PUBLIC CROP INSURANCE FOR DEVELOPING COUNTRIES: THE LESSONS FROM THE JAPANESE EXPERIMENT

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Crop Insurance as A Public Policy

In view of the overwhelming impact of agricultural risks on peasant economies, many governments have traditionally adopted various measures, often in an ad hoc manner, to help farmers partially meet the losses due to natural hazards. These measures often take the form of reduction of land rent and taxes, cancellation or postponement of loan repayments, and direct subsidies. There are several disadvantages with this practice. An important one is that farmers cannot expect assistance as a right, but only as a privilege, and as a consequence cannot take these possibilities fully into consideration in determining their courses of action (for example, choice of farming techniques or use of agricultural credit). Certainly, in the case of Japan, tenancy disputes over the rent reduction on the part of landlords during the depression years brought the final pressure on the government leading to the introduction of public crop insurance in 1939 (Yamauchi, p. 14-15). The advantages of all-risk crop insurance over these ad hoc measures on various aspects of the farm economy (innovative cultivating methods, credit, and overall stability) have been discussed in the literature (Bardhan; and Wharton).

An Outline of the Japanese Crop Insurance Scheme

The broad reasons why the Japanese agricultural insurance policies are of major interest are: (1) the comprehensive nature of the operation (all major crops, livestock, fruits and fruit trees, and silkworms and cocoons); (2) the public and compulsory nature of the policies; and (3) the small size of farms (the average size being less than one hectare). These considerations suggest that the Japanese experience may have important implications for crop insurance in developing countries.

The basic organizational units are the Agricultural Mutual Relief Associations, most of which coincide with the administrative area of the local communities (city, town, or village). Once an association is formed, all farmers with a certain minimum size holding are required to be members. Next come the Federations of Agricultural Mutual Relief Associations which have jurisdictions coinciding with the political boundaries of prefectures. All associations within a given prefecture are members of its federation. There are two other organizations, the Agricultural Mutual Relief Reinsurance Special Account and the Agricultural Mutual Relief Fund, both of which operate at national level and deal only with federations and, of course, the national treasury.

The sharing of responsibilities is as follows: the Ministry of Agriculture, using the preceding 20 years of data, calculates the standard premium rate, or, simply, the total premium for each prefecture. Each federation (prefecture) then applies this total premium to the associations on the basis of a risk index facing the association. These risk indices are calculated such that the premiums for high risk areas are scaled down by increasing premiums for low risk areas. For details, see Yamauchi. Notice that the actual rate of premium facing an association is expressed as a certain percentage of the total amount of insurance. It is the association's task to assess the total amount of premium due from each farmer, which requires estimating the total amount of insurance and the maximum amount of indemnity payable. Since 1972, for paddy rice, the insurance value on the crop of the whole farm has been set at 0.9 times the fixed price per koku (150 kilograms) times 80 percent of the normal yield on the farm, less the actual yield on the farm. Thus, the maximum indemnity payable

is 72 percent of the value of the normal yield on the farm. The marketing of rice is government regulated, with the price being fixed each year by the government. Normal yields are set at the prefecture, association, and farm (or plot) levels by the relevant authorities.

The disbursement of indemnities to farmers is also handled by the association. However, the association, being rather limited in its scope to spread risk over space, is only responsible for 10 percent of the total indemnity. The standard premium rate actually consists of three components: a normal rate corresponding to normal damages; an abnormal rate for abnormal damages; and a superabnormal rate for superdamages. The federation attempts to spread the remaining 90 percent of normal damage within the prefecture and any damage in excess of normal is dispersed nationally by the reinsurance account. Of the premium raised in an association, 10 percent is retained and the remainder handed over to the federation, which, in turn, splits it with reinsurance account in the proportion of normal to nonnormal premium rates. Table 1 provides an illustration.

Table 1--Total Paddy Rice Premium Collected and Its Allocation

Year	Standard Premium Rate[1]	Amount Collected	Association Share[2]	Federation Share[2]	Reinsurance Premium[2]
			million yen		
1948	4.928	1,641	164	671	806
	(42.4)		(10.0)	(40.9)	(49.1)
1949	4.928	4,131	413	1,687	2,031
	(42.4)		(10.0)	(40.8)	(49.2)
1950	5.058	4,635	464	1,922	2,249
	(43.0)		(10.0)	(41.5)	(48.5)

Sources: Yamauchi, p. 24; and Rowe, p. 43.

[1] The figures in parentheses denote the percentage of the normal premium rate in the standard rate.

[2] The figures in parentheses are percentages of the amount collected.

Thus, the federations reinsure damages in excess of normal damages with the reinsurance account, thereby attaining the maximum possible dispersion of risks. The associations, if damages are widespread, may find it difficult to pay 10 percent of the indemnities unless they have reserves carried over from previous years. In the event they are not able to pay, they are allowed to prorate the payments of indemnities. However, the federations are not allowed to default. For this purpose, the Agricultural Mutual Relief Fund was set up to facilitate lending and investment activities. A federation can thus borrow the required amount from the fund when necessary. The fund was initially set up with half the capital coming from the general account of the government and the other half obtained as investments on the part of the federations. The reinsurance account has traditionally received transfers from the general account of the government to write off the deficits, and, likewise, in case of excess funds, it transfers them to the general account.

Performance of the Plan

A review of the loss ratios is a useful starting point formalizing the financial

soundness of the plan. Loss ratios are the total amount of indemnity paid divided by the total amount of the premium times 100.

Table 2--Average Premium Rates and Loss Ratios

Year	Paddy Rice		Upland Rice		Wheat and barley	
	Standard Premium	Loss Ratio	Standard Premium	Loss Ratio	Standard Premium	Loss Ratio
1947-54	5.34	142	16.49	171	3.10	279
1955-63	5.94	59	15.15	105	5.13	225
1964-70	5.14	73	15.79	142	9.15	135
1947-70	5.51	91	15.75	104	5.63	217

Source: Constructed from data in Yamauchi, tables 3 and 11.

It is generally agreed that the actuarial basis for insurance was rather poor until about 1954; since then it has become more sound. However, for wheat and barley (except for the 1964-70 period), it appears that the premium rate was too low. It was raised to 12.13 percent during 1968-70, and to 13.75 percent effective 1972.

We also note from table 2 that the premium for paddy rice insurance seems rather high. This has been taken into consideration since 1972, and the rate since has been set at 3.5 percent for the farm unit calculation (3.9 percent on a plot basis). The recent record (especially post-1964) provides evidence for the contention that the Japanese crop insurance programme, after a somewhat long period of experimentation, is following a stable pattern. It still remains to be determined whether the costs are shared fairly by all parties concerned (farmers and government and whether they are too high for other developing countries to implement similar programmes.

Allocation of Costs

The default risk on the part of associations (due to the very limited nature of their liability) is not a major problem. Federations are, however, not allowed to default, and, as a result, their financial solvency depends crucially on the soundness of the actuarial basis of the premium rate determination. Deficits on the part of the reinsurance account are directly borne by the general account of the government, and, at least in the short run, these shortfalls are not a major problem. Over the long run, however, reinsurance premiums must cover indemnities payable by the reinsurance account for smooth functioning of the programme.

In the early days of the plan, all the agencies (associations, federations, and the reinsurance account) were steadily incurring losses. For example, during 1948-50, the average loss ratios were as shown in table 3.

Table 3--Average Loss Ratios, 1948-50

	Paddy	Upland Rice	Wheat and Rice
Associations	129	65	579
Federations	123	80	221
Reinsurance Accounting	135	60	1,003

Source: Rowe, tables 1 and 2; and Goodwin and Kunimi, Table B.

Clearly such a trend (except for upland rice) could not have continued without disrupting the scheme badly. The actuarial basis has changed over time so that overall loss ratios have declined considerably.

Even though the premium rates are actuarially sound, the farmers do not pay the entire amount. As of 1972, the actual rates and the treasury's share were as shown in table 4.

Table 4--Actual Rates and Treasury's Share, 1972

	Total Premium Rate	Treasury's Contribution
	----------Percent----------	
Paddy Rice [1]	3.911 (3.533)	59.1 (58.5)
Upland Rice	18.62	67.8
Wheat and Barley	13.75	67.2

Source: Government of Japan.

[1] The figures in parentheses are the rates applicable on a farm unit calculation. All other figures are on a plot basis.

In 1975, on account of paddy rice, the premium subsidy amounted to 32.5 billion yen.

Another major aspect of the government's contribution is the transfer of funds to cover the deficits in the reinsurance account, shown in table 5.

Table 5--Deficits (-) and Surpluses in the Reinsurance Account

	Cumulative Total for 1948-58	Cumulative Total for 1959-74	Cumulative Total for 1947-74
	----------million yen----------		
Paddy Rice	(-)5,265	42,875	37,610
Upland Rice	496	(-)2,972	(-)2,476
Wheat and Barley	(-)7,526	(-)18,508	(-)26,034
All Crops	(-)12,295	21,395	9,100

Source: Constructed from data in Government of Japan.

Clearly, the positive balance accumulated over 1959-74 has more than made up for the negative balances accumulated over 1947-58. More accurately, it is the strong performance of paddy rice insurance that has kept the reinsurance account solvent. Over the 15 year period (1959-74), in only 4 years were there deficits on the paddy rice account, while 11 occurred for upland rice and 9 for wheat and barley. It is also evident that unless some such risk spreading across crops is attainable, comprehensive agricultural insurance is unlikely to be successful. Finally, the table suggests that direct public responsibility is indispensable, for there ought to be some agency to absorb the initial losses (perhaps for as long as a decade) in the reinsurance account.

Policy Implications for Developing Countries

1. The Japanese scheme shows that a coverage rate of 60 to 70 percent of the value of the normal yield provides a meaningful insurance for the farmer. A somewhat lower figure of 50 percent should perhaps be the starting point, gradually raised to the eventual target.

2. For the major crops in the country, a total premium rate at least as high as in Japan (say 5 to 6 percent of the indemnification-based insurance value, say, every 4 years or so) will be necessary for the long term viability of the plan. This suggests that some mechanism for premium assistance will have to be devised.

3. Taking 1975 figures, the premium subsidy (for paddy rice) of 32.5 billion yen is approximately 1 percent of the value of the average yield. Using an average yield of 90 million koku per year, at 1975 prices, the average value comes to 3,150 billion yen. If the premium subsidy is earmarked as a percentage of agricultural income taxes, the required subsidy comes to approximately 5 percent of the likely tax base. Using one-fifth as a guide for the amount of the tax base (that is, one-fifth of agricultural income is taxable), 3,150 billion yen gives rise to about 630 billion yen of taxable income. Pechman and Kaizuka (p. 340) report a tax base of 32.7 percent for the Japanese individual income tax.

4. One can conclude that for other countries with similar damage rates and implementing similar crop insurance coverages for a crop such as paddy rice in Japan, the required premium subsidy can be roughly taken to require an additional tax of 5 to 6 percent of taxable agricultural income generated by the crop.

5. Even if this additional taxation is considered feasible, two other major aspects remain to be looked into. The first is the problem of obtaining funds to set up organizations similar to the fund and the reinsurance account. The difficulty likely to be faced by the countries like Bangladesh, Pakistan, and India (with much lower growth rather than Japan in the 1950s and 1960s) may prove insurmountable, unless help is forthcoming from organizations such as FAO, ESCAP, and the World Bank.

6. Finally, although risks can usefully be spread at different levels in appropriate proportions (from village to prefecture to nation, as in Japan), the Japanese experience suggests that eventually risks will also have to be spread across crops. This suggests that simultaneous insurance of all major crops is the only viable alternative for meaningful protection of all farmers. The Japanese case indicates that crops like wheat and barley (even with premiums up to 4 times higher than for paddy rice) would have been extremely difficult to insure without cross-subsidization with paddy rice.

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OPENER'S REMARKS--William M. Braithwaite

It might prove useful to examine the four main characteristics of the Japanese scheme to see how they might apply to similar plans in developing countries. The first is the establishment of local community associations to administer the plan. Members of each association are given the right to choose the level of insurance coverage that they want. In this way, they feel that they are involved in the decisionmaking process and thus are more likely to be committed to the plan.

The second is the compulsory nature of the scheme. All farmers above a minimum size must join. This avoids the problem of only very risky farmers taking out insurance, and it permits the government to spread the risk over a broad base to keep premiums at reasonable levels.

The third is the principle of spreading the risk across all major crops. This means that in Japan the more stable paddy rice is used to subsidize the less stable crops like upland rice, wheat, and barley. Without this subsidy, it is doubtful if most farmers could afford to insure high risk crops like wheat and barley.

The fourth is the substantial support from the public purse. The national treasury picked up the deficit during the first decade of the scheme before it became actuarially sound, and the government subsidized insurance premiums by as much as 50 percent. The paper estimates this subsidy alone is equivalent to an additional tax on agricultural income of 3 to 4 percentage points.

I suspect that the Japanese plan could not be transferred to other developing countries without some modifications of these characteristics to take into account the local cultural, social, and economic conditions. The above four characteristics are necessary in some form, but they are perhaps not sufficient conditions for a development plan where the government is trying to introduce a package of new technology to farmers which includes some minimum income guarantee to encourage adoption.

RAPPORTEUR'S REPORT--Wolfgang Wolf

The adaptation of Japan's crop insurance system to developing countries was the main point of the discussion. The financial capacity is still insufficient in many developing countries. This necessitates care in the introduction of a crop insurance programme.

The differences in crop production practices and education of farmers add to the above difficulties, as well as problems of nominating and appointing capable managerial staff, the uniqueness of the Japanese culture, and the costs of managing such an insurance system. Aspects of welfare and productivity were also discussed. The most efficient way to implement a crop insurance system has yet to be found.