

# Insurance Purchasing Decisions of Wheat Farmers in Hebei Province P.R.China

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**ABSTRACT:** The aim of this manuscript was to determine the demographic and financial variables influencing the insurance purchasing decisions of the wheat farmers using farm level survey data in Hebei Province of P.R.China. The field investigations were carried out using structured and designed questionnaire, focus group discussion and on site visit throughout in the targeted rural areas. Binary probit regression model was used to find out the main factors influencing the farmers wheat insurance purchasing decisions. Results showed that most of the farmers were associated with the insuring of their wheat crop in different ways. In the focus group discussion, it was found that the study area has been more exposed to natural disasters and the wheat crop productivity was also affected. However, the findings presented in the manuscript may help to get better the farmers wheat insurance purchasing decisions.

**Keywords:** Demographic and financial variables, Binary probit Regression, Insurance, Rural areas,

## INTRODUCTION

Hebei province of P.R.China consisted 72.88 million populations, has widely scattered agricultural land and one of the major grain-producing provinces especially for winter wheat production and ranked in 3<sup>rd</sup> position in P.R.China in terms of wheat area, production and yield [Wang Yan 2009]. The total cultivated land of Hebei Province is around 6.3173 million hectares which covers about 5.19% of all the cultivated land of P.R.China. The irrigated and rain fed areas of the Province are 4.548 and 1.769 million hectares respectively [China Statistical year book, 2013]. However at the same time, the winter wheat has seriously affected from climatic risk and natural disasters such as drought, wind hail and frost etc. Consequently the insurance, reinsurance and financial markets contribute to hedging more natural hazards than ever. To mitigate the winter wheat from these natural disasters, various risk management strategies such as government assistance, store crops for sale later, wheat insurance etc, have been adopted by the farmers. But Wheat Crop insurance is a new idea and innovation for rural areas in third world countries and is considered as the best mechanism to reduce financial damages. In recent years the wheat crop insurance in Hebei province has had a successful development with the premium income growth year after year, and the second largest crop insurance in the study area. The knowledge of factors influencing wheat insurance purchases is essential for evaluating the soundness and profitability of wheat crop insurance programs. Despite this importance, the demand for wheat crop insurance has received limited empirical attention. Several views of national and international scholars are presented below about the adoption of agricultural insurance. Ghalavand, et.al (2012), Sookhtanlo and Sarani (2011) studied the risk management of crops insurance in Iran, and showed the independent variables such as consult with other farmers, contact with insurance agents, awareness about the crop insurance, farmer's wheat crop area, economy and marketing management factor,

planting management factor, harvest management factor, infrastructure management of farming and risk sharing management factor influencing the crops insurance. Enjolras and Sentis (2011), Mishra and Goodwin (2006), Sherrick, et.al (2004) studied different factors influencing crops insurance decision and said that the highest risk farms are more interested to buy crop insurance, which is positively related to the past amount of claims, farmers have sufficient wealth reserves, non farm income etc are more interested as a substitute for federal revenue insurance. The larger, older, less tenured, more highly leveraged and higher yield risks farmers are more likely to buy insurance. Feng, et.al (2013) studied the factors influencing agriculture insurance purchasing intention of Hebei province through logistic regression analysis method using farm level data, and put forward the policy recommendations to improve the farmers insurance purchasing decision according to the empirical results.

**Data Sources**

This study was conducted in Agricultural University of Hebei Baoding P.R. China. Primary data was collected from field investigation through structured and designed questionnaire. In order to improve the authenticity of this investigation and get a more comprehensive understanding of farmer’s wheat production risk management and insurance purchasing decisions, this investigation was conducted throughout all the wheat growing areas in the province. During the investigation, a total of 560 questionnaires were distributed randomly, recycling 496 valid questionnaires reaching 88.571% effectively, and the questions were asked from senior family members. A senior family member is a person who makes most of the day to day management decisions in the family. All the investigations were conducted independently in the guidance of investigators, which can not only ensure the questionnaire can be recycled in time but also improve the effectiveness of the questionnaire content.

**Binary Probit Regression Model for Wheat Insurance as a Risk Management Tool**

Both Binary Probit and Logit regression models are the two methods to analyze the binary selection. But used the binary probit regression model as the method of empirical analysis in this manuscript. Where farmer's age ( $X_1$ ), Education ( $X_2$ ), No of family members ( $X_3$ ), Wheat cultivating experience ( $X_4$ ), Wheat crop area ( $X_5$ ), Wheat Yield ( $X_6$ ), Tenurial status ( $X_7$ ) Wheat Income of the farmers ( $X_8$ ), Non farm income ( $X_9$ ), farmers awareness about the Wheat crop insurance goals and objectives ( $X_{10}$ ), farmers Participation in wheat crop insurance training and workshop ( $X_{11}$ ), Indemnity paid to the wheat growers =  $X_{12}$  and alternative risk management practices other than wheat insurance =  $X_{13}$  are considered as independent variables and whether the farmers get the wheat insurance or not is considered as the dependant variable in terms of y. where y=1 says that farmers purchase wheat insurance, and y=0 says farmers purchase no wheat insurance. And name the probability of wheat farmers insure as P and the binary probit regression between P and variables  $X_1, X_2, \dots, X_n$  is

$$\ln \left[ \frac{P}{1-P} \right] = \beta_0 + \sum_{i=1}^n \beta_i x_i$$

**RESULTS AND DISCUSSIONS**

During the survey, group discussions and dialogue with the community farmers the investigators were asked different questions about the winter wheat crop production risk management, Different answers were received from community farmers and respondents, there are a lot of risk management practices were used such as Relief from the government and non government organization in case of disasters occurred, Store crops and spread sales over the year, Credit from a bank in case of an emergency, Non-farm income, Diversification of crops and insurance etc. But our interest in this study was to know about the wheat crop insurance participation or not, because the insurance provisions requires for a wheat farmer to cover all the wheat crop area if he or she decides to purchase wheat crop insurance. The data provides information about whether these 496 surveyed sampled farmers had wheat crop insurance or not. The above analysis showed that only 11.895% farmers out of these surveyed sampled farmers have purchased wheat crop insurance, while 22.034% farmers out of the insured farmers are in renewal cases and others 77.966% farmers currently participated in wheat crop insurance. During the field investigation it was also found that majority of the wheat farmers were unaware about the wheat crop insurance. And the wheat crop insurance purchase is in second position in agricultural crops after corn and the majority of the insured wheat farmers are cooperative farmers. During the survey the following questions were focused.

Table 1. Contact Persons and Institutions in Case of Wheat Risk

Contact Persons/Institutions	No. of farmers	Percentage
Local Agricultural Officers	176	35.484
Government department and Risk Assessment sector	73	14.717
Did not Know	69	13.911
Wheat expert in Agricultural Research Station SStation	62	12.500
Wheat expert in Agricultural university	52	10.484
Others	203	40.927

Source:- Survey data 2013-2014

The survey results indicated that 40.927% and 35.484% wheat farmers had contacted with their relatives and friends who they were expert in wheat crop production and with the local agricultural officers respectively, followed by 14.717% farmers contact with the government risk assessment department.

Table 2. Major Risks Affecting Farmers Family Wheat Production and Income.

Disasters	No. of farmers	Percentage
Drought	299	60.282
Wind and rain Storm	204	41.129
Frost	198	39.919
Wheat Price Volatility	97	19.556
Typhoon	17	3.427
Fire	16	3.226
Others	86	18.34

Source: - Survey data 2013-2014

The farmers were found to worry most about drought, wind and rain storm and frost which damaged their wheat crop by 60.282%, 41.129%, and 39.919 % respectively.

Table 3. The Ways of Hearing about Wheat Crop Insurance

Ways of Hearing	No of Farmers	percentage
Government dissemination of Information	308	62.097
Media	219	44.153
Relatives and friends	181	36.491
Insurance company advertisement and promotion	140	28.226
Education	23	4.637
Going out to work	13	2.621
Others	26	5.242

Source:- Survey data 2013-2014

During the investigation when the investigators asked from the wheat farmers, how they know about the wheat crop insurance they replied about the different sources. 62.097%, 44.153% and 36.491% farmers said that they were aware about the wheat crop insurance due to the government dissemination of information, media and know about the wheat crop insurance through relatives and friends.

Table 4. Different Reasons of Farmers for not Purchasing Wheat Insurance.

Reasons	No. of farmers	Percentage
Don't know about the wheat insurance	170	34.274
The Wheat Insurance Claim Procedure is too Complicated	169	34.073
Don't believe on insurance company	93	18.750
The wheat Insurance premium is very high	73	14.718
Low Compensation level of the Insurance company	72	14.516
Govt support/assistance is enough after disaster	63	12.702
Others	85	17.137

Source:- Survey data 2013-2014

The farmers presented different reasons, when contacted with uninsured farmers and households. 34.274 %, 34.073% and 18.750% farmers said that they don't know about the wheat insurance company, the insurance company claim procedure is too complicated and don't believe on the insurance company.

Table 5. Different Reasons of Insured Farmers for Purchasing Wheat Insurance.

Reasons	No. of farmers	Percentage
Wheat Insurance can effectively compensate the losses	30	54.238
Government provide premium subsidies	25	42.373
Purchase when surrounding people buy wheat insurance	12	20.339
See others getting benefits from wheat insurance	10	16.949
Village community leader mobilization	8	13.559
Insurance sale's man mobilization	6	10.169

Source:- Survey data 2013-2014

The insured wheat farmers presented different reasons for the purchasing of wheat insurance. 54.238 %, 42.373% and 20.339% wheat growers said that the Wheat Insurance can effectively and easily compensate the wheat losses, Government provide premium subsidies to wheat growers for buying wheat insurance and purchased wheat insurance when surrounding people buy wheat insurance.

**Wheat Insurance Premium and Compensation by the Insurers**

The insurance companies provide 4500 yuan per hectare compensation to the wheat farmers in Hebei province P.R.China. The wheat crop insurance premium was reported to be 5 % (225 yuan per hectare) of the compensation paid by the insurers to the wheat farmers, out of which total 180 yuan per hectare or 80% (10% of the county financial subsidies, 10% municipal financial subsidies, 25% provincial financial subsidy and 35% central financial subsidy) assumed by the financial departments, while farmers bear 20% (45yuan per hectare) of wheat crop premium.

**Variables Analysis**

In this paper for the quantitative variables, we used only the values of the variables and for the qualitative data we used dummy variables, dummy variable only represents the difference between categories, but not the value of the variable. If the farmers who joined cooperative and their land are cultivated by cooperatives =1 and others=0, the farmers awareness about the goals and objectives of wheat insurance=1 and the farmers have no awareness = 0, the farmers participation in wheat crop insurance training and workshop = 1 and have no participation=0. Indemnity paid to the wheat growers = 1 and not =0 and alternative risk management practices other than wheat insurance = 1 and not =0. After the combination of the above quantitative and qualitative statistical data, used software Eview 6.00 and adopted Binary probit regression estimation method that is put above 13 variables into the regression model equations and the probability values of all the variables less than 0.05, which showed the significance of the variables.

Table 6. Results of the Binary Probit Regression Analysis

Variables	Coefficients	Std. Error	z-Statistics	Prob.	Exp(B)
X1	-0.067816	0.022693	-2.988404	0.0028	0.93443
X2	0.254051	0.103677	2.450396	0.0143	1.28924
X3	-0.735574	0.228157	-3.223985	0.0013	0.47923
X4	-0.200282	0.049633	-4.035215	0.0001	0.81849
X5	0.127892	0.043316	2.952541	0.0032	1.13643
X6	0.001225	0.000412	2.971228	0.0030	1.00123
X7	1.929512	0.523474	3.685975	0.0002	6.88615
X8	0.191759	0.191691	-2.570984	0.0101	1.21138
X9	-0.000361	0.000155	1.082796	0.0194	0.99964
X10	1.031238	0.418142	2.466242	0.0137	2.80454
X11	1.244458	0.420848	2.957023	0.0031	3.47105

X12	2.20643	1.010039	2.013220	0.0241	9.083231
X13	-4.978787	1.433984	-3.471996	0.0005	0.006882
C	2.604052	1.811120	1.437813	0.1505	
McFadden R-squared		0.874265	Mean dependent var		0.197581
S.D. dependent var		0.398576	S.E. of regression		0.140248
Akaike info criterion		0.173376	Sum squared resid		9.520098
Schwarz criterion		0.275148	Log likelihood		-30.99718
Hannan-Quinn criter.		0.213325	Restr. log likelihood		-246.5269
LR statistic		431.0595	Avg. log likelihood		-0.062494
Prob(LR statistic)		0.000000			

Source:- Calculation from farm survey data through probit regression model

### **Age and Education**

The results of the binary probit regression coefficient were negative for age and positive for education. The age has negative and education has positive impact on the purchase of wheat insurance and which indicated that other things remained constant, older wheat growers were less likely to buy the wheat crop insurance than younger ones and the farmers with a higher level of education are more interested to buy wheat insurance. The results of the analysis indicated that the younger wheat farmers purchased wheat insurance are 0.934 times higher than older ones and better and higher educated people are adopted the insurance 1.289 times greater than the less educated peoples. The above results are consistent with the findings of Calvin (1992), Just and Calvin (1990), Smith and Baquet (1996), Edelman and Mishra.A.K (1990) etc.

### **Number of Permanent Family Members and Wheat Cultivating Experience**

The coefficient of both the variables have negative, which indicated that the farmers who have more permanent family members and wheat cultivating experience were less likely to purchase wheat crop insurance and 0.479 and 0.818 times were less interested to buy the wheat crop insurance respectively, and these results consistent with the results of Feng, W., et.al (2013) and Ghalavand, K, et..al (2012).

### **Wheat Crop Area and Yield**

The coefficient of wheat crop area and yield were both positive in the above binary probit regression analysis, which showed their positive relationship with the adoption of new technology like wheat crop insurance participation. The analysis further indicated that the wheat growers who have larger wheat crop area are 1.136 times more interested to buy wheat crop insurance than smaller wheat crop area, moreover the farmers who have higher yields are 1.001 times more interested to buy wheat crop insurance than lower wheat yield farmers. However our findings are consistent with the findings of Goodwin (2006), Calvin(1992), Just and Calvin (1990) and Enjolras, G and Sentis, P(2011)

### **Tenurial Status**

The above binary probit regression analysis indicated that the farmers who joined cooperative and their land were cultivated by cooperatives have positive impact on insurance purchasing decisions and are 6.886 times more interested to buy the wheat insurance.

### **Wheat Farm Income and Non farm Income**

Generally the peoples who have higher income, their insurance participation rate are higher than lower income wheat growers, but the above results are consistent with the general concept. The above results indicated that the wheat growers who earn more income from wheat farming are 1.211 times more than lower wheat crop income. While the negative coefficient in the non-farm income showed that the farmers who earn their income other than from agriculture are less likely to buy wheat insurance and are 0.999 times less interested to buy wheat crop insurance than wheat growers. This is consistent with the findings of Calvin (1992), Justin and Calvin (1990).

### ***Awareness about the Wheat Insurance and Participation in Training and Workshops***

In the above binary probit regression analysis the coefficient are positive both for the farmers who were aware about the goals and objectives of wheat insurance and were participated in wheat insurance training and workshops and both these farmers are 2.805 and 3.471 times more interested to buy wheat insurance than other farmers and these findings consistent with the finding of Ghalavand, K, et.al (2012)

### ***Indemnity Payment***

The indemnity payment is the most significant factor affecting wheat insurance purchasing decision. The intention of farmers who have received the wheat insurance indemnity were 9.083 times more than the farmers who have not received any indemnity, and have a more profound understanding about the wheat crop insurance and more trust on insurance companies. So they have a greater probability to insure. The result is consistent with the Feng, W., et.al (2013).

### ***Alternative Risk Management Strategies***

The negative coefficient in the above analysis showed that the alternative risk management strategies, such as government assistance, non farm income and the farmers who have diversified crops etc have inverse relationship with the wheat crop insurance participation rate. And the farmers who have the above risk management strategies are 0.007 times are less interested to participate in wheat crop insurance. Our findings are consistent with the findings of Coble, K.H., Knight, T.O (2002).

### ***Policy Recommendations***

#### ***Strengthen the Publicity of Wheat Insurance***

The above results of the study indicated that most of the wheat farmers were unaware about the wheat crop insurance and from the results we can draw the conclusion that the publicity of wheat crop insurance should be strengthened to improve wheat crop insurance participation rate. Therefore, it is highly recommended to the insurers, insurance policy and decision makers to play their full role by using media and other information channels to build a wheat crop insurance propaganda with the help of the market and various other information transmission Channels. Get the farmers a deeper understanding about the wheat crop insurance as a modern risk management tool.

#### ***Management of Wheat Crop Insurance Training Programme***

To develop and improve the wheat crop production, the government and the private insurers must implement and start wheat crop insurance training program for the local wheat farmers. And create awareness about the scope, goals and advantages of wheat insurance through consultation with other farmers, agricultural extension agents, participation in wheat insurance training, workshops, classes, sessions, extension lectures, watching films and video clips related to wheat insurance, visiting to wheat insurance companies activities, studying of extension bulletins and journals related to wheat insurance.

#### ***Agricultural Insurance as a Subject***

Being agriculture as the backbone of national economy, agricultural risk management must be teach as a subject in the agricultural universities of China and agricultural officers in the local agricultural research stations must have knowledge about agricultural specially the wheat crop insurance, so in case of wheat risk when the farmers contacts with them, they can easily guide and educate the farmers about the scope and importance of wheat insurance.

#### ***Focus on Non Cooperative Farmers***

Most of the insured wheat farmers are the cooperative farmers. And the non-cooperative farmers even did not hear and know about the insurance companies. Therefore it is strongly recommended that the government and the insurers not only concentrate the cooperative farmers, but also create awareness among the non-cooperative wheat farmers about wheat crop insurance.

#### ***Introduction of Large and Cooperative Farmers***

The government must introduce and focus the large farmers in Hebei province, and the large farmers will be easily focused and more attractive to adopt the new technology especially the wheat insurance. **Improve the**

### **Claims Quality and on Time payment of Insurance Companies**

The insurers should facilitate the insured wheat farmers to compensate their losses in a simplest and easiest way to attract other farmers towards insurers to get insurance. Strive to solve the problems generally reflected by the farmers such as difficulty to damage assessment and slow settlement of claim. Simplify claims procedures, shorten claims time and fully enhance claims quality. In case of disasters, insurance companies should provide full and timely compensation for the affected farmers, strictly in accordance with the contract of insurance. The experience of receiving compensations can produce positive effect on insured farmers and encourage them to make renewal insurances. At the same time, word-of-mouth publicity among farmers can affect the uninsured farmers to insure actively and thus increase the insurance purchasing rate.

### **Multiple Peril and Catastrophic Wheat Crop Insurance**

According to the Hebei province China wheat insurance policy, the wheat insurance only covers the hail, fire, heavy rains and wheat lodging, while the above results showed that the wheat crop in the province are mostly affected by the Attack of insects and diseases, drought, frost and others disasters. Therefore it is highly recommended to the province insurance policy and decision makers to introduce multiple peril and catastrophic wheat crop insurance programme separately and to fully concentrate for the smooth running of the wheat insurance by providing subsidies both to the insurers and wheat farmers.

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