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**MOBILIZING PRODUCTION CREDIT FOR SMALL FARMER  
AGRICULTURE: A DISCUSSION OF THE PROBLEM AND OF SOME  
POLICIES TO FACILITATE LENDING.**

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## MOBILIZING PRODUCTION CREDIT FOR SMALL FARMER AGRICULTURE A DISCUSSION OF THE PROBLEM AND OF SOME POLICIES TO FACILITATE LENDING

The difficulty of making small farmer credit available, accessible and affordable is an issue confronted in all of the developing countries. The source of the difficulty arises from the fact that in almost no developing country has a successful, sustainable agricultural credit system been established. All depend heavily upon direct or indirect subsidies either to interest rates and/or to cover the administrative costs. Almost all require periodic recapitalization. This is true irrespective of whether the government is a direct lender or supplies liquidity to commercial banks which intermediate the "programmed" or "directed" credit to small farmers.

The results of these programs over the last 30 years or so have shown that

**First**, almost all the agricultural lending banks have operated at a loss

**Second**, most have been supported by external resources, either in the form of grants or loans

**Third**, almost all of the specialized agricultural lending banks are either in precarious straits or are being closed. Here in Latin America, the lending banks of Peru and Bolivia have been closed. The Mexican bank has been reduced to 1/5 its former size. The agricultural banks of other countries, such as Honduras and Venezuela, are in the midst of a severe financial crisis. All have been recapitalized periodically.

**Fourth**, none have been capable of self-sustained growth from the small, heavily subsidized base to a large mass market. Institutional sources of credit still reach a very small portion of the small farmers in the developing countries.

In this atmosphere, there is a generalized intellectual ferment and a broad search both to understand the reasons for this situation and for alternative policies that will give the agricultural credit system sustainability. Numerous alternatives such as interest rate reforms and changes in banking practice are widely discussed within the lending banks themselves and in government.

Outside the banks themselves, development agencies and NGO's have up forward numerous "collateral enhancement" programs to help facilitate lending to (or more correctly, recovery from) small farmers. Keenly aware that the recovery rates of small farmer lending programs have not produced recovery rates that would permit them to operate without sustained subsidies, these programs of collateral enhancement implicitly seize upon the collateral constraint as the difficulty confronted by small farmers in obtaining loans and upon this same lack of collateral as the principle difficulty of banks in collecting these loans.<sup>1</sup> These enhancements generally include

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<sup>1</sup>However, it may be the case that the borrowers have adequate collateral but the collateral is unrealizable. Neither the legal nor political systems of developing countries are likely to permit the widespread realization of the collateral of defaulting small farmers.

- 1 Solidarity groups
- 2 Agricultural insurance
- 3 Guarantee funds
- 4 "Savings mobilization"<sup>2</sup>

Before turning to the policy discussion, it is useful to state what "collateral enhancements" cannot do

**They cannot fix the internal and operational problems of a credit system. They are "enhancements" to improve a functioning credit system, not the "magic bullet" that will "fix" the conceptual, structural and operational difficulties of the agricultural credit system. They can be a useful part of an operationally and financially sound agricultural finance system, but are not the means to achieve it.**

## SOLIDARITY GROUPS

In numerous countries around the world, solidarity groups have been organized to act as a "grass roots" financial intermediary. These groups take a loan from a bank as a group. Each individual member then becomes a sub-borrower from the group. The group itself is responsible for repaying the loan on time. If a recalcitrant member does not repay, the group can bring pressure to bear on him/her to pay up. If this pressure is unsuccessful, the member is expelled and the group as a whole has to respond to the bank for the loan.

This is perhaps the most promising development in recent years and appears at this stage to hold the most promise for both reducing the administrative costs of making numerous small loans and for improving the recovery rates. In effect, lending banks have become second story operations and have moved the credit supervision and loan collection responsibilities to a small group. While this strategy may work for small short term production credit, it would appear to be problematic in the case of more complex financial transactions.

The disadvantage of solidarity groups is that many prove to be transitory. When it is time to repay the loan, they have often dissolved, their members moved away or have joined other groups. While certainly promising, solidarity groups are viable only when the underlying businesses that the group or the groups' members operate are profitable. Loans to solidarity groups with unprofitable businesses will not make them profitable. Likewise, banks must maintain some loan supervision and insure that the group does not dissolve before the loan is due.

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<sup>2</sup>That is, borrowers must save as a condition for borrowing. These programs usually require the borrower to deposit some of the funds at the passbook rate of interest in return for a loan, which is usually priced far below the rate of interest prevailing in the informal market. Needless to say, small farmers quickly calculate the opportunity cost of these deposits by comparing the bank's rate of interest to what is obtainable in the informal market and make a decision to participate or not. Keep in mind that informal markets are not just lending markets, they also mobilize savings by paying a substantially higher rate or interest on small, short term quasi-deposits lent to the informal sector intermediary.

## AGRICULTURAL INSURANCE

Agricultural insurance may be the appropriate policy response when the difficulty confronted by small farmers is natural events that destroy their crops and thus their ability to repay their loans. It is a financial mechanism whose premium builds "surplus" in good years and pay it to farmers in bad years.

- ▶ The difficulty with agricultural insurance to date has been that
- ▶
- ▶ The administrative costs are high, often more than 30% of premium, and

It is difficult to build a large enough reserve to confront a major loss before that loss occurs. It may well take a century to build a reserve adequate to confront the "drought of the century" but the drought may occur in any year, including the first year of operation. Some reinsurance may be available in international markets to permit the transfer of some risks, but usually not the truly catastrophic risks.

The administration of agricultural insurance companies has not proved to be significantly different than that of agricultural banks.

### GUARANTEE FUNDS:

Guarantee funds exist in over 70 countries around the world. They are generally established on the argument that a guarantee will enable a bank to make a loan that it would not otherwise make to a priority or targeted sector. Again, the collateral constraint is put forward as the principle reason that banks are not lending and the guarantee is a means of overcoming this lack of collateral. While these funds, when they disburse, do in fact lower the default rate of a bank, they do not necessarily lower the overall cost of credit to the financial system. They do however redistribute it in a way that makes a comprehensive calculation difficult.

In the dozens of guarantee funds observed in developing countries, there are several notable factors.

**First**, they usually are established with a grant of funds from the state or abroad. These funds are deposited at interest and the income is most often used to cover expenses and disbursements. The fund's cost of capital is zero, but the cost to the financial system is the opportunity cost of capital. That cost is never accounted for, thus understating the cost of the scheme.

**Second**, the guarantee fees (the operating income) only rarely cover the actual costs of the defaults paid to the banks by the funds and the administrative charges of the fund. These are paid out of the fund and its investment earnings, most often decapitalizing the fund (in real terms) and impairing its future ability to write additional coverage.

**Third**, they tend to be quite costly administratively. This cost arises from the fact that if a fund is to function as a going business it must "underwrite" the loan and assign a variable premium based on the riskiness of the loan. To the extent that they assign a variable premium, the fund in effect raises the cost of the loan to the final borrower to the level that would have been charged by a bank if its interest rate were not capped or if the bank had to pay the costs of gathering information necessary to make a lending decision. The costs of recovering the collateral also raises the operational costs, although collateral realization is relatively rare. Few funds are able to develop a volume of business sufficiently large to lower the administrative costs per unit (number of loan guaranteed or aggregate volumes of guarantees) to a level that can be passed on to the borrower at an acceptable cost.

Guarantee funds frequently act as a back door subsidy to banks which are not able legally to charge an adequate interest rate in the first instance or are obliged to lend to a targeted sector. In time, almost all guarantee funds decapitalize due to the mismatch of revenue and expenses<sup>3</sup>

Finally, the funds are subject to the same catastrophic risk as is insurance. A major event may cause a massive call on the guarantees. As the fund is highly leveraged (guarantees are a multiple of capital), it may not have the reserves to meet the guarantees. These losses may arise from natural disaster, but equally frequently they arise from the economic cycle itself or even government economic and monetary policy<sup>4</sup>

## **STANDING DISASTER RELIEF PROGRAMS**

These have been the least successful of almost all the policies used to confront natural disasters. They require that a large fund be created and maintained. This is almost never the case. In France, a natural disaster fund was created but when France was hit by hurricanes, the fund was empty. The resources had long ago been used for other purposes. The second problem arises in identifying the recipients of the fund. After a disaster there is massive political pressure for a transfer of resources. Often the funds are transferred in a crisis atmosphere, and not necessarily to the groups that suffered the most loss, but instead to those that can mobilize the most political pressure. The national budget generally takes the hit.

The great advantage of a standing disaster relief program is that it has almost no

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<sup>3</sup>A few funds have protected their capital by slowly disbursing the guarantees. A good example is Nigeria where the Central Bank compels banks to lend to agriculture (or increases their legal reserves to prohibitive levels). The guarantee fund delays disbursements for years until inflation has severely eroded the principle.

<sup>4</sup>A good example of this difficulty is the U.S. Farmers Home Administration which guaranteed loans to U.S. producers. During the 1970's, when commodity prices were high, farmers expanded their operations, taking on heavy debt loads with government encouragement. When agricultural prices fell in the 1980's, farmers were unable to service their debts and the agricultural lending banks made massive calls on the guarantee fund. The ensuing "agricultural crisis" cost the U.S. Treasury an enormous amount of money. The collateral of the farmers was never realized, and in fact, the Congress enacted legislation permitting farmers to write down the value of the loans to the value of the underlying collateral--that is the loans were partially forgiven.

administrative costs until the disaster occurs. In the section below, we will outline a means by which a disaster relief scheme can be designed to avoid the twin perils of being decapitalized and being unable to identify the target groups that should receive the funds.

## **MANAGING AGRICULTURAL PRODUCTION RISKS IN NICARAGUA: A DISCUSSION OF THE ISSUE AND SOME ALTERNATIVE POLICIES**

Risk in agriculture arises from numerous sources. Some risks arise from the market prices that make a crop unprofitable, others arise from management failure when the producer is not able to produce the quality of the product that the market is prepared to buy at profitable prices. Technology sometimes fails and frequently in the developing countries, farmers lose money because of institutional failures to deliver the credit or inputs on time. Often the infrastructure or the lack of it contributes to the failure of farm enterprises. Farmers cannot get crop to market due to poor roads or lose crop due to poor storage and processing facilities. Often the loss to the farmer occurs at the market level. The farmers do not have assured markets or those markets are not able to process and sell the volume of product that the producers deliver. Finally, if these risks were not challenging enough, agricultural producers also face climatological risks. Floods and droughts are the most common of these in the tropics.

Each of these obstacles has to be approached with a set of policies tailored to the circumstances of the country and to the specific nature of the risks faced by agricultural producers.

In the case of natural hazards, such as floods and droughts, there is a range of policy options from which a risk management policy can be developed. In many cases, a "hardware" approach is preferable to a "software" approach. If drought is the problem, often irrigation is the most cost efficient solution. If floods frequently ravage crops, dikes, dams and drainage systems may resolve all but the most severe problems.

Often crop or crop credit insurance is put forward as a policy to deal with the natural hazard. While it is one policy that can be useful in some circumstances, it is but one of several alternatives. In some circumstances, an insurance product is indicated, in other cases it is not an appropriate policy response. In all cases, it should be considered as one of many possible policy alternatives to solve a specific problem in the national and agricultural context in which it will operate.

For the present purposes, we want to consider only the "software" responses to natural risk in agriculture but wish to remind the reader that after careful analysis, it still may be the case that infrastructure is more responsive to the problem of natural hazard than any of the following.

### **A CROP OR CROP CREDIT INSURANCE**

Crop or crop credit insurance (when the insurance attaches to the production credit) is a financial mechanism for collecting a premium in a good year and transferring it to a bad year or, alternatively, transferring resources from a zone or crop that is unaffected to one that is affected. It

is at its root a financial mechanism to move resources from one group to another group of producers

In all cases, insurance will have a net financial cost to the insured (unless offset by subsidies), although that cost will be realized in years without a loss, and presumably with better yields and partially recovered in loss years. Insurance is a zero sum game, the premiums paid either equal the indemnities plus the administrative cost or the insurer loses money (leaving aside for the moment investments that the insurer may make with the funds held for future payments). Even if the insurance program breaks even (premiums equal indemnities), there will be a net cost to be paid due to the administrative cost of the system. This administrative cost is borne either by the farmer as part of the premium, the insurer in the form of losses, or by the state in the form of a subsidy. There are only two players and all the costs are divided between them. Either the farmer pays the administrative cost or it is charged to the insurer, and perhaps transferred to the state via a subsidy.

The premiums will vary with the severity of the risks that are covered and with the administrative costs of operating the system. Thus, the premium paid by a farmer will vary depending upon the estimated indemnity costs of the insurer and the administrative costs necessary to issue and service the policies. The simplest statement of the Break Even point of an insurer is

$$\text{PREMIUMS} = \text{INDEMNITIES} + \text{ADMINISTRATIVE CHARGES}$$

A somewhat more complete statement of the Break Even point is

**PREMIUMS = INDEMNITIES + ADMINISTRATIVE CHARGES--INVESTMENT INCOME**

where investment income is the financial product generated by the premiums held in reserves to pay future losses

The point to be kept in mind in considering an insurance program is that the costs of the program are unyielding. While management can certainly reduce administrative charges and can to some extent affect the indemnity payments, the charges must be paid and any planning of an insurance program must a priori identify the sources of funds to meet the insurers' obligations

**ADVANTAGES** The advantages of crop or crop credit insurance is that it is a legal contract between the farmer and the insurer that attaches to a single insured and his fields. It identifies the insured, the crops covered, the risks that will be indemnified, and the terms and conditions under which the indemnity payments will be made. Both the insurer and the insured know under what circumstances a payment will become due. This type of insurance can be tailored to a wide variety of circumstances and the premium can be set to reflect the risks of a small region and theoretically even an individual producer. On an individual basis, it transfers risk, in this case production risk, from the producer to the insurer. On a portfolio basis, it can be used to spread risks amongst groups, regions, crops, agricultural cycles, and can in some cases be reinsured abroad, thus spreading the risks outside of the country.

**DISADVANTAGES** The chief disadvantage of this type of insurance is two fold

Crop insurance in both the developed and developing countries has proved to be quite expensive. Administratively, it is costly, often prohibitively so. An insurer must act prudently to avoid anti-selection and fraud. This requires a field staff to visit the fields before the policy is issued, usually during the cycle and when loss adjustments are required. From Peter Hazell's review of programs around the world and my study of the U S , Mexico, and Costa Rica, we can see that these costs can be quite high<sup>5</sup>. These administrative costs have to be borne either by the premium paid by the farmer or by a state subsidy. Furthermore, none of the crop insurance schemes established to date has been able to operate without a government premium subsidy in addition to the administrative subsidy. As a general rule, one can expect the overall cost of yield guarantee small farmer insurance programs to require resources of 15-25% of the total sum insured. It has been the practice to charge 5-10% of this amount to the farmer and to pay the rest through subsidies.

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<sup>5</sup>For example, even in the U S which has nearly optimal conditions in terms of ease of access to farms and large farm sizes, the subsidies are quite large. The administrative subsidy is about 35% of the premium paid by farmers. The government pays a subsidy about 40% of farmers' premium and losses about 40% in excess of premium income. This program costs about \$650 million per year and reaches about 25-30% of the farmers, who despite the heavy subsidy are not prepared to buy the insurance.

Second, farmers know their risks better than insurers. There is asymmetrical information. Farmers are often successful in selecting against insurers. This anti-selection may be fraudulent, but usually is not. An insurer offers a product at a given price and the farmer makes a rational calculation of whether he can profit from that product at that price on his fields sown to a specific crop at a given time using a specific technology. If he sees an opportunity to collect an indemnity, he will likely buy the product, otherwise he may not. The result is that the riskiest farmers are insured. Put the other way around, the premium either must rise to meet the riskiness of the insureds or the insurer must suffer the losses of inadequate premiums. Unless the program is obligatory for farmers, the insurer is forced to raise the premium, further pricing the better risks out of the scheme. The usual result is that voluntary participation is limited to high risk farmers, thus insurers have a small volume of high cost and high loss farmers. Even in highly subsidized schemes, the agricultural insurance has never reached more than a small portion of the farming population.

### **A FRAMEWORK FOR DECISION**

The history of small farmer insurance in Latin America is not bright. Some countries have tried and have closed the operations when the government was no longer prepared to bear the administrative costs and the premium subsidies needed to keep the program afloat. These include Ecuador, Venezuela, Bolivia, and Chile. Several others have maintained very small operations that may not long survive, including Panama, Costa Rica, and the Dominican Republic. Mexico is a special case where a large and very costly insurer was closed and a smaller version was set up, which despite the downsizing still requires both a premium and administrative subsidy.

Outside Latin America, small farmer crop insurance has not proved to be a successful policy. The Philippines is currently considering closing or radically restructuring its small farmer insurer. Companies in Nigeria and India are sustained by large government subsidies. The U.S. program was recently overhauled to give farmers a catastrophic insurance cover. Farmers have to participate in the insurance program as a precondition for access to the *ad hoc* disaster relief program.

Although far from conclusive, the research to date does not suggest that crop insurance has any impact upon the ability of farmers to confront losses from natural events over and above the transfer of resources that could be realized through a wide range of programs, some implemented at lower costs than insurance. This tentative conclusion owes as much to the fact that the effects of crop insurance cannot be separated from the effect of other variables as it does to the usually very high administrative costs of the insurance system which erode these benefits.

There is no empirical evidence that crop insurance has any effect on the recovery rates of lending banks. In fact, some evidence seems to suggest that banks often loosen already slack lending discipline when insurance is offered as a guarantee. Neither is there any evidence that crop insurance expands the total volume of lending to the sector. As most formal credit for the small farm sector is programmed credit and commercial lenders seldom participate voluntarily, due to financial repression, such as artificially low interest rates, and the very high unit costs of making small loans, the presence of crop insurance does not offset the cost and risk of commercial lending. Bear in mind

that crop insurance covers only the production risks, not the market risk or moral hazard. These are often more important in the recovery rates of banks than are natural hazards.<sup>6</sup>

Thus, the discussion of the creation of agricultural insurance should focus upon the management of natural risks and not upon the supposed collateral benefits that make the costs of the scheme seem more palatable on the surface. These benefits have to date proved elusive.

While there are numerous cases where agricultural insurance is the preferred policy tool to attack a problem of natural hazard, the history to date suggests a cautious approach and a sound financial analysis of how the insurer will meet its financial obligations before launching the program. To date, the programs that have succeeded have been run by private sector companies on a for-profit basis, selling a voluntary cover to larger farmers who want to use insurance as a means to a predictable cash flow.

This is not to suggest that small farmers do not confront severe climatological hazards or that they do not require assistance in recovering from a massive natural catastrophe. Quite the contrary, it is small farmers who have the most difficulty bearing the hardship of a drought or flood without external assistance. Frequently, they are the most numerous part of the rural population in the developing countries. These farmers have few resources and cannot easily recapitalize their operations. In many cases, small farmers were forced to sell land and/or migrate as the results of a drought and their inability to return to farming when the rains returned. The cities of the developing world are full of the dispossessed driven from the land by drought and an inability to return to farming due to a lack of resources.

In the present circumstances, establishing an insurance mechanism in Nicaragua requires a demanding financial analysis if the costly errors of other countries are not to be repeated.

Several preconditions must be met.

**First**, there is a legal requirement that an insurance company issue the policy. That company should have adequate capital to cover the start up administrative costs until the premium income can offset these costs. At present, INISER is a legal monopoly and would likely be the administrator of the program. It is doubtful that INISER would agree to put its own resources at risk and thus would administer the program and would depend upon external resources for the reserve and to cover losses in excess of premium income.

**Second**, a staff has to be recruited and trained to operate the field component of the crop insurance program. Insurance is a management-intensive business and the insurer must quickly develop the capacity to manage the field staff and schedule the field visits to

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<sup>6</sup>Reports from bankers and others familiar with rural credit in Nicaragua suggest that the "culture of non-payment" is very strong indeed, especially amongst the politically influential.

coincide with the crop cycle and the need to do timely inspections. Otherwise, losses will result for accepting poor risks.

**Third**, the insurer has to have sufficient funds to pay losses. This is more difficult in the case of catastrophic risks. The nature of drought and flood losses are different than other risks. When a drought occurs, all the insureds are affected. While over a long span of years, an insurer may create an adequate reserve, it must be prepared to meet the "drought or flood of the century" in the first year of operation. Furthermore, droughts are often multi-year events. Like earthquakes, the insurer must build and maintain a large reserve for many years, often decades. That reserve needs to be invested so that it retains its value in real terms.

### **A PRO FORMA BREAK-EVEN ANALYSIS FOR A NICARAGUAN AGRICULTURAL INSURANCE PROGRAM**

For the purpose of clarifying the finances of a small farmer insurance program, a break-even analysis is useful. First, we will do a static single-year analysis and then a multi-year analysis in which assumptions are made about the loss ratios across the span of years to illustrate the financial conditions under which an insurance program can succeed in Nicaragua and the principal difficulty of an insurance program exposed to catastrophic risk. This analysis also illustrates the conditions under which a program could operate at a reasonable cost to small farmers. It is in some respects, perhaps overly optimistic, especially as to the assumptions about the availability and cost of reinsurance.

To estimate the funds necessary to establish and operate an agricultural insurance program in Nicaragua, some assumptions are necessary. Based on these assumptions, some rough estimates of the amount of resources required for a successful program launch can be derived.

A recent USDA survey shows that about 460,000 hectares of corn were planted and only 280,000 were harvested. For beans, the figures were 125,000 planted and 77,000 harvested. These numbers show the effects of the recent drought on agricultural production. These numbers are far above those estimated by other sources which put corn production at 280,000 Ha while bean production was 172,000 Ha from CONAGRO.

Recent Banco Central data suggests that agricultural credit in Nicaragua is both quite limited and is declining in real terms. In part this is due to the agreement with the IMF and World Bank to cease recapitalizing the state banks with public funds and in part, it is due to a removal of the political requirements to make loans than had little chance of being recovered to politically important groups.

Through the end of October 1994, private commercial banks lent about 400 million Cordobas to short term agricultural lending. The state banking system channeled an additional 215 million Cordobas to short term agricultural lending. Most of this amount came from BANADES. Thus, on an annual basis, it is likely that total short term agricultural lending in 1994 will come to around only

750 million Cordobas, or just over \$100 million at the current exchange rate <sup>7</sup>

The importance of the volume of short term agricultural credits to the insurance is that Latin America farmers seldom voluntarily buy a policy and even if they wanted to, there is no sales network to sell them insurance. Thus, the insurance almost perforce has to attach to the bank credit. There simply is no other way to move the product <sup>8</sup>

There is no firm data on the number of hectares financed, but the scarcity of credit suggests that only a small portion of the land in production is financed by the banking system.

For the purpose of this exercise, we shall assume that the insurance program will begin with 50,000 hectares in year one and grow to 200,000 hectares in year 5. We shall further assume that the cost of production is set at \$300 per hectare <sup>9</sup>. This is in fact considerably more than is currently lent for production, but for the present exercise we assume that the Nicaraguan economy will recover and that credit amounts and volumes will approximate those of other countries in the region.

In year 5, 200,000 hectares represents 26% of the planted area planted to beans and corn, according to the USDA survey and 44% of the planted area according to the Ministry of Agriculture data. The sum insured on the 200,000 hectares, \$60 million, is about 60% of the total volume of short term credit at present.

The risks covered are restricted to flood, windstorm and drought and the cost of production. Pests and diseases are excluded as they are usually controllable by the grower and are almost always excluded from reinsurance cover. The premium rate is set initially at 8% <sup>10</sup>.

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<sup>7</sup>This is the BANADES annual loan volume. The stock of loans outstanding for agriculture is 711 million Cordobas, of which 188 million are classified as "overdue" (en mora). One banker suggested that the actual amount recovered may be considerably less than the 40% overdue figure and that in real terms the recoveries may be almost insignificant.

<sup>8</sup>The issues around compulsory insurance have been heatedly argued. One school holds that farmers should not be compelled to buy an insurance product that they do not want. Others argue that if farmers are using state resources they have to be diligent to insure that they are able to repay the loans and thus should insure. Even when the loans come from private banks, the argument is that they often have inadequate collateral and insurance enables them to borrow when collateral-based lending would not be possible.

<sup>9</sup>The actual amount of finance per manzana is ridiculously small. BANADES only finances about 45 Cordobas per manzana of corn and about 100 Cordobas per manzana of beans. I would doubt they could issue and service the loan for this amount. For the purposes of planning an insurance product, I have used a much higher figure that in many countries would represent a reasonable amount of production finance, in Nicaragua, it is much closer to the value of the crop.

<sup>10</sup>The choice of an 8% rate is arbitrary, it could be either higher or lower. However, it is about the average for the small farmer programs in Latin America. In addition, the USDA study mentioned above shows a 40% difference between planted and harvested hectares. An 8% premium rate would be sufficient to meet such a shortfall every 5 years.

Insurance regulation usually requires a 4 or 5 to one relationship between the premium written and the reserves available to support this insurance. As agriculture is a catastrophic loss business, a 2 or 3 dollars of premium to one dollar of reserves would be more prudent. In this case the premium volume would be around \$4.8 million (the \$60 million sum insured times the 8% rate). To write \$4.8 million of premium, reserves of about \$2 million or more would be prudent.

The total sum insured would be about \$60,000,000. The likelihood of a total loss, while remote, is still possible. More likely would be a Maximum Probable Loss (MPL) of 50% of the sum insured. Thus, a prudent insurer would have reserves and reinsurance to enable it to meet losses of \$30 million.

Reinsurance to cover the difference between the MPL and the premium income would be required to make the insurer viable and to protect its reserve.<sup>11</sup> Maintaining the reserve is critical to the on-going ability of the insurer to continue to write business.

Thus, reinsurance would be bought to protect the reserve. In reinsurance terminology, the company would need reinsurance for \$25.2 million in excess of \$4.8 million. The cost of the reinsurance would reduce the net premium income to the insurer, thus, a somewhat lower "excess" point (the point at which the reinsurer begins to pay) and a somewhat larger amount of reinsurance would be required. One may safely assume if reinsurance were available for this class of risk, it would cost not less than 40% of the gross premium, leaving the insurer with a net premium of \$2.9 million and the need to purchase \$27.1 million of reinsurance excess of \$2.9 million. There is a strong likelihood that reinsurer would not participate in the risks of a new company until it has several years of successful operations.

The administrative costs of operating the program can be reasonably accurately estimated. Assuming that the insurer does adequate field work and runs an efficient back office, probably an office staff of four or five people would suffice. Office equipment, a small computer and telecommunications are the equipment costs. The field staff would probably be one field inspector/supervisor per 5,000 hectares insured. Thus, the field staff would be about 40 people when the full volume of business is reached. An agronomist with benefits, travel expenses, and vehicle costs (unfortunately high in a rugged rural setting) probably run around \$25,000/year. While salary costs may be low, benefits are usually equal to the salary. Vehicles, expensive in the first instance, usually only last about 3 years with the hard use of constant field work. Thus the administrative costs would likely be about \$1.2 million per year for the central office and the field staff of a very efficient operation.

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for corn and about every 4 years for beans

<sup>11</sup> I have simplified reinsurance in order not to over burden this document with lots of technical jargon. Here what is proposed is a type of non-proportional reinsurance called "stop-loss". This type of reinsurance is designed to protect the reserves of the insurer from decapitalization by providing cover in excess of net premium income. There are literally hundreds of variations and other types of reinsurance.

These administrative costs are perhaps possible but do not characterize any of the existing programs where administrative expenses are approximate 30% of the premium in efficient operations and may even exceed the premium income in small insurers. If this low level of expenses were to characterize the program, the administrative expenses would be around \$1.4 million.

Based on these numbers, we can now calculate the break-even loss ratio for the company when it reaches a full-scale operation. The loss ratio is the comparison of income (premium) to expenses. For present purposes, we will use the "pure" loss ratio which excludes interest earned on investments.

ASEGURADORA AGRICOLA NICARAGUENSE  
(MILLIONS U.S. \$)

PREMIUM INCOME	4.8
REINSURANCE	(1.9)
ADMINISTRATION	(1.2)
NET INCOME	1.7 <sup>12</sup>

Thus, the new company has a net income of about \$1.7 million with which to pay without claiming on reinsurance or without dipping into reserves. Therefore, the break-even point in a given year is a loss ratio of 35%. That is, to break-even, the insurer can pay farmers no more than 35 cents on each dollar of premium paid to the company. At this point, the insurer is meeting its obligations and neither profiting or losing, neither capitalizing nor decapitalizing the reserve. It is however creating an implicit credit in its reinsurance account.

When losses exceed net premium income, farmers are paid their indemnities. The insurer recovers from the reinsurer. However, reinsurer would quickly adjust the cost of the reinsurance to recoup the loss in the following years. For our purposes, reinsurance can be considered as a small net cost to insurers across a span of years. If reinsurer do not realize some profit, they do not remain on the risk. The other side of the coin is that if the insurer has no reinsured losses, he can drive down the price of the reinsurance.

Across a span of years, the reinsurance cost will be largely recovered through indemnities. Let us suppose that the reinsurer would want a 10% profit on the reinsurance premium income. Reinsurer would be prepared over a span of years, especially if they were able to build up a reserve in the first years, to see most of the reinsurance premium returned. If the net cost of reinsurance

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<sup>12</sup>I have assumed a zero net tax rate for the insurance company.

were only 10% of premium paid to the reinsurer, the insurer would pay back to farmers in loss years most of the premium that they had paid in good years. Thus, if we assume that the administrative costs are fixed at \$1.2 million and the reinsurer are prepared to return all but 10% of the premium, the total deductions from gross premium would be just over \$1.4 million or 29%. However, keep in mind that reinsurance indemnities are paid only when losses exceed premium income, they are paid through the insurer to the insureds, and thus do not increase the insurers reserves.

Assuming that the entire 71% were returned in the form of indemnities, the net cost to the farmer (indemnities - premiums) would be 29% of the 8% premium he paid, or 2.3%. This would certainly be a reasonable charge for transferring risks to an insurer, if it could be reached in reality.

The 8% premium rate is over and above the present interest rates on agricultural loans. Nicaraguan farmers are charged interest rates of 18%. This insurance program would push financial costs to 26%. However, in bad years, if the company operated at break even, the company would return all but 2.3% of that 8% to farmers, reducing their net cost of credit and insurance to 20.3% with the insurer operating at break even.

The difficulty of agricultural insurance is that it covers catastrophic risks. The fact that droughts are largely random events imposes some special constraints on this class of business, especially if they occur before a long span of profitable years has allowed the insurer to build his reserve.

In the attached table, a five year cash flow projection has been set up. In this exercise we have assumed that the average pure loss ratio is 30% and in year five of operation, a drought has produced a loss ratio of 200%, two times the premium income. For the purposes of this exercise, we have assumed that the reinsurance begins in year two and cost 40% of gross premium and cover 100% of losses in excess of 100% of the gross premium income.

Starting with a reserve of \$2 million, the company has four years in which after indemnities and expenses it makes a net contribution to its reserve. In year 5, we have assumed a drought loss that is twice premium income. The premium in that year is \$4.8 million while the expenses and reinsurance deductions are \$3.1 million. Indemnities however soar to 200% of gross premium or \$9.6 million. The company is responsible for \$4.8 million of these losses while the reinsurer pays the remainder.<sup>13</sup>

However, a loss of this magnitude has to be funded by the insurer from the reserve. The impact of this loss on the reserve is catastrophic. It declines from nearly \$3.4 million to some \$260,000 without a recapitalization. The following year, the insurer can only write about \$520,000 of premium (or \$6.5 million of insurance at an 8% rate and a 2 to 1 relationship between premium income and reserves). Given the smaller capital base, the growth to the former level will be slowed.

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<sup>13</sup>The reinsurer also loses money over the five year period but breaks even in real terms, as interest on the reserves during the first three years offsets the loss in year five.

The company will also have to dramatically reduce its overhead costs for the newly downsized company

Lest a loss of this magnitude be thought excessive, bear in mind that the "loss cost" (the indemnity divided by the total sum insured) is only 16%. The USDA cited above data reflects a 40% difference between hectares sown and harvested this year. Drought losses of this magnitude are frequent. Had the loss been much larger, it would have completely wiped out the capital and bankrupted the company without an injection of new capital. Thus, this loss is on the low end of the spectrum of drought losses, yet its effects are devastating to a small company with a highly concentrated portfolio.

## **SUMMARY FOR CONDITIONS FOR ESTABLISHING A SUCCESSFUL AGRICULTURAL INSURER IN NICARAGUA**

From the above discussion, we can set out some of the basic elements for a successful insurance program in Nicaragua

1 An insurance company to issue the coverage and manage the back office business. Initial discussions with INISER were positive. INISER could both serve as an administrative home for the technical team that carries out the crop insurance program, as well as assuming some of the reinsurance, thus saving hard currency that would otherwise be paid abroad. However, agricultural insurance is a highly specialized business and INISER would need some scarce and relatively expensive technical assistance to set up and learn to run the business. Agriculture is an unforgiving line of insurance and mistakes can be very costly indeed, thus the technical assistance program is very important both to avoid costly errors and to assist the company in placing reinsurance in the very few markets prepared to underwrite this class of business in the developing countries.

2 A field team of about agronomists, about 10 in number at the outset and growing to about 40 by year five, equipped with jeeps for the required field work. The insurer would have to have the capability to organize, control and program the activities of this team. The training in underwriting and loss adjusting would likely have to be funded as part of the technical assistance effort.

3 A reserve of about \$2 million to begin a reasonable sized project. The reserve need not necessarily be in cash, it could be composed of guarantees from international donors to enable the program to begin. However, the guarantees would have to be firm and would have to be disbursed quickly in case of a major loss.

4 Administrative start up expenses cover the administrative charges in the first year until premium income is available from operations. Funds to cover the capital budget, including the vehicles and the other equipment would be needed.

5 The means to sell or otherwise place the policies. Latin Americans in general and farmers in particular have no experience buying insurance. The insurance would likely have to be attached to the credit.

6 Reinsurance or contingent guarantees of around \$30 million from donors to cover losses in excess of premium income. Reinsurance almost certainly would not be available in the first years.

## **B INCOME STABILIZATION AND ECONOMIC REACTIVATION PROGRAM**

The conditions for a successful insurance program are relatively demanding. There however may be other alternatives to confronting risk and catastrophic losses arising from natural events. Here I would like to explore one for a catastrophic insurance product that eases somewhat the demands of a small farmer credit insurance program.

If the problem of natural disasters is defined as one of offsetting the income shortfall due to the loss of crops, there are other policies that may assist in helping the sector to recover. The traditional approach has been to set up national disaster relief funds. These funds were supposed to be available to finance disaster relief following a massive catastrophe. All are decapitalized and are simply accounting devices. There are no funds available and any disbursements have to be drawn from the current budget.

Typical of these programs is the U.S. disaster relief program. Following a major loss in the farm belt, farmers mobilize and Congress appropriates a pot of cash to be doled out. This program coexists with both the Federal Crop Insurance Program and the Emergency Loan Program. The fact that crop insurance is available does not offset the pressure for grants and emergency loans (many of which are never repaid). Congress recently "fixed" the crop insurance program and is moving to make disaster relief a standing program whose payouts are available only to insureds and not determined after a loss when political pressure is greatest.

The major advantage of these programs is that they almost immediately reliquify farmers and reactivate the local economy by injecting cash. The disadvantage is that they are widely considered subject to abuses due to their *ad hoc* nature and the fact that the benefits are not predetermined.

### **A MODEL FOR THE REACTIVATION OF THE NICARAGUAN SMALL FARM SECTOR STABILIZING INCOME FOLLOWING NATURAL DISASTERS**

Following a natural disaster, not just farmers but the entire rural economy is impacted. Merchants see sales decline, buyers and processors are impacted, truckers don't have loads and banks cannot recover loans, and thus cannot continue lending. While farmers may be at the base of the pyramid, the effects of the disaster are felt throughout the rural economy and into the cities.

The policy problem is therefore to reactivate the rural economy. Enabling farmers to continue to planting the same surface benefits the entire farming community. The multiplier effects of reliquifying the farmer spread through the entire rural economy.

### **THE NATURAL DISASTER SMALL FARMER ECONOMIC REACTIVATION SYSTEM:**

This program is based upon an administratively uncomplex register of farmers and a reserve held in the Central Bank and/or composed of pledges by Donors. The basic elements are the following:

1 Each farmer would be allowed to register a specific number of hectares of grain and coffee production in the register set up specifically for this purpose. The number of hectares open for registry would correspond to the maximum number of hectares farmed by small farmers. Large land holders would not be specifically excluded, but could not register more than the maximum number of hectares permitted. Farmers would sign up at the municipality or some other government office, such as the Ministry of Agriculture. He would state how many hectares he farmed and what he planted on this land. He would provide a sketch map of his farm and would describe the boundaries and the neighbors who border his land. This would permit the statement to be verified either on the ground or by aerial photography.

2 Each farmer would pay an annual registration fee per hectare which would entitle him to participate in the disaster relief program. The fee could be uniform or could vary by crop and zone if there is information that indicates these crops or areas are more exposed to loss or more easily damaged. In principle, each participant would pay a uniform fee per hectare. Each farmer would pass through a photo i d system which provides him with a plastic encased photo and the registry information on the number of hectares and their location. This registry card would be the documentation to be presented when a disaster occurs. A fingerprint would make it more difficult to defraud the system.

3 The program would be mostly a good faith program in which farmers are trusted to declare the correct number of hectares and truthfully describe their location. However, the Ministry of Agriculture or other organizations could selectively verify the farmers' declarations by field visits and by using the local information network to ask about suspicious filings. As catastrophic losses are relatively rare events, the staff could work year around to refine the register and could over several years visit and map all the registrants. Aerial photography is quite inexpensive on a per hectare basis and could eliminate some of the fraudulent entries. Since catastrophic losses are by their nature unpredictable, there would be little incentive to try to "time" the system. Farmers would likely pay into the registry each year if the fee were not onerous and if they believed they would get paid in a bad year. That is, the same independent organization and trustworthy management that would attract savings to a financial institution needs to be in place to achieve large scale voluntary participation.

4 As the purpose of the system is to reactivate the disaster struck area, little concern need be paid to creating an actuarially fair system that will build up adequate reserves over time. However, if luck is on the side of the program, it may build a significant pile of cash that will need protection from the sharp knives of the political system unlikely to leave it "unused." As above, the independence and integrity of management will be a significant factor in protecting the reserve.

5 The "trigger" would be a predefined set of events in a given geographical area. One could, for example, define a drought as a 50% decline in average rainfall during the growing period coupled with a 50% decline in the average area yield.

6 The rainfall would be verified by some "protected" rain gauges in the safest site possible. In fact, for several hundred dollars one can buy "tamperproof" rain gauges that are mounted on telephone poles and connected by telephone line to a microprocessor. To tamper with the gauge, a person first, has to climb the pole and second, has to pour water into the gauge very slowly indeed, as the gauge measures the moisture by the hour. Thus, to tamper with the gauge, someone would have to spend several days on a telephone pole. If the gauges were redundant with gauges placed every 5-10 Km or so, then it would require a fairly large conspiracy of patient pole climbers.

7 In addition, the trigger would be partially composed by some sample cuttings. The Ministry of Agriculture or other groups, even private groups specially contracted, could carry out sample cuttings or pickings to determine the yield in the affected area. When both conditions are met, the system is "triggered."

8 Once triggered, the funds are transferred from the Central Bank or from the accounts of the Donors to commercial banks in the area. Each farmer with a current registry card would go to any local bank, present his card and would receive the payment to which he is entitled according to the details on his registry card. The card would be invalidated by the bank perhaps by cutting it and would be retained and forwarded to the program's administration for auditing purposes.

The system would have a very low administrative cost paid for out of the annual registration fees. It probably could be operated with a few employees that travel from area to area signing up farmers and verifying some of the details of the registry. The rain gauges require only occasional routine maintenance. The payment mechanism would be through commercial banks, thus no claims processing back office would be needed.<sup>14</sup>

The contingent liability of the system and the means of financing the reactivation costs are more problematic. Theoretically, the scheme could lose 100% of the entire amount covered in the first year. Realistically, the available records can be reviewed to try to determine frequency and severity of the drought and floods to determine the "maximum probable loss" and to build a reserve of contingent guarantees around this amount. While this would be no absolute guarantee, preparing to meet the maximum probable loss would meet the criteria of reasonable no prudent financial management.

Meeting the obligation under the program does not necessarily imply that the "maximum possible loss" has to be funded. Indeed, **it would be undesirable to do so, as it is doubtful that the reserve could be kept intact against the numerous and inevitable pressures to use the funds for other pressing purposes.** Instead, the program has to have the means to obtain the required cash.

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<sup>14</sup>The registry would probably appeal to medium and larger sized farmers but would have to be promoted amongst the smaller farmers. One possibility to help stimulate interest in the registry would be to hold annual drawings and give the winners a small tractor or other farm instruments.

Funding could, for example, be P L 480 funds held in the Central Bank, thus sterilized and not impacting the money supply and inflation. Donors could supply guarantees to disburse in the case of a natural disaster. The donors do not disburse cash until a disaster occurs. This is not unlike countries' other contingent liabilities, both for domestic and international obligations. The same is true of international banks. All the multilateral banks have callable capital which is a contingent liability for the member-countries. Both World Bank and the Inter-American Development Bank have discussed expanding this concept and making contingent loans for which the country pay only a small commitment fee to reserve the right to borrow at prenegotiated terms.

Under the loan conditions, Nicaragua would be entitled to borrow when a natural disaster occurs. The same process usually occurs on an **ad hoc** basis with countries suffering large losses rushing off to Washington and Europe to try to find donations and emergency loans. The major difference is that under this system, the beneficiaries are clearly identified and the amount of the indemnities clearly determined. Furthermore, the double trigger mechanism would give international donors confidence that their funds are going to needy and affected small farmers.

The program could begin in a single area on a pilot basis and gradually expand as the reserve builds up both from the registration fees and from donor guarantees. Over time, it could reach a nationwide level as additional guarantees were made available.

### **INSURING AGROINDUSTRIES, GOODS IN PROCESS OR IN TRANSPORT AGAINST VANDALISM AND CIVIL COMMOTION**

In parts of Nicaragua, the agroindustries and their goods are destroyed by elements operating outside the law. These elements, still armed after the end of the civil war, attacked the coffee, livestock, and sugar industries either as a means of demonstrating their political relevance or perhaps as a means of extracting a "war tax" from the owners.

From an insurance point of view, the solution to compensating these losses is quite simple and probably quite easy to implement. The same problem was encountered in El Salvador during the war. USAID asked me to develop an insurance program to cover these losses, in addition to the risk of burning of buses.

The program was quite simple in its structure. A "terrorist" rider was developed which attached to the fire insurance policy (which excluded these losses) in the case of agroindustries' plants and equipment, goods in storage or being processed and to the transport policy in the case of the buses. The owners had to have a fire or transport policy and then bought a very low cost rider to cover the losses caused by politically motivated destruction or civil commotion.

From the point of view of the insured, he simply claimed his losses and was paid, irrespective of whether it was a fire loss or a politically motivated act.

Once the claim was processed and the cause determined, the insurer paid the claim either from his own account in the case of a fire loss or a transport accident or from a special account established by USAID in the Central Bank in the case of a politically motivated loss

The program worked quite well and losses were surprising low. However, the agroindustries reported that they could proceed with normal operations without overmuch fear of suffering losses

There were some cases of fraud, many of which were disallowed by the requirement that internationally recognized loss adjusters be used to process adjustments that exceeded \$10,000. Several cases were suspicious enough that payment was withheld for a substantial time while the claim was investigated and was conditioned upon the insured replacing the damaged goods when it was believed that the insurance was being used as an exit strategy

In Nicaragua, it is difficult to estimate the size of a reserve required for this class of business. My initial impression is that it could be quite small. The problem appears to be declining and may be largely eliminated through the reintegration of the ex-combatants and the increased policing of the area

Since this is a class of business that is characterized by a rather slow build-up of claims, a small reserve of perhaps \$1 million would allow INISER (at present the only insurer) to write a very substantial volume of coverage for these risks. If one were to assume a premium rate of 5 per mil (0.5%--a rather high rate) and a 5 to one premium to reserve ratio, INISER could write \$200 million dollars of coverage against the reserve. International reinsurance usually has a "war exclusion" clause although some "war inclusion" cover is available. It is rather high priced and in this case, probably unnecessary in this case

**ASEGURADORA AGRICOLA NICARAGUENSE  
EN US\$**

AÑO	HECTAR ASEGUR	SUMA TOTAL ASEGURADA (A)	TASA	PRIMA BRUTA (B)	GASTO ADMTVO (C)	INDEM (D)	REASEGUROS		GASTO TOTAL (G) (C+D+E)	GANANCIA O PERDIDA	BALANCE DE RESERVA
							PRIMA (E)	INDEM (F)			
1	\$50 000	\$15 000,000	8%	\$1,200 000	\$150 000	\$360,000	\$0	\$0	\$510 000	\$690 000	\$2 690,000
2	75,000	22,500,000	8%	1,800 000	250 000	540,000	720 000	0	1 510,000	290 000	2,980 000
3	100,000	30,000,000	8%	2,400,000	600,000	720,000	960,000	0	2 280,000	120 000	3,100 000
4	150,000	45 000,000	8%	3,600,000	800 000	1 080,000	1,440,000	0	3 320 000	280,000	3,380,000
5	200,000	60,000,000	8%	4,800,000	1,200,000	9,600,000	1,920,000	4 800,000	12 720 000	(3 120,000)	260 000
<b>TOTAL</b>	<b>\$575,000</b>	<b>\$172,500,000</b>		<b>\$13,800,000</b>	<b>\$3,000,000</b>	<b>\$12,300,000</b>	<b>\$5,040,000</b>	<b>\$4,800,000</b>	<b>\$20,340,000</b>	<b>(\$1,740,000)</b>	<b>\$260,000</b>

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