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See table of contents

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Article abstract

La gestion des grands risques présente-t-elle des problèmes insolubles ? C'est à cette question que l'auteur tente de répondre, d'abord en définissant ce que l'on entend par catastrophe pour ensuite déterminer celles qui sont assurables. Lui-même membre du conseil d'administration d'un grand réassureur international, M. Conrad passe en revue les principaux marchés d'assurance et de réassurance couvrant les sinistres catastrophiques. Enfin, la réflexion de l'auteur s'étend aux défis et aux difficultés que posent les grands risques à l'égard des assurés, des assureurs, des réassureurs, puis des gouvernements.

How to Manage Catastrophe and Other Unmanageable Risks*

by

Klaus Conrad**

La gestion des grands risques présente-t-elle des problèmes insolubles? C'est à cette question que l'auteur tente de répondre, d'abord en définissant ce que l'on entend par catastrophe pour ensuite déterminer celles qui sont assurables. Lui-même membre du conseil d'administration d'un grand réassureur international, M. Conrad passe en revue les principaux marchés d'assurance et de réassurance couvrant les sinistres catastrophiques.

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Introduction

In developed economies, aside from the many different types of credit business, it is insurance that is the most important form of private financial service in terms of both quality and quantity. All over the world, more than US$1,200 billion of premiums are collected year after year by over 10,000 insurance companies; and a large part of this amount is flowing back to the holders of insurance policies in the form of claims payments and other benefits. It is an impressive thought that this gigantic,

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* *Permission to reprint this paper, which was presented at the International Insurance Society's 28th Annual Seminar in Toronto on July 67 1992, has been granted by the International Insurance Society and the author.

** Member of the Board of Management, Munich Reinsurance Co., Germany.

complex and yet highly organized movement of capital functions on the basis of an idea that is quite fascinating in its simplicity: a sufficiently large fund consisting of liquid assets set up jointly by a group of people who feel financially threatened in some way and who are prepared to pay something to ensure their financial security is used to settle losses suffered by individual members of the group.

What is probably even more astonishing is the fact that there is basically only one principle that keeps this financing system functioning and enables it to fulfill its proper purpose: chance. It is chance alone that determines who is entitled to make a claim on the fund. It is a constantly fascinating paradox of insurance that the very same factor that creates a feeling of insecurity is also the regulator that makes it possible to turn financial insecurity into security by means of insurance.

Thus, three essential preconditions have to be met if the risks assumed by an insurer are to be "manageable" now and in the future. First, the losses that occur must be fortuitous; second, the portfolio of risks to be covered must be sufficiently large for it to function as a collective; and third, the policyholders must be prepared—at least as a community—to pay a price for their insurance protection that is commensurate with the risks involved.

What is a "Catastrophe?"

No one will deny that disasters such as the capsizing of the "Herald of Free Enterprise" in which over 190 people lost their lives, the sinking of Piper Alpha in which the material loss alone amounted to nearly US$1.5 billion or earthquakes such as the one in America a few years ago which devastated huge areas and cost more than 20,000 lives were catastrophes in terms of both human and material loss that rightly shocked the world. In the same way, anyone who is not a complete cynic will use the word catastrophe to describe, for example, a family losing its home and all its possessions in a fire in which one of the children is killed as well. What we regard as a catastrophe depends in fact

not so much on the actual extent of the damage, whatever form this may take, as on the importance of the loss in the eyes of the person affected.

Since the term "catastrophe" is therefore clearly a subjective one, maybe it is helpful to recall its original meaning. In Greek the word "catastrophe" means literally a turn for the worse; it is therefore a misfortune that is not only greater than most but—and this is the crux of the matter—of a new and different kind. A catastrophe leaves no room for alternative action, so that one feels completely helpless in the face of it. In extreme cases, for the individual or community affected, a catastrophe may even destroy all prospect of a future in which the loss of life, health or material goods can ever be made good.

It is certainly no coincidence, therefore, that catastrophes that arouse this feeling of utter helplessness are linked closely with another idea that plays a pivotal role in ancient Greek thinking: namely the idea of fate. Perhaps it is this sense of abandonment to the whim of fate, the fear of finding oneself a "plaything of the gods," that makes us refer to natural hazards as catastrophe risks, even if they do not always take on dimensions that threaten a person's very existence. It is obviously enough if the person—or a large group of people—feels helpless in the face of these hazards of thinks there is no chance of combating them realistically.

If we compare the two different forms of catastrophe—the disaster threatening the very existence of one person or one family and the large-scale, fateful exposure to implacable forces of nature—we can detect a decisive common characteristic. Catastrophes are in all cases exceptional events that exceed the powers of individual to deal with them and that are no longer "manageable" out of the resources available to the individual, however one may define an individual in this sense: as a single person, a single company or—very broadly—as a single region. Assistance—at least assistance of a financial nature—in dealing

with such catastrophes is obtainable only at the higher level of a mutually supportive collective.[1]

At this point we come back to what was mentioned at the beginning: mutual support is one of the most typical and essential characteristics of insurance. Thus, you can twist and turn it this way or that, but the fact remains: protection against the consequences of catastrophic events is a genuine, perhaps the genuine function of insurance which will certainly become more and more important as time goes on. It presents a challenge that we have to be aware of when we talk about the outlook for insurance in the 1990s, as the overall topic of this annual Seminar of the International Insurance Society at which this paper is being presented requires.

Catastrophe Potentials in Insurance

From the practical standpoint, insurers traditionally always have distinguished between man-made catastrophes and so-called acts of God. We know today that this differentiation is an expedient that starts from a questionable premise. Human beings always are involved when we talk about natural catastrophes. On the one hand, we hardly are affected by a natural event occurring in an unpopulated area, even if it is of potentially catastrophic dimensions. An example is the so-called Tunguska event, in which a comet exploded on impact in Siberia in 1908. On the other hand, however, human beings influence almost all natural processes to an increasing degree—mostly in a negative way.

Nevertheless, from the underwriting point of view the differentiation between these two categories still provides us with a meaningful and fairly serviceable method of organizing the vast spectrum of catastrophic events. For it still makes a difference whether an event is triggered by human beings or

[1] Cf. the definition proposed at the UNDRO-convened meeting of international experts and representatives of international organizations (Prague, 23rd-27th September 1991): Disaster—a serious disruption of a society, causing widespread human, material and environmental losses which exceed the ability of the affected society to cope with using only its own resources.

natural forces.[2] There are vast differences in scale and size of catastrophes, in legal liability, in psychological reaction and in all questions of loss prevention. In spite of these differences, however, the risks and consequently the losses are increasing constantly in both categories and have reached magnitudes that would have been inconceivable only 20 years ago.

Even in the insurance of individual property risks, it is increasingly the single mega-losses that have a disproportionate impact on insurers' results. An analysis by the Munich Re[3] of 2,000 major fire losses between the years 1984 and 1989 has shown that less than a tenth (8.5 percent) of the material damage claims, each with a loss amount of over US$18 million, accounted for more than half (50.7 percent) of the total expenditure for material damage (Graph 1). In business

[2]Extreme scenarios are, however, conceivable nowadays in which an activation of mankind's destructive potential could cause losses of a similar magnitude to those arising out of natural catastrophes. An example would be widespread radioactive contamination. Even the long-term use of industrial products whose harmfulness is not immediately realized can have catastrophic consequences. The insurance industry's involvement in losses caused by asbestos, for example, is estimated at approximately US$60 billion.

Finally, catastrophic losses might well occur, especially in congested urban areas, as a consequence of past pollution. In the U.S. alone, the cost of cleaning up toxic waste deposits is expected to amount to at least US$100 billion, a sum that can in no way be financed through the accumulated profits of past liability covers. Accordingly, the latest concepts for the coverage of the liabilities imposed retroactively by the CERCLA Superfund Act of 1980 all tend toward the establishment of some kind of fund to be financed out of the income from general insurance taxes.

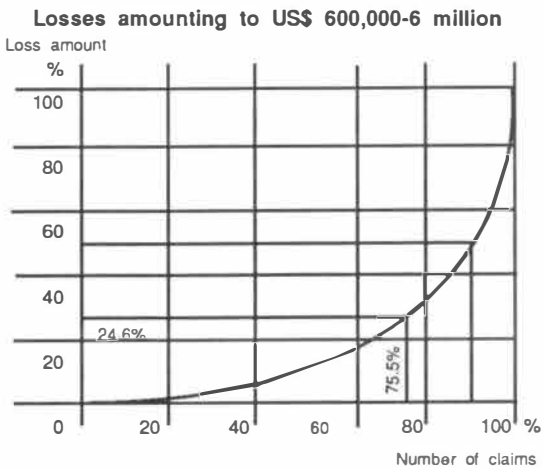
Another considerable loss potential for the insurance industry is that arising out of the close interdependency between national economies. A massive economic recession in the major industrialized countries could give rise to substantial loss accumulations from credit risks. Even a global spread of risk provides only limited protection against this danger, and so only a limited amount of reinsurance capacity is available for it.

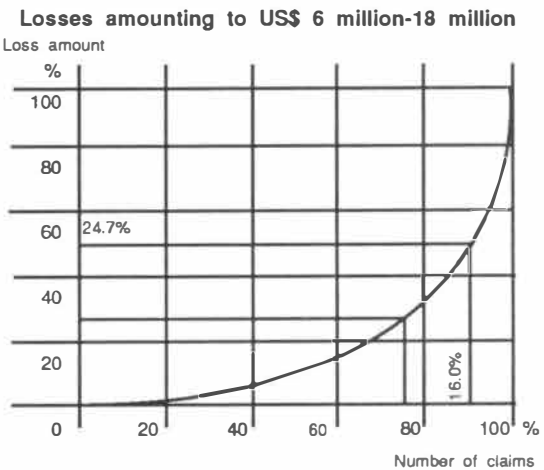
From the underwriting standpoint, the only way to deal with this risk is by means of very thorough risk assessment and accumulation control on a sector by sector basis to keep to a minimum the danger of catastrophic losses from the simultaneous failure of a large number of companies. In so doing, it is important to remember that there are certain limits to what the private insurance industry can do. It does not seem fair, for instance, that insurers should have to bear not only their own risks but also a part of the entrepreneurial risk of the banking sector. This would be particularly disastrous in a world economic crisis, in which it is vital that financial risks be borne by as many different parties as possible. The bad experience of the insurance industry with financial guarantee and mortgage guarantee business in individual recession-threatened markets provides a clear warning of potential dangers in store.

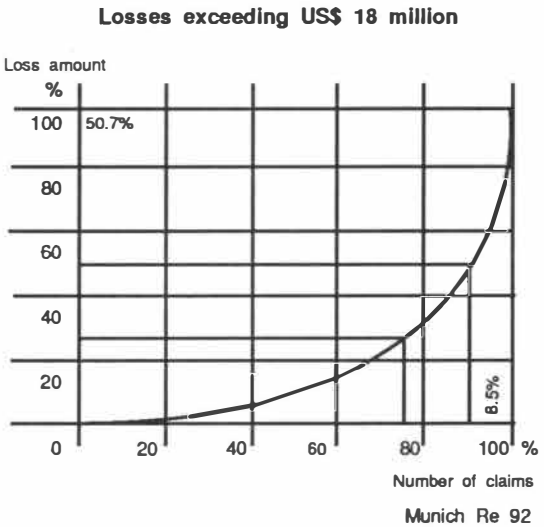
[3]Munich Reinsurance Company: "Schadenspiegel," *Losses and Loss Prevention*, 33rd Year, 1990, No. 2, pp. 4/5.

interruption the corresponding figures of 7.2 percent and 55.8 percent show an even more extreme relationship.

Graph 1: Fire/LOP - Germany (1984 - 1989)
Major losses as a proportion of overall claims expenditure







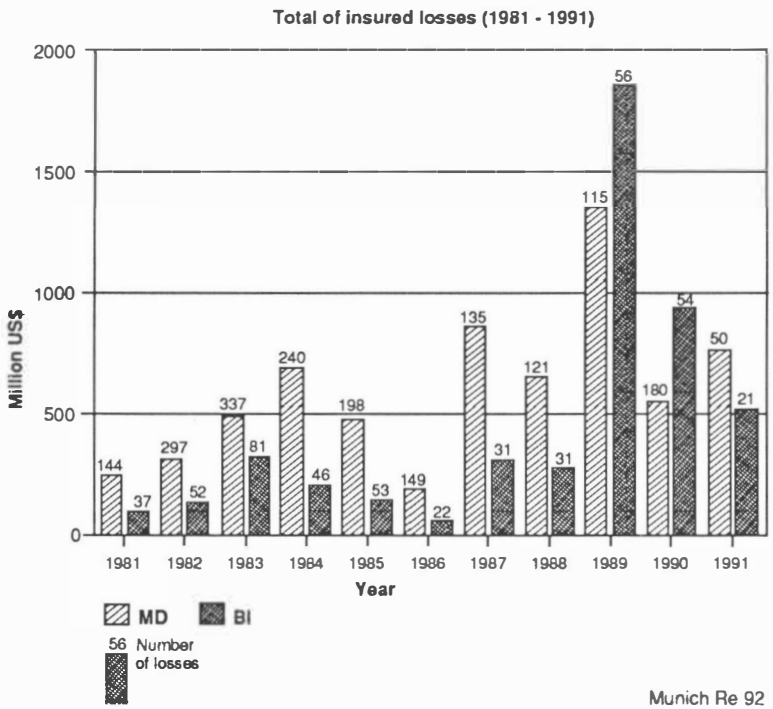
Now, as one might expect, by far the most important cause of such single catastrophic losses is explosions in petrochemical plants; and this risk sector can be taken as an example to demonstrate how the loss trend is currently developing (Graph 2).[4] There are many different reasons for this development—among them the increasing concentration of economic activity, ever larger plant sizes, centralized automated safety concepts that lead to fewer but larger losses, greater interdependence between production processes with a correspondingly greater chance of interruption, false economy with regard to safety devices and organizational measures for loss prevention, outdated and worn out plants and equipment as a result of declining reinvestment in certain branches of industry, etc.

The conclusion to be drawn from all this is that the risks that give rise to such losses are obviously expanding steadily into the area of catastrophe potential. Referring back to our earlier

[4]Munich Reinsurance Company: Losses in the Oil, Petrochemical and Chemical Industries—a Report (1991), pp. 8/9. Figures updated for this paper.

definition, this means that recourse needs to be taken more and more often to a risk-bearing collective of a higher order. In fact, losses of such dimensions scarcely can be handled by one single national insurance market any more. The risks involved are no longer "manageable" by a national market; theoretically, however, they should be no problem for the international market. When we hear complaints about shortages in capacity for industrial risks, it is frequently not so much that the amount of available capacity is limited; rather it is that the premiums are far from adequate and that coverage is far too wide.[5]

Graph 2: Oil and Petrochemical Losses



[5]For the distinction between "genuine" and "non-genuine" capacity problems see K. Gerathewohl et al.: *Reinsurance—Principles and Practice*, Vol. 1 (Munich, 1980), pp. 178/179.

Graph 3: Major windstorm disasters 1960 - 1991			
	Number	Economic losses (US$ billion)*	Insured losses (US$ Billion)*
Decade 1960 - 1969	8	21.6	5.0
Decade 1970 - 1979	13	31.7	7.9
Decade 1980-1989	29	35.5	17.4
Last ten years 1982 - 1991	34	55.3	33.6
Factor 80s : 60s	3.6	1.6	3.5
Factor Last ten : 60s	4.3	2.6	6.7

*** All figures in US dollars extrapolated to 1991 prices.** Munich Re 92

A steady trend towards ever greater claims costs is observable in the area of natural hazards too. This development is especially dramatic where catastrophic storm losses are concerned, as a long-term comparison shows (Graph 3).[6] The problems that result—or may soon result—from this are, however, much more serious. Here it is less a matter of shortfalls in capacity due to inadequate premiums—non-genuine shortages—but of the very basic question whether, and if so for how long, the global insurance market will be able to keep step with this development if it continues at the present rate. Natural catastrophes that come close to exhausting the entire worldwide insurance capacity present the greatest challenge today to the international insurance industry. Thus, the following remarks will concentrate on this issue.

[6]Munich Reinsurance Company: Windstorm (1990), p. 7. Figures updated for this paper.

The World Market for Natural Catastrophe Covers

Insurance against natural catastrophes that affect large areas always has had to rely on an atomization, on the widest possible spread of the risks concerned. This is done through the interlocking global system of direct insurance and reinsurance, and it provides the only means whereby catastrophe potentials of some US$10 billion can be covered—and presumably paid for in a matter of months.

The number of companies that participate actively in catastrophe reinsurance programs covering the events on a non-proportional basis is, however, much smaller than the number of those offering international reinsurance capacity in general. It is estimated that this limited circle consists of no more than 400 reinsurers in all, of which about 100 are professional reinsurers and about 50 are Lloyd's syndicates. The remaining 250 or so are "non-professional" reinsurers whose share in this type of business is, however, considerably less than that of the first two groups.

There are therefore comparatively few companies that are prepared to venture on to the dangerous ground of this high-risk market requiring great underwriting expertise Their willingness to enter into major financial commitments in those areas has not been rewarded very well in recent years. Of course, in a business that is based on lengthy return periods, the results of individual underwriting years have very little meaning on their own. However, whatever technique is applied to balance the results over a longer period of time, there is no getting around the fact that even these companies need to have positive bottom line results year after year; otherwise they will be unable to build up the ever larger underwriting reserves that they need to cover their ever increasing liabilities.

Therefore, in the last analysis, it is the overall profitability of the business that not only provides a measure of each company's productivity but also indicates in what direction the financial capacity and stability of the market as a whole is developing. Anyone can reach their own conclusions on this

merely by looking at the combined ratios of the main players over the last few years: among the 100 reinsurers who—as mentioned—carry the lion's share of international catastrophe insurance, this ratio was in 1988 a reasonable 108 percent, in 1989 still "only" 111 percent, but in 1990 nearly 120 percent. There is no doubt that this negative trend is very largely due to the increasing frequency and size of natural catastrophes. In 1990 natural catastrophes accounted for as much as 83 percent of the claims costs of all major insurance losses worldwide. Between the years of 1970 and 1990 this figure was on average only about 57 percent.[7]

It is true that in the last two years the premiums for nonproportional catastrophe covers have increased by leaps and bounds; in some cases they have quadrupled, and even on a global average they have nearly doubled. That is, of course, a very welcome development, not only because every service rendered deserves and adequate recompense but also because the disastrous situation on the retrocession market has made no other course possible. The fact that such price jumps from one day to the next have become unavoidable only shows how very inadequate that rates were. This was not just a case of a few percentage points of safety margin up or down; it concerned, and still concerns, the very substance of the loss potential, or what in other classes of insurance would be called the base load of expected losses. One cannot help having the impression that parts of the market were clearly no longer aware of the huge extent of their accumulated liabilities and that among those companies that were aware, many shrank from taking the decisive step that might endanger their established business connections.

Are those who are still active in catastrophe insurance and reinsurance then getting the correct premium rates today? One can say: the worse a player has suffered in the last few years, the

[7]Cf. W. Jakobi: Der Weltmarkt fur Katastrophendekkungen und seine Anforderungen an Erstversicherer (The World Market for Catastrophe Covers and the Requirements Directed at Primary Insurers) in: Versicherungswirtschaft 1991, 24th issue, pp. 1506-1414.

stricter is his resolve to sell his services only at the right price. Thus, in those national markets that have really suffered from storms, insurers do get premium increases—if they ask for them. The harder hit reinsurers will try to get the right price even from those exposed cedants that were not struck by a catastrophe of late, and retrocessionaires adamantly insist on their price as a precondition to staying in business. All these considerations that are meant to insure the viability of the market—the availability of capacity today and tomorrow—are based on past experience. However, in only a few cases are they based on the true present exposure; and hardly ever do they take into account the trends seen by scientists, economists and sociologists.

Risks Developments in the Natural Hazards Sector

We always have known that nature is not immutable. Within the confines of our globe and over a reasonable period of time, however, we have regarded it in the past as a constant factor, a patient and reliable partner whose reactions would not be much more difficult to forecast than, say, the hundred-year trend in our mortality tables. Recent events have robbed us of this feeling of security.

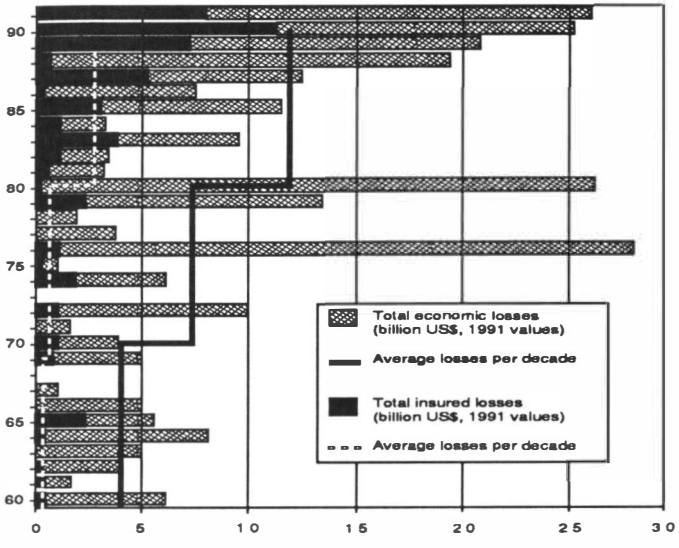
Of course, the striking increase in claims expenditure, which is particularly clear from the peaks of the last few years recorded in Graph 4,[8] cannot be explained solely by natural changes in the form of greater elemental violence and intensity. An important factor is also the steady increase in insured values, a development that of course can be managed financially for as long as the premium volume grows in the same proportion.

The real cause for concern is twofold. On the one hand, these steadily increasing insurance values are concentrated right in those densely populated areas that are particularly exposed to natural hazards; this applies, for example, to some of the world's highly populated earthquake zones and in almost all cases to coastal areas that are subject to storms and floods.

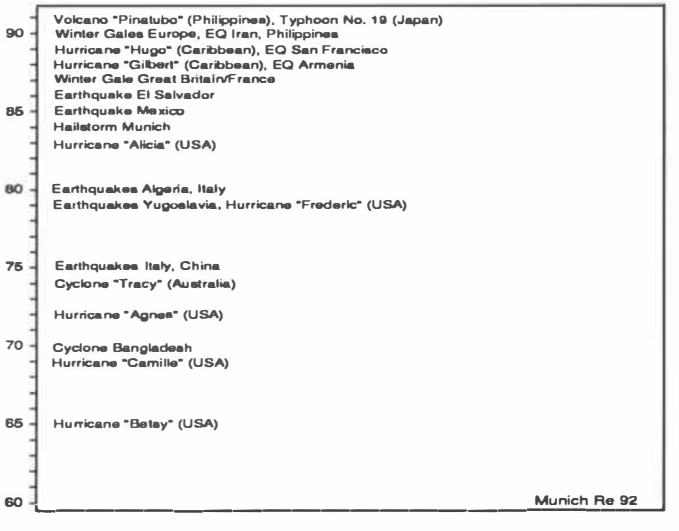
[8]Source: Munich Reinsurance Company.

Graph 4: Great Natural Disasters 1960 - 1991

Economic/Insured losses



Some major disaster



On the other hand, certain hazards seem to be becoming increasingly global in nature. For example, climatic zones that previously were rightly called temperate seem to be hit more and more frequently by devastating storms, thus activating liabilities that used to be accepted for next to no extra premium to "round off," as it were, the traditional forms of comprehensive cover.

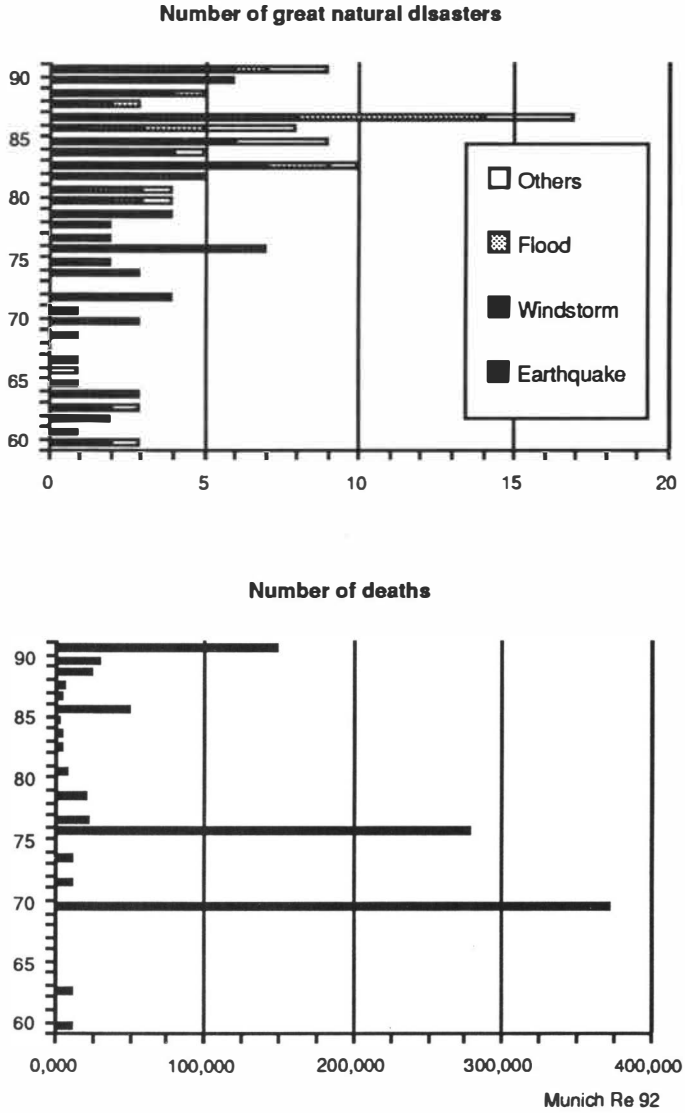
This is not the place to discuss "El Nino" and the California floods, snowstorms in Israel and the disappearance of Alpine glaciers, the effects of Pinatubo or of burning rain forests. Lots has been written about this; may it suffice to say here that with every reservation about drawing premature conclusions, nature somehow seems to react with increasing violence to our massive interference in her workings—violence that often is the subject of insurance cover (Graph 5).[9]

Challenges and Possible Solutions In an Ever More Difficult Environment

Despite their tremendous destructive power, natural hazards are by no means uninsurable per se. Natural hazards insurance certainly never has been a "simple" business. The low frequency of catastrophic events as compared with that of events in other classes of insurance means that the danger of loss is easily underestimated. The most important difference between natural hazards insurance today and in the past is, however, that nowadays errors can have incomparably greater consequences—consequences that are virtually irreversible and may be really catastrophic for the insurance industry. In other words, we can afford less and less to make mistakes or to become careless.

[9]Source: Munich Reinsurance Company.

Graph 5: Great Natural Disasters 1960 - 1991



The consequence is an unavoidable pressure to become more professional and more rational in our underwriting. However, this discussion is not just about the relatively small catastrophe reinsurance market of about 400 participants which was referred to previously. Here reference is made to the whole worldwide insurance community, which today is bound together in a single network of finance and communication. The individual branches of this network have to cooperate in meaningful ways if they are to achieve their common goal of providing and receiving security at the most favorable conditions for everyone concerned. For the chain extending from the policyholder to the last retrocessionaire is only as strong as its weakest link.

The challenges posed by the need for a really comprehensive system of risk management in regard to natural hazards are directed at three different groups: the policyholders, the insurance industry that is both direct insurers and reinsurers and—this may come as a surprise—government.

Policyholders

In most markets protection against natural hazards—where this takes the form of basic property insurance—is provided as a rule only in connection with covers against traditional types of perils such as fire and explosion. The usual combination of different types of cover is a sensible way of bundling risks, the primary aim of which is balancing the various hazards against each other and safeguarding against antiselection. Insurance buyers must understand that protection against natural hazards is not, however, an additional bonus that can be offered free of charge in order to make the basic cover more attractive or more competitive. It is not merely a means of "rounding out" a package of selectively designed covers, but an independent product in its own right with its own value and, hence, its own price.

We also need to try and discredit the myth that natural catastrophes are a scourge of mankind decreed by a fate against

which we are powerless. It is of course quite true that the individual has no chance of preventing natural catastrophes. Their effects, however, can be contained, even though the initiatives of individuals. This applies even in the case of earthquakes, which usually are regarded subjectively as being nature's greatest threat to mankind. With all but the worst quakes and outside the comparatively small zone of total destruction, appropriate construction techniques provide effective ways of preventing or minimizing losses.[10] In some countries this is already common knowledge, but in others there is still a great deal that could be accomplished through appropriately directed information campaigns. The image of our industry could profit from this too, especially if initiatives are rewarded properly on the premium side.

Another aim of properly directed information should be to make people aware that they often can improve greatly the effectiveness of their insurance cover—that is its cost/benefit ratio—by doing a little calculation and by agreeing, for example, on an appropriate deductible. From the standpoint of the insurance industry, there is no sensible reason why insurers, out of a false sense of perfectionism, should compensate every policyholder for every minor loss that hardly hurts him, while the accumulation of such "nuisance claims" requires the mobilization of entire national or even worldwide capacities and also causes the costs of claims settlements to snowball.[11]

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[10]Cf., for example, Munich Reinsurance Company: "Schadenspiegel," 27th Year, 1984, No.1, and 29th Year, 1986, No.1; Loss Adjustment after Natural Disasters (1982); Earthquake Mexico '85 (1986); Hailstorm (1984), pp. 51-53; Windstorm (1990), pp. 27-55. Swiss Reinsurance Company: Umweltveranderungen und Katastrophenrisiken (1985), pp. 49-51; Small earthquakes—small exposure? (1987); Newcastle: The Writing on the Wall (1990), pp. 11-21, 30-73. All-Industry Research Advisory Council/National Committee on Property Insurance: Surviving the Storm—Building Codes, Compliance, and the Mitigation of Hurricane Damage (Oak Brook, Ill. 1989).

[11]The influence of deductibles can be illustrated quite graphically by the example of the European winter gales in 1990. This series of violent storms gave rise to about 3 million claims in West Germany alone, resulting in an overall loss for the insurance industry of almost DM 3,6 billion. As-if calculations have shown that a general deductible of only DM 1.000 (about US$600) would have reduced the total loss amount by more than 50 percent. If each policyholder had borne only 1 percent of the value of his building, the loss to the market as a whole would have been reduced by well over three quarters.

It is also important to make it clear to the potential insured where the borders of what is feasible lie. Anyone who finds good reasons—which may indeed exist in his eyes—to undertake major construction projects in highly exposed areas—e.g., in flood plains or on seismic fault lines—must expect from the start that these cannot be insured, at least certainly not for their full value and not at an "economical rate." Here we are in the gray area between a fortuitous loss and a foreseeable loss, the area of entrepreneurial risk and willful negligence.

Direct Insurers

Looking now at risk management within the insurance industry, there is no lack of appropriate methods of risk assessment in natural hazards insurance. What is important, however, is that these methods be based on realistic data. Furthermore, realistic data require a sound basis of up-to-date scientific knowledge, so that return periods and intensities can be correlated accurately. What is also required is an effort to evaluate loss events as they occur, so that individual loss reports can be condensed into a useful body of loss expertise. Without such expertise, all we have is at best general guidelines.

However, we do not have the loss ratios for different types of construction graded for each level of intensity of the natural phenomenon, e.g., windspeed, that we need in order to be able to differentiate between the premiums required for each type of risks. Such differentiation is, in turn, necessary if policyholders are to be persuaded to take measures for loss prevention and if there is to be some prospect of reducing capacity requirements to a reasonable level by the application of appropriately calculated deductibles.

What is absolutely indispensable is that the information on the accumulated liabilities for each of the natural hazards covered be obtainable on the basis of small geographical areas and be subject to constant review. It should go without saying that this is essential for determining and curtailing production goals, laying down underwriting rules, controlling the build-up

of reserves and, last but not least, arranging for adequate reinsurance coverage. Particularly striking evidence of the fact that this is not always easy to practice and that expensive mistakes can occur even in highly developed markets was supplied in September of last year in connection with Typhoon No. 19. Not only individual companies, but also virtually the entire Japanese market—which is well known throughout the world for the rational and disciplined way in which it deals with the earthquake hazard—were surprised by a storm event that caused losses far in excess of the purchased reinsurance capacity. However, in all fairness, most of the international reinsurance community was taken by surprise too.

Reinsurers

In no sector of ordinary personal lines and mainstream commercial business is the reinsurance demand so enormous—for all direct underwriters of such risks without exception—as it is in natural hazards insurance. Accordingly, those companies that offer such reinsurance coverage occupy a particularly important position in this market. This implies a particular responsibility too. Anyone who helps markets to accept potential accumulation risks in the first place should be prepared to maintain the continuity of the covers provided. There are, however, two sides to continuity, as we are all aware. Above all, the need for continuity must not be used as a superficial argument for upholding the status quo as regards prices and conditions if they no longer correspond to present realities.

The portfolios of the large professional reinsurance companies, composed as they are of risks from all over the world and many different classes of business, tend to encourage the illusion that some kind of guarantee exists at this level that risks can be balanced against each other in perpetuity. However great the pressure on the direct markets from both the premium and the claims sides, the reinsurers are supposed to be able to squeeze out some kind of margin from somewhere or other if they only spread their business to a sufficient extent. It is clear that his

misconception arises out of an unfortunate combination of factual knowledge and wishful thinking.

Let it be stated once again: natural hazards are basically insurable. Of course, there are risk accumulations in some parts of the world that, if fully activated, would exhaust the entire financing capacity of the private insurance industry worldwide. With the exception of such cases—which can only arise because of the extraordinary extent of the risks involved and which the insurance industry has never claimed to be able to deal with in their entirety—natural hazards are still insurable, even in this day and age. That is, they are insurable provided they are properly underwritten and reinsured—and provided the protected market will be able to pay the required risk premiums.

The key to the problem of course lies in the prices and conditions of the original covers and the quality of the risk assessment. The world market is merely the mechanism into which this key may or may not fit. Reinsurers are among those who can help to make it fit.

As has already been mentioned, the rating of natural hazards requires a very special kind of expertise. Companies that engage in it need a fund of global loss experience and also must be willing to develop and constantly to revise their rating materials on the basis of their own claims experience, as well as that of others. The large professional reinsurance companies have these resources and skills and the capacity to put them to proper use. Their clients ought to take advantage of this and make use of the services they offer. Reinsurers always prefer doing some extra work on behalf of their clients to being compelled to make "blind" acceptances which, after a few claim-free years, may involve them in losses that are all the larger.

Owing to the possibility of global accumulations, it is indeed vital that reinsurers have a clear picture of the liabilities they are assuming. It can never be assumed that risks will balance each other; the requisite balance must be brought about through planning, design and control on the basis of appropriate information. This information can only be provided by the direct

insurers and, if it is to be of real use, it must conform to a set of uniform standards. It is not of much use to a reinsurer if he receives information on assumed accumulations—however reliable it may be—if each ceding company draws the borders of its accumulation assessment zones starting from a different street corner.

Standards of the kind required for this purpose have been provided for a number of years in regard to earthquake covers by CRESTA. In many markets, the existence of these standards has brought about considerable progress in the direction of greater "transparency." As far as storm events are concerned, a lot of work still remains to be done. The initiative launched by CRESTA in this sector should be supported vigorously by all of us—for our mutual benefit.

To plan a proper risk balance it is, however, necessary to know as exactly as possible what one's maximum loss burden is likely to be out of each commitment entered into. This is impossible if one agrees to insure accumulation-prone hazards proportionally without agreeing upon fixed aggregate cession limits. Any insurer who is offered an "open-end" cover these days ought to give some thought as to how "secure" the offering reinsurer is: no one who is unsure of the maximum extent of his aggregate obligations can guarantee his ability to meet them in the long term.

This appeal for a return to the recognized underwriting principles is directed towards reinsurers also. The science of underwriting is one that has been developed specifically for the purpose of enabling us to provide the service we do. It is diametrically opposed to the type of undiscerning bottom-line underwriting that adds up the results of risks that are qualitatively quite different into a single amount. At every reinsurance renewal one can observe that the simple addition of the results of different classes of reinsurance business is understood as a technique for balancing risks; and if the balance is a positive one, everything seems to be in the very best of order, so that no changes in participation are called for.

In fact, there is no question of a risk balance in this case; what is involved is a purely superficial manipulation of the figures that disregards the fact that the types of business involved are often quite different—different as regards the periods in which a risk balance is achievable and hence as regards the periods in which profits or losses can be realized in the individual classes of business. Any reinsurer who agrees to cover natural hazards must know that such business can be accepted only "on its own merits." If multi line or all risk covers are accepted, it is essential that the reinsurer be able to demand separate accounting and the application of different conditions and limits.[12]

Government

The demands, finally, that have to be made of governments in regard to dealing with the consequences of natural hazards are naturally particularly extensive and varied. This statement is not made out of any kind of naive trust in government as such, but because it is an established fact that governments are the most universal of all the collective support systems that can be expected to provide protection in the event of catastrophes. They are also the systems with the most extensive facilities, and their executive monopoly covers a wide range of activities: from the implementation of legal restriction of influences on natural risk factors and security regulations, from the promotion and tax exemption of private loss prevention measures to disaster relief in the last resort.

Many of these measures are obviously precautionary ones that have to be implemented before the event or are measures that have to do with direct humanitarian aid to the victims of a

[12]Profit sharing agreements, like every other form of variable premium payment based on loss experience, are technically unsuitable for risks with long return periods. The principle of "underwriting on its own merits" does not mean that reinsurers may not make their acceptance of large participations in catastrophe covers dependent on their receiving a certain amount of relatively stable basis business as well. The purpose of such "compensatory business" is not to subsidize the more highly exposed business but to reduce the relative impact of catastrophic losses on the reinsurer's overall result and liquidity situation.

catastrophe after it has occurred. What happens, though, when compensation needs to be paid for losses resulting from the destruction of financial assets? Is it still sufficient today to regard financial losses caused by natural catastrophes mainly as the responsibility of the owner himself or of the commercial risk carrier—that is, the private insurer? Does not the increasingly obvious man-made character of many natural events mean that new ways must be found for determining whether it is meaningful, practical or even necessary to appeal to government to act increasingly not only as a upholder of public order, but also as a risk-carrying collective and to agree to public funds being used for this purpose?

Although the question of the extent to which government is under a legal obligation is already a subject of lively discussion in a number of countries today, it is not one that will be discussed here. To pragmatists, it is obvious that government has certain functions as a provider of security; historically speaking, the very need for such functions may well have been one of the main reasons why governments were created in the first place. This is an obligation that exists basically still today. There can be no objection to efforts at deregulation where these are designed to remove unnecessary barriers to private initiative. However, this does not alter the fact that government—at least in a subsidiary function—still remains responsible for all questions of collective security.

For those who are firm advocates of market economy and private enterprise, it is clear that an essential precondition for economic freedom—or indeed freedom of any kind—is readiness to accept responsibility for one's own well-being. It certainly would be wrong to lay responsibilities on government if this meant suppressing private initiative. Equally, it is not the place of government to assume losses for which the insurance industry has accepted liability simply because the size of such losses threatens that industry's existence. If government is to assume a meaningful function in the context of a common system of risk management for natural hazards, this must be limited to stepping into the breach where the available

instruments of underwriting technique prove inadequate for reasons that lie within the nature of risks themselves. In other words, government should provide help wherever self-help fails or is no longer possible. Two basically different sets of circumstances exist in which this may occur; what they have in common is their catastrophe potential.

Case No. 1: Here it is the qualitative aspects of the risk that are significant. An example is floods in Holland. One can fully appreciate the arguments of the Dutch insurers when they say
100 that the risk of storm-driven tidal waves is not insurable in large areas of the country on a voluntary and competitive bases. The reason for this lies in the limits to which even the science of underwriting is subject. Extensive dike-building programs in Holland have increased the return periods of major disasters enormously, in some cases to as much as 10,000 years. From the purely mathematical standpoint, this results in very small net risk premiums for a huge loss potential which, in the event of a catastrophe, could not be recouped over any reasonable period because large economically productive areas would remain under water for a long time.

Calculation periods that are almost as long as the entire history of civilization are not justifiable planning parameter for private companies that may have to meet their obligations at any time and are subject to competition where premium rates are concerned. If we also consider that it is by no means impossible that climatic changes—e.g., the greenhouse effect—could result in a rise in sea levels, even during the life of the present generation, to the critical point where the activation of liabilities no longer seems improbable, the following conclusion becomes unavoidable: If financial compensation is to be provided for losses to large sectors of the population, this can be done on a sound basis only by the institution that is alone in a position to keep the potential risk under control by means of constant structural improvements—and this is of course the government. If financial responsibility is divorced from the capability of taking active measures against the increasing exposure to a very real danger, then the whole balance of performance and reward

as the basis mechanism of economic activity is jeopardized. In this instance no room is left for the private insurance industry to do its job with a reasonable chance of success.

Case No. 2: In this case it is not so much a question of whether a risk is basically insurable as of the overall amount of available capacity as compared with the loss potential. Examples here are earthquakes in California, hurricanes on the East Coast of the USA and earthquakes in new Zealand.

The only role that can be played by government here is a supporting one. Private insurance coverage should not be replaced but supplemented where required. This is a logical extension of the idea of help where self-help is insufficient.

Thanks to a closely knit system of global direct insurance, reinsurance and retrocession, the threshold above which such requirements may become acute is already very high. The very large loss events of recent years, above all, have gales in western and central Europe, the total insured loss was approximately US$10 billion, while the overall economic loss is estimated at about $15 billion. Roughly two-thirds of the indemnifiable claims finally were paid by the reinsurers—approximately 70 percent of these under non-proportional treaties.

In this case the concept of the worldwide proportional distribution of risks proved sound as far as the capacity was concerned. It emerged, however, that the relevant covers had been offered at much too cheap a price; and this was at all levels of risk assumption and processing. It also became clear that the total insured loss from a catastrophic windstorm in Europe could have been greater still and that, if the pressure on the retrocession markets, which have shrunk anyway, should increase still further as a result of a general increase in loss frequency, capacity shortages could arise in the future.

For the time being, though, we are far away, inasmuch as European storms are concerned, from this threshold of necessary government intervention. The response of the European insurance market to the windstorm losses of 1990 and to the

retrocession shortages seems quite healthy, logical and far from panicky: insurers and reinsurers do pay the higher premiums demanded for their protection; they do demand higher premium rates of their insureds, where required; and they do keep higher retentions, where full protection is not available. Accumulation control efforts and efforts at portfolio management are intensified and so is the exchange of know-how with the scientific sector in order to improve the basis for PML estimates and for a regionalized rating structure.

As direct insurers become more aware of their increasing accumulation exposure, they will be more inclined to use the perhaps most effective tool to bring down exposure, loss-handling cost and reinsurance premium: higher deductibles for the insureds. A homeowner in central Europe can easily bear the first $2,000 of a windstorm claim. Such an increased deductible alone would give European insurers enough capacity margin to cope with insurance needs for a number of years to come and would keep the need for government help well out of sight. A population base of 200 million Europeans exposed to winter gales indeed should be able to pay the insurance premium for a $20 billion worst case storm PML. The case for the 30 million Californians and a $50 billion earthquake PML certainly looks different, and the example of earthquakes in New Zealand is even more drastic.

Thus, it is not surprising that in New Zealand a cooperation has long existed between the insurance industry and the government for the cover of the earthquake risk in the form of a fund. Such a fund is also discussed in the US. In theory such a fund could be financed by contributions out of the premiums of national companies and would be backed, as soon as it reached the limits of private capacity, by public sector loans at favorable terms. The total market loss after which claims might be made on the fund could be fixed at a certain percentage of the net market premium for all classes of insurance for which financing was to be provided, and the rights of the fund members to draw on the fund could be restricted by means of aggregator deductibles related to their premium income from these classes.

The guaranteed support of the government through repayable loans to a great extent would take the fatal sting out of the threat of unknown accumulations.

One of the most important questions is of course that of the level at which such a fund would have to go into action. Apparently there is no general answer to this question.[13] It seems important, though, that this level should be determined flexibly on the basis of the market premium concerned and by taking into account the capacity provided by the worldwide reinsurance market and the taxable reserve resources of the market participants. In this context, the balance sheet capacities of the insurance companies are only one quantity to be considered; another important quantitative criterion is the volume of current capital transactions in the economy concerned. This means that, depending on local circumstances, the threshold values would be considerably lower than the total market capacity. It would be important in any case to prevent substantial losses resulting from widespread emergency sales of assets.

But what about "the other unmanageable risks" mentioned in the title that the International Insurance Society had chosen for this paper? Let us return to the beginning of this paper: if a large enough group of individuals who are threatened by a similar danger, a danger that will strike any individual of the group fortuitously and will cause financial loss, is prepared to pay an appropriate price for their financial indemnification, such risk is manageable. If only one of the prerequisites contained in the above sentence is not met, then it is indeed unmanageable by insurance and/or reinsurance.

[13]The accumulation potential that could be activated through a severe European storm is estimated today at anything up to US20$ billion. Assuming a final participation in the overall loss of about two thirds, even a "medium-sized" event costing roughly US$20 billion would increase the combined ratio of the 150 largest professional reinsurers operating in the world market for catastrophe covers by an average of eight percent. The availability of capacity for loss events of this magnitude is no doubt just about within the realms of possibility. It is interesting to note, incidentally, that the latest American Earthquake/Swift Dreir Project also has put the intervention threshold for an excess of loss cover financed through a fund at an eight percent increase in the combined ratio of the market as a result of the event covered.

There are innumerable examples of what cannot be insured or what should not have been insured; such examples might be useful, but would leave the reader with a negative aftertaste. Thus, this paper shall be limited to the sample field of natural catastrophes and the ensuing risks, which are indeed manageable.

The high degree of interdependency existing among economic units today means that a great deal has to be taken into account if the high standard of living achieved in many parts of the world is to remain a secure perspective for the future,. Ever more complex problems, also with regard to security in the face of natural catastrophes, make it necessary that all those concerned work together reliably and in a coordinated fashion. We as professional reinsurers are willing to do our part in this regard both now and in the future. For not only is this in our legitimate own interest, but also we know that the service we provide is needed and will be needed even more in the future. While we are willing to continue our best efforts in this respect, we also demand support for these efforts. Only then will there be some assurance that catastrophe risks from natural hazards will continue to be manageable now and in the future.