RESEARCH ARTICLE

A test on adverse selection of farmers in crop insurance: Results from Inner Mongolia, China

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Abstract

Adverse selection is an operating risk of crop insurance. Based on survey data on crop insurance collected by questionnaires in Inner Mongolia, China, the paper uses non-parametric analysis and econometric models to estimate the relationship between conditions for crop production and farmers' insurance decision in order to test the existence of farmers' adverse selection. The results show farmers' adverse selection does exist, but settling a claim by negotiation and premium subsidy from governments at all levels can defuse farmers' adverse selection under the current system of crop insurance. Risk regionalization, heterogeneous insurance contract and product innovation may decrease adverse selection to some extent.

Keywords: crop insurance, farmers, adverse selection

1. Introduction

The China Agriculture Policy Insurance Program (CAPIP) was initiated in 2007 with premium subsidies from the government at all levels. From 2007 to 2013, the premium income, including farmer and government payments, totaled more than 115.3 billion CNY, and indemnities of 75 billion CNY were paid to 144 million households. Crop insurance is a major component of CAPIP, and the magnitude of the agricultural insurance program in China has been the second only to the United States. Crop insurance in China covers the entire country, and insurance receiving financial subsidy covers a broad spectrum of agricultural products including corn, wheat, rice, soybean, potatoes, rape, and sunflower.

Due to its broad scope and rapid development, it is important to assess the functioning of the crop insurance program including issues of adverse selection (Zhou 2012). Adverse selection is the phenomenon wherein the insurer experiences an unexpectedly high probability of loss on account of the type of insurees who choose to participate in the program. This occurs because of asymmetric information between the insurer and the insuree, with the insurer treating the potential participants as facing equal risks and setting program parameters accordingly, while the insurees know that their risks are unequal. The insurees with greater risk are then more likely to participate in the program while those with less risk are less likely to participate. Understanding the extent to which adverse selection exists in the Chinese CAPIP program is important for agricultural policy in China: If adverse selection exists, then the Chinese government will pay far more in indemnities than expected. Refinement of the program

parameters is then necessary to reduce the unexpectedly large burden on the government.

At present, the majority of Chinese crop insurance products have a uniform premium rate over a large region, such as a province or a city. A uniform premium rate and voluntary participation of farmers are likely to lead to adverse selection in the crop insurance market if the farmers' risks differ. Qualitative evidence of adverse selection in crop insurance has been observed in the Inner Mongolia Autonomous Region in China. Farmers are observed to have different rates of crop insurance participation in different regions with different natural conditions under a uniform coverage level and premium rate. Generally, farmers facing frequent natural disasters are be likely to participate in crop insurance, whereas farmers facing few natural disasters typically do not participate. Consider participation in corn insurance in Bayannur City and Ulanqab City from Inner Mongolia. As shown in Table 1, crop production conditions are quite good in Bayannur City, where 85% farmlands are irrigated, and the corn insurance participation rate was relatively low at 45.44, 57.05, and 70.16% in 2010, 2011, and 2012, respectively. However in Ulanqab City, only 25% of farmlands are irrigated, but the corn insurance participation rate was nearly 100% from 2010 through 2012. These qualitative observations suggest the possibility that farmers with greater risk exposure participate in crop insurance at a higher rate.

Theoretical studies on adverse selection began with the work of Akerlof (1970) and Rothschild and Stiglitz (1976). Akerlof (1970) first presented the concept of adverse selection with low-quality products driving high-quality products out of the market in the "lemon" model. Extensive studies on adverse selection of the insured farmers in crop insurance appeared in the late 1980s and early 1990s. Some authors argue that there is no adverse selection in crop insurance in the early 1990s (Coble et al. 1993; Just and Calvin 1994a, b). However, more recent work has focused on measuring the role of adverse selection in the demand for crop insurance. One perspective is that, although premiums negatively influence the insurance decision of all farmers, the elasticity of demand for low-risk farmers is lower than that for high-risk farmers (Miranda 1991; Goodwin 1993;

Shaik et al. 2005; Gunnsteinsson 2012). Goodwin (1993) provides an empirical assessment of the demand for crop insurance by Iowa corn producers. Adverse selection in the insured pool suggests that producers with differing levels of loss-risk have different demand elasticities. Makki and Somwaru (2001, 2002) apply both parametric and non-parametric procedures to test for the conditional independence of the choice of insurance coverage and the risk of loss in the Iowa corn and Texas cotton insurance markets. The results show that high-risk farmers are more likely to select revenue insurance contracts and higher coverage levels, implying adverse selection in the crop insurance market. Shaik et al. (2005) found that farmers having a higher expectation of output risk and price risk are more likely to purchase revenue insurance.

Some researchers have observed that other attributes of the farm may also influence the insurance decision (Quiggin et al. 1993; Just and Calvin 1994a, b). Quiggin et al. (1993) point out that if large farms have consistently higher yields per acre than small ones, then offering a uniform insurance contract generates adverse selection with small farms choosing insurance and large ones choosing to self-insure. That is, if farmers differ in characteristics that determine yield distributions and farmers know their yield distributions better than the insurer, then farmers with a higher ratio of expected indemnities to premiums (farmers for whom insurance is more profitable) are more likely to participate (Just and Calvin 1994a, b).

In terms of causality, some researchers conclude that adverse selection can result when insurers misclassify the level of risk in making rates for farm-level crop insurance (Skees and Reed 1986; Just et al. 1999; Makki and Somwaru 2002). Thus, when high- and low-risk farmers are offered the same crop insurance contract with the same price, adverse selection is a likely outcome. Other researchers conclude that adverse selection can influence the supply of multi-peril crop insurance (MPCI) from private insurance companies, and can cause welfare losses when low-risk farmers are crowded out of the crop insurance market (Esuola et al. 2007). Shaik and Atwood (2002) found the associated costs of adverse selection in U.S. cotton crop

Table 1 Participation rate and loss ratio of different crops in Linhe District and Hangjinhou Banner, Inner Mongolia Autonomous Region, China (%)[1]

District	Crops	2010		2011		2012	
		Participation rate	Loss ratio	Participation rate	Loss ratio	Participation rate	Loss ratio
Linhe District	Corn	49.93	31.25	56.21	48.72	64.04	82.58
	Wheat	15.64	73.89	28.02	0.00	71.34	90.91
	Sunflower	100.00	81.05	74.25	58.54	100.00	133.11
Hangjinhou Banner	Corn	56.35	40.59	69.64	35.62	97.94	53.39
	Wheat	30.93	50.40	45.87	0.00	97.25	82.35
	Sunflower	99.46	62.59	100.00	58.93	88.47	125.94

[1] Source: Inner Mongolia Branch of People's Insurance Company of China (PICC).