

COMMERCIAL VIABILITY ANALYSIS OF CROP INSURANCE AS MICROINSURANCE

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Crop insurance is one form of micro insurance as it gives an opportunity to obtain a reliable, formal safeguard against adverse events. The objective of the study is to test the commercial viability of crop insurance scheme of PACS in the two blocks of Hooghly district of West Bengal during disaster years and also examine their performance of crop insurance scheme to understand whether farm income stabilised as a result of it or not. Results show that the problem of stabilisation of farm income is not resolved. On the other hand, administrative cost incurred by PACS for providing crop insurance facility is generally high. As cost exceeds revenue in most cases, PACS are in no position to improve their financial performance. Thus for improved financial performance of PACS, there is a need to increase the amount of premium collected so that it becomes viable for them to provide crop insurance facility. The financial non-viability of crop insurance scheme in this study is mainly due to problems of adverse selection, moral hazard, insufficient amount of premium collection and high administrative costs. Increased commercialisation of agriculture affects farmer's income due to price shocks. Therefore there is a need to incorporate market risk in crop insurance scheme.

Key Words: *Microinsurance, Primary Agricultural Credit Societies, crop insurance.*

INTRODUCTION

Agriculture is an inherently risky business. It is subject to a number of random disturbances. These disturbances arise due to random price changes, changes in geological, biological and climatic conditions. In order to cope up with these disturbances, certain strategies and instruments are required. Programmes adopted by government such as relief measures and traditional risk management instruments have been adequately effective in overcoming such shocks. Agricultural productivity and income from farms are often affected by natural disasters. The amount of loss incurred due to unfavourable conditions is on the rise as agriculture became more commercialised. Loss can be minimised by protecting the farmers. Minimising the loss is necessary because it leads to loss of labour, reduced income for the households causing problems of acquiring inputs for the next season and rising default due to irregular repayment. Problems of liquidity lead to dilution of assets created by farmers over past years. The farmers often depend upon informal sources for borrowing which is costly. Farming and farm economy are adversely affected due to indebtedness of farmers which arise due to successive crop failures thus reducing the pace of development through reduced food supplies and raw materials.

Due to various natural and manmade events, farm output and income are at risk and agricultural insurance is an effective means of tackling this risk. Agricultural Insurance is a means of protecting the agriculturist against financial losses due to uncertainties that may arise from named or all unforeseen perils beyond their control (AIC, 2008). Agricultural insurance can help farmers to stabilize their income and avoid losses arising out of natural disasters or low market prices. Crop

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insurance motivates farmers to make more investments in agriculture by spreading crop losses over space and time. Most developed countries like USA and Canada as well as in the European Union crop insurance acts a safety-net. Due to the problem of harvest failure and natural catastrophes small and marginal farmers are affected the most as they are low-income people and do not have alternative sources of income. Hence they should be adequately insured against such perils.

Micro insurance is the “protection of low-income people against specific perils in exchange for regular premium payments proportionate to the likelihood and cost of the risk involved”. Thus crop insurance is one form of micro insurance as it gives an opportunity to obtain a reliable, formal safeguard against adverse events. Micro insurance started because low-income households could not get access to insurance facilities on fair terms. Access by poor households to the insurance sector was limited and informal mechanisms were costly. Government provided some insurance to low-income households but it was not adequate and inefficient and was incurring huge losses. Providing insurance to poor households has problems like moral hazard and adverse selection. Transaction costs are high and contract enforcement is difficult. The amount of loan sanctioned to small and marginal farmers is termed as microcredit due to its small size as microcredit depends on the size of land and scale of finance. The premium which is a fixed percentage of the loan amount is small in case of small and marginal farmers. The sum insured will thus be less because it depends on the amount of crop loan sanctioned. Hence the indemnity will also be less which is dependent on the yield. As the farm size is small for small and marginal farmers therefore the yield is also low. Thus the crop insurance facility provided to small and marginal farmers can be considered as micro insurance.

There are strong interlinkages between micro insurance, microcredit and micro savings. Savings and insurance provide protection against shocks but insurance not only offers a higher degree of protection against losses but also reduces the on-going uncertainty induced by vulnerability to various shocks.

Agricultural Insurance Products

Agricultural insurance products can be classified into three main groups on the basis of determining how claims are calculated. They are classified as:

- Indemnity based agricultural insurance
- Index based agricultural insurance
- Crop revenue insurance.

Indemnity based insurance products determine claim payment based on the actual loss incurred by the policy holder. If an insured event occurs, an assessment of the loss and a determination of the indemnity are made at the level of the insured party. The classification is divided into—named peril and multiple peril agricultural insurance. Named peril (damage based), provides indemnity against adverse events that are explicitly listed in the policy. This has a number of distinctive features:

- The sum insured is agreed during the contract and may be based on production costs, or on the expected crop revenue;
- The loss is determined as a percentage of the damage incurred by the insured party
- The indemnity is calculated as the product of the percentage of the damage and the sum insured;

Multiple perils (yield based) (MPCI) provides insurance against all perils that affect production. Under this type of insurance, the sum insured is defined in terms of the expected yield to the producer. Cover is normally set in the range of 50 percent to 70 percent of the expected yield. The expected

yield is determined on the basis of the actual production or the area in which the producer operates. The sum insured can be based on the future market price of the guaranteed yield or on the amount of the loan if the producer has taken a loan. The calculation of the payout is based on the difference between the actual yield and the guaranteed yield at the agreed price.

Index based agricultural insurance products payout is based on the value of an “index”. The index is a variable that is highly correlated with losses and that cannot be influenced by the insured. Indexes can include rainfall, temperature, regional yield, river levels etc. A threshold is created which is less than the index. The insurer indemnifies the insured party where the average yield is less than the threshold.

For crop revenue insurance, the insurer protects the holder from reduction in yield and also adverse movements in crop prices. The guaranteed yield is determined as a percentage of the producer’s past production, and the guaranteed price can be either the future market price for the crop for the month of harvest or the strike price of a base price option. If the actual yield received by the producer, is less than the guaranteed amount, the insurer will pay the difference.

Approaches to Crop Insurance

There are two approaches to crop insurance-

1. Individual approach - yield loss on individual farms forms the basis for indemnity payment.
2. Homogeneous area approach - a homogeneous crop area is taken as a unit for assessment of yield and payment of indemnity.

In both the cases reliable and dependable data on yield for past 8-10 years are needed for fixing premium on actuarially sound basis. Homogeneous area approach has the advantage of availability of data on yield variations. Agricultural insurance is a specialized nature of insurance. Therefore, insurance companies operating in this market either have committed agribusiness units or outsource the underwriting to agencies that specialize in it. Agricultural insurance is not limited to crop insurance, it also applies to livestock, bloodstock, forestry, aquaculture, and greenhouses. There are two major categories of agricultural insurance: single and multi-peril coverage. Single peril coverage offers protection from several hazards. In India, multi-peril crop insurance programme is being implemented, due to disastrous consequences of nature on agricultural output thus affecting the society, in general, and farmers, in particular. Three main factors have contributed to the growth in agricultural insurance:

- (i) Increase in the value of agricultural production in recent years
- (ii) Increase in value of agricultural assets which has also increased the sensitivity of loss of agricultural value, consequently raising their demand for insurance
- (iii) Development of new markets for agricultural insurance and the increase of public sector support in existing markets.

Evolution of Crop Insurance in India

Crop insurance in India was introduced soon after independence in 1947. A special study to work out modalities of crop insurance was commissioned in 1947-48 following an assurance given by the Ministry of Food and Agriculture to introduce crop and cattle insurance in the country. The first aspect regarding the modalities of crop insurance considered was whether it should be on Individual Approach or Homogenous Area Approach. The ‘individual approach’ seeks to indemnify the farmer to the full extent of the losses and the premium to be paid by him is determined with reference to

his own past yield and loss experience. The 'homogeneous area' would comprise of villages that are homogenous from the point of view of crop production and whose annual variability of crop productivity would be similar. Various agro-climatically homogenous areas are to be treated as units and the individual farmers in those area units would pay the same rate of premium and receive the same benefits, irrespective of differential loss in individual yields. The ministry circulated the scheme for adoption by the state governments but the states did not accept.

In 1965, the Central Government introduced a Crop Insurance Bill and circulated a model scheme of crop insurance on compulsory basis to constituent state governments for their views. The bill provided for the Central Government framing a reinsurance scheme to cover indemnity obligations of the states. However because of very high financial obligations none of the states accepted the scheme. Different experiments on crop insurance on a limited, ad hoc and scattered scale started in 1972-73.

Though, agricultural insurance is largely in the public domain some private efforts especially in weather insurance have also been there for some time. The real challenge is to scale up the distribution and ensure fast claim settlement. India, thus, has a publicly administered crop insurance scheme since 1972. Public crop insurance schemes are available to cultivators as means of reducing the cost associated with crop failure. The schemes, however, suffers from moral hazards and adverse selection and are very costly.

First Ever-Individual Approach Scheme (1972-1978)

In 1972-73, the General Insurance Department of Life Insurance Corporation of India introduced a Crop Insurance Scheme on H-4 cotton. Later in 1972, general insurance business was nationalized by an Act of Parliament, and the General Insurance Corporation of India (GIC) was set up. The new corporation took over the experimental scheme in respect of H-4 cotton in Gujarat. The Scheme was based on "Individual Approach". The scheme continued till 1978-79.

Pilot Crop Insurance Scheme (PCIS) (1979-1984)

Based on the recommendations of Prof. Dandekar, a Pilot Crop Insurance Scheme was introduced by GIC in 1979. The important features of the scheme were:

- The scheme was based on "Area Approach".
- The scheme covered cereals, millets, oilseeds, cotton, potato and gram.
- The scheme was available to loanee farmers only and on voluntary basis.
- The risk was shared between General Insurance Corporation of India and State Governments in the ratio of 2:1.
- The maximum sum insured was 100 per cent of the crop loan, which was later increased to 150 per cent.
- A 50 per cent subsidy was provided for insurance charges payable by small and marginal farmers by the State Government and the Government of India on 50:50 basis.

The PCIS launched in 1979 continued till 1984-85 and was implemented in 13 states.

Comprehensive Crop Insurance Scheme (CCIS) (1985-1999)

On the basis of experience gained from implementation of PCIS a Comprehensive Crop Insurance Scheme (CCIS) was introduced with effect from 1st April 1985 by the Government of

India with the active participation of State Governments. The Scheme was linked to short term crop credit and implemented on homogeneous area basis. Though the scheme was available to all states it was not mandatory. The main features of the scheme were:

- It covered farmers availing crop loans from financial institutions for growing food crops and oilseeds on compulsory basis.
- The premium rates were 2 per cent for cereals and millets and 1 per cent for pulses and oil seeds. Small and marginal farmers were given a subsidy of 50 per cent of the premium payable shared equally by the central and state governments.
- The central and state governments shared the premium and claims in the ratio of 2:1.
- The scheme was optional to state governments.
- The scheme was a multi-agency effort, involving Government of India, State Governments, Banking Institutions and General Insurance Corporation of India.

Experimental Crop Insurance Scheme (ECIS) (1997-1998)

During 1997 a scheme viz. Experimental Crop Insurance scheme was introduced from 1997-98 which was implemented in 14 districts of five states. The scheme was similar to CCIS except that it was meant for all small and marginal farmers with 100 per cent subsidy in premium. The central and state governments shared the premium, subsidy and claims were in 4:1 ratio. The scheme was discontinued after one season due to administrative and financial difficulties.

National Agricultural Insurance Scheme (NAIS)

The National Agricultural Insurance Scheme (NAIS) was introduced from 1999-2000. Agricultural Insurance Company of India Ltd (AIC) which was incorporated in December, 2002, and started operating from April, 2003, took over the implementation of NAIS. This scheme is available to both loanees and non-loanees. It covers all food grains, oilseeds and annual horticultural / commercial crops for which past yield data are available for an adequate number of years. The scheme is operating on the basis of both “area approach”, for widespread calamities, and “individual approach”, for localized calamities such as hailstorm, landslide, cyclone and floods.

The objective of the study is to test the commercial viability of crop insurance scheme of PACS in the two blocks of Hooghly district of West Bengal during disaster years and also examine their performance of crop insurance scheme to understand whether farm income stabilised as a result of it or not

OVERVIEW OF LITERATURE

Risk is uncertainty that affects an individual's welfare. In order to overcome the problem of production risk in agriculture, farmers have adopted alternative practices and strategies for stabilising farm income in the absence of crop insurance. But these strategies rely heavily on government policies and thus the need for crop insurance increases immensely (Walker and Jodha, 1986). Rao et al. (1988) stated that a wealthy farmer is able to bear the risk better and is also capable of spreading it over time. A rich farmer would want higher average yield even at the cost of greater variation on output annually. Binswanger (1980) mentioned that the strategies adopted by the farmers to deal with risk or manage losses are very expensive in arid and semi-arid regions. Hazell (1991) pointed out that proper strategy will have to be chosen for reducing the effects of risk on a farmer and risk management includes alternative strategies. Harwood et al. (1999) stated that in order to reduce risk there is a need to assess trade-off between risk and expected return. Gine, Townsend and Vickery

(2007) argued that weather index insurance is more suitable for farmers. But proponents of index based insurance claim this type of insurance to be transparent, reduces moral hazard and adverse selection problem and facilitates payouts without delay.

Farmers have their own ways to mitigate risk. There are certain risks that are exclusive to agriculture. If the weather is bad, yield falls and the farmers have to face the risk (Singh and Jogi 2008). There are risks related to price which increase the economic cost to the farmer. If the farmer's benefit-cost trade-off favours mitigation, then he will attempt to lower the possibility of adverse effects (Hardaker, Huirne and Anderson 1997; World Bank 2005). Singh (2009) states that crop insurance is very important in India because Indian agriculture is dependent on vagaries of monsoon and other factors over which the farmers have no control. There are large numbers of suicides of farmers in India over the last few years,

There is little evidence to show that crop insurance has had any positive impacts on agricultural lending, agricultural production or farm. Bassoco et al. (1986) and Tsujii (1986) show that social returns compared to cost of crop insurance is negligible in Mexico and Japan. Pomareda (1986) found that the borrowers of ADB in Panama would have been equally beneficial from a small rise in interest rate as the compulsory crop insurance programme. Insurance markets for natural disaster risk are largely missing in developing countries. In developing countries, spatially correlated risk exposure creates a significant challenge since participants in consumption-smoothing mechanisms often come from the same region or even the same village (Anderson, 1976). Barnett (1999) argued that crop insurance are prevalent in developed countries because of large government subsidies which are expensive, inefficient and have worse implications for natural disasters. The major role played by insurance programmes is the indemnification of risk-averse individuals who might be adversely affected by natural probabilistic phenomenon. Ahsan et al. (1982) states that insurance facilitates individuals to undertake risky activities as insurance minimises shifts and risks. Jodha (1981) finds that the credit institutions fail to minimise risk of Indian farmers because loans for consumption purposes are not provided to the farmers affected by drought. Hazell et al. (1986), Pomareda (1986) and Mishra (1996) state that due to crop insurance the farmer is able to repay the debts in case of crop failure and therefore there is lesser risk of becoming defaulters of institutional credit. Bhende (2002) point out that the farm income of small and marginal farmers can be stabilised along with an increase in farm production if the crop insurance programmes is effectively designed and implemented well. Hazell (1992) mentioned that if a farmer is assured of compensation during crop failure, then he may adopt that technology which is uncertain. This will increase value added from agriculture, and income of the farm family. Bhende (2005) found a positive relation between income of farmers and level of risk. Atwood et al. (1996) stated that crop insurance allows producers to deal with higher levels of debt without increase in risk. Mishra (1994) observed that Comprehensive Crop Insurance Scheme (CCIS) increased loan amount per borrower and reduced proportion of non-borrower among small farmers. The financial performance of most of the public crop insurance has been ruinous in both developed and developing countries.

O'Donoghue et al. (2009) found out that farm specialisation increased with the expanded crop insurance. This is because farmers started producing these crops where expected returns were high or due to the fact that demand for crop diversification was reduced due to availability of crop insurance. Investment is discouraged due to climatic risks which retard growth and individuals are trapped in poverty because sudden changes in weather affect progress. Dercon (2005) in different studies show that poor in developing countries move in and out of the state of poverty on a regular basis. Any kind of shock affects poor individuals and the poor are not able to access financial services due to high transaction costs.

METHODOLOGY AND DATA

Secondary data is collected from Hooghly district of West Bengal to test the commercial viability of crop insurance scheme of PACS in the two blocks of Hooghly district of West Bengal during disaster years and also examine their performance of crop insurance scheme. Hooghly District Central Cooperative Bank Ltd. (HDCCB) registered on 29.4.1966 is the premier cooperative institution in Hooghly District catering to the agricultural credit needs of the farmers. This Bank is the highest lending financial institution among all the banks including any nationalized bank in Hooghly. The credit plan for agriculture and allied activities were targeted at Rs. 8343.71 lakhs in 2005-06 and 95.85% was achieved. The cumulative issue of KCC loan till 2005-06 was Rs.7036.17 lakhs and the cumulative number of KCC cards issued till 2005-06 was 89356 (Annual Report of Hooghly District Central Cooperative Bank Ltd.). The role of the Hooghly District Central Cooperative Bank Ltd. (HDCCB) in microfinance is also significant compared to the Cooperative Banks of other districts and has been considered as the role model for many districts and states. Out of the eighteen blocks in Hooghly, only two blocks have been selected for the survey randomly and these two sample blocks are (i) Chinsurah-Mogra and (ii) Tarakeshwar. Both the blocks have tribal based communities with a considerable percentage of people lying below the poverty line. Chinsurah-Mogra has two PACS affiliated to Hooghly DCCB Ltd - Digsui Union Large Sized Primary Cooperative Agricultural Credit Society Ltd. and Talandu Sech 'O' Samabyay Unnayan Samiti Ltd. The former is the oldest. This is also another reason for choosing Chinsurah-Mogra. This society was formed on 5th March 1957 at Digsui catering to the needs of 13 villages – Digsui, Khalsi, Gannegarh, Bagri, Daharchakulai, Mamudpur, Kabirhati, Naksha, Fatehpur, Taragun, Champarui, Aashphal and Rajarambati. Till 1975, this society provided only agricultural credit but since 1976 provisions were also made for other loans like loans for allied activities, pledge loans against 'Kisan Vikas Patra', loan against 'term deposits' etc. The society also has formed four Farmer's Clubs since 1996. These clubs help in production of seeds of paddy, potato, mustard and oilseeds. The club members impart training to the farmers regarding production and preservation of seeds which are provided to the farmer's club by the government. The main crops grown are Aman paddy and potato and some Boro paddy. Talandu Sech 'O' Samabyay Unnayan Samiti Ltd was formed on 26.12.73. It covers two villages – Talandu and Bharatpur. The main objective of this society was to provide agricultural loan and make provisions for irrigational facilities like all other Primary Agricultural Credit Societies till 1995. Since 1996 this society started accepting deposits from public and granting other loans which include loans for allied activities like poultry, animal husbandry, fishery dairy etc. Loans were also provided for purchase of power tiller and setting up of grocery shop. Before the introduction of Kisan Credit Card scheme crop loans were usually short-term loans. But with the introduction of KCC, medium-term crop loans are also provided by this society. Land acts as the collateral for short-term loans and medium-term crop loans. The main crops grown are Aman and Boro paddy and some potato. Term loans are also granted against National Savings Certificate, Kisan Vikas Patra and fixed deposit with the society. Recovery of loans has been to the extent of 90% on an average. The other facilities provided by this PACS are – sale of fertilizer and insecticides, sale of potato seeds and paddy seeds, sale of potato sacks for storing purposes and purchase of paddy from the farmers at the market rate for selling them to the traders thus helping the farmers to market their produce if they themselves are unable to do so. This society had formed one farmer's club on 20.03.03 named "Udayan" which is not effective. In Tarakeshwar there are eighteen PACS out of which, one is chosen and it is known as Vivekananda Samabyay Krishi Unnayan Samiti Ltd. It has the maximum number of savings-linked and credit-linked groups. Incidentally Vivekananda Samabyay Krishi Unnayan Samiti Ltd was awarded for having the best 'Farmer's Club' of West Bengal by NABARD during 2004-05. This society was formed on 17th September 1977. It covers five villages – Kanaria, Mohonbati,

Nacchhipur, Tullyan and Champadanga. Till 1985, the society had the power to disburse agricultural credit only. The different types of loan disbursed by Vivekananda Samabyay Krishi Unnayan Samiti Ltd. were salaried loan, pledge loan and SHG loan along with crop loan. The society also provides other facilities to farmers other than agricultural loan like provision of agricultural inputs to farmers at subsidized rates, production of seeds (Aman paddy and potato) and providing them to farmers at minimum rates, testing of soil, transport facilities at subsidized rate to farmers to transfer the agricultural product to the market, production of bio fertilizers and vermi compost and consultancy services to farmers regarding purchase of seeds. The society also has formed two farmer's club since 2002. Both the farmer's clubs are registered under this society. The farmer's club provides assistance to the farmers regarding buying of seeds. The rate of recovery varied between 80% and 90% for all the three PACS in the financial year ended in 2004.

As the basic objective of this study is to test the commercial viability of crop insurance scheme by PACS during disaster years, secondary data on average administrative cost per insurance contract, average indemnities paid on average premiums collected on an insurance scheme were obtained for the disaster year of the respective PACS. In order to calculate the indemnity, data on guaranteed yield or threshold yield, actual yield and sum insured of the farmers were collected from the respective PACS for the time periods 2004-05 to 2010-2011. For examining the performance of crop insurance of these PACS data on areas covered, number of farmers covered, sum insured, premium collected, claims paid, sum assured as percentage of value of crop output, guaranteed yield and actual yield were also collected for the same time periods. The time periods considered are 2004-05, 2007-08 and 2010-11.¹

Operation of Crop Insurance Scheme by PACS in Hooghly

As the major role of Primary Agricultural Credit Societies is to cater to the needs of the agriculture sector and provide credit facilities to the members of individual liability loan contract system, provision of crop insurance scheme is also an added function of PACS. All KCC loanee members can avail of this facility. Like any other insurance scheme, a certain amount is collected as premium from the loanee members. The premium is a fixed percentage which is deducted from the loan amount. It can also be paid in cash directly by the members. The premium rate is fixed under National Agricultural Insurance Scheme. The rate of premium varies from crop to crop. It also changes from time to time. The current rate of premium is 2.25% for Aman paddy, 2.5% for Boro paddy and 4.85% for potato. The premium is collected by the respective PACS and transferred to their accounts with Hooghly District Central Cooperative Bank Ltd. All farmers including sharecroppers and tenant farmers growing notified crops in notified areas are eligible for coverage under the scheme. The scheme operates on the basis of area approach i.e., defined areas (unit of insurance) for each notified crop for widespread calamities. The unit area of insurance is a block. The assessment of loss is estimated through Crop Cutting Experiments (CCEs) conducted by the state administration. The District Revenue administration assists implementing agency in assessing the extent of loss. In case of loanee farmers the sum insured would be at least equal to the amount of crop loan advanced (scale of finance plus insurance charges). The sum insured may extend to the value of the threshold yield of the insured crop at the option of the insured farmer. The state government plans and conducts the requisite number of Crop Cutting Experiments (CCEs) for all notified crops in the notified insurance units in order to assess the crop yield and maintain a single series of CCEs and resultant yield estimates, both for crop production estimates and crop insurance. A Technical Advisory Committee (TAC) comprising of representatives from NSSO, Ministry of

Agriculture (GOI) and Implementing Agency is constituted to decide the sample size of CCEs and all other technical matters. If the Actual Yield (AY) per hectare of the insured crop for the defined area on the basis of requisite number of CCEs in the insured season falls short of the specified TY, all the insured farmers growing that crop in the defined area are deemed to have suffered shortfall in yield (SY). The scheme seeks to provide coverage against such contingency. Indemnity shall be calculated as per the following formula:

$$\text{Indemnity} = (\text{SY} / \text{TY}) * [\text{Sum Insured for the Farmer}]$$

where, $\text{SY} = \text{TY} - \text{AY}$ for the defined area

Once the yield data is received from the respective blocks of the district as per the prescribed cut-off dates, claims are worked out and settled by the implementing agency. The claim cheque along with claim particulars is released to the District Central Cooperative Bank Ltd. Primary Agricultural Credit Societies at the grass-root level; in turn credit the accounts of the individual farmers. There is delay in compensation by six months on an average. Indemnity-based agriculture insurance is followed in the two blocks of Hooghly under study. No microinsurance facility is provided to members of joint liability loan contract system in Hooghly.

Viability of Crop Insurance Scheme in Hooghly

In order to test the commercial viability of crop insurance scheme in disaster risk areas, the theoretical model of this study is estimated adopting a simple analytical model used by Hazell ((1992). According to the model, the premium collected on an insurance scheme must exceed average payouts in order to ensure the viability of the insurance contract. The average payout is the summation of both administrative costs per insurance contract and indemnities. Following Hazell (1992), the condition for a viable and sustainable insurance contract is of the following form:

$$A+I/P < 1$$

Where A= average administrative costs per insurance contract

I= average indemnities paid

P= average premiums paid.

The ratio I/P measure the average return to farmer's own investment in the insurance. The term 'indemnity' refers to the compensation sum that insurers make to the holder of the insurance contract upon post assessment of crop damage due to an officially acknowledged natural disaster.

The time span chosen for testing the commercial viability of crop insurance scheme is 2004-05 to 2010-11. As the primary data analysis is done for two time periods 2004(t^{th}) and 2008 ($(t+1)^{\text{th}}$), hence these two time periods are included. The reason to include 2010-11 is to check the viability of crop insurance scheme in recent times with the same time interval that existed between t^{th} and $(t+1)^{\text{th}}$ period. The commercial viability of crop insurance scheme is tested for those years when disaster event strikes.

Table 1: Commercial Viability of Crop Insurance Scheme in Digsui Union Large Sized Primary Agricultural Credit Society.

COMPONENTS	YEARS OF DISASTER	
	2006-07	2008-09
Crop	Potato	Potato
No. of Farmers Covered	51	65
Average Administrative Cost per Insurance (Rs. Lakhs)	0.04	0.03
Average Premium Paid (Rs. Lakhs)	0.004	0.002
Average Indemnities Paid (Rs. Lakhs)	0.08	0.06
A+I	0.12	0.09

Source: Data collected from PACS and calculated by the author

Both the PACS in Chinsurah-Mogra block experienced crop failure due to the disaster event during 2004-2011. For Digsui Union Large Sized Primary Agricultural Credit Society, there were two years of disaster -2006-07 and 2008-09. Both the years faced losses with respect to potato. For calculating administrative cost for insurance, the components included are salary paid to staff directly related to KCC loan facilities, salary paid to other staff, net meeting expenses for KCC loan, TA bill, rent, rates and taxes, electricity, printing, stationery and others and depreciation. 20% of the salary paid to other staff is accounted for in this case because there are other staff members who do not at all cater to the needs of KCC loan such as the SHG coordinator, staff members dealing with other activities of PACS. So, income of such members should not be included for estimating viability crop insurance scheme. For rent, rates and taxes and electricity, printing, stationery and others and depreciation, 70% of the total expenses are included because the main objective of PACS is to cater to the needs of the agricultural and allied activities. These percentages have been suggested by the officials of respective PACS. Similar was the case with Talandu Sech 'O' Syamabyay Samiti Ltd. They also experienced two years of crop failure for potato. In addition, this PACS also faced losses during 2007-08 with respect to Boro paddy. In Tarakeshwar, Vivekanada Samabyay Krishi Unnyayan Samiti Ltd. experienced one year of crop failure for potato during 2008-09.

Table 2 - Commercial Viability of Crop Insurance Scheme in Talandu Sech 'O' Sambayay Samiti Limited.

COMPONENTS	YEARS OF DISASTER		
	2006-07	2007-08	2008-09
Crop	Potato	Paddy (Boro)	Potato
No. of Farmers Covered	30	45	45
Average Administrative Cost per Insurance (Rs. Lakhs)	0.04	0.03	0.06
Average Premium Paid (Rs. Lakhs)	0.002	0.005	0.004
Average Indemnities Paid (Rs. Lakhs)	0.03	0.007	0.02
A+I	0.002	0.036	0.08

Source: Data collected from PACS and calculated by the author

Tables 1, 2 and 3 depict the commercial viability of crop insurance scheme in Digsui Union Large Sized Primary Agricultural Credit Society, Talandu Sech 'O' Syamabyay Samiti Limited and Vivekananda Samabyay Krishi Unnyayan Samiti Limited respectively. All components for greater than tth period have been converted into constant price considering 2004-05 as the base year on the basis of consumer's price index of the agricultural labourers of West Bengal.

Thus from the above three tables it is clear that the crop insurance contract is not viable for the three PACS under study during years of disaster. The main reason for non-viability of crop insurance is lower amount of premium received from farmers. The amount of premium paid by a farmer depends on the loan amount and is a fixed percentage of loans granted. Amount of loan depends on size of land. Most members availing of crop insurance facilities in this study are small and marginal farmers and therefore the size of land owned by them is also small. As a result the amount of loan granted is less and the premium paid is also low.

Table 3 - Commercial Viability of Crop Insurance Scheme in Vivekananda Samabyay Krishi Unnyayan Samiti Limited.

COMPONENTS	YEAR OF DISASTER
	2008-09
Crop	Potato
No. of Farmers Covered	440
Average Administrative Cost per Insurance (Rs. Lakhs)	0.02
Average Premium Paid (Rs. Lakhs)	0.02
Average Indemnities Paid (Rs. Lakhs)	0.06
A+I	0.08

Source: Data collected from PACS and calculated by the author

On the other hand the indemnity paid to the farmers is high which is calculated on the basis of loss due to crop failure. The rate of premium is also low and cannot be raised much because the farm income is very low. Hence farmers are not willing to pay high premiums because the claims are received only during years of disaster. When there is no disaster, the amount paid as premiums apparently seems to be a loss to the poor farmer household as there is no sum assured.

Table 4 - Financial Performance of Crop Insurance Scheme for Digsui Union Large Sized Primary Agricultural Credit Society

Paticulars	2004-2005	2007-2008	2010-2011
Area Covered (Acres)	485	542	570
No. of Farmers Covered	301	337	354
Sum Insured (Rs. Lakhs)	23.35	21.68	23.35
Sum Assured (Rs. Lakhs)	Nil	Nil	Nil
Premium Collected (Rs. Lakhs)	0.39	0.48	0.73
Claims Paid (Rs. Lakhs)	Nil	2.05	0.49
Claims Ratio	N.A	4.27	0.58
Premium/ Sum Insured (%)	1.67%	2.21%	3.13%
Claims/ Sum Insured (%)	N.A	9.5%	1.79%

Source: Data collected from PACS and calculated by author

Financial Performance of Crop Insurance Schemes in Hooghly

For analysing financial performance of crop insurance scheme, it is important to consider the area covered, number of farmers covered, sum insured, premiums collected and claims paid. These components are used to understand and analyse the financial performance of different PACS in Hooghly as suggested by the officials of PACS. The sum insured depend upon the areas covered and the number of farmers covered. The premium collected depends upon the number of farmers availing of crop insurance facility and the size of land owned by them. The rate of premium is also an important factor in determining the amount of premium. In order to calculate claims, the size of land is the determining factor. The actual average yield / hectare for the defined area is determined on the basis of Crop Cutting Experiments (CCEs). If the actual yield in CCEs of an insured crop for the defined area falls short of the specified guaranteed yield or threshold yield, all the insured farmers growing that crop in the area are entitled for claims. The claims are calculated using the formula:

$$\frac{(\text{Guaranteed Yield} - \text{Actual Yield}) * \text{Sum Insured of the farmer}}{(\text{Guaranteed Yield})}$$

The claims are paid to the Primary Agricultural Credit Societies via Hooghly District Central Cooperative Bank Limited who in turn pay the claims to the loanee farmers. The credit institution (here PACS) would adjust the amount against the crop loan and pay the residual amount, if any, to the farmer. Area yield insurance is practically all-risk insurance. However, there are delays in compensation payments. The financial performances of crop insurance scheme for the three PACS under study are given in tables 4, 5 and 6 respectively. All components for greater than tth period have been converted into constant price considering 2004-05 as the base year on the basis of consumer's price index of the agricultural labourers of West Bengal.

Table 5 - Financial Performance of Crop Insurance Scheme for Talandu Sech 'O' Samabyay Samiti Limited.

Paticulars	2004-2005	2007-2008	2010-2011
Area Covered (Acres)	168	185	194
No. of Farmers Covered	90	127	92
Sum Insured (Rs. Lakhs)	3.19	5.32	5.87
Sum Assured (Rs. Lakhs)	Nil	Nil	Nil
Premium Collected (Rs. Lakhs)	0.08	0.14	0.22
Claims Paid (Rs. Lakhs)	Nil	0.49	0.37
Claims Ratio	N.A	3.5	1.95
Premium/ Sum Insured (%)	2.5%	2.63%	3.24%
Claims/ Sum Insured (%)	N.A	9.2%	6.3%

Source: Data collected from PACS and calculated by author

N.A: Not Applicable

From the above three tables it is clear that the total premium collected by all the three PACS increased over time which was due to the change in the premium rate. As it is already seen from tables 1, 2 and 3 that the crop insurance scheme is not viable for the three PACS under study, therefore it

can be concluded that the financial performance of PACS did not improve. Even though there is no sum assured yet the PACS are not at any advantage. As there is no sum assured against the premium paid, small and marginal farmers consider payment of premium to be expensive and thus have a tendency to avoid availing of crop insurance scheme. None of the PACS derived any advantage when it came to overall loss ratio denoted by A+I/P. This indicates that crop insurance programme needs to be designed keeping in mind the requirements of PACS as well. As the coverage of crop insurance facility is restricted to loanee farmers only the number of farmers covered is small and thus premium collected is also less. Thus the problem of adverse selection by non-loanee farmers is not addressed. The problem of moral hazard is also not eliminated because the 'area approach' adopted by the PACS fails to provide incentives to the farmers. Delay in compensation payment also discourages farmers from availing of crop insurance facility. The crop insurance facility covers only production risk but does not cover market risks and therefore there is no minimum guaranteed income for farmers on account of market risks which discourages small and marginal farmers to paying premiums. Thus problem of stabilisation of farm income is not resolved. On the other hand, administrative cost incurred by PACS for providing crop insurance facility is generally high. As cost exceeds revenue in most cases, PACS are in no position to improve their financial performance. Thus for improved financial performance of PACS, there is a need to increase the amount of premium collected so that it becomes viable for them to provide crop insurance facility.

**Table 6: Financial Performance of Crop Insurance Scheme for Vivekananda Samabyay
Krishi Unnayan Samiti Limited.**

Particulars	2004-2005	2007-2008	2010-2011
Area Covered (Acres)	200	284.33	151
No. of Farmers Covered	416	426	539
Sum Insured (Rs. Lakhs)	35.65	43.08	54.13
Sum Assured (Rs. Lakhs)	Nil	Nil	Nil
Premium Collected (Rs. Lakhs)	5.7	7.1	9.2
Claims Paid (Rs. Lakhs)	Nil	Nil	Nil
Claims Ratio	N.A	N.A	N.A
Premium/ Sum Insured (%)	15.9%	16.48%	16.9%
Claims/ Sum Insured (%)	N.A	N.A	N.A

Source: Data collected from PACS and calculated by author

CONCLUSION AND SUGGESTIONS

In order to stabilize incomes, prevent asset depletion, and to enhance competitiveness both policymakers and farmers realise the need for agriculture insurance. Despite various schemes launched from time to time in the country agriculture insurance has served very limited purpose. The coverage in terms of area, number of farmers and value of agricultural output is very small, payment of indemnity based on area approach miss affected farmers outside the compensated area, and most of the schemes are not viable. The financial non-viability of crop insurance scheme in this study is mainly due to problems of adverse selection, moral hazard, insufficient amount of premium collection and high administrative costs. With increased commercialisation of agriculture price fluctuations have become highly significant in affecting farmer's income. Therefore there is a

need to incorporate market risk in crop insurance scheme.

For viability of crop insurance scheme and stabilisation of farm income, the following suggestions are made:

1. Increase the coverage of crop insurance scheme to non-loanee farmers as well so as to increase the amount of premium collected.
2. Different premium rates should be charged for different categories of farmers so that small and marginal farmers are encouraged to include themselves in crop insurance coverage. This will also increase the amount of premium collected by PACS and improve their financial performance.
3. Promote public-private participation in agricultural insurance more effectively to reduce burden of government and brings skill, expertise and innovation into the market, thereby improving financial conditions of PACS and also enhancing quick settlement of claims.
4. Insurance coverage should be provided for market risk which could be minimum support prices or market based price from the past to guarantee price to the farmers to stabilise their farm income.
5. Effective monitoring and good governance is required for the success of the crop insurance scheme.
6. The microinsurance scheme should also be extended to members of self-help groups to improve the financial performance of PACS.

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