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The Underwriting of Catastrophe Risks

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Article abstract

Nous remercions l'auteur, M. Hervé Cachin, de nous avoir permis de reproduire le texte de la conférence qu'il a donnée à Monte-Carlo, en 1988. L'ampleur et l'importance des risques catastrophiques est ici examinée sous l'angle de la souscription. L'auteur y aborde, en particulier, trois aspects : la définition du concept des risques catastrophiques, le contrôle des cumuls et la réassurance.

The Underwriting of Catastrophe Risks

by

Hervé Cachin, Paris[1]

Nous remercions l'auteur, M. Hervé Cachin, de nous avoir permis de reproduire le texte de la conférence qu'il a donnée à Monte-Carlo, en 1988.

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For the third time in twenty years, the *Rendez-Vous de Septembre* is devoting its theme to catastrophe risks.

This highlights the fact that the situation has evolved sufficiently over the last few years to justify and update studies carried out in the past.

It is a fact that cover for catastrophe risks occupies an increasingly important role in the activity of insurers and reinsurers, and that this tendency will continue in years to come, for three main reasons :

1. Exposure to catastrophe risks is increasing on a worldwide basis.

   Technological progress in developed countries, industrialisation in developing countries and the expansion of urban zones lead to increasingly significant concentrations of values, which considerably increase the amount of damage which may be caused by a single natural event.

   Hurricane Betsy, which cost $715 US million in 1965, would cost more than $10 US billion today, due to the increase in values of

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[1] Mr. Cachin took part in the *Rendez-Vous de Septembre 1988*, held in Monte-Carlo on Tuesday, September 6th.

property situated in the area which suffered the loss in 1965. The cost to insurers of an earthquake in San Francisco could be between $30 US billion and $50 US billion at today's prices.

2. Insurance cover for risks related to the occurrence of natural events has developed considerably over the last few years, notably in European countries.

   In France, for example, the take-up rate for storm cover has increased 85% in 1978 to close to 100% in 1988 for simple risks, and from 20% to 75% for industrial risks. This is following an effort launched by insurance companies at the instigation of the authorities, who wished to see the cover more generalised.

3. In addition to catastrophes caused by natural events, there are also nowadays catastrophes connected with industrial activity. These involve the liability of companies towards their employees, the consumers or the environment. Losses arising from the production of asbestos and pollution liability are the most significant recent examples.

   The recent development of the market, and the occurrence of certain catastrophic losses (hurricane Alicia in 1983, Munich hailstorm in 1984, freeze in France and earthquake in Mexico in 1985, hurricane in Western Europe in October 1987) have highlighted a few important problems. I will confine my paper to these points :

   - the definition of insurable risks,
   - the control of accumulations,
   - the reinsurance of catastrophe risks.

1. Definition of Insurable Risks

The concept of an insurable risk is a relative one, since risks once considered uninsurable are insured and reinsured by the traditional market these days.

In fact, the insurability of risks exposed to catastrophe is dependent on the capacity available in the world market :

- certain risks will never be insurable because they would put at risk amounts considerably in excess of world capacity. Such is the case, for example, with damage caused to fixed installations by war ;

- other risks are only partially insured because available world capacity does not permit 100% at reasonable terms. Such is the case for industrial risks in the most exposed earthquake zones in Japan (cover is limited to 15% of value in zone 5, namely the Tokyo zone).

But for the majority of natural catastrophe risks, insurability depends on the possibility of establishing a group of risks which allow the constitution of a fund sufficiently large to cover major losses. For certain risks such as floods, earthquakes and landslides only an obligation to insure may avoid anti-selection.

In certain markets, insurance companies, without intervention by the authorities, have established a system of natural catastrophe cover for simple risks. Such is the case in Great Britain, Sweden and Norway, where householders' comprehensive policies cover flood, landslide and earthquake on an obligatory basis ; likewise in Switzerland, for flood, landslide, avalanche and storm.

In two of these cases (Switzerland and Norway), these risks are reinsured by a Special Pool of which all market companies are members.

In other countries, the authorities have decided to intervene to supplement the traditional market when its capacity is insufficient, or to take its place when it is non-existent.

In Japan, for earthquake insurance for simple risks, the system established in 1960 allows Japanese companies to give cover of between 30% and 50% of sums insured (with a maximum limit per risk of 15 million Yen), thanks to State cover which operates for 50% above 55 billion Yen and 95% above 280 billion Yen, up to a maximum single event loss of 1,500 billion Yen.

This system, which combines harmoniously the intervention of private insurance companies and the State contribution, has allowed companies progressively to increase cover granted, thanks to the establishment of a tax-exempt catastrophe fund, which currently exceeds 400 billion Yen.

- In Spain, a State-backed public fund covers earthquake, volcanic eruption, flood, cyclone, acts of terrorism and riot as an adjunct to Fire and Engineering cover provided by the insurance companies.

– In France, the State established an obligatory natural catastrophe scheme in 1982, covering damage caused by *the abnormal intensity of a natural phenomenon.*

This definition is very imprecise, since the risks covered are not named ; rather it is a decision by the authorities which determines whether or not a particular natural event comes under the scope of the scheme.

It is an obligatory scheme for all who have taken out a material damage policy. There is a single tariff fixed by the authorities, calculated as a percentage of the premium received in respect of the basic covers.

The obligatory nature of the insurance allows the avoidance of anti-selection and the single tariff establishes a solidarity between all insureds by fixing their contribution independently of exposure to the risks.

The *Caisse Centrale de Réassurance*, a public body, offers the market State-backed reinsurance (Quota Share and Stop Loss) which protects the companies against major catastrophes without there being any obligation to reinsure with this body.

This system has worked satisfactorily since 1982, but the absence of a clear definition of the risks covered is a source of confusion, notably for insureds.

It was thus that the storm of October 1987 was declared a natural catastrophe, occasioning indemnities under the scheme to people who several years beforehand had refused to take out storm cover offered by their insurers !

A modification of the law, giving a more precise definition of the risks insured, would avoid the situation where loss coverage depends on a decision by the authorities. It would then be possible to move progressively towards the open market having a larger involvement in the risk, with State intervention being limited to catastrophes of such an exceptional size that market capacity is exceeded.

2. Accumulation Control

Increase in exposure to catastrophe risks makes awareness and monitoring of accumulations more necessary than ever.

Progress has been made in this area in recent years, but the situation is far from satisfactory in certain markets and for certain types of risk.

As far as *earthquake* is concerned, the Japanese market was the first. From the 1950's, when Japanese insurance companies put together earthquake cover for industrial risks (shock and consequential fire), they got together to evaluate and to communicate to their reinsurers their exposures in each of the twelve zones covering the country. They also agreed to fix a maximum limit for sums insured in each zone, for each proportional reinsurance treaty.

Later, in the 1970's, the majority of Latin American markets most exposed to the risk, in cooperation with the international reinsurers, established a system of accumulation zones which in theory allows direct insurers and their reinsurers to be aware of their accumulations in each zone.

What is more, certain reinsurers discovered at that time that their exposures were much higher than they had previously imagined. Consequently, they had to reduce their shares significantly.

The concept of a contractual limit of sums insured per zone, for each reinsurance treaty, is beginning to progress in Latin America, but it has not been accepted by all the insurance companies, nor in all the markets concerned.

At the end of the 1970's, the situation also developed in California, thanks to the intervention of the Insurance Department, which was worried at the prospect of a large earthquake causing bankruptcies of insurance or reinsurance companies.

The regulations established from 1.1.79 divide California into eight zones and fix the maximum probable loss to be used for each zone, taking into account the different types of construction.

However, the system is not completely satisfactory, inasmuch as it is restricted to the direct earthquake cover, without evaluation and control of the accumulations corresponding to fire as a consequence of earthquake, whereas this cover is normally given under Householder's and Commercial Multirisk policies.

As fas as *storm and hurricane* are concerned, progress made the last ten years in the evaluation of accumulations by direct insurers

and reinsurers has been much more disappointing. Outside the United States and Canada, accumulation information in the possession of insurance companies – and therefore their reinsurers – remains largely insufficient.

In France, after the severe storm of 1982, the *Assemblée Plénière* began an information system intended to give a split by *Département* of the portfolio of each direct insurance company. However, the system remains unsatisfactory for reinsurers, as less than half of the insurance companies have followed this initiative.

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French, German and British insurers, and their reinsurers, therefore, have currently only a very imprecise idea of the maximum loss they are exposed to on a catastrophic storm affecting one or more of their markets.

The storm of October 15th 1987 in Europe demonstrated that a single event could cause significant damage over a very wide area, going from Portugal to Norway, via France and Great Britain (close to $3 US billion in total, of which $2 US billion relates to Great Britain).

Let us hope that this catastrophic event will make European insurance companies aware of the necessity of equipping themselves with a system for zonal accumulation control, comparable to that which exists in the United States.

Even when direct insurers have developed a good accumulation control system, the quality of available information deteriorates as it passes along the chain of cover, from insurer to reinsurer, from reinsurer to retrocessionaire, etc.

Extreme cases are when reinsurers come in on the fourth or fifth rung, notably when they cover portfolios of Excess of Loss treaties on an Excess of Loss basis.

It then becomes almost impossible to know the accumulations. In this case, many reinsurers have no other choice than to rely on their own retrocession protections, without being sure, in the majority of cases, that these will be sufficient.

It is in this manner that artificial capacity may arise, risking collapse like a house of cards the day a major catastrophe happens.

The table in Annexe 1 shows, by a purposely simplified example, that five companies each with net capacity of FF 10 million can together, by way of mutual reinsurance, develop a capacity of FF 150 million.

These complex, circuitous arrangements, whereby each is a reinsurer of the others, lead to very late advices in the event of a major loss, and make it difficult for each company to estimate its definitive loss cost.

Such was the case in the London LMX market following *Alicia* in 1983, which is still giving rise to loss advices in 1988, five years later.

In a speech given in London a year ago, Mr. John Emney described the phenomenon in the following terms : "A loss which was known at the time of occurrence. . . is continuing to invade new layers in the LMX market. For those underwriters who only wrote the upper layers in 1983, and that is especially true of the overseas market, they are finding that policies which they previously thought were clean are now total losses. Of course, many, after deduction of their retention, are immediately sending the loss straight back to the London Market, which further compounds the problem" (Annexe 2 simulates this *spiral effect* on the five companies of Annexe 1, in the event of a loss affecting them for a total amount of FF 73 million).

I will not dwell on the dangers of such a system, which is made possible only by an insufficient knowledge of the accumulations at each link in the chain of cover.

I am sure that the progress which will be made on this subject will probably show that the capacity available today for the cover of catastrophe risks is an artificial and innocent one, linked to the opacity of the system of information on accumulations.

Let us hope that in the meantime, a major loss does not expose the aberrations of the existing system by provoking the chain default of several reinsurers.

3. Reinsurance of Catastrophe Risks

Over recent years, the reinsurance policy of direct insurers has developed, in the form of large increases in their retention on ordi-

nary risks, a consistent move towards non-proportional reinsurance and a corresponding reduction in proportional reinsurance.

Cover for catastrophe risks is therefore becoming an increasingly important part of business accepted by professional reinsurers.

On such risks, reinsurers are faced with an increasing imbalance between the reducing volume of premiums ceded and heavier potential liabilities. The storm of October 1987 in Europe is a case in point, since reinsurers paid approximately 50% of the cost of losses incurred in Great Britain, and nearly 70% of those in France.

This imbalance is all the more worrying in that reinsurers on catastrophe layers have no guarantee of continuity (explicit or implicit) given the instability of the non-proportional reinsurance market today.

Moreover, this instability, caused by excessive competition, does not allow reinsurers to give their ceding companies the service which they have a right to expect from them.

In fact, the object of reinsurance for direct insurers is to obtain as regular a spread as possible of the cost of catastrophes over a period of time, which presupposes a certain stability in the cost of reinsurance cover from one year to the next.

On their side, reinsurers calculate their technical rates from the analysis of past loss experience over very long periods – roughly 100 years for earthquake and 20 years for storm – and, all things being equal, these technical rates should not increase significantly after a major catastrophe (unless it reveals a long-term tendency which had not been anticipated) nor reduce after a few loss-free years.

In fact, competition in the market leads to a very different development, which is satisfactory neither for the direct insurer nor for the reinsurer.

After several good years, during which catastrophe covers have been little or not at all affected, available capacity increases, which causes a drop in premium rates to levels considerably below the technical rate, and makes it impossible for reinsurers to set up the reserve funds necessary to face up to the future catastrophe.

When this catastrophe happens, it clearly highlights the previously insufficient rates and leads reinsurers to try to recoup their losses over a short period by applying brutal rate increases, always supposing, of course, that competition allows.

Clearly, by acting in this way, the reinsurer is not really fulfilling his role, since he is not allowing his ceding companies to budget for the cost of their protections over the medium term.

However, if direct insurers wish to benefit from a more stable market, they must accept to take a long-term view, as they do in their relationships with their insureds.

It is absurd for a Fire policyholder to demand a tariff reduction after a few loss-free years. It is just as absurd for a direct insurer to demand from his reinsurers a rate reduction for his catastrophe covers after a few profitable years.

All these reflections show that, despite progress made these last new years, notably in the evaluation and control of accumulations, the reinsurance of catastrophe risks is still being carried out at conditions which are not technically satisfactory.

I am sure that in the years to come, the common efforts of insurers and reinsurers will enable this market to become an adult one, and to put at the service of insureds and direct insurers a capacity which is sufficient (whilst not being innocent), stable and solvent.

ANNEXE 1

5 Companies operate in a market
(in French Francs)

	Company A	Company B	Company C	Company D	Company E
Net Capacity	10 million	10 million	10 million	10 million	10 million
Retrocession capacity	20m xs 10m placed with B and C	20m xs 10m placed with C and D	20m xs 10m placed with D and E	20m xs 10m placed with E and A	20m xs 10m placed with A and B
Total capacity	30 million	30 million	30 million	30 million	30 million

In the market, these companies alone offer capacity of FF 150 million, whereas their real capacity is FF 50 million.

If loss advices to these companies reach FF 150 million, each company will have a net loss of FF 30 million for a theoretical capacity of FF 10 million.

ANNEXE 2

Simulation of the "Spiral Effect"
(in French Francs)

	Company A	Company B	Company C	Company D	Company E	Total
Deductible	10 million	10 million	10 million	10 million	10 million	
Total capacity XL reinsurance	30 million	30 million	30 million	30 million	30 million	
placed with A	–	–	–	50%	50%	
B	50%	–	–	–	50%	
C	50%	50%	–	–	–	
D	–	50%	50%	–	–	
E	–	–	50%	50%	–	
Gross losses advised at						
Round 1	15,000,000	12,000,000	20,000,000	8,000,000	18,000,000	73,000,000
2	19,000,000	18,500,000	23,500,000	14,000,000	23,000,000	98,000,000
3	23,500,000	23,000,000	28,750,000	19,000,000	26,750,000	121,000,000
4	27,875,000	27,125,000	33,250,000	23,875,000	31,875,000	144,000,000
5	31,937,500	30,937,500	37,500,000	26,562,500	34,937,500	161,875,000
6	33,281,250	**32,000,000**	**40,000,000**	**28,000,000**	36,281,250	169,562,500
7	**34,000,000**	32,000,000	40,000,000	28,000,000	**37,000,000**	171,000,000
8	34,000,000	32,000,000	40,000,000	28,000,000	37,000,000	171,000,000
Net losses	14,000,000	12,000,000	20,000,000	10,000,000	17,000,000	73,000,000

The loss cost stabilises after 6 rounds for companies B, C and D and after 7 rounds for companies A and E.

Gross losses recorded by the 5 companies together total FF 171 million.