors comes from the best of human intentions, but it sets up all of the perverse incentives associated with the Samaritans dilemma, Buchanan (1977). Knowing that agencies stand ready to provide the resources to rebuild, those at risk have less incentive to act in a manner which pays any attention to the underlying risks.

In designing a public insurance program to avoid this difficulty, two features must be in place. First, the program must be priced at an actuarially fair level. Second, the program must maintain capital reserves based on standard insurance principles.

And herein lies the paradox. Put simply, a well designed public catastrophe insurance program mimics as far as possible the procedures of an equivalent competitive private market.

CONCLUSION

The view that a public insurance scheme must mimic the private market leads to the obvious question, why not just let the private market

do it? But we have already noted that private insurers are often simply unwilling to write catastrophe lines. We have proposed an intermediate solution, government loans that provide temporary capital in the aftermath of a catastrophic loss, but we acknowledge that this may not be enough. In this case, a direct government intervention may be needed, but the government insurance must require premiums which reflect the underlying risks (no matter how large) and must operate with a capital reserving strategy which makes frequent appeals to the Treasury for a bailout unnecessary. The government plan should not operate with subsidies that have the effect of encouraging individuals to put themselves and their possessions in harm's way. In short, a rational public catastrophe insurance scheme must be operated on the same principles that would govern the scheme were it to be offered by a competitive private market.

Letters commenting on this piece or others may be submitted at

<http://www.bepress.com/cgi/submit.cgi?context=ev>

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1 An earlier examination of this question by David Cummins and his coauthors in 2002 raised doubts about the adequacy of reserves. Since this study was written, reserves have grown sharply, but the basic conclusion of their paper, that additional financial instruments are needed, remains true

2 To give perspective, note that one domestic insurer, AIG, had stock market losses in one quarter of 2002 of \$629 million, \$354 million in one stock alone (Worldcom).

3 That the price be appropriate is an obvious requirement. In Florida, for example, Hartwick (2005) provides data showing that, based on the premiums in force, Hurricane Andrew wiped out about ten years of earnings, and then again the four hurricanes of 2004 erased another 11 years of earnings. On this basis, Hartwick concludes that the pricing of hurricane insurance risk has been set too low.

4 For an analysis of capital-market products for disaster risks, see General Accounting Office, (2002).

5 Risk Management Systems (2005), a firm specializing in the analysis of catastrophe insurance risks, estimated as of September 9, 2005 that the Katrina hurricane and New Orleans Flood created more than \$125 billion of economic losses, of which \$40 billion to \$60 billion were insured losses, and of which \$15 billion to \$25 billion were insured flood losses.

6 As Scott Harrington has pointed out to us, this debt on the insurer's books could raise issues for the insurer's rating agencies. These agencies would have to be persuaded that this government loan is just equity in waiting.

