International Journal of Chemical Studies

P-ISSN: 2349–8528
E-ISSN: 2321–4902
www.chemijournal.com
IJCS 2020; SP-8(4): 254-256

Received: 28-05-2020
Accepted: 30-06-2020

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Factors affecting risk taking behavior of farmers: A study in Chhattisgarh

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DOI: https://doi.org/10.22271/chemi.2020.v8.i4d.10018

Abstract
An Indian farmer faces various types of risks in the process of agricultural production and disposal of agricultural output. The nature and magnitude of risk which agricultural producers faces varies from farmer to farmer and from region to region. The study critically evaluates the factors which affect the risk taking behavior of the farmers in Chhattisgarh state of the India. Necessary and required data were collected from the selected 200 farmers of the three agro-climatic regions of the Chhattisgarh, India by using personal interview method. The effect of exogenous variable like Age of the respondent, Education level, Gender, Experience in farming, family size, Number of earners in family, Size of operational holding, Annual total income of family, Availability of market, Distance of market from home, Sources of non-farm income, Institutional credit arrangement to an outcome variable i.e risk taker or risk averse was tested by using logit regression estimate. Result revealed that among thirteen exogenous variables, Five variables exhibited statically significant relationship with the risk taking attitude of the farmers *viz*. Family Size, No. of earners in family, Family income, Experience in farming and Gender of the farmer. Further taking into consideration the positive and negative contribution to the outcome variable it was found that family size exhibited negative relationship as the calculated odd ratio is less than one (0.999) implying that as the family size increases risk taking attitude decreases while No. of earners in family, Family income, Experience in Farming showed positive relationship as calculated odd ratio for these variables are greater than one (1.0) implying that increase in value of these variables, decrease the risk taking behavior of the farmers. In case of gender, the male farmer is more risk taker than female farmer.

Keywords: Agriculture risk, risk taking behavior, logit regression estimates, Chhattisgarh, Farmers, risk bearing capacity

Introduction
A popular peasant saying that "abundance of water destroys life; paucity of water destroys life" signifies agriculture's link with monsoon. The vagaries of nature have been associated with ups and downs in cultivation (Mishra, 2008) [4]. As agriculture is inherently dependent on the vagaries of weather, such as the variation in rainfall, number of rainy days, etc. This leads to production (or yield) risk, and affects the farmers' ability to repay debt, to meet land rents and to cover essential living costs for their families. Naturally, the risks are faced by farmers as producers and all other stakeholders who perform the functions of input production and supply, credit delivery, and product handling, marketing and processing. Among all the stakeholders, the most vulnerable to these risks are farmers in general, and specially those who lives in low-income agriculturally-dominant developing countries like India, where the more than 50 per cent of the working population get job opportunity from this sector. The nature and magnitude of risk which agricultural producers faces varies from farmer to farmer and from region to region. Vulnerability of the agricultural producers is compounded by low carrying capacities of the producers and their increased dependence on loans from institutional and non-institutional sources for meeting consumption requirements and for coping with the consequent output and income losses. Low yields and consequently decreased production, leading to reduced incomes for the producers, are particularly common in rain-fed production environments where the producers are dependent to a very large extent on monsoon conditions.

Risk taking behavior of the farmers is affected by factors of the human endowment, production endowment, agro-climatic and institutional endowment. The human endowment factors enable the potential adopters to understand and decode the information and thereby help the diffusion

of the new technology. Moreover risk taking behavior of the farmers is affected by the individual and psychological attributes of the farmer. Study of Rao, 2007 [6], suggested that risk attitudes are more personal traits than they are determined by demographic and socio-economic characteristics. The production endowment affects the choice and desirability of the particular technology. The risk bearing capacity of the farmer also depends on the production environment, say in the form of the capital endowment of the farmer. The climatic variations, the development of the location with respect to the availability of market facility, institutional capital arrangement, accessibility to these facilities and other supply conditions contributes to risk taking behavior (Suresh *et al*. 2007) [7].

Data and Sampling Technique

Chhattisgarh state has been divided in three Agro-climatic Zones i.e. Northern Hill, Chhattisgarh Plain and Bastar Plateau (Fig 1). Present study has been conducted in these three Agro-climatic zones of the Chhattisgarh. One district from each zone of Northern Hill and Bastar plateau *viz*. Korea and Kanker respectively; and two districts from Chhattisgarh plain *viz*. Mahasamund and Durg were selected on the basis of co-efficient of variance of productivity of rice (as rice is the main crop and grown by the farmers in more than 80 per cent of the area). One block from each sample district was selected randomly. These were Korea, Kanker, Mahasamund and Durg. Further one village from each selected block and four villages near (in distance) to selected village by making a cluster of 5 villages have been selected. Finally 10 farmers from each selected village comprising 200 farmers have been selected for the present study.

Fig 1: Map of Chhattisgarh

Analytical Framework

To determine factors which influence the risk taking attitude of the farmers, logit model was used and analysis was done with the help of SPSS package. This model is generally used to predict the effects of change in the independent variables on the probability of belonging to a group or category when the dependent variables are dichotomous (Berkson, 1944). To generate the dependent variable, the farmers are classified into two groups, who takes risk and who do not take.

Logit model is specified as:

$Pi = \left(\frac{1}{1+\left(e^{-Zi}\right)} \right)$, where Pi is the probability that a farmer is risk taker and

1- $Pi = 1 - \left(\frac{1}{1+\left(e^{-Zi}\right)} \right)$ is the probability that a farmer is not a risk taker i.e. risk averse.

The odd's ratio = $\frac{pi}{1-pi} = e^{zi}$

Taking logarithm on both sides,

Ln $\frac{pi}{1-pi}$ = Zi = α + $\sum_{i=1}^{n} \beta i Xi + ei$ where X is the vector of the independent variable and βi's, the coefficients to be calculated.

The index variable Pi indicating whether the respondent is risk taker or risk averse can be expressed as a linear function of the independent variables. Thus the specified logit regression model is as follows:

Li = αi+β1X1+ β2X2+ β3X3+ β4X4+ β5X5+ β6X6+ β7X7+ei

X1=Age of the respondent in year
X2= Education level of respondent
X3= Gender
X4= Experience in farming in year
X5= family size
X6= Number of earners in family
X7= Size of operational holding in hectares
X9= Annual total income of family
X10= Availability of market
X11= Distance of market from home
X12= sources of non farm income
X13=institutional credit arrangement

Results and Discussion

In present study 13 explanatory variables were considered for analyzing factors affecting risk taking behavior of farmers, among these explanatory variables, Gender of the farmer (0 for male and 1 for female), Institutional Credit Arrangement (0 if available otherwise,1), Easy availability of Transport (0 if available otherwise, 1) are treated as dummy variables. Observed Tolerance values for explanatory variables are greater than unity which indicates the absence of Multicolinearity between explanatory variable in the model.

The Logit regression estimates on the factors affecting risk taking behavior of the farmers are presented in Table 1. Five explanatory variables exhibited statically significant relationship with the risk taking

Table 1: Logit Estimates of Factors Affecting Risk taking Behavior

Explanatory Variables	Case	Standard Error	Exp (B) Odd Ratio
Age		0.1666	0.8315
Education		0.1117	1.0839
Family Size		0.000018	0.999*
No. of earners in Family		0.1926	1.6482***
Holding Size		0.4886	0.6226
Family Income		0.000017	1.03**
Experience in Farming		0.1161	1.265**
Gender of the farmer	0	0.4573	4.899***
Institutional Credit Arrangement	0	0.1825	0.811
Easy availability of Transport	0	0.2336	1.45
Constant		3.0109	0.5526
-2 log likelihood	275.978		

*** Significant at 1 per cent
**Significant at 5 per cent
*significant at 10 per cent

attitude of the farmers *viz*. Family Size, No. of earners in family, Family income, Experience in farming and Gender of the farmer (Hall *et al*. 2003) [2]. Among these variables, family size exhibited negative relationship as the calculated odd ratio is less than one (0.999) implying that as the family size increases risk taking attitude decreases. (Pampel, 2000) [5] Calculated odd ratio for the variables *viz*. No. of earners in family, Family income, Experience in Farming are greater than one implying that increase in value of these variables, decrease the risk taking behavior of the farmers. In case of gender, the male farmer is more risk taker than female farmer (Johnson *et al.* 2009) [3].

Conclusion

Findings of the study clearly indicated that the farmers of the Chhattisgarh are very much affected by socio-economic and demographic features in agriculture risk taking. There is need for improving the education level, generate another sources of income, gain more experience in farming for different crops so that they can cope the production risk by agronomical practices.

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