Crop Insurance as a Risk Reducing Measure : Issues and Problems

M. LUTFOR RAHMAN
AND
KHANDKER QUDRAT-I-ELAHI

I. Introduction

Like most economic activities, farming involves risk and uncertainty to a great extent. Natural hazards like floods, droughts, diseases, etc., generally affect crop yield seriously in Bangladesh. For this reason, farmers adopt new farming methods (technologies), plant varieties, etc., conservatively. The slower introduction of new agricultural technologies may limit the expansion of agricultural productivity and inhibit overall economic growth in developing countries like ours. To increase agricultural growth, therefore, the burden of risk borne by farmers need to be reduced. Unfortunately, private markets for insuring agricultural business do not exist. Suggestions have been made for governments to undertake crop insurance programme as a part of broad agricultural policy.

However, in analysing the crop insurance problems, theoretical issues related to risk and uncertainty faced by the farmers are hardly explained in proper perspective. This has led to in many cases, the inadequate understanding of the problems of crop insurance policy in a developing country like Bangladesh. This paper is a modest attempt to address the theoretical issues of risk and uncertainty as related to the credit and crop insurance problems of the farmers in Bangladesh. In section II, a short theoretical description of the concept of risk and uncertainty is presented. Risk and credit considerations of small farmers are discussed in section III. A review of the crop insurance programme

The authors are Professor and Assistant Professor of the Department of Agricultural Finance, Bangladesh Agricultural University, Mymensingh, respectively.

in Bangladesh is presented in section IV, while problems and issues for research on crop insurance in Bangladesh is presented in the concluding section.

II. Theoretical Concept of Risk Bearing

A distinction is normally made in the literature between uncertainty and risk. The term uncertainty is usually used in those situations where a probability distribution, or the likelihood of alternative events, such as, annual net cash revenue flows, cannot be estimated due to lack of information. Risk, on the other hand is usually used to refer to those situations where such a probability distribution can be estimated by using either objective or subjective estimation procedures. Because farmers are unlikely to have sufficient data to measure an objective probability distribution, subjective probability distribution is used for evaluating risky investment.

It is believed that most individuals tend to avert risk and risk aversion in turn explains many observed phenomena in the real economic world. Risk-averse behaviour results when the decision maker exhibits diminishing marginal utility for increases in expected wealth. This feature of economic theory implies that the disutility of losses outweighs the utility of gains when gains and losses are of equal magnitude and likelihood. Hence, the risk averter will evaluate a risky alternative at less than its expected monetary value. In fact, the difference between the expected monetary value and risk averter's value is a risk premium or cost of risk bearing required to convert the risky expectation into one that is certain. The greater is the aversion to risk, the higher is the risk premium. However, the level of risk aversion is responsive to changing wealth, experience, age and other relevant factors. It was observed that absolute risk aversion generally decreases as wealth increases (Arrow, 1971).

For an agricultural farm, the choices in production, marketing and finance generate a portfolio comprised of physical and financial assets. According to mean-variance (EV) efficiency criterion, originally proposed by Markowitz (1970), an investor only considers expected values and variances (or standard deviations) or expected returns in choosing his portfolio. An efficient set of portfolios results from investment plans providing

minimum variance for various levels of expected returns. An optimal choice or best combination among the efficient portfolios provides maximum utility.

Let us construct an "efficiency frontier" joining all the possible portfolios that are Pareto-risk-optimal (Fig1). That is, these portfolios provide minimum variance (V) for each possible value of expected return (E). It follows that the decision maker cannot change a portfolio without lowering expected net income or raising risk in one of several possible formulations. Net returns will be maximised if operators in each period are at Q, or as near horizontally to it as can be ensured by an efficient credit and insurance market that guarantees the farms' survival or continued operation even through bad periods.
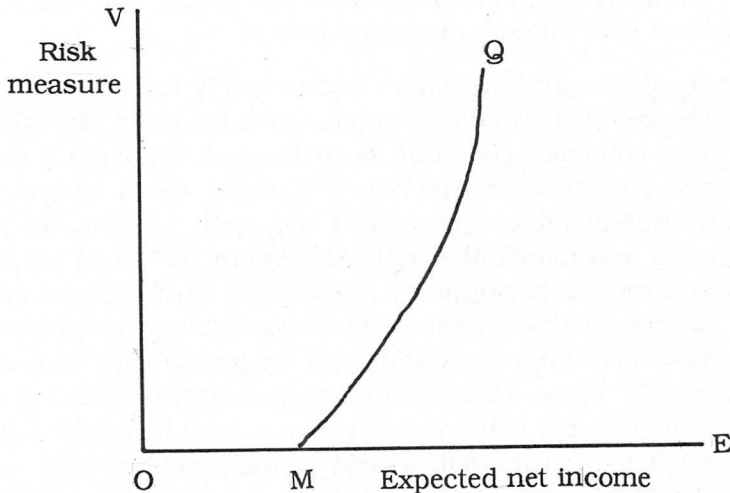

Fig–1

III. Risk and Credit Considerations of Small Farmers

In areas with little technical change and widely fluctuating output, small farmers usually do not demand extra production credit, but operate near M on QM (Lipton, 1979). To uncover the main reason why poor farmers operate near M, we must look "behind the diagram", which, like most risk profit analysis, is restricted to investment decisions. A poor farmer borrows mainly to support consumption needs in bad years or in the slack season, repaying in good years or at post harvest period.

In poor countries, costly and informal consumer credit often deters small farmers from operating near Q. Unlike big farmers, after a bad harvest, they almost always find their troubles, as consumers and as producers at the same time. That is why they default in production credit in order to be a good repayer of consumption credit from non-institutional sources. Further it is profitable to use an institutional loan taken at 12 percent interest to repay a consumption loan borrowed from non-institutional source at 40 percent interest rather than to use that production loan to buy fertilizers offering, say, 20 percent return. Credit thus turns out to be a total problem, and that only when formal and informal sources together, and competitively, meet consumer credit needs will small farmers readily demand and apply production credit. Over all, rural development programmes improving—"welfare cushions"—tend to reduce both absolute risk aversion and the demand for consumption credit, and therefore, propensity of poor farmers to operate near M.

Poor people in rural areas face exceptionally high background risk which extends beyond production, such as, pests, drought or flood, price collapse, etc., and even beyond sudden needs of consumer credit. It covers the risk of diseases which are usually frequent, unpredictable, uninsurable and costly to treat, the risk of pregnancy and many other risks. An improved "social welfare" system can reduce background risk of poor farmers to a great extent. Improvements, especially for large farmers, are achieved less by movement on a static QM than by investments that shift QM eastwards. These diversification of investment portfolios can be achieved through, with credit provision, acquiring productive assets, such as, a tubewell, a field of high yielding rice, etc., (Lipton, 1979). However, it is hard, for small farmers to diversify their farming. As compared with, say 20 acres, it is less attractive to try a new cropping pattern on 25 percent of 2 acres, especially if holdings are fragmented. Well designed crop insurance programme along with credit facilities can largely reduce the risk of the small farmers and can shift the QM eastwards, particularly at lower level, in their case too.

IV. Review of the Crop Insurance Programme in Bangladesh

The incidence of natural hazards is very high in Bangladesh which may frustrate government's efforts to augment agricultural

growth by introducing improved crop varieties. Therefore, a pilot crop insurance scheme was undertaken in 1977. The organization responsible for this programme was the Shadharan Bima Corporation (SBC). The project's main objective was to carry out research for promotion and development of a comprehensive crop insurance programme for Bangladesh (Huq, 1980). After more than ten years of operation, the project is about to die out. The SBC has not done any evaluation of the project as yet. The crop insurance programme of the SBC is quite comprehensive. It provides protection against several natural hazards, e.g., droughts, floods, cyclones, hailstorms, plant diseases and pests attacks. Six crops were brought under the insurance programme namely ; aman, aush, boro, jute, sugarcane and wheat. Premium rates, calculated on the basis of estimated value of each crop per acre, are shown below :

Name of crops	Premium rates of estimated value/acre (%)
Aman	5
Aush	4
Boro	3
Jute	3
Sugarcane	5
Wheat	3

Source : SBC Documents.

There are little variations in premium rates for different crops. For example, boro, jute and wheat have the same premium rates. Similarly, aman and sugarcane have the same premium rates. But these crops face different kinds of hazards and therefore, risks of crop loss may be different. The programme failed to attract farmers to take crop insurance. In 1977 the programme was introduced in two upazilas. By 1981 it was expanded to 56 upazilas. But from 1982 and onwards the geographical coverage declined considerably. In 1986, the programme survived in only six upazilas.

Table 1 : Project Area and Number of Farmers Covered by Insurance

Year	No. of Districts	No. of Upazila	No. of Society	No. of Farmers Insured	Total Acreage Insured
1977	2	2	5	35	27.31
1978	13	26	72	1638	1475.10
1979	14	45	241	1361	1956.66
1980	19	55	325	1997	3245.79
1981	14	56	198	1572	1898.91
1982	15	41	153	1147	1215.62
1983	12	24	92	550	618.70
1984	10	25	120	816	652.16
1985	7	14	150	1283	622.03
1986	6	6	13	74	268.50
1987	12	16	53	230	434.57

Source : SBC Documents.

The number of farmers taking crop insurance increased until 1980 and then it gradually declined (Table 1). In 1980, the number of farmers insured was 1997 but in 1986 it decreased to 74 only. In 1980, the acreage insured was 3245.79 which decreased to 268.50 in 1986. Table 2 shows premiums collected and claims paid during 1977 to 1987. Per acre average premium collected was Tk. 113.18 while average claim paid was Tk. 563.30. In other words, for every taka of premium collected, premium paid was Tk. 4.80. There has not been an estimate of administrative costs of the programme. If the administrative costs are added, then the programme will indeed be very expensive.

Table 2 : Insurance Premiums Collected and Claims Paid During 1977-87.

Year	Premium Collected Per Acre	Claims Paid Per Acre	Claims Paid Per Taka of Premium Collected
1977	115.50	N.A.	N.A
1978	86.80	162.30	1.87
1979	94.60	154.10	1.63
1980	79.90	272.90	3.42
1981	94.20	368.70	3.91
1982	103.50	579.10	5.60
1983	111.50	694.00	6.22
1984	139.60	383.90	2.75
1985	166.50	570.50	3.43
1986	153.10	1557.70	10.17
1987	96.80	890.80	9.20
Average	113.18	563.30	4.80

Note :

N.A. Not Available.

Source : SBC Documents.

V. Conclusions

The previous review of the SBC's crop insurance programme reveals two gloomy pictures, e.g., i) the programme has made little appeal to farmers and ii) the cost of running the programme is unusually high. So, any research on crop insurance in Bangladesh should address these two issues. If the crop insurance programme is not popular to farmers, then the justification for introducing the programme is weak. Therefore, reasons why farmers do not show interest in crop insurance must be found out in the light of discussions in sections II and III. There may be two probable reasons. First, farmers may not be aware of the benefits of the programme. Second, premiums may appear high to farmers. It was mentioned earlier that the premium structure appears unreasonable. Furthermore, the premium rates may be considered high by farmers. Insurance is a game in which only losers benefit. If the probability of being a loser is thinner than being a gainner farmers would be less interested to take insurance.

Therefore, an important area of research is to enquire why farmers have not accepted crop insurance. More specifically, investigations should be made on farmers' awareness of the benefits of the programme and premium structure of different crops. Premium rates for different crops should be fixed on the basis of riskiness of production of those crops. Thus, measurement of risks associated with the production of different crops will create an area for further research. Experience of crop insurance programme shows that it is a costly venture. The main reason is that the amount of insurance claims was several times higher than the amount of premiums collected. Thus, another important area of research is to investigate why insurance claims are so high.

References

Arrow, K.J., *Essays in the Theory of Risk Bearing*, Markham Publishing Co., Chicago, 1971.

Huq, S.Z., "Crop Insurance in Bangladesh", A Paper Presented in the APRACA/NAIA Asian Crop Insurance Seminar held in Tokyo, 1980.

Lipton, M., "Agricultural Risk, Rural Credit and the Inefficiency of Inequality", in *Risk Uncertainty and Agricultural Development*, *Roumasset*, J.A. et al. (eds.), Agricultural Development Council, New York, 1979.

Markowitz, H.M., Portfolio Selection : *Efficient Diversification of Investments*, Second Printing, Yale University Press, New Haven, 1970.

Shadharan Bima Corporation (SBC). Official Documents.