

TOWARDS AN "INTERNATIONAL INSURANCE FUND": A TOOL FOR MITIGATION OF EXTRA-HAZARD RISKS

YEHUDA SHENHAV

Faculty of Management
Tel-Aviv University

ABSTRACT

In this paper, the establishment of a new insurance organization, the International Insurance Fund (IIF), is proposed. This organization should undertake to deal with extra-hazard risks which are beyond the capacity of both the commercial insurance industry and national governments. It is proposed that the IIF be designed along the basic lines of the International Monetary Fund (IMF) and its sister organizations.

The hypothetical scope of the IIF operations during recent years is illustrated. Certain practical aspects of its actual operations are discussed; some of them call for further examination.

Key words: Major catastrophes, "International Insurance Fund", Organization and Management.

The author gratefully acknowledges helpful comments given to him by Dr. Baruch Berliner, of Switzerland.

This paper was supported by the M. W. Erhard Center for Higher Studies and Research in Insurance.

INTRODUCTION

In recent years, the issue of the optimal arrangements for mitigating extra-hazard risks has been gaining the increased attention of insurance scholars and executives. The various papers, seminars and plans that dealt with this issue, usually suggested solutions based on the traditional commercial insurance arrangements, or some kind of a governmental involvement, or a combination thereof.

The purpose of this paper is to examine the issue of mitigating extra-hazard risks from an international viewpoint, and to call for the establishment of a new insurance organization: the International Insurance Fund. This organization should undertake to deal with extra hazard-risks in a level above both the commercial insurance industry and national governments.

The first section of the paper briefly reviews the literature and existing arrangements or proposals to mitigate extra-hazard risks.

A new offsetting portfolio approach is proposed as an additional tool to facilitate the commercial insurability of catastrophic risks. It is admitted, however, it is not yet evident to what extent this new approach can be immediately and practically applied.

The second section of the paper brings data of recent catastrophes and evaluate their absolute and relative magnitude. It is argued that many catastrophes were too severe to be handled by single governments, and broad international aid was needed.

The third section proposes the institutionalization of international aid in case of major catastrophes through the establishment of an International Insurance Fund. This organization will undertake to aid national governments in case of "super-catastrophes". It is proposed that this organization is designed along the well-known International Monetary Fund, and it is illustrated how this body could have been involved in indemnifying certain worldwide recent major-catastrophes.

The last section deals with certain theoretical and practical aspects of the actual operation of the proposed International Insurance Fund. The subjects dealt are such as perils covered and excluded, bases of calculating losses, system of indemnification, premium fixing, and organization and administrative issues.

The paper concludes with the hope, that although a more elaborate study of the proposed IIF is clearly needed, it will not take long before this organization is established and put into operation.

I. THE MANAGEMENT OF EXTRA-HAZARD RISKS—A REVIEW

Insurance literature refers to the term "catastrophes", "disasters", "extra-hazard risks", "large risks" and "major losses" as close substitutes. All these terms refer to exposures or to losses of extraordinary magnitude. In recent years, the issue of mitigating extra-hazard risks has received increased attention of insurance scholars and executives, as well as statesmen and legislators. This is especially true with regard to the United States, in which many studies were conducted, and several organizations and funds for the purpose of mitigating extra-hazard risks were established. (For detailed references, see Anderson [1]).

Usually, the perils of catastrophic consequences that were studied were the natural hazards such as earthquakes, windstorms and

floods. In general the studies argued in favor of using the traditional commercial insurance mechanism as a basic tool to mitigate these extra-hazard risks. In order to make the coverage most comprehensive, various incentives for participants, such as affordable rates and governmental subsidies, were proposed. In addition, compulsory elements were frequently suggested. Almost all studies emphasize that some kind of cooperation between the government and the insurance industry is necessary in mitigating extra-hazard risks. Basically, the government should act as a stop-loss reinsurer, or as a financier of last resort, in case of a major disaster.

In describing his proposal for handling catastrophic losses, Wagner d'Alessio brings the following illustration which contains the basic feature of most existing programs to handle extra-hazard risks [2]:

A Program for Payment of Catastrophe Losses

<i>Portion of Loss</i>	<i>Who pays</i>	<i>Total Catastrophe Loss</i>	<i>Amount of Loss</i>	<i>Source of Funds</i>
Excess	Insurance Co.		Excess over catastrophe reserve to balance of total loss	Fed. Government reinsurance by low interest loan. Repayable only from future catastrophe premium.
Catastrophe	Insurance Co.		Amount above expected loss to balance in catastrophe reserve	Accumulated catastrophe reserve from percent of catastrophe premium
"Expected"	Insurance Co. and its reinsurer		Amount above deductible up to established percent of annual catastrophe premium of insurance company	"Expected" loss portion of catastrophe of premium
Deductible	Policyholder		Mandatory deductible first 3% to 5% of amount insured	Resources of Policyholder

Above diagram is *not* to scale.

The program suggested by d'Alessio, as well as all other proposals to mitigate extra-hazard risks, necessitate a rather heavy governmental backing. Recently, the author proposed a new approach, temporarily termed the offsetting portfolio approach, to insuring extra-hazard risks. If this approach can be practically applied, governmental involvement in mitigating extra-hazard risks might be considerably reduced, or even not actually needed.

A more detailed treatment of the offsetting portfolio approach is given elsewhere [3]. Basically, this approach is based on building a well balanced portfolio of negatively correlated perils, so as to minimize the total uncertainty of the insurer. For example, the death peril covered by the regular life insurance policies is negatively correlated to the "long life peril" covered by annuities and pure endowment policies. The occurrence of an extra-hazard peril (such as earthquake, war or famine), might result in extra losses in the "Death Type" component of life insurance business. At the same time, the occurrence of these perils should result in gains in the "Life Type" component of insurance business. Conceptually, a well balanced portfolio of such negatively correlated perils might provide an adequate basis to insure extra-hazard perils with minimal safety margins and/or minimum governmental involvement.

It is hoped, that the offsetting portfolio approach will be further studied and will be put into practical use by the commercial insurance industry sometime in the future. As for the current situation, it is admitted that some kind of governmental involvement in mitigating extra-hazard risks is clearly needed. However, as several recent major catastrophes have depicted, even governmental capacity and authority might be insufficient when major disasters are concerned. The next section is an attempt to establish an international framework to handle extra-hazard risks that are above the capacity of single governments or countries.

II. MAJOR WORLDWIDE CATASTROPHES AND THEIR ABSOLUTE AND RELATIVE MAGNITUDE

In recent years, several events resulted in losses estimated in hundreds or even thousands millions of U.S. dollars. Every January issue of "*Sigma*" (a monthly published by the Swiss Reinsurance Company) brings a detailed list of catastrophes that occurred during

the preceding year. Based on this source, Table I was constructed, so as to give a basic picture of the absolute magnitude of losses in the "Big Ten" Catastrophes during 1971-1976 and early 1977.

TABLE I
Worldwide Major Catastrophes 1971-1976 and Early 1977
("The Big Ten")

Catastrophe					
No.	Source	Date	Place/Country	Cause of Loss	Victims/Damage
1	Sigma	February 9, 1971	Los Angeles California U.S.A.	Earthquake	45 dead, \$1,000 m. total damage \$31.6 m. insured damage
2	Sigma	August end, 1971	North India East Pakistan	Monson Storms Floods	over 300 dead, \$750 m. production and harvest losses
3	Sigma	June 20, 1972	East Coast U.S.A.	Hurricane "Agnes"	appx. \$3,100 total damage, 97.9 m. insured damage
4	Sigma	July 21, 1972	Philippines	Flood Catastrophe	427 dead, \$600 m. material damage
5	Sigma	December 23, 1972	Managua Nicaragua	Earthquake	appx. 10,000 dead, \$1000 m. material
6	Sigma	April 2-5, 1974	14 Southern and Eastern States	Tornado	over 300 dead, 430 m. insured damage
7	Sigma	September 18, 1974	Honduras	Hurricane "Fifi" Flooding	appx. 10,000 dead, \$500 m. material damage
8	Sigma	January 2/3, 1976	Northeast of Europe (WG, NL, GB, B, Scan)	Storms	appx. 100 dead Swiss Frs. 1500 m. total damage over Swiss Frs. 100 m insured damage
9	Sigma	February 4, 1976	Guatemala	Earthquake	22,000 dead, U.S. \$750 m. total damage, U.S. \$75 m. insured damage
10	News Media	March 4, 1977	Romania	Earthquake	1750 dead 11,000 wounded U.S. \$1,000 damage, 33,000 houses destroyed, 35,000 homeless

It is always emphasized by "*Sigma*", that their lists of catastrophes do not claim to be comprehensive. Moreover, those losses to which no numerical amount of monetary loss was attached are not included in Exhibit 1. For example, the July 28, 1976, earthquake in the People's Republic of China, claiming 665,000 victims, is not included. Although this event was probably the worst disaster of the 20th century—no data are available as to the total damage that was caused by that earthquake.

According to Table 1, Hurricane "Agness" caused the biggest amount of loss. However, this loss was "only" 0.3 percent of the U.S. gross national product for 1972. In contrast, the Managua earthquake loss accounted for more than the total G.N.P. of Nicaragua for 1972. In evaluating the relative severity of losses, they should be compared to relevant economic figures, such as the annual Gross National Product of the countries hit by the event. This is done in Table 2.

Similar to Table 1, Table 2 includes only those losses to which monetary amount of damage was attached. It is clearly seen, that the most severe losses occurred in Nicaragua, Honduras and Guatemala, all of them in Central America. The other countries most severely hit by catastrophe were Mauritius, the Philippines, Romania and India/East Pakistan. None of these countries is a western industrial country. On the contrary, all the major catastrophes that hit western countries accounted for less than 1 per cent of respective Gross National Product.

There is no specific theory of the magnitude of loss from risk a country can absorb, without severe social and/or economic consequences. But if this magnitude is put at the (admittedly arbitrary) figure of one percent of national income, then in seven cases, at least, the magnitude of loss was above that figure. If the ratio of loss to G.N.P. put at five percent—at least five events should be considered beyond the capacity of being absorbed by the country which was hit by the catastrophe.

In fact, it is frequently found that after a country is hit by a severe catastrophe, a broad international drive develops to provide it with financial and physical resources. Thus, it is somewhat presumptuous to assume, that countries might overcome severe catastrophes with no outside aid. This situation calls for the establish-

TABLE 2:

Major Worldwide Catastrophes and Their Ratio to G.N.P.

No.	Date	Place/Country	Cause of Loss	Amount of Loss	GNP	Loss GNP ratio (%)	Relative Severity Rank
1	February 9, 1971	California U.S.A.	Earthquake	\$ 1,000 m	\$ 1,063,400 m	0.1	
2	July 1971	Argentina Chile	Earthquake	\$ 250 m	\$ 31,400 m \$ 7,050 m \$ 38,450 m	0.65	
3	Aug. 1971 First Half	India	Flooding of the Ganges	\$ 250 m	\$ 50,000 m	0.5	
4	Aug. end 1971	North India East Pakistan	Monsoon Storms Floods	\$ 750 m	\$ 50,000 m \$ 5,000 m \$ 55,000 m	1.4	VII
5	June 20, 1972	East Coast, U.S.A.	Hurricane "Agnes"	\$ 3,100 m	\$ 1,1171,000 m	0.3	
6	July 21, 1972	Philippines	Flood	\$ 600 m	\$ 8,460 m	7.1	V
7	November 13, 1972	Western Europe W.G., N., G.B., F., B.	Cyclonic Storms	\$ 150 m	\$ 702,000 m	0.02	
8	Decem. 23, 1972	Managua, Nicaragua	Earthquake	\$ 1,000 m	\$ 916 m	109.2	I
9	April 25, 1973	Midwest, U.S.A.	Flooding of Mississippi	\$ 400 m	\$ 1,306,600 m	0.03	

No.	Date	Place/Country	Cause of Loss	Amount of Loss	GNP	Loss GNP ratio (%)	Relative Severity Rank
10	January 27, 1974	Queensland Australia	Cyclonic "Wanda" Flooding	A\$ 100 m (insured)	A\$ 50,360 m	0.2	
11	April 2-5 1974	14 States U.S.A.	Tornado	\$ 430 m (insured)	\$ 1,413,200 m	0.03	
12	September 18, 1974	Honduras	Hurricane "Fifi" Flooding	\$ 500 m	\$ 970 m	51.5	II
13	December 25, 1979	Darwin, Australia	Cyclone "Tracy"	A\$ 200 m (insured)	A\$ 50,360 m	0.4	
14	February, 6, 1975	Mauritius	Cyclone "Gervaise"	Maur. RS 551.5 m \$ (100 m)	M.R. 3,125 \$ (100 m) (1974)	17.6	IV
15	January 2/3 1976	Northwest of Euro. (W.G., NL, G.B., B, Scan).,	Storms	S.F. 1,500 m (\$ 600 m)	\$ 1,000,000 m	0.06	
16	February 4, 1976	Guatemala	Earthquake	\$ 750 m	\$ 3,000 m	25.0	III
17	November 10, 1976	Sydney - Australia	Hail Storms	A\$ 50 m	A\$ 65,000 (est.)	0.08	
18	March, 1977	Romania	Earthquake	\$ 1,000 m (est.)	\$ 40,000 (est.)	2.5	VI

ment of intergovernmental organization which will undertake to be ready to act in case a member country is severely hit by an extra-hazard risk.

III THE HYPOTHETICAL ROLE OF THE INTERNATIONAL INSURANCE FUND.

Working in partnership with the United Nations in various economic, social, scientific and technical fields is a group of intergovernmental organizations related to the United Nations by special agreements. The International Monetary Fund (IMF) is one of these intergovernmental organizations.

The function of the IMF is to promote international monetary cooperation, and currency stabilization. One of the specific purposes is:

“To give confidence to members by making the Fund’s resources available to them under adequate safeguards, thus providing with opportunity to correct mal-adjustments in their balance of payments without restoring to measures destructive of national or international prosperity.” [4].

In addition to the IMF there exist several related agencies which aim to further economic development and provide capital and financing to member countries in need. Among these organizations are the World Bank, the International Development Association (IDA), and the International Finance Corporation (IFC).

Towards the end of 1976, the IMF had some 130 member countries and its total “quotas” summed up to about 30 billion SDRs, or about 35 billion U.S. dollars. The quotas are the basic reserves and lending capacity of the IMF. Each member country is assigned a quota, which originally was determined by a complex formula based on “the ability of a country to subscribe resources to the Fund, the need of a country for use of the resources of the Fund, and the economic significance of a country” [5]. The operation of the IMF is basically by extending short and medium term credit to member countries in need, and imposing (sometimes tight) restriction in return [6].

It is proposed to establish a sister organization to the IMF—the International Insurance Fund (IIF). Its main purpose will be to assist member countries which were hit by a “super-catastrophe”

caused by a pure risk. A super catastrophe might be defined as an event causing loss of, say, one (or five) percent of Gross National Product of the country involved. The aid might be monetary, or in kind, or a combination thereof, subject to a considerable deductible absorbed by the country hit.

A more detailed discussion of the operation of the proposed IIF is given later. In order to illustrate the basic magnitude of the operation of the IIF, had it been in effect in recent years, Table 3 was constructed. This table is based on the data of Table 2, assuming various deductibles of the GNPs of the countries involved.

TABLE 3

Hypothetical Operation of the Proposed International Insurance Fund in Recent Years.

Event No (in table 2) (a)	Millions of Current U.S. \$				
	Total damage (b)	Annual G.N.P. (c)	Amount of Compensation (rounded) Assuming Deductible of G.N.P.		
			one percent (d)	five percent (e)	ten percent (f)
4 India/Pakistan (1971)	750	55,000	200	0	0
6 Philippines (1972)	600	8,460	500	200	0
8 Nicaragua (1972)	1,000	916	1,000	950	900
12 Honduras (1974)	500	970	500	450	400
14 Mauritius (1975)	100	545	100	50	50
16 Guatemala (1976)	750	3,000	700	600	450
18 Romania (1977)	1,000	40,000	600	0	0
	<u>4,700</u>		<u>3,600</u>	<u>2,250</u>	<u>1,800</u>

Table 3 illustrates, that the hypothetical IIF would have provided compensation, during the last seven years, in seven out of the eighteen events of table 2 if a deductible of one percent of G.N.P. had been applied. The total compensation in that case would have summed up to about 3.6 billion U.S. dollars. If the deductible is increased to 5 percent, only five events would have been granted compensation, totaling 2.25 billion U.S.\$\$. And for a deductible of 10 percent—four events totaling 1.8 billion U.S.\$, would have been compensated.

It should again be recalled, that Table 3 refers only to those events, in which amounts of loss were available, and that these losses generally do not include human capital losses. The available data give some basis to estimate that there was some 20 to 30 additional events of "super-catastrophes" during 1971-1976, on which no amount of monetary loss is available. ("Super catastrophe" is defined here as a loss above 1 percent of G.N.P.) In these additional super-catastrophes, some 50,000 people were killed, a similar number to the total number of dead in the seven events listed in Exhibit 3. If the number of dead could serve as a guideline of any value to estimate property damage, it might be assumed, that total property damage in those 20-30 additional super catastrophes was about \$ 5 billion.

To summarize, if the IIF would have been in operation since 1971, it would have dealt with some 30 or 40 events of super catastrophes, in which the total property damage would have been at the magnitude of \$ 10 billions. If a deductible of one percent of G.N.P. would have applied, the amount to be compensated would have been in the range of 6 or 7 billion dollars.

On an average annual basis, this means that the proposed IIF would have dealt with about half a dozen of super catastrophes per year, with an average annual budget of about one billion dollars. These figures suggest that the IIF would have had a very important role in handling major catastrophes, had it been in operation in recent years, even if loss of human resources would not have been compensated.

IV SEVERAL THEORETICAL AND PRACTICAL CONSIDERATIONS OF THE PROPOSED IIF OPERATIONS

Although the basic concept and purpose of the proposed IIF is easy to grasp, it has several aspects and many details that should be carefully studied. The main points discussed next are:

- (a) Perils covered and excluded.
- (b) Method of determining losses.
- (c) System of settling losses.
- (d) Basis of fixing "premiums".
- (e) Use of deductibles and insured participation.
- (f) Loss control and relief centers.

(g) Mutual relations with the commercial insurance industry and

(h) Administration aspects.

(a) *Perils Covered and Excluded*

The main purpose of the proposed IIF is to aid governments in cases of super catastrophes caused by perils beyond their control. Along this line of thought, perils such as wars or riots should not be covered by the IIF. However, all other perils might be covered on an "all-risk" basis. As a matter of fact, perils covered will be those of super-catastrophic nature, such as: earthquakes, windstorms, floods, landslide, cold and famine. It is still to be considered whether drought, nuclear fault and similar perils on which the government has considerable control should be covered. In any case, the coverage should be an "all-risk" coverage with specific perils excluded rather than a named peril cover.

(b) *Method of Determining Losses*

To enable a country an early return to regular operation after a super-catastrophe, losses should be determined on a broad basis. Property damage should be determined on a "replacement cost new" basis, rather than on an "actual cash value" basis. Consequential losses resulting from perils covered should also be determined on a broad basis, despite well-known practical difficulties of estimating such losses.

Loss of human life, injuries, and becoming homeless is very difficult to objectively determine. If such losses are to be covered, it might be preferred to calculate them on an advanced "valued" basis. Values should probably be related to national income per capita, and should have different factors for dead, injured and periods of being homeless.

(c) *System of Settling Losses.*

The issue of settling losses by cash payment versus repairing or replacing with real goods and services was intensively discussed by John D. Long [7]. Long, who concentrated in certain personal insurance lines such as automobile and home owner insurance, did not arrive at a final conclusion, and suggested to put the option to test.

In the specific case of national super-catastrophes it seems that

the decision should be made on a case to case basis, and should not be decided in advance. It is also proposed, that any kind of loss settlement would be on a specific combination of a loan and a grant basis, rather than a non-refundable compensation. The lending might be on very favorable terms, and with minimal safeguards, and thus might have a certain element of subsidy or grant.

From the immediate practical viewpoint, this lending arrangement has an impact quite similar to a non-refundable grant. However, from an "educational" viewpoint, and providing incentive to utilize loss-control and loss-reducing measures—the lending arrangement is preferred to grants. In addition, the lending arrangement will provide the IIF with more financial resources and capacity *vis a vis* the regular compensation arrangement.

(d) Basis of Fixing Premiums

Theoretically, insurance rates should meet the three well-known criteria of adequacy, reasonableness and fairness. The proposed IIF, however, is not a regular commercial insurer. Rather, it is a combination of an insurer and a financier. In the latter capacity it is similar to the IMF and its "sister-organizations", such as the World Bank, IFA and IFC.

It is proposed, therefore, that the basic resources of the IIF will be contributed on the basis of both regular actuarial considerations, and practical considerations of member countries ability to contribute and their economic strength. Total initial resources might be in the magnitude of 2 billion U.S. dollars, and if additional amounts are needed, it might be obtained through increasing members contributions or through borrowing.

It should be noted, that if the criteria of economic strength is the dominant one in fixing member countries contributions to the IIF, most of the burden will be borne by the industrial countries. Based on historic records, these countries were relatively less exposed to super-catastrophes. From this viewpoint, the IIF might be in a similar situation to the IMF.

In order to raise the initial resources needed to let the IIF begin its operation, and until more accurate calculations are accomplished, several practical possibilities that might immediately carried out might be considered:

- (a) any member country will make an initial contribution according to its relative share in the IMF quota.
- (b) any member country will make an initial contribution according to its relative share in world insurance premium volume.
- (c) any member country will make an initial contribution according to its relative share in world exports.

According to their formulas, the relative initial contributions might be along Table 4.

TABLE 4

Three Alternatives for Raising Initial Resources to the Proposed IIF.

	Total World Insurance Premiums (1974, percentage)	IMF Quotas (August 31, 1976 percentage)	World Exports 1975 (%)
	(1)	(2)	(3)
1 U.S.A.	51.1	22.9	13.5
2 West Germany	9.3	5.5	11.3
3 Japan	8.6	4.1	7.0
4 Great Britain	5.8	9.6	5.5
5 France	4.8	5.1	6.7
6 Canada	3.4	3.8	4.2
7 Netherlands	1.9	2.4	4.4
8 Australia	1.8	2.3	1.5
9 Italy	1.8	3.4	4.4
10 Switzerland	1.3		1.6
Sub-Total	89.8	59.1	60.1
All other	10.2	40.9	39.9
TOTAL	100.0	100.0	100.0

Sources: (1) Insurance Information Institute, "Insurance Fact", 1976, p. 10.

(2) International Monetary Fund, "International Financial Statistics", October 1976, p. 8.

(3) International Monetary Fund, "International Financial Statistics".

It is estimated, that total worldwide insurance premiums in 1978 might be in the magnitude of 300 billion U.S. dollars. Current IMF quotas are at the magnitude of 35 billion U.S. dollars, and 1977 world exports is estimated at 1,000 billion U.S. dollars. If the IIF is to raise an annual contribution of about 2 billion U.S. dollars, it might be accomplishing it by charging a member country to con-

tribute about $\frac{2}{3}$ of 1 percent of its annual premiums, or about 6 percent of its quota to the IMF, or about one fifth of one percent of its annual exports, (or an equivalent combination thereof).

(e) Use of Deductibles and Insureds Participation

Intelligent use of deductibles and insureds participation in losses is widely recommended by insurance scholars and executives, as long as it is within the capacity of the insured. It tends to encourage insureds to utilize loss control and loss reduction measures, and to avoid administrative cost of handling small claims. Thus, deductibles and participation should considerably reduce premium rates.

For similar reasoning, it is proposed that deductibles and percentage participation is widely used by the IIF. The deductible for any member country might be a percentage (say between one to ten percent) of its GNP, and the insured's percentage participation might be from 10 to 30 percent of the loss sustained (above the deductible). The specific figures might be left to the member countries to choose, and their contributions will be adjusted accordingly.

It should be added, that the relatively high deductibles and percentage participation has an important function of leaving the area for commercial insurers to continue their traditional activities.

(f) Loss Control and Relief Centers.

A most important function of the IIF should be encouraging and promoting the use of loss control measures, and the establishing and operating of relief centers throughout the world. It is too frequently uneasy to observe, that after a super-catastrophe occurs, whether in Honduras or in Romania, relief supplies are not readily available. It is recommended that the IIF operates worldwide permanent centers ready to act in an emergency, and endowed with far-reaching powers for such cases.

The IIF should operate or coordinate worldwide weather and geological, etc. observation network and warning service. It should promote study and research in the area of predicting and controlling catastrophes, and train governments and population in facing them. Thus, similar to the IMF, (and may be even more) the proposed IIF might have a strong impact and influence on member countries in controlling and reducing super catastrophe losses.

(g) Mutual Relations with the Commercial Insurance Industry.

The proposed IIF would most probably have close administrative cooperation with the commercial insurance industry in the areas of loss control, research, and perhaps settlements of claims. It is less clear whether the IIF should (or could) cooperate with the commercial insurance industry in reinsurance or coinsurance of super-catastrophes, and this question might be left open to future study.

(h) Administrative Aspects.

The IIF should probably operate with member countries through their insurance commissioners, or a similar national authority. In general, the administrative and organizational structure of the proposed IIF might be quite similar to that of its sister organization such as the IMF and several other non-monetary agencies of the United Nations.

CONCLUDING REMARKS.

It lasted several years, and much effort was contributed by scholars and governments, until the IMF and similar organizations were established. The author does not assume that this proposal to establish an International Insurance Fund is immediately adopted. However, it is believed that the basic idea of the proposed IIF has many theoretical and practical advantages, although certain issues are still to be studied and solved. It is hoped that it will not last too long until the IIF is established and put into operation.

REFERENCES

- [1] Dan R. Anderson, "Development of the Principal Elements of a Comprehensive Catastrophe Insurance System," *CPCU Annals*, (September 1975), p. 131.
- [2] Wagner d'Alessio, "Private Carriers Can Provide Insurance Against Catastrophes II," *Best's Review*, February 1972, p. 12.
- [3] Yehuda Shenhav, "The Case Against Traditional Insurance of Extra-hazard Risks," *The ASTIN Bulletin*, Forthcoming.
- [4] J. Keith Horsefield, "*The International Monetary Fund, 1954-1965*," (Vol. III: Documents,) I. M. F. (Washington, D. C.) 1963, p. 188.
- [5] *Ibid.*, pp. 146-147.
- [6] For latest development of the IMF "The IMF Wields Sudden New Power," *Business Week*, (March 28, 1977) pp. 86-90.
- [7] John D. Long, "A New Settlement Option: Restoration Instead of Cash" *CPCU Annals*, (December 1972), pp. 293-318.