

Impact of Crop Insurance on Area and Production: A Balanced Panel Model Analysis in the Hooghly District of West Bengal

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ABSTRACT: This article examines the impact of three important parameters such as insurance participation (INSP), total sum insured (TSI) and total premium collected (TPC) on total area under cultivation and total production for Aman Paddy, Boro Paddy and Potato respectively in selected district Hooghly, West Bengal. The balance panel model has been used to justify the above argument. We have collected the requisite data from District Statistical Hand Books, Economic Review of West Bengal and from the Nodal Office of National Agriculture Insurance Company of India Limited, Kolkata. Our empirical finding is that both the total sum insured (TSI) and total premium collected are incentive to increase the area of these crops. The insurance participation (INSP) and total sum insured (TSI) both assist to increase the production of all crops. But the influence of total premium collected (TPC) which is different, just for Aman Paddy is non-cooperative to increase the production. We have observed an adverse significant effect of insurance participation on total area under cultivation for all crops.

JEL Classification: C13, C22, Q14

Keywords: balance panel model, insurance participation, total premium collected, total sum-insured.

I. INTRODUCTION

Crop insurance is the foremost device of livelihood security to the farmers. We know that a prime issue in agricultural economics is the design of scheme that offers insurance against risk. At initial stage of decision regarding implementation of crop insurance, Dhandaker (1976, 1985) had recommended that due to poor socio-economic condition of rural people the individual yield crop insurance scheme is inappropriate in agriculture. In that position, he suggested that the area yield crop insurance technique is suitable which reduce the problems of moral hazard, adverse selection and administrative cost.

The government had introduced the Comprehensive Crop Insurance Scheme (CCIS) on 1st April 1985 with help of General Insurance Corporation (GIC) of India in alliance with state governments (as co-insurer in the ratio of 2:1). It includes only loanee farmers. Being a policy maker, further the government implemented the National Agricultural Insurance Scheme (NAIS) from Rabi 1999-2000 to bring into the umbrella of safety net that is under crop insurance simultaneously both loanee and non-loanee for providing financial support, technical support and stabilizing the income of farmers. In between the government continues his effort to implement various schemes on pilot basis such as seed crop insurance scheme, Firm Income Insurance Scheme (FIIS), Weather Based Crop Insurance Scheme (WBCIS) and Coconut Palm Insurance Scheme (CPIS) in West Bengal along with some southern states of the country. But in contrast with current agricultural scenario, the government accepts the NAIS for protecting themselves from crop loss due to natural disasters.

Notable theoretical and empirical studies pointed that in the development countries where agriculture is the main source of living then to give protection to the all types of farmers from risk the area yield crop insurance scheme is logically better than the other schemes (Dandekar (1976, 1985), Ahsan et al. (1982), Miranda (1991), Wang, et al. (1998), Kalavakonda and Mahul (2005)). Besides, few outstanding studies remarked that if the insurance schemes run by public and private risk sharing mechanism it will be a better way of financial support to the farmers at the time of crop failure (Sinha (2004), Veeramani, et al. (2005)).

As per information of the Agriculture Insurance Company of India Limited from Kolkata Office, ninety two percent (92%) people directly depend on the agriculture. Further out of total insured farmers ninety eight percent (98%) belong to the category of small and marginal farmers and agriculture is their livelihood. The Government of West Bengal gives special attention on the crop insurance scheme from Rabi Season 2000-01.

This paper studies the impact of insurance participation, total sum insured and total premium collected on both total area and production for rainy season paddy; Aman Rice, winter paddy that is Boro Rice and winter commercial crop that is Potato respectively during the period 2002 to 2009 in Hooghly district, West Bengal. The secondary data have been collected from District Statistical Hand Books, Economic Review of West Bengal and from the Nodal Office of National Agriculture Insurance Company of India Limited at Kolkata.

II. METHODOLOGY

The balance panel model has been considered to study the magnitude of insurance participation (INSP), total sum insured (TSI) and total premium collected (TPC) on total area (TA) under cultivation and total production (TPR) of selected crops during the period 2002 to 2009. We have applied the ordinary least square (OLS) technique to estimate the parameters of the model.

The equation is

$$\ln(y_{it}) = \pi_1 + \pi_2 \ln(x_{2it}) + \pi_3 \ln(x_{3it}) + \pi_4 \ln(x_{4it}) + \varepsilon_{it} \quad (1)$$

$$E(\varepsilon_{it}) \square N(0, \sigma^2)$$

where *i* stands for the *i*th cross-sectional unit and *t* for the *t*th time period.

III. EMPIRICAL RESULTS AND DISCUSSION

The insurance participation which is the ratio of insured area to total area under cultivation is a key to decide to take risky steps in agriculture by a farmer. If it is fluctuated all other important parameters such as insured area, number of insured farmers, total amount of loan taken by farmers that is sum-insured and collection of total premium are related to crop insurance also will be vary. These factors would support to increase both the production and total arable land of the crops.

Table-1. Balanced Panel Regression Result of Area and Output on Insurance Participation in Hooghly District

Method: Panel Least Squares; Sample: 2002-2009; Periods included: 8							
Aman Rice: Total panel (balanced) observations: 128							
Dept.Var	E.V.	Coef.	S.E.	t-Stat.	R ² (\bar{R}^2)	F-stat.	D-W. d-stat.
log(TA)	log(INSP)	-0.823*	0.047	-17.668	0.77 (0.76)	135.982*	1.982
	log (TSI)	0.764*	0.082	9.296			
	log (TPC)	0.319*	0.075	4.264			
	Const.	-4.753*	0.784	-6.061			
log(TPR)	log (INSP)	0.869*	0.060	14.392	0.71 (0.70)	100.032*	1.904
	log(TSI)	0.851*	0.103	8.269			
	log (TPC)	0.018	0.093	0.191			
	Const.	-3.636*	1.010	-3.601			
Boro Rice: Total panel (balanced) observations: 120							
log(TA)	log (INSP)	-0.937*	0.023	-41.003	0.94 (0.94)	897.494*	1.807
	log (TSI)	0.868*	0.024	36.371			
	log (TPC)	0.219*	0.033	6.680			
	Const.	-6.693*	0.413	-16.213			
log(TPR)	log (INSP)	0.922*	0.036	25.935	0.87 (0.87)	404.762*	1.947
	log (TSI)	0.985*	0.037	26.535			
	log (TPC)	0.481*	0.072	6.672			
	Const.	-5.808*	0.642	-9.044			
Commercial Crop Potato: Total panel (balanced) observations: 128							
log(TA)	log (INSP)	-0.912*	0.044	-20.841	0.92 (0.92)	493.780*	2.393
	log (TSI)	1.216*	0.059	20.636			
	log (TPC)	0.331*	0.054	6.102			
	Const.	-8.503*	0.505	-16.850			
log(TPR)	log (INSP)	0.798*	0.148	5.393	0.49 (0.47)	39.225*	2.185
	log (TSI)	1.696*	0.199	8.511			
	log (TPC)	0.919*	0.184	5.004			
	Const.	-4.137	1.707	-2.423			

Source: Author's own computation based on secondary data on insurance participation in agriculture in the district of Hooghly, West Bengal

* stands for significant at 1% level of significance; ** stands for significant at 5% level of significance; *** stands for significant at 10% level of significance

INSP=Insurance Participation; TSI=Total Sum-Insured; TPC=Total Premium Collected; TA=Total Area; TPR=Total Production

Dept. Var. = Dependent Variable; E.V. = Explanatory Variable; Coef. =Coefficient; S.E. =Standard Error; t-stat. =t-statistics; F-stat. =F-statistics; D-W. d-stat. =Durbin-Watson d-statistic, Const.=Constant

Data Sources: (i) Agriculture Insurance Company of India Limited, Om Tower, 5th Floor, 32. Chowringhee Road, Kolkata-700 071; (ii) Hooghly District Central Co-operative Bank Ltd., Netaji Subhas Road, Chisurah, Hooghly-712 101.

Our empirical results have been represented in the “table-1”. It is noticed that the insurance participation is significantly related with the total area under cultivation but the relation is adverse. Because insured area is increased due to crop insurance but total area under cultivation may or may not be increased. On the other hand, the area under cultivation is significantly linked with both total sum-insured and total premium collected for all crops. Our empirical result also shows that the magnitude of total production is directly influenced by all explanatory variables of the model. As per general rule of insurers the amount loan taken by farmers decreases due to increase in the premium rate. But at the time of collection of data we have observed least variation of premium rate. So we state that the amount of premium collected is increased due to increase in the collected loan by insured farmers. Therefore, the insured area as well as insurance participation are increased which also help to increase the production of the crops. Thus, the amount of total premium collected supports to increase total area in addition to production.

IV. CONCLUSIONS

In this study, we have analyzed the impact of insurance participation, total sum-insured and total premium collected on area and production of Aman Rice, Boro Rice and Potato during insurance period 2002 to 2009. Here the balance panel model is considered for empirical analysis and is estimated by ordinary least square technique.

The empirical results indicates that the insurance participation insists the farmers to take care to increase the output of our study crops such as Aman Paddy, Boro Paddy and Potato but it fails to increase the total area under cultivation. It also suggests that the total sum-insured and premium collection both are fit to increase both the area and production of our three selected crops.

Thus the crop insurance is a medium to enrich the risk bearing capacity, to increase the allocation of resources, to proper utilization of land and to provide livelihood security of farmers.

It is also noted that various agricultural insurance schemes have been introduced to protect the farmers from crop failure. But the case of suicide has been increased day by day all over the country. The main reason is that the bureaucrats in the agriculture ministry have no clear understanding of the problems of our farmers. They continue with their insurance experiments-sometimes for specific crops, sometimes for stable farm incomes, sometimes for specific areas.

Further research should incorporate all other crops under insurance scheme to explain the effect of crop insurance participation on livelihood security of small and marginal farmers.

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