# THE ROLE OF INSURANCE IN CATASTROPHE RISK MANAGEMENT: THE EUROPEAN PERSPECTIVE

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## Abstract

*The prevalence of catastrophes around the world has captured public attention It has also made insurers and governments consider the risk management of catastrophes, how they can be lessened in severity (and sometimes in frequency). This paper considers the ways in which countries in Europe, and the European Union have dealt with the issue of the role of government and insurer. The major question is: To what extent is exposure to catastrophe a private (insurer) or public (government) matter? Examples are given from the situation in France, Germany, Spain and Switzerland.*

*The conclusion is that catastrophe risk management is largely considered to be a corporate concern, provided by the insurance industry, even though some insurance principles are difficult to apply. Governments sometimes provide a framework, but otherwise their intensity and involvement differs widely. The role of reinsurers in spreading regional catastrophic risks is substantial, and they also engage in risk modelling and disaster risk financing on a country basis There is no 'European Risk Management', but a wide range of diverse solutions on a national or even local basis. Finally, the situation in some other parts of the world is described.*

## Introduction

Catastrophes, natural and man-made, seem to be increasing. Natural disasters include storm (hurricane/typhoon), earthquake, flood, tsunami, plus the threat of viral epidemics). Back in 1996 Bernstein's book on risk warned us that "discontinuities, irregularities, and volatilities seem to be proliferating ... and even the planet Earth seems to be under attack" (Bernstein,

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1996: 329). In this first decade of this century, there have been exceptional meteorological events and unsettling developments: winds have reached peak levels, plus the strongest hurricanes ever recorded, and with tropical cyclones and storms appearing even in Europe (Swiss Re, 2006; Munich Re, 2006; Kron, 2006)). Reinsurers have warned that rising temperatures will make floods and hurricanes become more common across the world. Man-made disasters include terrorism, (bombs and planes, and bio-terrorism).

The risk thermostat of the average citizen is being recalibrated as this new millennium advances (Nichols, 2004). The risk realization by citizens, and their expectation of government intervention, is putting pressure on governments to implement disaster prevention and remedies (Kitseree and Lawrence, 2006). The Twin Towers atrocity in 2001 galvanised the practice of risk management: nobody had conceived that such a thing could happen, and cause such death and destruction. That attack was then the most expensive insurance event in history, and highlighted the vulnerabilities and limitations of economic, financial and contingency insurance systems (Liedtke, 2006).

A characteristic of the 2004 Tsunami in Southeast Asia (caused by an earthquake measuring 9 on the Richter scale, with waves travelling at 800 km per hour), the Pakastini earthquake in 2005, and the 2010 Haiti earthquake, was that mostly it was poor people affected and they occurred in areas of low insurance penetration: as insurance claims were low, their significance is almost forgotten. Hurricane Katrina in USA in 2005 was the most costly insurance event ever recorded, worse than the terrorist bombing of the Twin Towers in 2001, and its expensive location ensured subsequent evaluation and analysis of the insurance and government response.

Insurers and governments respond to these mammoth risks in different ways and from country to country. For insurers, the 2001 WTC terrorist incident, although not a natural disaster, was a major test of insurers' macro issues, such as solvency adequacy, insurance capacity, uninsurability of some risks, and inadequacy of traditional forms of risk management, all of which are very relevant issues for catastrophe risks generally.

There are basically three aspects when considering catastrophes: risk reduction (pre- and post-loss), risk sharing (cost and compensation), and crisis handling. From another perspective, the issue is the extent to which governments and insurers should share responsibility for each of the three aspects. What are their respective roles?

## Approaching the Topic

Typically, only small parts of a country are exposed to specific catastrophe perils (such as earthquake or flood). The two basic issues which need decisions are:

- Are catastrophe risks and events a private problem (for insurers) or a public matter (for governments)..
- How is solidarity defined, and between whom? Solidarity means the sharing of risk between insured, insurer, reinsurer and government. It is like an advanced form of mutual insurance.

When confronted with fundamental insurance issues, it is wise to reconsider the basic principles of insurance, for they really are fundamental, and to ignore them or breach them could be potentially disastrous. However, the following three basic principles of insurance operating in an open market are hard to apply:

***Risk-based pricing.*** Higher exposure should lead to higher premium, which can lead to anti-selection. That, in turn, can lead to higher premiums because of imbalance in the pool of insured risks. The result is an unstable system and lack of coverage.

***Group-balance concept.*** This concept means that a group of insureds in a region potentially affected by catastrophe, share the burden whether or not they are affected by an actual event. The group could also be a region or country. This is hardly applicable without public incentives or pressures. The problem if there is no incentivisation is that the affected group could not bear the cost otherwise. An example is Florida USA where if insurance is not provided or subsidized, then houses would not be built after a hurricane.

***Limitation of exposure.*** This principle protects insurers from insuring risks beyond their financial capacity to pay resulting claims. However, with catastrophe risk, sometimes the total amounts at risk (accumulation per event) are way in excess of the total insurance market capacity.

Next, we turn to the political / government perspective, and discover more problems. Generally, politicians and governments have:

- no interest to pay for claims and public welfare following a 'catastrophe'
- an interest to avoid wide fluctuations of budgets
- an interest to have a stable insurance industry and market
- been influenced by certain lobby groups to subsidize some catastrophe coverage (such as crop insurance for hail damage).

## The Organization of Catastrophe Risk Management

Risk management is essential in countries whose people, infrastructure and economy could be devastated by catastrophe. The question is: Who should organize this? In reaching a solution

to this question, some related issues first need to be considered:

- Do we want a public 'redistribution of funds' for catastrophe exposure?
- If so, who organizes this: is it an industry task or a public matter?
- What is the (target) group?
- Is the solution voluntary or obligatory?
- Is the solution local or national?
- What are the specific exposures from a specific peril in a given region? (This enables risk modeling).
- Is it just a 'reimbursement' of losses' after the event happens, or 'real Risk management' which would include research and loss prevention, etc?

There is no 'European answer' to these questions, not even a 'European Union answer'. Instead, there are almost 50 national answers for approximately 10 different catastrophe perils (natural and man-made).

**Industry Involvement and Focus**

Next, we consider the extent of involvement in catastrophe risk management. There is a wide range of insurance industry and/or government involvement:

- Private supply of catastrophe covers
- Industry or governmental pool solutions
- Cooperation with a state-owned body
- Reinsurance
- Indirect government support (tax allowance for fluctuation reserves)
- Acceptance as a personal risk (leading to government case-by-case decisions)
- Combinations of these.

It is impossible in this article to discuss all the technical details, because so many factors are involved, including:

* Historical background
* Type of government involvement
* Legal basis / Status
* Premium / Loss pool
* Insured perils
* Definition / declaration of a 'catastrophe'
* Premium calculation / pricing
* Loss potentials
* Risk of underinsurance
* Claims handling
* Limits, deductibles
* Reinsurance
* Taxation
* Proactive risk management

This article therefore concentrates on a few relevant examples from several countries which illustrate the range of individual 'European' solutions.

### Example: Spain Consorcio de Campensacion de Seguros (CCS)

This is a public entity linked to the Ministry of Economy, but supervised like an insurance company. It was incorporated 1954 but its history dates back to 1928. Since 1991 there has also been private coverage possible.

The CCS undertakes many of the different insurance market functions, eg

- Multi-peril crop insurance and forest fires
- Automobile insurance (eg uninsured motorist, state-owned cars)
- Hunters' liability insurance
- Liquidation of insolvent insurers
- Credit insurance
- Environmental risks
- Terrorist attacks
- Natural catastrophes (floods, earthquake, storm, landslides, etc.).

Insurance cover is obligatory for earthquakes, tsunami, volcanic eruptions, and non-typical storms. The premiums are undifferentiated for each region, thus disregarding the different regional risk exposures. This acts as a form of redistribution of funds with a tax-like character. There is no reinsurance cover as the State guarantees sufficient funds for claims. Insurers act only as brokers, for 5 per cent commission. There is strong political support for this system, and political influence within it.

### Example: Switzerland

There are three relevant organizations involved in catastrophe risk management, all acting as meta-insurers because of the potentially massive claims cost of an incident.

The ***Intercantonal Reinsurance Association*** is a national non-profit organization for a loss prevention service against elemental risks, and it also provides reinsurance for 19 local building insurers. Member companies have 80% market share (obligatory and monopoly). There is a voluntary reinsurance pool by way of stop-loss reinsurance coverage. There is total additional coverage of CHF 750 million. Retrocessional coverage is bought internationally

The ***Swiss Earthquake Pool*** is a voluntary pool for earthquake risks for 18 cantonal building insurers. In Canton Zurich, earthquake risk is included in the policies. Compensation is provided only for direct damages and only to member insurers. The total limits (for the first two events) are CHF 2,000 million. An insured's retention is 10 per cent, with a minimum of CHF 50,000

The Earthquake Syndicate: was formed by 24 private fire insurers, in 7 cantons which do not have building insurers. Membership of the syndicate is voluntary.

***Switzerland: An Overview***

The acceptance of private supplemental cover against natural catastrophes is low (high accumulation, high prices). There is a voluntary system for building insurance; involving intensive loss prevention. There are substantial limitations: no insurance of building contents or consequential damage; relevant deductibles and aggregate limits are below total values. Spreading the local risks, on a national and international level, is working. Not being part of the national risk management system, insurers rely on the reinsurance system. There is no risk differentiation: whatever the statistical facts and probabilities, all are considered equal.

**Example: France**

There is active involvement by the French government, through the state-owned '***Caisse Centrale de Reassurance***' (CCR). This was established in 1946. Premium income in 2008 was EUR 1.2 million (among the biggest reinsurers in the world). CCR reinsures various 'special' risks (transport, agriculture, nuclear, construction, terror, etc.).

By law since 1982, there is also provision of natural catastrophe cover, which is an obligatory inclusion in property insurance for an additional premium. There has been cover for storm since 1990. CCR gives unlimited reinsurance coverage (a combination of quota share and stop loss) to insurers, for events which are declared by the government to be a 'natural catastrophe' (Cat Nat). There is no risk differentiation.

**Example: Germany**

Several historic monopolies or compulsory insurances for certain perils (fire, flood, earthquake) existed in some German regions for centuries. They were abolished by the 3rd Non-Life EU Directive in 1994. In Germany, risk management is considered to be a private/corporate matter, spreading risks by way of reinsurance (eg mainly storm). Some natural catastrophe perils are covered under standard policies (eg storm, hail under a building or car insurance). Optional 'catastrophe' coverages (ie flood) are provided by private insurers, but there is low demand due to high premiums. Government influence is limited to the supervision of the insurance companies and some financial support in very special catastrophic events (eg flood).

***German Terror Pool: EXTREMUS AG***

*EXTREMUS AG* is a stock company founded in 2002 by 16 insurance companies to insure

terror risks for commercial clients. There is EUR 2,000 million coverage, of which 99.8 per cent is reinsured in the open market. On top, is EUR 8,000 million of federal warranty (but this was scheduled to be reduced after 1 January 2010). There is a voluntary supplement to German industrial fire/BI policies for combined sums insured of more than EUR 25 million. German interests abroad are insured by a Lloyd's consortium. In 2008 there were 1,300 policies, with a premium income of EUR 50 million, handled by 120 staff.

From a market perspective, *EXTREMUS* is of very limited relevance: The reasons for this are:

- German interests abroad are insured by a Lloyd's consortium.
- 'One peril coverage' for a special target group.
- Voluntary insurance with limited interest from the clients' side.
- Much more a risk broker than a risk carrier
- Political backing but reducing over time.
- Example of reactive Risk Management (one year after WTC in 2001).

## European Risk Management: Some General Conclusions

From these examples, some general conclusions can be drawn about risk management in Europe. First, the protection against 'catastrophic' risks is mostly considered to be a private/corporate matter - to be provided by the insurance and reinsurance industry based on technical considerations. However, insurance principles are hard to apply. As governments have an interest to make 'solidarity' work, they sometimes provide a framework for this (as in the examples from Spain and France). There is no 'European Risk Management', but a wide range of diverse solutions on a national or even local basis.

Also, the intensity and form of governmental involvement differs widely. The role of reinsurance in spreading regional catastrophic risks is substantial. Additionally, ideas of 'country risk management', 'risk modelling' and 'disaster risk financing' are promoted by them. Risk Management in a wider definition (building codes, zoning, fire protection, research etc.) exists on a national or regional level, but has not yet been instituted on a European level.

## Some Other Countries and Techniques

It is interesting to look at what has been happening in some other countries. Since 2004, Indonesia has had a special reinsurer, PT Assuransi Maipark Indonesia, which deals only with catastrophe risks within Indonesia. It is a joint undertaking by all licensed insurers and reinsurers, sets pricing levels, and has a statistical data base for earthquake and other catastrophe risks (Jacinto, 2006).

Blong (1997) reviewed in scientific detail the risk management of catastrophe exposures in Asia, especially earthquakes. Experts in China are designing a probabilistic earthquake model for the whole country (Asia Insurance Review, July 2006, p2). China has introduced an earthquake pool, but only a tiny fraction of China's potential exposure to disasters is insured (Hahn, 2006).

Reinsurers are refining their risk assessment models for catastrophes, especially windstorms and hurricanes, climatic cycles, and global warming (Swiss Re, 2006). The central Java earthquake of 2006 (5,600 dead, 10,000 homeless) has been rigourously analysed by Munich Re.. The Singapore-based Capital Reinsurance Group has announced a joint project with a company in California, Risk Management Solutions, to develop catastrophe risk models for the Asian market (Asia Insurance Review, Vol.1, No.19, 25 March 2010).

In Britain there have been serious floods this last decade, especially affecting private dwellings, needing government assistance as well as producing insurance claims. Yet the disasters could have been foreseen as many local planning authorities have for twenty years allowed houses to be built on known river flood plains. A consequence is that many insurers now refuse flood cover in such areas. However, in 2010 some mortgage lenders announced that they would no longer insist on flood cover as a condition for lending money. Here we see local governments and national banks acting irresponsibly, in the interests of seeking more customers, ratepayers or mortgage-interest payers (Kitseree and Lawrence, 2006).

Pools can be set up by many insurers to share their risks, the government often acting as the guarantor or insurer of the last resort providing limits higher than the insurers' pool limit because of capacity constraints. Terrorism cover is available through pools, in Australia, Britain, France, Germany, Netherlands, Spain, and USA, which differ in detail but are all government/insurer partnerships. The model was the terrorism pool set up by Britain because of Irish terrorist bombings, which lasted for twenty-five years in Northern Ireland and England (Kitseree and Lawrence, 2006).

Catastrophe Bonds (CAT Bonds) are modern alternative risk transfer (ART) products, and are used by some insurers and reinsurers to help them pass on to the financial market part of their risk exposure, and thus they represent an additional insurance capacity for risks. They have been rated by Moodys since 1997. Over 50% of Bond exposure is for USA hurricanes and earthquake risks. Swiss Re, among others, issues CAT Bonds, in four varieties (ISQ, 2004). So far, the worst hurricanes and earthquakes have not triggered Bonds.

Japan is prone to major catastrophes. Tsunamis can reach 30 metres in height - three times the height of the 2004 Southeast Asian tsunami. Japan is plagued with earthquake fault zones. A major catastrophe happens every 5, 10, 20 years. Since 2005 insurers have had to set up an annual catastrophe fund, statistically calculated, which the Financial Services Authority checks

for accuracy and adequacy, including unearned premium reserves for natural disasters (Kawachimaru, 2006). Some Japanese insurers have been using CAT Bonds for their earthquake risks since 1998. In 2006 the Japanese insurance regulator tightened requirements to increase the minimum capital or reduce peak-zone exposure (Isherwood, 2006). Earthquake risks in Japan are ceded by insurers to Earthquake Re (a private company) which then retrocedes 80% of the risks to the government and the remainder to insurers (Kawachimaru, 2006).

The 2004 Asian tsunami affected 14 countries and killed about 220,000 people. After it hit Thailand, there were some insurance problems about whether the proximate case was earthquake or flood, but insures got together and decided to pay claims if the policy had earthquake and/or flood cover. When there was another problem about the interpretation of business interruption cover, the government's Insurance Commissioner effectively intervened to provide guidelines ensuring a consistent industry approach (Newall, 2006).

Many countries are already affected by rising sea levels, including Thailand where parts of Bangkok are below sea-level. New York City is considering floating barriers, at great expense, which would protect only part of the city. In England, the river Thames barrier, finished 30 years ago to protect London, is now considered to be inadequate against rising tide levels. Many scientists and politicians perceive the effects of global warming as the most serious threat human society has ever faced, which will destroy water and food supplies across the world, triggering giant migrations and worldwide conflicts (McCarthy, 2009). The failure of the UN Copenhagen Summit in December 2009 was because many governments decided that they cannot risk the immediate damage which radical action would do to their economies, with consequent social unrest.

In summary, much catastrophe risk management, in one form or another, is happening around the world. However, it tends to be patchy, and insufficient when set against the awfulness of catastrophic events. A world-wide catastrophe caused by global warming, is already happening, and the pace gets quicker than predicted. The threat of the consequences of global warning "is the most imposing scientific and technical challenge that humanity has ever faced", according to the British Minister for the Environment (uk.yahoo.news.com 13 October 2006). Lloyds of London issued a strong warning that insurers must face up to the increasing threat of climate change or risk extinction (Lloyds, 2006).

As Newall (2006) asked of insurers: Are we prepared? One of his major concerns was whether insurers had enough staff (and skills) to deal suddenly with huge numbers of claims. The Twin Towers (and Pentagon) incident in 2001 produced 40,000 insurance claims for a total of US$18.8 billion. It also produced thousands of personal injury claims, but the Federal government quickly established a Victims Compensation Fund to avoid costly and lengthy litigation. There were 1,300 victims of Hurricane Katrina in Louisana USA in 2005, and 1.75 million property and BI claims. When added to three other hurricanes nearby in the same year,

Dennis, Rita and Wilma, that produces a total of 3.3 million claims in one year (Newall, 2006). Such a volume severely tests the ability of insurers to handle the claims quickly, professionally and humanely,

As to global worming, it will take popular pressure for governments to act adequately. The measures needed will be harsh and unpopular, such as preparing for the abandonment of built sites in flood plains or low-lying estuaries, or near crumbling cliffs, abandoning any thought of coastal or riverside protection, rationing food and water, and forming riot-control and looting-control squads, and worse (McGuire, 2002). Are governments brave enough for that? Are citizens?

**Table: Insurability of Natural Catastrophes**

The following Table is a summary of what has been said about Europe. It is an overview of the different counties and what they do.

(A = Austria; D = Germany; CH = Switzerland; F = France; E = Spain)



Insurability of Natural Catastrophes

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| Nation | A | D | CH | F | E |
|---|---|---|---|---|---|
| Governmental organisation level | • | | ••• | ••• | ••• |
| Sociability | •• | •• | ••• | ••• | ••• |
| Minimisation of moral hazard (individual) | • | •• | • | •• | •• |
| Incentive for collective risk minimisation | • | • | ••• | ••• | • |
| Premium level | ••• | •• | • | • | • |
| Anti selection risk | ••• | •• | | | |
| Risk mapping applied | | ✓ | | | |
| Coverage obligatory | | | ✓ | ✓ | ✓ |
| Obligation to contract | | | ✓ | ✓ | ✓ |
| State / Governmental subsidy | ✓ | ✓ | | ✓ | ✓ |
| Risk differentiated premium | ✓ | ✓ | ✓ | | |

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