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Evaluating the demand for aquaculture insurance: An investigation of fish farmers' willingness to pay in central coastal areas in China

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ABSTRACT

Despite the remarkable development in its fishery sector, the penetration rate of fishery insurance in China is considerably low. This paper examines the key factors that contribute to the poor performance of fishery insurance, in particular aquaculture insurance, in China. The double-bounded dichotomous choice contingent valuation method (DB DCCVM) is used to investigate fish farmers' willingness to pay (WTP) for an insurance program, based on a survey of 1280 fish farmers in three coastal cities in China. The results indicate that fish farmers' decisions on adoption of an insurance scheme depend on various factors, among which magnitude of loss, fish farmers' awareness toward insurance and their education all have a positive impact. However, income and farming years are more likely to have a negative effect. In addition, the mean WTP for aquaculture insurance is estimated to be CNY 579 (US$ 90.05) [2] per household, which is equivalent to 1.5% of fish farmers' mean annual income. These results provide several policy implications for not only the Chinese government but also researchers as well as insurance companies.

1. Introduction

Fisheries and aquaculture are one of the most important sources of income for millions of people around the world. The most recent estimates from the FAO Food and Agriculture Organization of the United Nations [31] indicate that 56.6 million people across the world were engaged in the primary sector of fisheries and aquaculture in 2014. Of this total population, 25% (approximately 14 million people) were in China engaged as fishermen and fish farmers. Over the past decades China's fishery industry has achieved remarkable development. China represents more than 60% of the world aquaculture production and has remained the major producer for marine fisheries production followed by Indonesia, the FAO Food and Agriculture Organization of the United Nations [31]. In 2016 the total value of production in fisheries was CNY1200 billion (US$186.63 billion) [26], contributing to approximately 1.6% of the nation's GDP.[3]

The fishery sector is broadly divided into capture fishery and aquaculture, both of which are highly dependent on resources and climate and therefore are of high risk. The risks in capture fishery include typhoon, technical failure and accident as well as loss of life and injury on board. In aquaculture there are several factors that can cause production loss and facilities damage such as natural disasters, technical failure, extreme weather and environmental pollution [76]. In 2016, various risks caused a total economic loss to fishery and aquaculture in China of approximately CNY28.8 billion (US$4.48 billion) and the number of the dead, missing and seriously injured people was 165 [26].

Insurance mechanisms have been widely used in agriculture for risk management as an effective means to mitigate financial risks and to reduce negative impacts of natural catastrophes. An average of 30% of global economic loss from natural disasters is compensated by insurance. The rate is much higher (50–60%) in the developed countries such as the US and Canada, but considerably lower (less than 2%) in China [62]. Artemis [6] reported that most of China's US $41 billion of catastrophic economic losses in 2015 were uninsured and concluded that insurance penetration had not kept pace with the rapidly growing economy. As an important part of agriculture insurance system, fishery insurance in China is still under developed,

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[2] The exchange rate of 1 US Dollar to Chinese Yuan was 6.43 on 18th June 2018 from Bank of China.
[3] China's GDP was CNY74,413 billion (US$11,572 billion) in 2016 (National Bureau of Statistics of China 国家统计局, 2017).

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despite reports of substantial damage and losses every year. For instance, in 2013, although 988,500 fishermen and fish farmers were insured through China Fishery Mutual Insurance Association (CFMI, 中国渔业互保协会), they accounted for only 12.5% of the total number of people engaged in the sector. In the same year, the total premium income of fishery insurance was CNY1.44 billion (US$224 million), less than 5% of the total premium volume of agriculture insurance in China [39].

A fishery insurance program in China was initiated in 1982 by the People's Insurance Company of China (PICC, 中国人民保险公司) as part of the company's agriculture insurance services. The scheme was on a small scale and only covered loss of life and injury from accident and damage to fishing vessels. The PICC did not insure aquaculture until 1995 when a pilot scale was undertaken to cover only 2% of the total aquaculture area in China [76]. In spite of continuous support from central and local governments to develop fishery insurance programs in the past decades, the penetration rate of aquaculture insurance remains low. This is partially because the lack of underwriting profitability has compelled some insurers to pull out of insuring aquaculture livestock due to the nature of business. The difficulty arises from determining damage and loss as well as structuring premiums in absence of accurate statistical data. There has been an increasing number of studies that attempt to explore specific means of insurance against aquaculture risks. However, to our best knowledge, very few have examined the factors from fish farmers' perspective and investigate what influences their decisions on adoption of aquaculture insurance. In particular, there is no such a research that has been undertaken to reveal fish farmers' actual willingness to pay (WTP) for aquaculture insurance in China and address the barriers to insurance adoption in coastal areas where aquaculture plays an important role in the local economy.

Therefore, this paper is focused on investigating fish farmers' WTP for aquaculture insurance and aims to identify the key factors associated with poor adoption of aquaculture insurance in three coastal cities in China based on a survey of 1280 fish farmers. The paper is structured as follows. Section 2 provides the background and the current status of China's fishery insurance in general, followed by a review of related literature in Section 3. Section 4 establishes the theoretical framework and basic assumptions. Then, data collection and methodology are explained in Section 5. In Section 6 the descriptive statistics and empirical results are presented and discussed. Section 7 concludes the paper with policy implications and recommendations.

2. Overview of fishery insurance in China

A fishery insurance program in China was initially provided in 1982 by the People's Insurance Company of China (PICC, 中国人民保险公司) as part of the company's agriculture insurance services. Since then fishery insurance has gone through a series of continual adjustments in terms of both programs and practices.

2.1. Evolution of operational mode of fishery insurance

A fishery insurance program in China started in accordance with the commercial insurance operational mode and was initially monopolized by the People's Insurance Company of China (PICC, 中国人民保险公司). In 1985 several other insurance companies entered the market, such as China Ping An Insurance (Group) Company Ltd. (中国平安保险 (集团) 股份有限公司), China Life Insurance Company Ltd. (中国人寿保险股份有限公司) and a few foreign commercial insurance companies. However, confronting with diverse sources of uncertainty and high level of risks associated with fishery and aquaculture, commercial insurance companies were reluctant to get involved in this sector, particularly, in small-scale fisheries and fish-farming activities. In the 1990s, financial loss resulting from operating these insurance businesses became particularly severe due to the lack of policy support from the government. As fishery and aquaculture proved itself to be an expensive class of insurance to handle, most commercial insurance companies pulled out, leaving the PICC alone offering a very limited range of services such as employers' liability insurance and large fishing boat insurance.

In 1995, the PICC began to insure aquaculture on a pilot scale and received a total premium income of CNY9.3 million (US$1.45 million). Nonetheless, the indemnity paid was CNY18.3 million (US $2.85 million), which made the loss ratio[4] of almost 200% [36]. As a result of such a huge loss, insurance for aquaculture was ceased in 1996 following high occurrence of disasters abetted by poor farming management. The pilot commercial insurance program for aquaculture was thus deemed unsuccessful. In the meantime, China Fishing Boat Owners Mutual Insurance Association (中国渔船船东互保协会) was established in July 1994. It was then renamed as China Fishery Mutual Insurance Association (CFMI, 中国渔业互保协会) in October 2007. CFMI aims to help share risks between the owners of fishing vessels, fishermen and fish farmers as well as associated stakeholders. It is a nonprofit organization and regulated by the Ministry of Agriculture and Rural Affairs (MOA, 中华人民共和国农业农村部). Owners of fishing vessels can join it on a voluntary basis.[5] This business model effectively helped to alleviate conflicts of interest between commercial insurance companies and the insured.[6] Over the last decade, fishery mutual insurance has gradually replaced commercial insurance and become the primary operational mode of fishery insurance in China. Between 1994 and 2012, CFMI insured more than 5.57 million fishermen and 350,000 fishing vessels [25]. In 2012, CFMI initiated a pilot insurance program for aquaculture in partnership with commercial insurance companies as well as aquaculture cooperatives and associations. In that year the aquaculture area under the insurance program was around 80,000 mu,[7] which is less than 1% of China's total aquaculture area [58].

Since 2008, there has been increasing financial support for fishery insurance provided by central and local governments at various levels. More commercial insurance companies started to enter the market. Thus the fishery sector in China is currently operated in both mutual and commercial modes.

2.2. Policy support from central and local governments

In order to expand the coverage of fishery insurance, in 2008, the MOA issued "The notice regarding the pilot project of central government's premium subsidies for fishery mutual insurance" [53]. This project initiated a trial of subsidized insurance programs in some key fishing areas such as Shandong, Zhejiang, Guangdong, Jiangsu, Hainan, Liaoning and Fujian. Since then a special budget of approximately CNY100,000 (US$15,552) from central government has been injected annually into fishery insurance programs as direct financial support and subsidies.

In recent years local governments have been following central government's suit to make a great effort in providing various subsidies:

[4] Loss ratio is the proportion of indemnity paid to premium earned by the insurer.

[5] CFMI's headquarter is in Beijing with nine provincial associations and 30 offices in various provinces.

[6] Mutual insurance by definition is owned entirely by their policyholders. Any profits earned are returned to policyholders in the form of dividend distributions or reduced future premiums. It is different from stock insurance, which, on the other hand, is owned by their shareholders and therefore strive to maximize shareholders' value.

[7] 1 mu is equal to 0.165 acres.