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Impact of Weather Based Crop Insurance Scheme on Insured and Uninsured Chilli Cultivators in Guntur District of Andhra Pradesh.

K P Sravana Varalakshmi, G Raghunadha reddy , D V S Rao and V Srinivasa Rao
College of Agricultural Economics, Agricultural College, Bapatla – 522 101, Andhra Pradesh

ABSTRACT

The input-output coefficients were generated with personal surveys from 60 insured and 60 uninsured chilli farmers from six villages of three mandals in Guntur district, during 2013-14. The Cobb-Douglass production function was found to be better fit in the present study. The farm size, value of assets and holding of insurance policy were found significant. The sum of elasticities of production were observed to be 2.001, 1.238 and 1.488 for insured, uninsured and overall group indicating increasing returns to scale respectively. The sign of the coefficient obtained in this analysis is positive, thereby showing that the insured farmers were more efficient in the bundle of resource use than the uninsured farmers.

Key words : Dummy variable, Insured, Resource Use Efficiency, Returns to scale, Uninsured farmers.

Chilli is one of the important cash crops being grown in Guntur district of Andhra Pradesh. In the recent year's area, production and productivity of the crop are very impressive indicating the chilli growing is a viable enterprise for the farming community in the district. Chilli is grown in wide area of 63499 ha with a production of 322 MT (2012-13), and the extent of area allotted by the farmers has not been varied over the last two decades. The chilli crop is highly sensitive to weather conditions, pests and diseases. Inadequate and excessive rains during planting and harvesting periods result in severe quantitative and qualitative losses. Therefore it can be expected that farmers would be interested in insuring the chilli crop. Chilli crop, apart from being sensitive to weather hazards, it requires very heavy expenditure during the production period and the farmer is not assured of good quality and disease free crop which is essential for obtaining reasonable yields sufficient to recover expenses. Therefore insurance is considered to be important for this crop.

Andhra Pradesh is one of the leading states in implementing weather based crop insurance schemes in the country. WBCIS had started from *kharif* 2009 and about 16,500 chilli cultivators in Guntur district have received the first ever insurance claim of 17.34 crores through the scheme. In this context, an economic assessment of WBCIS which is being implemented in the district since five years for red chillies assumes importance. Hence present study was conducted to know the impact of the weather based crop insurance scheme between insured and uninsured chilli farmers in terms of their resource use and gross income generated.

MATERIAL AND METHODS

The present study was carried out in Guntur district of Andhra Pradesh state during 2013-14. The input-output coefficients were generated with personal surveys of insured and uninsured sample farmers selected from six villages of three mandals in this district. From each selected village, 10 insured and 10 uninsured farmers were selected thus, 60 insured and 60 uninsured farmers were selected for the study.

Production Function Analysis

Cobb-Douglas production function was used to study.

$$Y = a\ X_i^{bi}$$

Where, 'Xi' is the variable resource measure,
'Y' is the output,
'a' is a constant and
'bi' estimates the extent of relationship between X_i and Y When, Xi is at different magnitudes.

$$\ln Y = \ln a + b_1 \ln X_1 + b_2 \ln X_2 + b_3 \ln X_3 + b_4 \ln X_4 + b_5 \ln X_5 + b_6 \ln X_6 + b_7 \ln X_7 + b_8 \ln X_8 + b_9 \ln X_9 + u_i$$

Where,
Y= Gross income of chilli, (Rs. /ha)
a = Intercept
X_1 = Farm size (ha)
X_2 = Value of planting materials, (Rs. /ha)
X_3 = Cost of labour (human+ bullock), (Rs. /ha)
X_4 = Cost of fertilizers, (Rs. /ha)
X_5 = Cost of plant protection chemicals, (Rs. /ha)
X_6 = value of farm assets (Rs. /ha)
X_7 = premium paid (Rs. /ha)
X_8 = compensation received (Rs. /ha)
X_9 = holding of insurance policy (if yes=1, or no=0)
b*1* ———— b*9* are the parameters (coefficients) to be estimated, that respectively measured the relationship between those inputs and output in the production process,
u is the error term and ***ln*** is the natural logarithm of the respective

The Chow's-F Test: Comparing Two Regressions:

The Chow's-F test was applied for testing the equality between coefficients obtained from different regressions *i.e.* for insured and uninsured chilli sample farmers. Symbolically, it can be expressed as follows:
Where,

$$F = \frac{\{\sum e_p^2 - (\sum e_1^2 + \sum e_2^2)\}/k}{(\sum e_1^2 + \sum e_2^2) / (n_1 + n_2 - 2k)}$$

Σe_p^2 = Regression sum of square for over all analysis (both insured and uninsured chilli
Growers as a whole)
Σe_1^2 = Regression sum of square for insured chilli growers
Σe_2^2 = Regression sum of square for uninsured chilli growers
K = Number of explanatory variables plus intercept
n1 = Number of observations for insured chilli growers
n2 = Number of observations for uninsured chilli growers
If calculated 'F' > table 'F'0.05 {k, (n1+ n2-2k)} degrees of freedom, then it can be concluded that two estimated functions differ significantly.

Resource Use Efficiency:

Efficiency is defined as the value of output that is generated per unit of input. The higher the value, the more efficient the use of resource is. The sign of the parameter estimates of the dummy variable in the pooled equation as measure of the efficiency of resource use between the farm groups. The sign of the dummy variable reveals the direction of the efficiency of resource use between the insured and uninsured farms. A positive signed coefficient indicates the efficiency moves toward the larger integer of the coded variables, whereas a negative coefficient suggests that the efficiency measure will tend to the lower integer. (Olubiyo et al, 2009).

RESULTS AND DISCUSSIONS:

The co-efficient of multiple determination (R^2) values were 0.729, 0.793 and 0.753 on insured, uninsured and overall chilli sample farmers respectively. It indicates that about 73 per cent, 79 per cent and 75 per cent variations in the gross return was explained by the model with use of explanatory variables (X_1 to X_9). The R^2 values indicated the proportion of the total variation in output that is accounted for by the included independent variables. The high percentage values show the equations to give good representation of the relationship between farm output and the included variables.

The table shows that the pooled estimates revealed that labour, the value of the stock of assets owned by farmers and holding of insurance policy were significant ($p<0.01$). The use of fertilizer was significant at five per cent level and the size of the land holding of farmers was significant at 10 per cent level All the variables are positively signed implying that they are positively contributing to output but at different rates. Similar results observed in studies of Gondola et al (2008) and Olubiyo et al (2009).
The analysis revealed that one unit increase in the quantity of X_1, X_3, X_4 and X_6 inputs, results in 0.06711, 1.18287, 0.29455 and 0.07061 per cent increase in gross returns respectively of insured farmers. For uninsured farmers, one unit increase

Table. Production Elasticities of insured and uninsured farmers of Chilli Crop.

Variables	Insured	Uninsured	Over all
Intercept (a)	11.7219	12.32215	12.7856
	(0.0321)	(0.0692)	(0.05134)
Farm size (X_1)	0.06711*	0.048642	0.069475**
	(0.0926)	(0.123)	(0.035839)
Seed (X_2)	0.49376	0.476104	0.061579
	(0.1638)	(0.346)	(0.568767)
Labour (human+bullock) (X_3)	1.18287**	0.396181**	0.95582
	(0.051274)	(0.042)	(0.85394)
Fertilizer (X_4)	0.29455**	0.192139**	0.19972
	(0.033493)	(0.056)	(.85233)
Agro-chemicals (X_5)	-0.09485	0.076068	0.08329
	(0.619214)	(0.512)	(0.620399)
Value of Farm assets (X_6)	0.07061**	0.049344**	0.05071**
	(0.051)	(0.023)	(0.035451)
Premium (X_7)	-	-	0.00326
			(0.985705)
Compensation received (X_8)	-0.00300	-	-0.00218
	(0.984)		(0.989399)
Dummy (X_9)	-	-	0.067054***
			(0.012469)
R^2	0.729	0.793	0.756
□bi	2.001106	1.238477	1.488728
Chow F-test		5.665165326*	

Source: Field Survey data

Figures in parentheses indicate probabilities

*Significant at 10% level of significance

**Significant at 5% level of significance

***Significant at 1% level of significance

in the quantity of X_3, X_4 and X_6 inputs, results in 0.3961, 0.1921 and 0.04934 per cent increase in gross returns. For pooled estimates, one unit increase in the quantity of X_1, X_6, and X_9 inputs, results in 0.0694, 0.05071 and 0.06705 per cent increase in gross returns respectively. Even though the compensation received was non-significant with the gross returns the production function analysis shows that the addition of the inputs leads to better marginal gross returns in case of insurance farmers.

The analysis resulted that sum of elasticities of production were observed to be 2.001, 1.238 and 1.488 for insured, uninsured and overall indicating increasing returns to scale, respectively. It means that gross value of chilli increases proportionately with an increase in the variable factors with same propositions.

The Chow's 'F' ratio was found significant at 10 per cent level, which indicated that the existence of significant difference in parameters obtained for insured and uninsured farmer's through production function analysis. This implied that the only insurance has not caused the structural break in the production relations and shifted the production functions upward, but the other factors such as labour, planting materials and fertilizer also have contributed significantly. Similar type of results was obtained by Jishnu et al in chilli crop (2014).

The sign of the parameter estimates of the dummy variable in the pooled equation has showed the measure and direction of the efficiency of resource use between the insured and uninsured sample farms. The sign of the coefficient obtained

in this analysis is positive, thereby indicating that the insured farmers were more efficient in the bundle of resource use than the uninsured farmers. Similar findings obtained by Khai and Yabe (2011) and Nwaru and Iheke (2012). The result is, however, in contrast with the findings of Olubiyo et al (2009).

The two groups of farmers sampled for this study operate in a similar and contiguous area, they displayed some differences in their farm operations. The insured farmers are more commercially oriented in the choice of their inputs used on the farm. Many of the insured farmers were educated and know different approaches to get better advantage insurance. The insured farmers were chosen the reputed company inputs and adopted cold storage preservation compared to uninsured farmers because of their accessibility to the bank credit.

CONCLUSIONS

1. The results of the returns to scale indicating that the gross value of chilli increases proportionately with an increase in the variable factors.
2. The results of Chow's 'F' ratio indicating that, only insurance policy has not caused the structural break in the production relations and shifted the production functions upward.
3. WBCIS resulted in changed in production practices; but this had not lead to a statistical significant increase in output between insured and uninsured farmers.
4. Insured farmer would generate more output and greater net profit by reorganizing their present level of resource use as compared to uninsured farmers.

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