

Research on Risk Control Mechanism in Multi-level Agricultural Insurance System

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Abstract

In the construction of a Multi-level agricultural insurance system, it is particularly important to improve the risk prevention and control mechanism as agricultural insurance institutions assume the responsibility of coping with risks and government departments fulfill the obligation of controlling risks. Through the implementation of differentiated insurance premium subsidy policies, the establishment of an actuarial system for agricultural insurance rates, the establishment of a Multi-level risk diversification mechanism, the promotion of structural reform on the supply side of agricultural insurance, and the linkage with banks and credit to help farmers and other risk control mechanisms, efforts are made to solve the inherent contradictions of an incomplete, inadequate and unbalanced agricultural insurance system, accelerate the high-quality development of agricultural insurance, and enhance the professional operating capacity of market players.

Keywords

Agricultural Insurance; Risk Control Mechanism.

1. Introduction to the Risk Control Mechanism in the Agricultural Insurance System

On 19 September 2019, four departments, namely the Ministry of Finance, the CBIRC, the Ministry of Agriculture and Rural Affairs and the Forestry and Grassland Bureau, jointly issued the Guidance on Accelerating the High-Quality Development of Agricultural Insurance[1]. The document clearly requires that by 2022, the construction of a Multi-level agricultural insurance system should be basically completed and ensure that the infrastructure and utility are basically perfect, the system operates efficiently and orderly, and matches the stage of modern agricultural development. At present, China's agricultural insurance is broadly divided into three main categories, namely, financially subsidized basic insurance, commercial insurance and additional insurance, covering index insurance, regional yield insurance, comprehensive insurance package (i.e. the coverage includes agricultural production facilities and equipment) and other sub-divisions[2], so it is particularly important to improve the risk prevention mechanism. In view of the endogenous and exogenous risks faced by insurance companies in their operations, completing and improving the risk prevention mechanism is both a way to strengthen the primary responsibility of agricultural insurance institutions to deal with risks and to implement the necessary obligations of administrative units to control risks.

On the one hand, agricultural insurance providers operate their insurance business and bear the results in full accordance with market-based principles, and at this stage the government does not have a reliance on their insurance responsibilities and results. This requires agricultural insurance providers to strictly comply with relevant legal guidelines and regulatory requirements, provide sophisticated and accurate insurance products and services,

establish a simple and complete internal control system, ensure efficient and smooth payment channels, and prevent anticipated risks.

On the other hand, China is currently implementing a financially supported system of joint participation, risk sharing and risk diversification in agricultural insurance. This requires the relevant authorities to draw up a risk map for agricultural production, improve the risk diversification mechanism for catastrophes, build a diversified agricultural insurance system, formulate model clauses for key areas, optimise the dynamic adjustment mechanism for insurance rates, improve the reinsurance system and the reinsurance mechanism, and maintain good order in the agricultural insurance market.

2. Existing Problems of Risk Control Mechanisms in the Agricultural Insurance System

After more than ten years of development since its birth, China's agricultural insurance has entered a critical stage of high-quality development, and the risk control mechanism is gradually being improved. However, due to the inherent contradictions of an incomplete, inadequate and unbalanced agricultural insurance system, there is a gap between the current risk control mechanism and the actual needs of risk protection in the context of the "three rural areas".

2.1. Financial Subsidies are not Sufficient to Deal with Systemic Risks

Changes in financial subsidies only relate to different sources of premiums and do not have any impact on the total amount of premiums, nor do they equate with the actual amount of claims paid. Once the insurance payout condition is triggered, the total liability will be much greater than the sum of the premiums received from all sources and the insurer will have to rely on its own solvency to meet its insurance payout obligations and mitigate the related risks. The risk of loss caused by different insured persons in the same region suffering from the same risk factor at the same time is a systemic risk. This risk that cannot be completely avoided makes the risk of insured persons in the same region highly correlated and cannot meet the basic requirements of the law of large numbers, nor can it meet the sufficient spatial and temporal dispersion, thus forming an unexpectedly high payout rate, resulting in insurance companies being tired and unprepared.

2.2. The Mismatch between Premiums and Liabilities Poses a High Risk of Payouts

The lack of actuarial basis of big data in determining agricultural premium rates has led to unscientific delineation of risk areas and unsound rate adjustment mechanisms, weakening the ability of insurance companies to withstand major risks. On the one hand, due to excessive and undesirable competition in some areas, insurance rates are poorly matched to actual conditions and insurers bear the risk of over payments. This will make it difficult to charge the full cost to the financial statements, raising compliance risks. On the other hand, policy agricultural insurance usually covers different risk areas and farmers within the same administrative region, but there are no differences in agricultural insurance liabilities, coverage amounts and rates. This can lead to higher insurance coverage in high-risk areas, higher insurance premium rates for insured entities with lower risk management levels, and greater willingness to insure in areas where production costs are lower than the insurance amount.

2.3. The Improvement of the Risk Diversification Mechanism for Catastrophes is Difficult

In the event of a severe natural disaster, serious livestock disease or a downturn in the agricultural market, the risks will not be spread and balanced across the region, and these

companies will face huge payouts, affecting their solvency and even their cash flow. The company's solvency would be affected, and even the adequacy and stability of its cash flow and ability to continue as a going concern. Therefore, it is not enough to simply require the relevant companies to make provisions for agricultural insurance catastrophe risks.

2.4. In-depth Reinsurance Business is Still in a Shallow State

China's agricultural insurance follows the underwriting policy orientation of low protection and wide coverage, but generally ignores the deeper reinsurance aspects of agricultural insurance. The reinsurance market generally holds a strict attitude towards the agricultural insurance business, rejecting types of insurance that feature high risk such as poverty insurance and local specialty insurance[3]. International reinsurers, on the other hand, tend to increase reinsurance premiums significantly after catastrophe events, and some even choose to withdraw from the agricultural reinsurance market. [4]Although the overall agricultural risk management level of the industry has been qualitatively improved after the establishment of the China Agricultural Insurance and Reinsurance Community, its membership is still limited to agricultural insurance companies and risks are still shared within the system without a risk export mechanism.

2.5. The Risk of Adverse Selection has Caused Commercial Insurance Institutions to Shy Away From it

Agricultural insurance is subject to the niche nature of the beneficiary group and information asymmetry in the production and operation process, so adverse selection risk is relatively common, i.e. the issuing insurance operators choose to avoid issuing agricultural insurance due to profitability and management input level. At the same time, if an insurance operator mishandles or violates the law, commercial organizations tend to be cautious about agricultural insurance products as they are heavily penalized due to the fact that agricultural insurance involves policy issues that benefit the people and farmers.

3. Optimisation Options for Risk Control Mechanisms in the Agricultural Insurance System

3.1. Boldly Pilot and Implement Differentiated Insurance Premium Subsidy Policies

For functional crops such as wheat, rice, maize, soybeans and rapeseeds, launch a pilot of bulk crop income insurance[5], focusing on promoting additional coverage type insurance products to increase the insurance coverage rate of small farmers; with a focus on high-standard farmland, launch a pilot of arable land index insurance to improve the efficiency of financial subsidies and positively incentivise land strength improvement[6]. Create a diversified system of insurance premium subsidies for different target groups: for smaller farmers, the government subsidises the full premium of the policyholder, thereby protecting against catastrophes with a low probability of occurrence; while for operators of new intelligent agriculture, the government provides subsidies for the basic cost of losses.

3.2. Refine Risk Zoning and Establish an Actuarial System for Agricultural Insurance Rates

Construct a national agricultural production risk map based on the frequency of vulnerability to mega-natural disasters and the extent of post-disaster damage, implement differentiated financial subsidy policies, and establish targeted agricultural insurance terms. A data sharing system for agricultural insurance will be constructed to lay a solid scientific foundation for proper agricultural insurance claims, so that the pricing of different types of agricultural insurance in each region will match the actual risk, and a scientific actuarial system for

agricultural insurance rates will be established. At the same time, we will optimise the layout of the grassroots network of agricultural insurance institutions, simplify the front office operation process, optimise the middle office business processing system and enhance the back office information-assisted decision-making capability, so as to fully implement the "three no-village" service of "no-village insurance, no-village claims and no-village payout". "The service will be provided by the company[7].

3.3. Refine Risk Zoning and Establish an Actuarial System for Agricultural Insurance Rates

The formal questionnaire is the offline delivery channel, and the sample service of the questionnaire star is used to convert the survey data into electronic data. This paper mainly conducts research through two channels, namely, visiting three brands such as Boxcar, 19 offline stores and conducting research in different communities in Nanjing and other cities. In order to further ensure the accuracy and authenticity of the data, the sample set was screened based on the consistency of questions and answers before and after the questionnaire. There were 534 remaining valid questionnaires, and the effective rate was 94.36%. The results of sample statistical analysis on the data collected by offline new retail stores and community surveys are shown in Table 2 and Table 3.

3.4. Innovate Service Content and Promote Structural Reform on the Supply Side of Agricultural Insurance

Pilot agricultural demonstration zones, combined with agricultural-related financial institutions, have established a modern agricultural development model that integrates "supporting agricultural insurance, helping agricultural financing and promoting agricultural services", expanded the scope of agricultural insurance operators, established a list of insurance subsidies for agricultural products with local advantages [8], increased the types of collateral for loans in accordance with local conditions, and provided large Agricultural equipment financing leases. Extend the agricultural insurance service chain, focus on filling the lack of risk management after insurance, provide agricultural industry chain risk management services, introduce special services such as land transfer, agricultural procurement, agricultural machinery operation, farming plant protection, agricultural waste disposal, agricultural production help marketing, etc. to protect expected rights and interests and help agricultural development.

3.5. Clarify Payout Obligations and Link up with Bank Credit to Help Farmers

Vigorously support the development of agricultural insurance products of the farmer loan promotion category, reasonably enhance the credit rating of high-quality farmers, especially large-scale operators, and allow banks to issue loans in the form of policy pledges to break the dilemma of difficult financing for small and medium-sized farmers [9]. At the same time, it is clear that banks are the first-ranking party to pay out compensation, and when the policyholder is unable to repay the loan, the insurance company will pay out the principal and interest of the loan to the bank. Through the credit enhancement function of agricultural insurance, it will promote the smooth flow of credit resources to poor areas and realize the interoperability and mutual assistance between agricultural insurance and rural credit.

4. Ideas for the Construction of a Food Production Support and Protection System based on the Agricultural Insurance System

Based on the objective reality of China's current Multi-level agricultural insurance, the current design of China's agricultural insurance can be adjusted from the core of risk compensation to the core of the "combination of risk compensation and income subsidy" approach, so that

agricultural insurance becomes an important way to subsidise the income of grain farmers. Specifically, for wheat, rice, maize and soybean varieties, income protection clauses are used to ensure the stability of farmers' income, while risk compensation contract clauses are used to underwrite losses in the event that farmers may suffer significant losses due to various external risk factors[10].

4.1. Case Assumptions

Taking maize insurance as an example, assuming that the guaranteed price announced in advance for the year is RMB1/catty and the local perennial yield of maize is 800 catties/acre, and that farmer A has chosen a coverage level of 85% when taking out the insurance, farmer A has locked in his future income of RMB680/acre if he achieves the perennial yield (referred to as "reaching production") ($800 \times 1 \times 0.85$). At harvest time, farmer A will face three possible scenarios.

First, the yield will meet or exceed the usual yield. Assuming that farmer A harvests 1,000 kg/mu of maize and the market price is RMB 0.7/kg, farmer A will receive an income subsidy of RMB 120 ($680 - 800 \times 0.7$) per mu from the agricultural insurance. What needs to be emphasized here is that even if the actual yield of the farmer exceeds the perennial yield, the perennial yield is used in the agricultural insurance income subsidy measurement, so as to encourage farmers to grow more and better food.

Secondly, the yield does not reach the normal yield, but is higher than the natural risk compensation standard. The new agricultural insurance will not pay claims in this case, so as to encourage farmers to achieve high yields in the coming year.

Thirdly, if the yield is below the natural risk compensation standard due to a disaster. Assuming that the compensation standard of the new agricultural insurance for farmers whose maize crop is lost due to the disaster is RMB 160/mu, and the maize yield of farmer A is reduced to 200 kg/mu due to the disaster and the market purchase price is RMB 0.7 per kg, then farmer A will receive RMB 20 ($160 - 200 \times 0.7$) per mu from the agricultural insurance as compensation for natural risks.

4.2. Simulation Calculation

In accordance with the design of the "combination of insurance and subsidies", we calculated the total amount of financial subsidies under the new scheme and compared it with the amount required under the current support policy system. The details are as follows.

4.2.1. Selection of Simulated Year Data

The programme measurement involved four major grain varieties, namely wheat, rice, maize and soybean. As 2015 was the peak production year for the four staple grain varieties of wheat, rice, maize and soybean in China, the production data required for the measurement was based on 2015. Accordingly, 2016 was the peak year for the purchase of the four staple grain varieties of wheat, rice, corn and soybeans in China, and therefore the data required for the measurement of the subsidy amount in the circulation field was based on 2016.

4.2.2. Selection of Market Price Data

The market price of grain is the core of the entire subsidy measurement work and is also a difficult point. The perennial implementation of minimum purchase prices for wheat and rice in China has led to domestic market prices for wheat and rice deviating from the real supply and demand for a long time[11], and the need to replace domestic market prices by converting international market prices later. To this end, for wheat varieties, we used the 2018 weighted import c.i.f. price of U.S. and Canadian wheat plus circulation costs as the benchmark to determine the domestic market price of wheat at RMB1/catty; for rice varieties, the 2018 weighted import c.i.f. price of Thai rice was used to invert the price of rice, while the domestic price ratio of corn, wheat and rice was referenced to determine the domestic market price of

rice at RMB1.1/catty; for corn varieties, as the market price has been liberalised, the average domestic maize purchase price in 2018 was used as the basis to determine the market price of maize at RMB0.9/catty; for the soybean variety, as it is highly dependent on the international market [12], the average domestic soybean purchase price and the CIF price of imported soybeans in 2018 were used as the basis to determine the market price of soybean at RMB1.75/catty.

4.2.3. Selection of Guaranteed Price Data

In order to ensure that the new system of "insurance and subsidy" grain subsidies does not reduce the strength of subsidies for farmers' income from grain cultivation, and to ensure the timeliness and accuracy of grain subsidy calculations, the guaranteed price of grain was set on the basis of the 2018 national minimum purchase prices for wheat and rice, as well as the prices of corn and soybeans after enjoying producer subsidies: ① The guaranteed price of wheat was set at RMB1.35 per catty. The guarantee price was determined to be RMB1.35/catty, and the calculated price of wheat subsidies was RMB1.15/catty if farmers were insured at 85% of the guarantee level, which was the same as the minimum purchase price of wheat in 2018. ② The guarantee price for rice was determined to be RMB1.47/catty, and the calculated price of the rice subsidy was RMB1.25/catty if farmers were insured at 85% of the guarantee level, which was the same as the 2018 average minimum purchase price for indica and japonica rice. ③ The guaranteed price for maize was determined to be RMB 1.18/catty, and the calculated price of the maize subsidy is RMB 1/catty if farmers are insured after 85% coverage level, which is the same as the 2015 maize temporary storage price (after 2016, the maize price support policy was changed to market price + producer subsidy, but the subsidy is comparable to the 2015 maize temporary storage price [13]). ④ The guaranteed price for soybeans was determined to be RMB 2.47/catty, and the calculated price for soybean subsidies is RMB 2.1/catty if farmers are insured at 85% of the guaranteed level, which is comparable to the 2018 soybean market price + producer subsidy support.

4.2.4. Measurement Results

Table 1. Estimation of the amount of food subsidies under the "combined insurance and subsidy" scheme (Unit: RMB billion)

Region	Wheat	Rice	Maize	Soybeans	Total
Total amount of subsidies to support the implementation of the "combination of risk and subsidy" in the areas covered by the policy	247	385	169	36	837
Nationwide implementation of the "combined insurance and subsidy" total subsidy	346	560	416	82	1404

Note: Total subsidy = guaranteed income - perennial production x market purchase price. Where, perennial production = actual average production x 90%, actual average production data is from data published by the National Bureau of Statistics.

Using the central government's 2020 subsidy funds of 163.2 billion yuan for grain distribution as a benchmark, and on the premise of maintaining the level of income subsidies for grain farmers and the scale of 140 billion jin of central reserve grain, based on available grain statistics and our calculations, if instead risk compensation is paid to farmers in the form of new agricultural insurance, there are two scenarios.

New agricultural insurance is carried out only in the wheat and rice minimum purchase price pre-programmed areas, as well as in the areas where subsidies for corn and soybean producers are implemented, i.e., covering the areas where the current grain price support policy is implemented. By integrating the current agricultural insurance system, the central government

will only need to subsidize new agricultural insurance to the tune of RMB 58.2 billion per year to achieve the subsidy effect of the current grain price support policy, which will save the central government RMB 105 billion per year This will save the central government RMB 105 billion annually.

Table 2. Comparison of funding requirements between the current food subsidy system and the "combined insurance and subsidy" system (I)

Comparison of subsidy systems	Subsidised projects	Amount (in billion)	Remarks
Current system	Total financial subsidies for food support policies in 2020	1632	
	Agricultural insurance premium subsidy	458	Can be automatically transferred to the new agricultural insurance system of "combined insurance and subsidy" to offset the financial subsidy expenditure "combined insurance and subsidy"
New system	Amount of subsidy	837	Theoretical measurements
	Add	20	Agricultural reinsurance company operating costs
	Add	86	Agricultural insurance company operating expenses
	Add	97	Custodial costs of maintaining a consensual stock of 140 billion pounds of central reserve grain
Financial savings	-	1050	

Table 3. Comparison of funding requirements between the current food subsidy system and the "combined insurance and subsidy" system (II)

Comparison of subsidy systems	Subsidised projects	Amount (in billion)	Remarks
Current system	Total financial subsidies for food support policies in 2020	1632	Can be automatically transferred to the new agricultural insurance system of "combined insurance and subsidy" to offset the financial subsidy expenditure "combined insurance and subsidy"
	Agricultural insurance premium subsidy	458	
New system	Amount of subsidy	1404	Theoretical measurements
	Add	20	Agricultural reinsurance company operating costs
	Add	86	Agricultural insurance company operating expenses
	Add	97	Custodial costs of maintaining a consensual stock of 140 billion pounds of central reserve grain
Financial savings	-	483	

By integrating the existing agricultural insurance system, the central government would only need to subsidize RMB 114.9 billion per year for new agricultural insurance, which would enable all grain farmers in the country to enjoy the same level of subsidy benefits as those in the regions where the current grain price support policy is implemented, saving the central government RMB 48.3 billion per year.

5. Future Trends in Risk Control Mechanisms in Agricultural Insurance Systems

Based on the current situation and problems of the risk control mechanism in China's agricultural insurance system, the author believes that the risk control mechanism in the agricultural insurance system will show the following three major changes: from administrative decision to market contract, from financial relief to insurance settlement, from government management to market service. On the basis of agricultural insurance risk management, the function of economic compensation will be given full play. [14]The risks borne by individual agricultural producers alone will be transformed into centralised management and reasonable dispersion of risks by insurance companies, thereby safeguarding the interests of individual agricultural producers. While strengthening the government's positioning, the relationship between the government and the market will be clarified to reduce the problems of irregularities, compliance management and premiums that actually exist in the agricultural insurance market. Specific problems that have arisen in practice will be effectively avoided, further ensuring the high speed and quality development of agricultural insurance and improving the professional operating capacity of market players.

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