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REINSURANCE AND
CROP INSURANCE STRUCTURAL FACTORS

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Opinions expressed are solely the author's and do not necessarily reflect those of the Federal Crop Insurance Corporation, the U.S. Agency for International Development, nor the United States Government.

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I. INTRODUCTION

In October 1980, David Gilboa and I reviewed the advisability of FAO becoming involved in crop reinsurance as had been requested by its previous General Assembly. Our views were presented in a brief paper entitled Reinsurance and Comprehensive Crop Insurance Programs. Since then, work supported by the Agency for International Development ~~(AID)~~ and implemented by the Interamerican Institute for Agricultural Cooperation ~~(IICA)~~ in Latin America as well as the continuing review of programs and issues in other parts of the world has shed new light on the design of crop insurers and has made it evident that a supplement to the earlier paper would be useful.

The basic premise of this paper will be that the availability of crop reinsurance is limited primarily by structural factors of the crop insurers themselves and that these can be managed with proper planning. Central to this premise is our belief, supported by early experience in Latin America as well as by the mature programs in Mauritius and Puerto Rico, that the crop insurers can be self-financing organizations once they have gotten through an approximately ten-year startup period.

— For the sake of readers not familiar with crop insurance or reinsurance, a brief explanation follows.

Reinsurance refers to the process whereby an insurance organization cedes to another organization part of its insurance liabilities. Reinsurance enables the insurer to handle more risks than it would be able to accept otherwise, and it reduces the risk that in the event of a catastrophe the insurer will suffer losses in excess of its financial resources. It is, in short, a means for financing large losses.

In case of comprehensive crop insurance programs, there exists the

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potential for large losses due to drought, floods, frost, excessive rainfall and similar hazards which might affect a large proportion of the farmers at the same time. The threat of these losses has been one of the more effective deterrents to the introduction of comprehensive crop insurance.

Some countries have considered establishing programs by investing large sums of capital in their insurance schemes in order to provide a reserve for catastrophic losses. Although this is prudent, it is costly since resources which could be used in other development programs are tied up. It is, also, impossible for the poor nations.

Most countries have operated their crop insurance schemes on a pay-as-you-go basis by pledging the full faith and credit of the governments to the insurers. The clear disadvantages of this system are the threat of disruption of budgeted development plans, the stimulation of inflation if government prints money to pay losses, and the uncertainty as to whether or not poor governments will indeed be able to cover claims fully and promptly.

Reinsurance enables a country to pay a relatively small annual premium and to receive a relatively large return on those infrequent occasions when catastrophic losses occur. Reinsurance, thus, makes it less costly and safer to operate a crop insurance program. If crop insurance itself is desirable, then reinsurance is a necessity for all but the wealthiest nations.

The remainder of this paper is arranged in four sections. Section II is concerned with the state of the reinsurance market at present and whether or not there is much unsatisfied demand from crop insurers. Section III reviews five options for managing reinsurance needs. Section IV describes the relevant structural factors of crop insurers and their impact upon reinsurability. The final section presents a summary and recommendations.

11. CURRENT STATUS OF CROP REINSURANCE

The question which we must address here is: Is reinsurance in such scarce supply or offered under such onerous conditions that a special reinsurance program should be launched by the governments of developing countries and International Development Organizations (IDO's)?

The way to answer the question is by examining the current situation. Informal discussions with crop insurance, government, reinsurance and International Financial Organizations (IFO) officials permit the following incomplete compilation:

A. Countries and programs with at least five years of experience:

1. Those in which the governments supply adequate reserves and therefore do not appear to want to buy reinsurance from outside are: Japan, U.S.A., Canada, Sweden, and Mexico.
2. Those which manage to purchase even a small reinsurance cover include: Mauritius, Puerto Rico, Israel, South Africa, Zimbabwe, and Panama.
3. Those which could probably benefit from reinsurance at present are: Costa Rica, Sri Lanka and Cyprus.

B. Countries and programs with less than five years of experience:

1. Those which have started or may start crop insurance programs and may want reinsurance in the next 3 to 7 years are: Ecuador, Bolivia, Dominican Republic, Venezuela, India, Republic of Korea, Philippines, Thailand, Indonesia, Australia, Taiwan, Pakistan and Chile.
2. Those with crop-hail insurance carried out by the private sector which may expand to comprehensive coverage if reinsurance were available are: Most of Western Europe, Argentina and Australia.

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From the above list, it seems that there is no great unmet need for reinsurance at present. The programs mentioned at item A.2. require, in my opinion, that structural adjustments be made before they can qualify for reinsurance coverage. Significant demand should develop in the next five years. An informal survey of commercial reinsurance companies indicates that commercial reinsurance will be available to well-managed crop insurance programs once they gain a minimum of experience and maturity.

III. REINSURANCE MANAGEMENT OPTIONS

In this section we will discuss five alternatives for financing catastrophic losses. The first three involve the reinsurance mechanism; commercial reinsurers, a pool and an international reinsurance fund. The fourth alternative is banking, which is qualitatively distinct from reinsurance. The final alternative is to provide technical assistance to the insurers so that they can obtain their own reinsurance.

A. Commercial Reinsurers

Currently, international commercial reinsurers are only slightly involved in crop insurance, reinsuring just six programs. There are at least three reasons why commercial reinsurers should be interested in crop insurance; (1) it is a new risk, which will help their portfolios to be more balanced, (2) it can generate a fair profit, and (3) there is considerable surplus capacity (i.e. - underutilized capital) in the market at present. However, reinsurers are reluctant to enter into this area. ←

The reluctance stems from three principal problems all of which can be overcome with proper design and management.

1. Catastrophic Hazards -The more likely a direct insurer is to suffer

a large loss, the less attractive it is to a reinsurer. For example, an insurer covering 20 crops grown by 50,000 farmers each in a dozen different areas and over two planting seasons is more likely to be offered coverage than is an insurer of one crop grown by a million farmers in only a few areas. Insurance programs should be designed to provide as much spread as possible.

9 Comprehensive crop insurers cover such hazards as drought, flood, disease, insects, and typhoons. A characteristic of these is that when one farmer is affected, all are affected. This catastrophe potential is a serious problem and must be managed just as the lack of spread. The number of crops, planting seasons and areas where the insurer works must be increased. New programs such as farmer's life insurance and livestock, aquaculture and forestry insurance, farm machinery, buildings and liability insurance have to be added so as to balance the insurer's portfolio.

2. Experience - Most crop insurers do not have much experience to show the reinsurers who require it for calculating a premium rate. Also, crop insurance managers frequently have no previous insurance experience; this further discomfites reinsurers. Finally, there have been several failures in the past which have chastised reinsurers. Therefore, it is necessary for any crop insurer to have a minimum of three to five years of successful operations under stable management to show their prospective reinsurer. This can be gained during the pilot stage.
3. Moral Hazard - In order to manage the startup costs and to provide a guarantee for excess losses during this period, most crop insurance program designers have turned to the government. While providing the

desired benefits, the involvement of government has created another problem: moral hazard. Moral hazard ordinarily refers to the incentives insurance provides the insured to deliberately cause or falsify a loss and collect from the insurer. In this case, we are concerned about the insurer causing ~~improper~~ losses for the reinsurer.

7 The reinsurance relationship is usually protected by the insurer's desire to make a profit or, at least, to avoid losses. This is not the case for a Politically Managed Insurance Corporation (PMIC) since the ultimate motivator is the political status of the program's controllers. (PMIC's are discussed in section IV.) When many farmers suffer a noninsurable loss simultaneously, they are likely to apply pressure to the government which will be tempted to get out of this difficult situation by ordering the insurer to pay. The existence of reinsurance reduces pressures for financial responsibility and results in a practice called "milking," which is the greatest single barrier to a successful reinsurance relationship.

When the reasons for and against reinsurers participation are weighed, and the fact that they are presently reinsuring six programs considered, we can feel reasonably confident about future availability. The major problem seems not to be with the reinsurers but with the quality of insurers seeking coverage. The most productive role for development agencies then would seem to be as a provider of technical assistance to help existing and new programs become Technically Managed Insurance Corporations (TMIC). (TMIC's are all discussed in Section IV.)

B. Pool

A pool is an agreement between insurers to cede a part of each insurer's premium income and liability to the pool in exchange for an equal

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part of each other's liabilities and premium.

The pool itself does not assume any risk. Just as any reinsurance program, the pool has several advantages: (1) it spreads risks, (2) it reduces the reserve capital required for any given portfolio, and (3) it enables the participants to increase the amount of coverage in force. Surpluses which cannot be covered by the pool may be reinsured commercially.

PMIC's represent a difficulty for the pool. Some countries will place poor business in it and will tend to run a deficit. Other countries will resent subsidizing these and will withdraw. To prevent this, the pool will have to institute management controls. This is expensive, and can be done more economically by the already existing commercial reinsurers. Pools are effective means for reinsuring "good" risks, but cannot change "bad" risks to "good".

C. International Reinsurance Fund

An International Reinsurance Fund differs from a pool in that it is capitalized and accepts risks for its own account. Since national crop insurance programs are often controlled and subsidized by their governments, this institution could be established under an agreement between the governments of the interested countries.

As a risk assuming entity, the institution must be provided by the participating governments with adequate capital as an initial reserve. International assistance in the form of development grants or loans does not seem likely at this time. Since commercial reinsurance is possible for TMIC's, donor countries will not want to undercut them. Rather, they would probably prefer to help the PMIC's reconstitute themselves as TMIC's.

It is essential for this fund, just as it is for the pools, that in the long run the receipts (plus interest on investments) should balance with

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payments (plus the administrative costs) to each national crop insurer. Again, some procedure for periodic review of the results for each partner is essential. Otherwise, as we have already seen, some insurers will gain at the expense of others; distrust and dissatisfaction will grow and the institution will not be able to function. A reinsurance fund seems to have the same limitations as do the pools--it cannot make "good" risks out of "bad".

D. Banking

The International Financial Organizations (IFO), both public and private sector, present an additional alternative. These organizations can provide loans to cover the large losses with which we are concerned. These can be granted as either standard loans or as contingent loans, and they can be given at either commercial or concessional interest rates. This may be the only source of extranational financing for the PMIC's

A contingent loan is similar to a line of credit. The loan is agreed to before hand; a small holding fee is charged; then, when needed, funds are drawn down; and repayment is made according to previously specified time and interest rate conditions. A difference between contingent loans and lines of credit is that drawdowns from the former are made only upon the occurrence of specified contingencies instead of whenever the borrower wishes.

One important difference between contingent loans and long term insurance arrangements is the scheduling of the payments. In the case of contingent loans, repayment comes after a loss, when the borrower may find it most difficult. With reinsurance, repayment is spread out evenly with part of the loss being paid beforehand.

Whether the loans are made at concessional or commercial rates is a political question which is greater than the scope of this paper. However, if loans are available, it is more likely that the TMIC's rather than PMIC's

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will get either concessional or commercial loans. This is because programs that distribute their benefits according to technical rather than political criteria will be more effective in dealing with risk and uncertainty, and hence more likely to stimulate agricultural production. Unfortunately, it is most likely that loans will not be available at all. This is because the IFO's will be reluctant to invest their limited funds in programs which duplicate the already existing reinsurance institutions.

E. Technical Assistance Association

The simplest form of cooperation between national programs is the creation of an office to provide generalized technical assistance for the insurers. It would be similar to a trade association in that it would serve as a communication channel for insurers wanting to learn about reinsurance. It would not replace the reinsurer - broker - client relationship, but would facilitate it. Membership in the association would be considered by the reinsurers as a minor indication of the competence of an insurer.

The association would need to be supported in the beginning by a contribution from international donors but would have to come up with a design for eventual self-financing before those contributions would be forthcoming. Financial self-sufficiency is always problematic for this kind of association.

The association would not be able to place "bad" business, of course, but it could be used to deliver the technical assistance needed to help PMIC's convert to TMIC's.

IV. STRUCTURAL FACTORS OF CROP INSURERS

Now let us consider the nature of the insurers being reinsured. The most important single factor is the quality of management -- whether it is technically or politically dominated. The reason for this is that moral

hazard is limited successfully in one case but not in the other. Moral hazard is capable of destroying reinsurance relationships. Several other factors are also discussed below.

In this paper we have been referring to TMIC's and PMIC's as if they were unique and mutually exclusive models of crop insurers. Although many variations exist between these conceptual poles, it will help the discussion that follows if we assume that they are indeed unique and mutually exclusive.

A. Management

What are the management options and what are their effects?

Management, as we have stipulated, can be dominated by either political or technical/professional concerns, not by both. If decisionmaking is controlled by political forces, the insurer will be unable to resist certain pressures for ex gratia loss payments. This is not necessarily the case for PMIC's in other lines of business--automobile insurance for example. There, when an insured suffers an uninsured loss, he will seldom be able to force the insurer into paying. However, with crop insurance cases often arise where several hundred, or even thousand, farmers suffer an uninsured loss at one time.* Here, because of the force of their numbers, they often are successful in obtaining payment. If a government is close to an election or is feeling insecure for any reason, the leverage of the insured farmers is increased. If

* In insurance terminology, we can differentiate between these two cases by pointing out that in one case independent exposure units are insured (automobiles) whereas in the other case the exposure units are highly correlated (e.g., neighboring farmers exposed to drought). It is this exposure unit feature in combination with the PMIC, and not the PMIC per se, which makes reinsurance for crops so difficult. The case of I.N.S. (Instituto Nacional de Seguros), a government insurance monopoly in Costa Rica, is instructive. Among reinsurers, I.N.S. has a reputation for being one of the most professional and competent insurers in Latin America. It has had no difficulty in obtaining and keeping reinsurance for its regular lines--fire, life, auto, health, etc. Based on this excellent reputation it convinced a group of German, Swiss, British, American, and Swedish reinsurers to provide crop coverage several years ago. The program developed well until a large loss occurred at an inauspicious time. The reinsurers paid their claims, of course, but then withdrew from any further participation.

the losses can be passed on to a reinsurer, fund or pool, then restraint is a most precarious virtue.

TMIC's may take several forms. They may be regular stock companies. They may be mutuals or cooperatives. They may be town mutuals (very small companies operating in limited areas) as in Japan. Finally, they may be mixed-sector enterprises, but only with limited government control. A unifying element among all these forms is that they are concerned with either making a profit or, at least, as in the case of the cooperatives, avoiding losses.

We should make one last observation before leaving the PMIC's and TMIC's--that PMIC's work reasonably well in one kind of country. These are the affluent nations which can afford to pay for their political decisions. This is the case for Japan and the U.S.A., with their modified PMIC's, and for Canada, Sweden and Mexico. However, small and poor countries and especially countries exposed to severe catastrophic losses (e.g., typhoons to island nations) cannot afford the luxury of PMIC's. For them, reinsurance is especially crucial and a TMIC type organization indispensable.

B. Financing

What is the probability of being able to build self-financing insurers? What is the effect?

Self-financing insurers now exist in Puerto Rico and Mauritius, thus demonstrating the feasibility of the idea. Both of these are broad risk (windstorm) rather than comprehensive insurers. This means that the need for inspection and administrative costs are lowered but they must still cope with the problems associated with catastrophic risks.

Theoretically, it seems possible to have a self-financing, fully comprehensive crop insurer if it is directed to small scale commercial farmers (SSCF) and has a diversified portfolio. SSCF's produce a surplus with which

to pay premium. Credit linkages, as we shall see below, are also important. Initial results from a project in Latin America support the feasibility of self-sufficiency.

There are two difficult financial problems for a comprehensive crop insurer. One is the handling of large losses and the other the startup of operations when reliable and representative actuarial data do not exist.

The absence of adequate actuarial data initially requires that the insurer operate "in the dark" until its own experience can provide the necessary actuarial data. Therefore, the insurer must use judgmental rates in the beginning and must confront the possibility of heavy losses before it has had a chance to build up reserves. This is one of the core problems which has kept the private sector out of crop insurance and has reserved it incorrectly, as an exclusive field for social insurance.

One feasible strategy is that government underwrite the startup costs and guarantee excess losses during this period. This does not mean, however, that program designers must produce PMIC's which will be at a disadvantage in the next stage when they want and need commercial reinsurance in order to finance the truly large losses.

If programs can be made to be self-supporting, then not only will government be saved the expense of supporting it, but it will also be freed to allow the insurer to function as a TMIC.

How is the self-financing, technically managed insurer to be built? Here is one scenario; there are many.

A mutual insurer is established. Each farmer/policyholder has a vote for the board of director. The insurer begins with a management appointed by the promoters.

A development loan of the two-step type is obtained by the government from an IFD or aid donor and passed on to the insurer in local currency.

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Conditions might be as follow:

Loan to government	Reloan to insurer
10 years grace at 2%	10 years grace at 5%
20 years payment at 3%	20 years payment at 6%

The insurer would place the funds in productive, employment generating investments at rates higher than the repayment interest. This margin would underwrite the startup administrative costs. The government's investment would be protected by the supervision provided by its Insurance Commissioner.

By year 10 the insurer should be self-sufficient if it has developed a large, diversified portfolio. By year 30, it should have paid back the loan and generated an equal capital of its own.

e. CREDIT LINKAGE

What is the nature and the effect of the credit linkage?

A credit linked crop insurance program is one where most of the following features can be found.

- Banks' clients in specified classes are required to purchase the insurance as a condition of the credit; (e.g., rice farmers in certain provinces)
- The farmer applies for the insurance automatically when he

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applies for the loan;

- ° The premium is added to the farmer's loan, but withheld by the bank and paid directly to the insurer;
- ° The insurer covers the loan (including the premium), interest and, perhaps, a small extra amount;
- ° Insured amount, loan amount and costs of production are all roughly equal;
- ° The farmer, banker and insurer all agree that the farmer will use a specific technology package;
- ° The banks act as a communication channel for reporting farmer losses back to the insurer;
- ° The insurer pays losses into the farmer's bank account; and
- ° The bank deducts any outstanding loan balance and refunds the difference to the farmer.

It is actually the first item in this list that causes a program to be credit-linked. The others are necessary or desirable for implementation.

Credit-linkage provides a means for protecting against adverse selection. This occurs when too many persons with a higher-than-planned probability of loss purchase the insurance. It is a serious problem for insurances in which participation is voluntary. ~~X~~ credit-linked programs are semi-obligatory which works to control ~~and~~ adverse selection by automatically selecting an average group of farmers.

Credit linkage also facilitates low cost administration and guarantees good number of clients. These things have a strong impact on the financial viability of the insurer.

Finally, credit linkage identifies clients who tend to fit the SCCF description rather than that of the subsistence farmer, and situations which

are more likely to support development rather than disaster relief goals.

In general, it can be said that credit linkage supports a strategy characterized by TMIC, self-financing, SCCF and development goal features.

F. Summary

In this section we described several structural aspects of crop insurers which affect their reinsurability. The first and most important was management decisionmaking; whether it would be politically or technically/professionally dominated. We called the resulting organizations PMIC's and TMIC's. Because of their inability to control moral hazard, we concluded that reinsurance would be unavailable for PMIC's or, if obtained, unstable. Further, we concluded the TMIC's could be found in stock or mutual companies, cooperatives, town mutuals, and even mixed sector insurers if special precautions were taken to guarantee managerial independence.

Next we examined financial features of crop insurance. The lack of adequate actuarial data early in the program as well as sizeable startup cost may lead to a dependence on government for financing. If the programs are not properly designed, PMIC's rather than TMIC's will result. Later, when mature, the programs will need reinsurance for large losses but if they have used the government-financed-PMIC strategy, this will be precluded.

We then looked at the impact of goals on the insurer and identified two discrete bundles of goals. The Disaster Relief Goals assume that farmers cannot be self-sufficient and commits the program to the government-financed-PMIC strategy. The Development Goals have the opposite impact.

The clientele to whom the insurance is directed was examined next. Poor, small farmers were not seen as a monolithic group but one that could be usefully differentiated into subsistence and SSCF types. Choosing SSCF permits a "self-financing-development-oriented-TMIC" strategy. Choosing

subsistence farmers leads in the opposite direction unless a subsidy channeled through some other system raises the subsistence farmers to SSCF status.

Finally, the issue of credit linkage was discussed. Linkage with credit makes the programs easier to administer, the self-financing strategy possible, supports the development goals, and tends to select SSCF type clientele.

Taken together, these five items define two discrete crop insurance strategies. These can be called the PMIC and TMIC strategies and are shown below.

TWO CROP INSURANCE STRATEGIES

STRUCTURAL ELEMENTS	TMIC	PMIC
1. MANAGEMENT CONTROL	TECHNICAL/ PROFESSIONAL	POLITICAL
2. FINANCING:		
A. STARTUP	GOVERNMENT PLUS PRIVATE	GOVERNMENT ALONE
B. MATURE PROGRAM	SELF-FINANCING PLUS REINSURANCE	GOVERNMENT SUBSIDY AND FARMER'S PREMIUM
3. GOALS	PROMOTE AGRICULTURAL DEVELOPMENT	PROVIDE DISASTER RELIEF
4. CLIENTS	SMALL SCALE COMMERCIAL FARMERS	SUBSISTENCE FARMERS
5. CREDIT LINKAGE	LINKED	LINKED OR NOT

V. SUMMARY

The idea that IFO's and IDO's promote some sort of international reinsurance scheme for crop insurers does not seem to be justified. Of fourteen programs in existence for at least five years, six have some reinsurance, five do not wish to purchase coverage, and only three want but have been unable to arrange or keep coverage. Each of these three programs could, in my opinion, obtain reinsurance coverage if its management and financial structures were changed.

There are presently about fifteen new insurers which will be requesting coverage in three to seven years. Many of these are not being structured as TMIC's and will have difficulty in establishing permanent reinsurance relationships in the future.

Since availability of reinsurance depends on the quality of the insurer's structure, it would seem that the most productive role for the IDO's is as a provider of technical assistance during the design stage. This would enable the reinsurance connection to be made later on. An optimal role for the IFO's is to provide the financing for the capital and startup costs of the TMIC's.

The fact that reinsurance is absolutely necessary for any country or insurer with limited capital if they wish to provide a high quality insurance guarantee to a large number of farmers and still stay in business when large losses occur, is part of the justification for IDO and IFO involvement. The impact of crop insurance on farmers, agricultural production, credit institutions, and extension services is the other part.

Two other options for providing reinsurance were seen as impractical. A reinsurance pool constituted by the various insurers would be vulnerable to moral hazard and would tend to disintegrate quickly. An international reinsurance fund would suffer from the same problems, but it would also have difficulty in attracting capital, as potential donors would point to the duplication of efforts with the established commercial reinsurers. Another option, a technical assistance office, would not be very effective as it would have no impact on the moral hazard issue.

The final option --banking-- seemed to be the only hope, although a very slim one, for the PMIC insurers. They should discuss the situation with the development banks, but again one must question the wisdom of using IFO funds to compete with the already existing international reinsurance