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Crop insurance as a risk management tool in agriculture: The case of silk farmers in northern Iran

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ABSTRACT

Crop insurance is an important risk coping mechanism in agriculture, but its role in the sense of security has not been yet institutionalized in small farmers' culture. Farmers' preferences and factors affecting the adoption of silkworm insurance were explored in Guilan Province of northern Iran. Over half of the farmers (59.5%) mentioned the low indemnity rate paid by insurance companies as the main problem of insurance services. In addition, the long period of indemnity payment was reported as another major problem of insurance services. A sizeable proportion of the farmers (35.6%) were willing to pay for insurance only at indemnity reception. Most farmers (79.4%) had a risk-taking propensity. Informing silk farmers about damage assessment schedules and about indemnity payment in a timely manner were the most important factors rated by the farmers for insurance adoption. High income and small distance of insurance affiliates from the silk farms was associated positively with insurance adoption. By contrast, income from sources other than silk farming was associated negatively with insurance adoption. The study provides baseline data on farmers' stated preferences and willingness to pay for silkworm insurance, filling a knowledge gap in farmers' behaviour towards insurance adoption. It also answers the question of what drives farmers to adopt insurance schemes for protection of silkworm raising in the area of northern Iran. The information provides useful policy insights on the development of silkworm insurance as a financial facet of a risk mitigation strategy in northern Iran or in other areas where silkworm raising exists and offers insights on what is desirable for silk farmers as far as provision of silkworm insurance is concerned. To improve insurance adoption by silk farmers, it is important to have a fair premium proportional to farmers' income and to pay indemnity to the damaged insured farmers in a timely manner.

1. Introduction

Agricultural production in all sectors is inherently a risky business; farmers face a great variety of weather, pest, disease, input supply, and market-related risks resulting in the instability of their income (Hazell, 1992; Hardaker et al., 2004; Zulfiqar et al., 2016). The prevalence of risk in agriculture is not new and farmers have, over generations, developed ways of reducing and coping with risk. Crop insurance is a coping mechanism and ex-ante adaptation measure by which protection from potential risk is transferred from the insurance organization to the insurer. Crop insurance compensates the farmer if there is ultimately crop failure in spite of all the precautionary measures taken by him. In this mechanism, a payment of a certain small amount of premium ensures usually the receipt of a larger amount of compensation, depending upon the occurrence of an unpredictable adverse event. The acceptance of insurance services in the agricultural sector is low as compared with other sectors of the economy. Farmers often view insurance as an unnecessary expense instead of an investment to curtail future risk, especially given the small size of their holdings.

Raising silkworm has a special niche in the agricultural sector of Guilan Province in northern Iran and is the direct source of income for several farmers. Like all other agricultural products, the production of fresh cocoon is exposed to several risks, so that insurance service has a lot to do with mitigating potential hazards. Hence,

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mechanisms should be in place to motivate silk farmers to adopt insurance as an innovation. In this context, it is important to identify factors affecting the adoption of silkworm insurance and to determine their relative importance. The development of silk farming can help in the development of invaluable handicraft industries, like carpet-weaving, paving the way for the devise of new industrial initiatives. Silkworm farming allows the development of local silk industries, including textile industry and intermediary industries between production and end products. These activities are related to cocoon drying, cocoon boiling, filament extraction, filament weaving, bleaching, and degumming, which all together cover a wide range of rural and urban occupations in different parts of Iran, creating job opportunities in silk production and processing chain (Research Fund for Development of Silk Farming and Silk Industries in Iran, 1990).

Silkworm insurance in Guilan Province was started in 2003 with 5474 boxes and 971 users, covering 8.5% of the silkworm eggs distributed in the province. In total, the relatively good performance of monitoring of insurance agents and experts of Iranian Silkworm Farming Corporation as well as the settlement of insurance claims in a timely manner resulted in growing satisfaction of policy holders, so that silkworm insurance was spread to other silk farming regions, including provinces of Razavi Khorasan, Golestan, and Mazandaran. In 2014–2015 growing season, silkworm insurance covered 7211 boxes of 12,750 silk egg boxes distributed in Guilan Province, i.e., 57% of the distributed silk eggs were insured. Also, from 8057 users, 3047 farmers, i.e., 38%, were covered by silkworm insurance (Insurance Fund for Agricultural Products of Guilan Province, 2015). Silkworm insurance that has been just recently launched is a relatively new initiative for fresh cocoon producers. So, understanding factors impacting its adoption by silk farmers and attitudes towards it, can help understanding the challenges of insurance plans, facilitate their implementation, and assist the development of silk farming.

Certain studies have been carried out on factors affecting various types of the insurance adoption throughout the world, such as livestock insurance adoption by commercial dairy farmers in Eritrea (Mohammad and Ortman, 2005) or by cattle farms in Western Kenya (Otieno et al., 2006), crop insurance purchase in France (Enjolras and Sentis, 2011), hail insurance decisions in Switzerland (Finger and Lehmann, 2012), the demand for agricultural insurance in Spain (Garrido and Zilberman, 2008), crop insurance decisions in the US (Sherrick et al., 2004) and in China (Yang et al., 2015) as well as crop insurance adoption in Iran (Qorbani et al., 2000; Dadras Moghaddam and Zamanipour, 2010; Karami, 2011). These analyses showed that the adoption of various agricultural insurance programs is determined by a variety of factors. In spite of the vital importance of insurance for the farmers and its role in the sense of security of production, insurance has not been yet improved in rural areas of Iran and has not been institutionalized in farmers' culture. In Guilan Province, the main silkworm production region in Iran, factors related to the adoption of insurance by silk farmers have not been studied. Therefore, it is of importance for planners and policy-makers in the agricultural sector to know the factors influencing crop insurance adoption in silk farming raising.

The general aim of the present study was to identify farmers' preferences about silkworm insurance and examine factors influencing insurance adoption by silk farmers in Guilan Province of northern Iran. The results might provide useful insights to better understand farmers' behaviour towards crop insurance and contribute towards more sustainable crop insurance schemes for silk farmers in the future.

2. Methodology

2.1. Study area and sample selection

The present study was carried out with silk farmers in Guilan Province of northern Iran. The statistical population composed of all silk farmers in Guilan Province (8057 farmers) in 2015. Since the number of silk farmers differs in different counties and there are farmers who are insurance adopters and farmers who are non-adopters, a two-phase stratified sampling method was applied. The sample size of the study was determined by the following equation (Bartlett et al., 2001):

$$n = \frac{\frac{z_{\frac{\alpha}{2}}{}^2 pq}{d^2}}{1 + \frac{1}{N}\left[\frac{z_{\frac{\alpha}{2}}{}^2 pq}{d^2} - 1\right]}$$

where n = sample size, N = population size (in this case N = 8057 farmers), p = estimated proportion of the population (p = 0.5), q = (1−p) (i.e., q = 0.5), d = one half of the desired interval width (d = 0.05), and z = the value of the standard normal distribution for the selected confidence level of 95% (z = 1.96). From the above equation, the sample size was calculated to 376 farmers.

2.2. Data collection

The research tool was a questionnaire that was designed based on authors' experience. It included sections for personal, agricultural, and economic characteristics of the silk farmers, factors affecting insurance adoption, such as the main problems about silkworm insurance, willingnes to pay for silkworm insurance, contacts with insurance and extension agents, affiliate distance from the farm (rated on a scale from 0 = not important to 5 = very much important), and risk-taking propensity of the farmers on twelve statements (rated with 1 = affirmative or 2 = negative). The content validity of the questionnaire was evaluated and confirmed by a panel of academic professors and experts from Iran Silkworm Research Center (ISRC). The reliability of the questionnaire was estimated to be 0.84 using Cronbach's alpha, according to which the questionnaire was accepted as a reliable research tool for the study.

2.3. Data analysis

Basic descriptive statistics (frequencies, percentages, means, and standard deviations) of the sample were calculated. Inferential statistics, including *t*-test and Mann-Whitney test, were used to determine the relationships between measured variables. The relationships between the quantitative variables with the nominal variable of adoption were examined with correlation tests and the relationships between nominal variables were examined with the chi square (χ^2) test. To determine quantitative relationships between the dependent variable (0 = non-adopter and 1 = adopter) and the independent variables, logit regression analysis was used. Logit regression is used for prediction of the probability of occurrence of an event. Predictor variables may be either numerical or categorical. The logistic model is typically used when the dependent variable can take on two values. In this case, these are: 1, indicating adoption of silkworm insurance and 0, indicating non-adoption of silkworm insurance. The forward selection approach was used in this study. In the output of the analysis in the results section, estimates for the beta (b) are not presented. Instead, the