

International Conference on Agricultural Risk and Food Security 2010

An Empirical Study of Agricultural Insurance -----Evidence from China

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Abstract

This paper explores the factors that affect the farmers buying or not buying agricultural insurance so that the provider of insurance, state-owned agricultural insurance companies or commercial ones can adjust their strategic to suit the demand of farmers based on our results and China's special characteristics in rural area, such as huge rural population and state-owned land system. In this paper, we also provide some suggestion on how to develop the agricultural insurance in China for policy maker.

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Keywords: Empirical study; Agricultural insurance; China

Introduction

Agriculture is a high risky business. The farmers who are engaged in agriculture have to face a variety of risk like natural disasters, market-related risk, technical risk, systematical risk and financial risk. Agricultural insurance provides the possibility of shifting natural risk, increasing output, and improving rural household's welfare and level of utility. It is also widely believed that agricultural insurance has significant on keeping the national fiscal stable, and also increasing rural poor households' willingness to adopt new technologies that raise both mean levels and riskiness of income. Farmers will be more likely to follow the principle of maximum benefit and adopt high technologies which might be uncertain if they know for sure that the agricultural insurance will cover the possible loss of income.

Two main aspects were discussed by the previous papers. One is about the important of agricultural insurance which is well supported by empirical evidence. Using data from the year of 1998 through 2000, Orden (2001) found that the agricultural insurance improves the output of agricultural production by 0.28-4.1%. Hazell (1986) certified through the data collected in Mexican that the crop insurance options successfully reduce the likelihood of low incomes and shift the efficient mean income standard-deviation frontier upward. Using nationwide, cross-

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section data at the farm level, Just, Calvin and Quiggin (1999) identified the differences between insured and non-insured farmers, which insured farmers tend to receive sufficient expected benefits compared to the non-insured farmers when their income is catastrophically low caused by uncontrolled reasons. The other one is about the reasons of failure of agricultural insurance markets. Kramer (1986) thought the market for crop insurance would fail because of the lack of government subsidies. The asymmetric information on the other hand, especially the adverse selection and moral hazard are the main causes of markets failure. (Goodwin and Smith 1996, Chamber 1989, Nelson and Loehman 1987). However, Miranda and Glauber (1997) took a different view on agricultural insurance market failure. They thought, compare to the asymmetric information problems, the systemic risk could cause more serious obstacle to the private crop insurance industry.

The opinions on agricultural insurance above mostly focus on the problems from the “supply” point of view, such as how agricultural insurance markets run and the related results caused by the failure of the markets, and how agricultural insurance help farmers to shift all kinds of risk. However, the problems from the “demand” side, such as what are the main factors that will influence the farmers to buy or not to buy agricultural insurance were rarely discussed. Only by knowing this well, can we set up a more perfect agricultural insurance system.

In this paper, we attempt to shed some light on the related issues by providing empirical evidence in three areas using a household survey data collected in 2007 and 2008 from rural China. First, by describing the extent by which rural farmers in our sample have agricultural insurance, we aim to increase our understanding about the relative importance of agricultural insurance in rural economy. Second, by investigating rural households’ characteristics and the status of agricultural insurance, we are interested in assessing the potential underlying factors behind household’s decision on buying or not buying agricultural insurance. And finally, by comparing the State-own agricultural insurance program to other insurance programs, we are able to identify the extent to which insurance has achieved their potential, and the way of developing China agricultural insurance. Basically, our research dedicates to giving the answer on this issue and taking the WTO related regulations to support the development of China rural economy.

Agricultural Insurance in China

Agricultural insurance in China is playing more and more important role on increasing the capacity of disaster recovery, ensuring social stability in rural areas, servicing to a new socialist countryside construction, and building a harmonious society. According to the data from China Insurance Regulatory Commission (CIRC), agricultural insurance premium income achieved 7.003 billion yuan by the first half year of 2009. Around 20 companies are engaging in agricultural insurance business. They paid 3.407 billion yuan of compensation to 5.0172 million famers to help them recover from the nature disaster and other reasons beyond their control. However, compare to the huge rural population and agricultural production area, the agricultural insurance apparently cannot meet the demand. To some extent, China has not yet set up an efficient agricultural insurance system to help rural households to smooth the risk (See table 1). The capacity of risk-bearing of Chinese famers is really low, “the development of agricultural insurance is still facing the lack of catastrophic risk dispersion mechanisms,” which has influenced the development of rural economy.

We have explored the main reasons of the markets failure of China agricultural insurance as follows:

The main obstacle is the lack of support from government. Since agriculture is high risk industry, the insurance company has little interest in engaging in it base on the principle of profit maximum. For the policy maker, they should emphasize more about the function of insurance as a tool of subsidize. Private multiple peril crop insurance still requires a government subsidy (Chambers, 1989). The possible reason as explained by him is include the difficulty of insuring frequent and highly covariate agricultural production risks and the persistence of moral hazard and adverse selection problems.

Second, China has a vast, complex and diverse natural environment and huge population which decide that it is hard to divide the different kinds of agricultural insurance by only single standard. The standards meet in one area

may not work in others. The categories of agricultural insurance are not easy to define, the claims standards are not easy to universalize, the insurance rate is not easy to determine. Thus, the investment of agricultural insurance companies is very big and hard to get profit. The huge population decides the small arable land area per capita which is less than one-third of the world's average level. Because of the decentralized operation and high frequency of natural disasters, the range of compensation will be very wide and huge once the risk happens.

Third, the income per family in rural China is much lower than it is in cities. Famers usually are not willing to buy insurance by the limited income. Most of the famers also don't know how to buy and what agricultural insurance can do for them. One of the main purposes of this paper is to explore the factors that affect the famers not to buy the agricultural insurance and provide suggestion to policy makers.

Data

The present research relies on data collected by face-to-face interview in November 2007 through March 2008 in Heilongjiang Province which is located in northeast of China. Agriculture in this province is important not only to the province itself but to the whole country. The total arable land in Heilongjiang province is 1.76 million mu which ranks the first in the country. The overall grain production capacity has stabilized at above 35 billion kilograms every year in this province. Half of the commercial grain in China is provided by Heilongjiang Province which is the largest productions base of the country. (Wang, 2008) The main agricultural products are rice, corn, soybeans and cotton. All the productions are planted only one season per year due to the cold climate. Since Heilongjiang is located on one of the three black soil belts in the world, the quality and quantity of agricultural productions can be guaranteed. The data collected in this province has significance reference.

In this section, we briefly describe the basic information by analyzing the data and get to know the economic context of China agricultural insurance. It is necessary to make some clarify on some variables. 471 data which were gotten at random from 28 villages will be used in the sample. Totally, 19 variables are included in the regression. It shows that the average age of observed households is 43.98 years old. Since we interviewed the head of household, so the gender of male accounts for 83.44%. Male, especially in rural area has higher status in China. The average household size is 3.80. As demonstrated in table 1, the variable of children, 0.82 represents not the exact children of number a family have but the number of children who are schooling. Among all 471 samples, only 27 households are insured, the percentage is only 5.7, which is really low. And 18 farmers buy health care insurance, the rest of nine famers buy the insurance which is related to agriculture. From the data, we can get the conclusion that the famers in China have no strong intendency to buy agricultural insurance. As regards the reasons, we will discuss based on our data in the next section.

Empirical Analysis

The switching regression model with an endogenous criterion function postulates for any observations i (Maddala 1983).

$$Y_{1i} = \beta_{1i} X_{1i} + \mu_{1i} \quad \text{if } \gamma Z_i + \mu_i \leq 0 \quad (1)$$

$$Y_{2i} = \beta_{2i} X_{2i} + \mu_{2i} \quad \text{if } \gamma Z_i + \mu_i > 0 \quad (2)$$

Where X_{1i} , X_{2i} are vectors of exogenous or predetermined variables; β_1 , β_2 , and γ are the corresponding vectors of parameters; μ_{1i} , μ_{2i} and μ_i are random disturbances; Y_{1i} , Y_{2i} are two possible dependent variable. $\gamma Z_i + \mu_i$ is criterion function. The dependent variable is a dummy variable (= 1 if famers reported to have agricultural insurance, =0 otherwise).The results of the probit estimates on buying or not buying agricultural insurance are presented in table 2.

The following variables are included to identify the expected effect on agricultural insurance (the directions as in parentheses). age (-), male (-), households size (-), households education (+), number of schooling children (-), employment section 2, which is off farm industry (+), land assets (-), distance to agricultural company (-), leader (+), rate of agricultural Insurance(-).

The descriptive and econometrics analyses yielded a number of highly consistent results across different estimation methods. First, as expected, the agricultural insurance demand is significantly affected by household's

production capacity as supported by the fact that household size, agricultural land, and head's education, all significantly increase household's probability to buy agricultural insurance. For example, every additional year of head education would increase the probability by 15%. An additional expense on agricultural insurance would reduce the probability by 21%.

Results

Recognizing the limited knowledge about the functioning of agricultural insurance markets in China, especially on the demand side of the markets, this paper aims to fill this gap based on a recent household survey. A few interesting findings emerged from our study. First, households' decisions on whether to buy agricultural insurance and from which company state-owned or private to borrow are mainly determined by households' production capacity and the transaction costs. Increasing the accessibility of agricultural insurance by reducing the transaction costs is an essential step to improve agricultural insurance. Second, there is evidence that the agricultural insurance markets are functioning below their potential. And those who are likely to need the agricultural insurance the most (with more land) are most likely to be constrained. Findings in this study have significant policy implications for addressing the agricultural insurance demand and supply in rural China.

In order to make the agricultural insurance markets efficient to help farmers to smooth all kinds of possible risk, the government should do more in the following aspects: First, the law system about the agricultural insurance should be consummated; the status of state-owned and private agricultural company should be clarified. The government should play the role as a subsidize provider. Second, to establish the policy-oriented agricultural insurance system, increase the support from fiscal and financial departments and implement of the policy and provide financial support for agricultural insurance are important steps to develop agricultural insurance in China. As well known, to implement policy-oriented agricultural insurance is important regulation allowed by WTO rules. China should make full use of this rule. Speeding up the establishment of the policy mechanism, providing premium subsidies and preferential policy such as tax, service and etc. and encouraging commercial insurance companies operating agricultural insurance are three main tasks of the government. Third, building the re-insurance subsidies and catastrophic risk reserve fund as well is necessary for establishing perfect agricultural insurance system.

Table 1 China Premium income of agricultural insurance the year of 2001 through 2007

| year | Overall Premium Income of Insurance (billion Yuan) | Premium Income of Property Insurance (billion Yuan) | Premium Income of Agricultural Insurance | Percentage in the overall Premium Income of Insurance |
|------|--|---|--|---|
| 2001 | 2109 | 685 | 3 | 0.014 |
| 2002 | 3054 | 780 | 3 | 0.010 |
| 2003 | 3880 | 869 | 5 | 0.013 |
| 2004 | 4318 | 1125 | 4 | 0.009 |
| 2005 | 4932 | 1283 | 7 | 0.014 |
| 2006 | 5640 | 1579 | 8 | 0.014 |
| 2007 | 7036 | 2087 | 53 | 0.075 |

Table 2 **Estimated Coefficients of Probit Model (Probability of Buying Agricultural Insurance)**

| Variables | Estimated Coefficient | P-value |
|--|-----------------------|----------|
| Age | -.136 (.323) | 0.565* |
| Male | -.352 (.135) | 0.726 |
| Household Size | -1.256 (2.167) | 0.898 |
| Household Education | .158 (1.531) | 0.000*** |
| Number of Schooling Children | -.268 (.506) | 0.031** |
| empsec-2 | .005 (2.672) | 0.601 |
| Land assets | .201 (-365) | 0.033*** |
| Distance to Agricultural Insurance company | -.358 (1.549) | 0.532* |
| Leader | .212 (.340) | 0.991 |
| Rate of agricultural Insurance | -.212 (2.505) | 0.002*** |
| Number of observations: | 351 | |

*** significant at 1% level

** significant at 5% level

* significant at 10% level

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