Should Governments Provide Catastrophe Insurance?

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Abstract

Hurricane Katrina and the terrorist attacks of 9/11 2001 have focused attention on the appropriate role of government in providing insurance against catastrophes. This paper argues that wherever possible governments should follow policies which enable the continuation of a private insurance market. In the event that government must itself provide catastrophe insurance it should follow the same actuarially based pricing and reserving rules that would be followed by a competitive private market.

Introduction

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 on whether or not this new role should extended; see e.g. Hubbard and Deal (2004), Wharton Risk Management and Decision Processes Center (2005), C.B.O. (2005), US Treasury (2005) , Smetters (2005), Jaffee and Russell(2003, 2005).

In this paper we focus on two central aspects of this question. Firstly, we revisit the question of what features of catastrophe insurance make it so special that private insurers have declared it to be 'uninsurable." [1] Secondly, stipulating for the moment that private markets by themselves will not insure large infrequent events, we examine the form of the public/private partnership which provides the most beneficial risk management incentives.

[1] The following statement is not untypical. "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 Wall Street Journal (2005).

Catastrophes: Are Private Insurance Markets Viable[2]?

From the point of view of actuarial science, the absence of private markets for catastrophe insurance is something of a puzzle. A 100 year flood causing $50b in damage, (expected loss=$500m per annum), for example, is well within the approximately $400b carrying capacity of the domestic US property casualty industry, not even counting the additional carrying capacity of foreign re-insurers such as Lloyds, Swiss Re and Munich Re.[3]

This "actuarial" view that catastrophe risks are insurable is supported by the fact that at one time or another, insurance against all catastrophes in the US 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) to lower the probability or the consequences of a subsequent event. Of course, insurers may argue that before the event they had misjudged the potential magnitude of the loss, but even if the event creates losses far above 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[4], external financial markets should be available to replenish the capital stock.

This capital restocking process is not free of practical difficulties, and in prior work we have noted a number of them, Jaffee and Russell (1997). For example, providers of new monies will be rightly concerned that their capital will be used to pay off existing claims. Again, under current US law, the interest on capital reserves is taxed even though it is expected to be used to pay claims, see Harrington and Niehaus (2001). 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

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[2] An earlier examination of this question by Cummnins et al (2002) raised doubts about the adequacy of reserves. Since this study was written, reserves have grown sharply, but the basic conclusion of this paper, that additional financial instruments are needed, remains true.

[3] To give perspective, note that one domestic insurer, AIG, had stock market losses in one quarter of 2002 of $629m, $354m in one stock alone (Worldcom).

[4] 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. See http://www2.iii.org/media/met/floridahurricanes .

to be used to finance terrorism risk.[5] The market for such instruments is still not large ($1b 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.[6] The increase in sophistication of both catastrophe risk modeling and catastrophe financial engineering (the two go hand-in-hand) 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 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, Jaffee and Russell (1997).

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. Shelor, Anderson, and Cross (1992) documented that the 1989 Loma Prieta earthquake had a positive impact on insurance firm value. Aiuppa, Carney, and Krueger (1993) also also demonstrated positive insurer share price reaction to that event. Kennedy and Lamb (1997) found that property liability insurers experienced a significant positive reaction immediately after the Northridge earthquake. Aiuppa and Krueger (1995), 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 Cummins and Lewis (2003) 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 free to be 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. After all, modern insurance was born of a desire to provide catastrophe insurance. The 1666 Great Fire of London, which destroyed ¼ of England's GDP, led to the creation of England's first fire insurance company, the Fire Office.

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[5] Cancellation of the the finals of the FIFA World Soccer Cup in 2006, for example, is insured by a catastrophe bond for $260m issued by Credit Suisse, see Credit Suisse (no date).

[6] For an analysis of capital-market products for disaster risks, see General Accounting Office, (2002) *Catastrophe Insurance Risks: The Role of Risk-Linked Securities and Factors Affecting Their Use*, GAO-02-941 (September 2002).

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 need 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 is backstopped by a line of credit with the US Treasury of $1.5b, some of which was used in 2004. Since losses from Katrina will clearly greatly exceed this[7], those who bought this flood insurance are now almost as dependent on taxpayer largesse as those who did not.

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.

A. 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 are lobbying hard for the continuation of these benefits.

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.

The same argument can be made with respect to private insurers. The federal Government can offer to make loans at market rates to beleaguered insurers, these loans being treated as qualifying reserves until such times as they are replaced with external capital.[8] Note

[7]Risk Management Systems, 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 $125b of economic losses, of which $40b to $60b were insured losses, and of which $15b to $25b were insured flood losses.

[8] As Scott Harrington has pointed out to us, this debt on the insurance company's books could raise issues for the insurance company rating agencies. These agencies would have to be persuaded that this government loan is just

that 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 some of the reluctance to write catastrophe lines.

B. 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. There are other stabilization weapons such as monetary and fiscal policy which can achieve that goal. [9]

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 successful public insurance program, two features must be in place.

1) the program must be priced at an actuarially fair level;

2) the program must be reserved according to standard insurance principles.

And here 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.

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equity in waiting.

[9] The argument that subsidized terrorism insurance is necessary to increase employment has been made by Hubbard and Deal (2004) in supporting a permanent extension of TRIA.

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 one solution, temporary provision of 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 it must operate with a reserving strategy which makes it unnecessary to appeal to the Treasury for a bailout with high frequency. There certainly can be no argument for the government plan to operate with subsidies that have the effect of encouraging individuals to put themselves and their possessions in harm's way. 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.

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