On the Pilot Agriculture Insurance Program in Zhejiang Province

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Abstract

Zhejiang Province of China suffers heavy economic loss in agriculture due to frequent disastrous events. In 2006, the provincial and local governments in Zhejiang Province initiated a pilot agriculture insurance program with the touching-stones-to-cross-the-river philosophy. The practical strategy was successful in the past several years, whilst the determination of regional insurance rates was lack of sound risk assessment and validation. In this study, the hazard types, premium structure and premium rate are analyzed with more than 18,000 records of claim data of 2008. Detailed crop risk mapping with insurance data as validation will be helpful to the adjustment of insurance rate in the future. It was found that natural disasters, especially hydro-meteorological disasters were the main causes of agricultural loss in Zhejiang. Farmers in the developed coastal regions of Zhejiang were more willing to buy crop insurance and their insurance loss was higher because of more exposed to tropical cyclones and rainstorms.

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1. Introduction

Zhejiang Province suffers frequent disasters, such as tropical cyclone, flood, drought, diseases and insects, etc. Agriculture is vulnerable to these disastrous events and suffers tremendous losses every year. The annual loss in agriculture of Zhejiang reached 6 billion from 1996 to 2004. In 2005, the agricultural loss caused by tropical cyclones exceeded 10 billion Yuan. Agriculture insurance could have played an important role, but during 1996-2004, the insurance indemnities were only 52.54 million Yuan in total [1], due to low penetration ratio.

In order to transfer the high risk in agriculture and build resilient agricultural and rural communities, Zhejiang Province began to develop a pilot agricultural insurance program since late 2005 based on ‘Government Guidance, Market Operation, Co-Insurance and Voluntary Participation’ rational.

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The Pilot Agricultural Insurance Program (PAIP) in Zhejiang was supported by the provincial government and the “Policy Agricultural co-Insurance Body” was set up, which assigned PICC Property and Casualty Company Limited as leading insurer and involves 10 insurance companies as co-insurers. The Program was developed to implement a pilot practice in 11 counties from 2006. The Pilot Program had 9 insurance subjects including rice, pig, greenhouse vegetable, watermelon, etc. Each pilot county must choose rice and 4 more subjects [2]. The insurance liability covered main natural disasters, such as tropical cyclone, rainstorm, flood, hail, disease and insect.

In 2006, 17,000 rural households were covered and the amount increased to 59,800 in 2007. More than 130 million Yuan has been paid to about 30,000 households 2006 – 2008 including crop and aquaculture insurance. Premium income of crop insurance in 2006 was only 4.8 million Yuan, but the indemnity amount reached 9.15 million Yuan, while 13.5 million Yuan premium incomes and 39.6 million Yuan indemnity amount in 2007[3]. And in 2008, the Program has been expanded to the whole Zhejiang Province besides the pilot counties.

As a pilot project promoted by governments, the premium rating determination was short of historical data or risk zoning support. In order to understand the operation of the Program, a retrospective study on the practice is needed. The objective of this paper is to map the agriculture insurance information in 2008, and analyse the insurance data and regional premium rate based on county.

2. Data and methods

The crop insurance policy and claim dataset were obtained from the Pilot Agriculture Insurance Program in Zhejiang Province in 2008. The dataset include 1) policy data, such as policy No., address, covered households, premium per household, total premium, and 2) claim data, like policy No., date of loss occurrence, cause, address, insured loss, and indemnity, etc. The policy No. connects the two parts together. Altogether around 18,2000 records of crop insurance data were collected covering 90 counties of Zhejiang Province.

In the original dataset from PAIP, each data record has an address but lacks of accurate geographical coordinates. In order to map the information to county-level map, every record was geocoded to a county in Geographic Information System (GIS) according to its address automatically or manually. Then the insured households, insured crop areas, premium income, premium rate, and insurance payment etc. in 2008 were mapped in GIS.

3. Results

3.1 Hazards

Hazards to crop loss in Zhejiang Province are mainly tropical cyclone, rainstorm and flood, disease and insect, etc. According to the claim dataset of Zhejiang in 2008, as shown in Fig. 1, more than two thirds of the crop loss was induced by tropical cyclones and 13.1% by rainstorms, 6.7% by diseases and insects. The rest of the crop loss was caused by other hazards, such as snowstorm etc.
3.2 Premium Structure

Premium rate is usually determined by pure premium ratio from historical loss, operational cost and profit ratio. Agriculture is typically high risk; thus, the pure premium rate of crop insurance is usually higher than 1%, which is the rate of household property insurance. The problem comes out that ars are not willing to pay the premium at high level given their low purchasing capacity and risk awareness, and insurance companies may make a loss if selling policies in low price. Then, globally, the governments play an important role with appropriate subsidies in the agriculture insurance field.

Historical data of long time series, 25 years at least, is main source to calculate loss ratio and analyse pure premium rate. Since no loss data was available before, the basic premium rate of the PAIP in Zhejiang Province was set to be 2.5%. In order to embody different levels of risk in different regions, a regional risk coefficient, to be 1.3, 1.2 or 1, was involved as risk zoning in Zhejiang [2].

Government subsidies would not be lower than 35% of the premium in the PAIP in Zhejiang Province. Different crops had different proportions in premium subsidies. For rice, the premium was 13.4 Yuan per Mu (1 ha = 15 Mu) together with insured amount of 268 Yuan, and the premium subsidy proportion was at least 50% in 2006 – 2007[2]. In 2008, premium rate of rice was set to be 5% and the governmental subsidy proportion was increased to 75%, while other subjects to 45% at least. The provincial and local government paid 30%, 45% of the premium respectively (Fig. 2), a 4:6 proportion of the totalled 75% subsidy [4].

![Fig. 2 Premium structure of rice insurance of PAIP in Zhejiang Province](image)

The rate of the PAIP in Zhejiang has been partially subjective without historical data accumulation, as well as the rationality of risk zoning and regional risk coefficient. With 18.2 thousand records of insurance data, the premium rating of crop insurance in Zhejiang was analysed based on county-level mapping.

3.3 Policy and Claim Mapping

In order to analyse spatial distribution of the insurance information, GIS was used to map the policy and claim dataset from PAIP in Zhejiang Province. The involved attributes included covered households, covered crop areas, premium income, insured amount, mean premium rate and indemnity.

In 2008, 160.4 thousand households bought the crop insurance, only 2% of 7.82 million productive households of the whole rural Zhejiang. The majority of the insured households are big farms or agricultural cooperative associations that were considered to be in higher risk. Most of the covered households were distributed in northern and the coastal regions (Fig. 3). The insured areas reached 4.50 million Mu, 18.8% of totally 23.96 million Mu farmland in Zhejiang (Fig. 4). The main insured crops were paddy rice, greenhouse vegetable, watermelon, etc.
The premium income of crop insurance in 2008 reached 32.24 million Yuan. Compared to total crop output of 79.6 billion Yuan in Zhejiang, the insurance depth was only 0.4‰. Premium per capita was 0.86 Yuan and 4.1 Yuan per household. Most of the premium income distributed in southeast coast and around Hangzhou City (Fig. 5), which was similar to the distribution of insured amount, 486.3 million Yuan in total (Fig. 6).

Mean premium rate of each county in Zhejiang was figured out based on the total premium income and insured amount (Fig. 7). The premium rate of most counties was around 5%. Taizhou City in the southeast coast of Zhejiang had highest rate, evenly higher than 8% in its counties.
The total indemnity of crop insurance in Zhejiang exceeded 17 million Yuan in 2008. The most disastrous regions in Zhejiang in 2008 were the southeast coastal counties (Fig. 8) mainly because of tropical cyclones, and loss of each county reached 1 million Yuan. The insurance loss of Rui’an, a county of Wenzhou City in the southeast coast, reached 3.94 million Yuan while many counties in the central and west parts suffered minor damage.

4. Conclusion and Discussion

The Pilot Agriculture Insurance Program in Zhejiang Province has taken the first step of new agriculture insurance. Both insurance data and operational experiences are accumulated, as well as lessons. It was concluded that:

(1) Natural disasters, especially hydro-meteorological disasters such as tropical cyclone, rainstorms and floods, are the main causes of agricultural loss in Zhejiang. More than 80% of crop loss was caused by natural disasters according to the claim data of Zhejiang in 2008 (Fig. 2). Therefore natural disaster risk assessment must play an important role in premium rating of agriculture insurance.

(2) Most of the covered households are distributed in northern and the coastal regions of Zhejiang, where are more developed and frequently hit by tropical cyclones and rainstorms. It is suggested that the coastal residents are more risk-aware and willing to buy crop insurance with more developed economy and higher purchasing capacity, compared to the west and inland Zhejiang. In addition, the range of insured rural households must be expanded to cover not only current big farms or agricultural cooperative associations, but also the huge amount of single households with low coping capacity, so that the all households can benefit from the crop insurance with government subsidy.

(3) Most counties have the same premium rate around 5%, according to Fig. 7. Risk zoning needs improvement to make differential premium rate instead of current regional coefficients. Risk zoning of natural disaster, especially hydro-meteorological disasters, will help optimize premium rate determination.

(4) Government subsidies account for large proportion of the premium in the past practice. For paddy rice, the main covered crop in Zhejiang, the premium subsidy is 75%. It has reduced the burden of farmers, but it meanwhile increases financial pressure of governments, especially the local governments who should pay 45% of the premium income. The sustainability of this premium structure needs more validation and discussion. The uncertainty could become a potential barrier to further risk transfer through reinsurance.
Reference:


