

“Insurance + Remote Sensing” Double Flying, Help Anhui Rural Revitalization and Development Analysis

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Abstract

The report to the 19th National Congress of the Communist Party of China put forward the rural revitalization strategy, stressing the need to continuously push agriculture and rural areas toward modernization, so that hundreds of millions of rural households in China can achieve a better and happy life. In order to modernize agriculture and rural areas, it is necessary to serve the agricultural industry with modern means and scientific technology, and make agricultural production more modern. As an important part of agricultural science and technology innovation, remote sensing technology is becoming more and more widely used in agriculture. First on the basis of analyzing the development status of agricultural insurance in Anhui Province, this paper proposes the problems faced in the development process of agricultural insurance in Anhui Province. Secondly, for the above problems encountered in the development of agricultural insurance, the role of remote sensing technology applied in agricultural insurance is expounded, and then the still existing problems of "insurance + remote sensing" applied in agriculture in Anhui Province are analyzed. Finally, it puts forward the suggestion that remote sensing technology should be applied to the development of agricultural insurance in Anhui province in the future, and helps to help "insurance + remote sensing" to promote the development of rural revitalization in Anhui province.

Keywords

Rural Revitalization; Remote Sensing Technology; Anhui Province; Agricultural Insurance.

1. Foreword

The 14th Five-Year Plan makes overall plans for giving priority to developing agriculture and rural areas in the new stage of development and comprehensively promoting rural revitalization, pointing out the direction for the work on agriculture, rural areas and farmers at present and for a period to come. At the same time, the central committee of the communist party of China of the State Council on promoting rural revitalization of accelerate agriculture and rural modernization of the implementation of digital rural construction development project, speed up the construction of agricultural rural remote sensing satellite facilities, develop wisdom agriculture, establish agricultural rural big data system, promote a new generation of information technology and agricultural production experience depth fusion. As satellite remote sensing is listed as a strategic emerging industry by the country, the supply capacity of remote sensing data resources in China has been rapidly enhanced. Relying on the multi-type, high-quality, stable, reliable and large-scale comprehensive spatial information comprehensive service capability, the application of satellite remote sensing technology in natural resources, agriculture, ecological environment and other fields has developed vigorously, better supporting the comprehensive application of various industries. In recent years, with the increasing financial support for "three" rural, in the field of financial credit, Banks using satellite remote sensing technology to further improve agricultural and rural credit assets data and risk monitoring mechanism, improve agricultural financial service quality effect,

fu can agricultural industry modernization, provide support for the rural revitalization of national strategy. Therefore, this paper mainly analyzes the advantages of remote sensing technology in agricultural insurance application area, and then analyzes the problems existing in the application of remote sensing technology in Anhui Province. In view of these problems, we put forward the rationalization suggestions of "insurance + remote sensing" for the development of agriculture in our province, so as to promote the agricultural development of our province and help the rural revitalization and development of Anhui Province.

2. Overview of the Development of Agricultural Insurance in Anhui Province

Anhui province is a big agricultural province in China. Agricultural production affects the economic development of our province and farmers' production and life. However, agriculture in our province is often affected by climate conditions, producing serious natural disasters, threatening the normal growth of crops and the economic safety of farmers. Since the implementation of agricultural insurance in Anhui province, it has shown the characteristics of relatively high loss ratio and greater risk, but the overall operation condition is good, which plays an obvious positive role in the development of agriculture in Anhui province.

2.1. Agricultural Disasters in Anhui Province

Anhui province is located in the north-south transition zone, and the climate change range is relatively large during the season change, especially in the relatively low-lying basins like the Yangtze River and the Huaihe River, resulting in frequent meteorological disasters in Anhui Province and a relatively wide range, seriously endangering the agricultural production in Anhui province. Such as drought and flood disasters, hail, freezing damage, strong wind and even overcast rain are relatively high kinds of disasters in our province. The specific conditions of disasters are as shown in Table 1.

Table 1. The specific situation of several types of disasters

disaster types	Disaster specific situation	harm
Drought and flood disaster	CONTINUOUS HEAVY RAINFALL PERSISTENT HIGH HEAT OR NO RAINFALL	CAUSE CROPS TO DROWN OR WASH AWAY CAUSE CROP YIELD REDUCTION OR FAILURE
hail	SPECIAL GEOGRAPHY AND CLIMATIC CONDITIONS WORK TOGETHER	CAUSE MECHANICAL DAMAGE TO CROPS
Freezing harm	CHILLING INJURY FREEDAMAGE (FROST, COLD WAVE)	NORMAL GROWTH AND DEVELOPMENT ARE BLOCKED OR SLOWED DOWN CAUSE DAMAGE TO CROP PROTOPLASM
fresh gale	TRANSIENT MAXIMUM WIND SPEED OF 17.2M/S (ABOVE LEVEL 6)	CAUSE CROP STALK TO BREAK, VEGETATION LODGING, AGRICULTURAL EQUIPMENT DAMAGE
Even the rain	IT LASTED FOR MORE THAN FIVE DAYS OF CLOUDY AND RAINY DAYS	AFFECT CROP SOWING, FLOWERING AND POLLINATION

Source: Public data collection

2.2. The Development of Agricultural Insurance

In recent years, Anhui province is committed to the development of health agricultural insurance, and strive to promote rapid development, gradually formed the basic agricultural insurance covering the province's farmers, agricultural supplementary insurance and agricultural disasters insurance has the scale of the economic main body, and open full cost

insurance pilot, agricultural characteristics of "one county product" the healthy development trend. Anhui Provincial Committee and Anhui Provincial government have been highly concerned about the work of agricultural development. Since 2009, the provincial government has included agricultural insurance into the livelihood project of Anhui Province for ten consecutive years, making Anhui province the first province in China that the agricultural insurance covers a crop area of more than 100 million mu, and the agricultural insurance coverage covers the whole province.

2.2.1. Gradually Form a Multi-Level Agricultural Insurance Insurance System

In 2017 and 2020, the Anhui Provincial government held two on-site promotion meetings for the provincial agricultural insurance work, respectively, in order to promote the transformation and upgrading of agricultural insurance. During this period, the financial departments at all levels in Anhui province were respectively guided by the needs of the development of agriculture, rural areas and farmers, focusing on increasing the financial input in agriculture, and promoting the continuous upgrading and development of agricultural insurance. With the strong support of the government, the insurance product system of insurance companies is also constantly enriched. The policy-based agricultural insurance in our province has included the three categories of planting, breeding and forestry, 14 varieties and 21 products stipulated by the state into the scope of insurance subsidies, realizing the full coverage of planting, breeding and forestry, and the product types rank among the top in China. In addition, the provincial finance also implements the way of incentive policies instead of subsidies, encouraging all localities to carry out business according to their own local characteristics and farmers' needs, and to develop crops with local characteristics such as tea, aquatic products and Chinese medicinal materials with local characteristics. Compared with 2019 and 2020, the various characteristic agricultural insurance products in our province increased by 32, and the total number of products reached 202. (Data source: Anhui Provincial Finance Department <http://czt.ah.gov.cn/index.html>).

2.2.2. The Security Level and Scope of Agricultural Insurance Coverage have been Steadily Improved

My province's agricultural guarantee level and guarantee scope are steadily improved. According to the adjustment of the insurance industry and the change of industrial upgrading, a dynamic adjustment mechanism is established to continuously improve the guarantee of agricultural insurance. In 2020, the agricultural insurance hazard pilot areas of wheat, rice and corn three major food crops coverage increased to 650 yuan per mu, 800 yuan per mu and 550 yuan per mu, can fattening pigs, numerous sows coverage also rose to 800 yuan per head and 1500 yuan per head, public forest and commercial forest coverage also increased to 780 yuan per mu and 1000 yuan per mu, the specific situation table 2. (Data source: Anhui Provincial Finance Department <http://czt.ah.gov.cn/index.html>)

Table 2. Crop improvement indicators in Anhui Province in 2020

Unit / Product Type	Wheat	paddy	corn
Yuan / mu	600	800	550
Unit / Product Type	growing and fattening pigs	The breeding sow	
Yuan / head	800	1500	
Unit / Product Type	public welfare forest	Commodity forest	
Yuan / mu	780	1000	

The coverage of insurance is also expanding. In 2020, the insurance coverage rate of wheat, rice and corn, the three major grain crops in the province, will reach 95 percent, reaching the

national target of more than 70 percent by 2022 ahead of schedule. The depth of insurance has reached the national target of 1% for 2022, reaching 1.04%. Wheat, rice and corn, the three major food crops covered by disaster insurance, have been expanded from 16 districts to 35 districts. In addition, four countries have tried full coverage for two consecutive years. Of this amount is 10.4 billion yuan. State aid; 72.4 million farmers received 528.8 billion yuan, 12 billion yuan in insurance compensation and 24.58 million farmers.

2.2.3. Construction of Agricultural Insurance Innovation Model Gradually

In order to innovate the agricultural insurance system, Anhui province took the lead in establishing a three-level insurance guarantee system scheme of "basic insurance + major disaster insurance + commercial insurance". During the 13th Five-Year Plan period, the central policy field crop-based insurance not only promoted the introduction of basic insurance, but also covered 470 million people. A total of 316 billion yuan was provided to 67.1 million farmers. In terms of disaster insurance, 4.88 million people were covered in the 16 pilot areas each in 2018 and 2019.mu. A total of 5.64 million mu was planted, up 72 percent and 16 percent respectively over the previous year, and the number of affected farmers reached 20,000 and 27,000, respectively. After the expansion to the 35 pilot areas in 2030, the three most important cereal crops were 48.3 million. Premium income amounted to 1.32 billion yuan, of which 1.05 billion yuan for governments at all levels; in addition, as part of promoting the connection between supplementary professional insurance and disaster insurance, three pilot areas have been implemented, including supplementary professional insurance for rice, wheat and corn. During the 13th Five-Year Plan period, the total commercial insurance premium in Anhui province reached 230 million yuan, providing protection for 284,000 farmers. The risk protection fund was 5.4 billion yuan, the actual insurance compensation was 250 million yuan, and the income of farmers was 1.211 million people. (Data source: Anhui Provincial Finance Department)

In terms of agricultural insurance work innovation, since 2017, Anhui province has actively implemented an innovative poverty alleviation insurance model, and gradually implemented comprehensive poverty alleviation insurance such as "deep poverty insurance" and "anti-poverty return insurance" in 33 districts of 11 cities. From 2017 to 2020, the cumulative fiscal premium income of all cities and counties reached 160 million yuan, providing 145.74 billion yuan of risk guarantee to 1.856 million poor farmers. Second, we will complete trials of full-cost insurance. Since 2019, Anhui province has implemented full-cost insurance for the first time in four pilot projects, covering a total of 3.24 million mu and with an insurance rate of 94.7%, actually receiving 56,000 farmers and receiving a compensation amount of 280 million yuan. The last point is the implementation of the special agricultural insurance policy. Anhui province suffered from a massive flood in 2020. To better reduce disaster losses, Anhui province has introduced some special measures, such as providing "housing and compensation" for flood control camps. In the end, the actual compensation for the flood was 2.13 billion yuan, compensating 1.945 million farmers. (Data source: Anhui Provincial Finance Department).

2.3. Problems Facing the Development of Agricultural Insurance in Anhui Province

2.3.1. The Underwriting and Claims Cost of Insurance Companies is High

Compared with the risks faced by agricultural insurance and ordinary property insurance, the insured subject matter of agricultural insurance has a higher risk and a greater uncertainty, which leads to the subsequent risks of agricultural insurance. Investigation, damage determination and claim settlement process is more complex, the claim cost is higher. On the other hand, in the traditional agricultural insurance claims and underwriting business, the insurance company uses the artificial way to verify and determine the insured subject matter, which causes a lot of waste of manpower and time. Moreover, the subject matter of

insurance insured by agricultural insurance is generally relatively large and wide in scope. The use of manual underwriting and loss determination not only improves the cost of claims and underwriting, but also if the staff makes measurement and calculation errors, the re-calculation needs additional costs, which greatly reduces the work efficiency of the insurance company.

2.3.2. Information Asymmetry Exists between Farmers and Insurance Companies

The mode of agricultural production is very different from other industries, because agricultural production is highly dependent on natural factors. However natural factors variation is difficult to human control, so the insurance company in the process of obtaining the crops underwriting information cost is increasing, but the insurance company is limited by insurance costs, can not expand the collection of underwriting information cost, which causes the agricultural insurance market information asymmetry problem. In addition, after insured the agricultural insurance products, farmers neglect the management and maintenance of the insured crops, which greatly increases the probability of loss of the subject matter, and the scope of risk loss is also expanding. The problem of information asymmetry existing between farmers and insurance companies often causes the occurrence of farmers' moral hazard behavior, and the problem of moral hazard behavior caused by farmers is often listed as follows. First of all, in the moral problems of farmers in disaster prevention and loss reduction, the crops insured by farmers are not only affected by climatic factors and natural conditions, but also the management mode of farmers is largely very important. If farmers neglect the management of crops after insurance, the underwriting cost will be greatly increased. The second is the moral hazard caused by farmers' intentional behavior. Some policy-holders in order to obtain higher insurance compensation, deliberately expand insurance loss or cause insurance accident to cause cheat insurance behavior. For agricultural insurance companies, it is difficult to measure the insured matter when settling the claim. If the insured farmers deliberately expand the loss of the insured matter, it is difficult for the insurance company to find, so the speculative behavior of the farmers causes the loss of the insurance company.

2.3.3. The Enthusiasm of Farmers in Some Areas to Participate in the Insurance is not High

Although the coverage rate of agricultural insurance in my province is greatly improved, but there are still some areas of the farmers' insurance enthusiasm is not high, through understanding, there are mainly the following reasons. First, farmers in some areas of insurance awareness is relatively weak, are not willing to spend insurance for their crops. Second, many farmers think that their sown crops are too small enough to get an insurance policy. Third, there is a large gap between the amount of insurance claims and the expectations of farmers. Some farmers feel that the amount of insurance claims cannot meet their economic losses, which is caused by the gap between the claims standards of insurance companies and the actual sales of crops in the market.

3. The Role of Remote Sensing Technology on the Development of Agricultural Insurance in Anhui Province

3.1. Reduce the Underwriting and Claims Costs of Insurance Companies

The biggest characteristic and direct role of remote sensing technology in agricultural insurance application is to significantly improve the efficiency of insurance companies and reduce company costs. Compared with the manual underwriting and compensation of traditional agricultural insurance, the images of the insured subject matter obtained by agricultural insurance companies using remote sensing technology and UAV technology are more clear and complete, and they can explain the actual situation of the insured subject matter objectively and fairly, which can accurately understand the growth status of crops and the

disaster situation. In the underwriting process, the understanding of the underwriting crop information is more accurate and fast, and the area measurement and risk determination of the damaged target in the claims settlement process are more accurate. Therefore, the use of remote sensing technology not only greatly improves the efficiency of insurance companies, but also saves a lot of time and labor costs, which brings convenience to both insurance companies and farmers. For example, in July 2020, continuous heavy rain occurred in Anhui province during the plum rain season, causing 1.236 million peasant households. The damaged area of crops reached 924,000 hectares, causing direct economic losses of 1.47 billion yuan. Guoyuan Insurance received more than 4,080 cases, and the estimated loss amount was about 100 million yuan. In the face of disaster, Guoyuan insurance timely carry out rescue and relief and claims work, fully do a good job of rapid disaster relief, timely claims. In view of the serious disaster, wide scope and difficult actual investigation, Guoyuan Insurance has strengthened technological innovation and got rid of the traditional survey and damage determination method. The Tongling Central Branch of Guoyuan Insurance has adopted satellite remote sensing monitoring as the main method and uav survey as the auxiliary method. Through satellite remote sensing technology, the index of insured crops is quickly extracted to accurately reflect the growth status of crops. Through the analysis of the crop index, the insured crops are classified into disasters, forming a spectral map of the vegetation growth status and the damage situation, and helping the agricultural insurance to complete the inspection target, survey and damage determination. Remote sensing technology effectively solves the difficult problems in the investigation process and improves the efficiency of post-disaster claim settlement..8 (Data source: Guoyuan Financial Holding Group <https://www.gyjkt.com.cn/index.html>).

3.2. Reduce the Information Asymmetry between Farmers and Insurance Companies

Moral hazard and inverse choice in information asymmetry are the challenges faced by insurance companies in the process of development, and they are especially obvious in agricultural insurance. Such as insured farmers in underwriting and claims, in order to get a higher insurance amount, may deliberately hide some important facts to the insurance company, but the insurance company is limited by the technical conditions, not timely and accurate development problems, caused the actual claims amount is higher than the expected claims amount, bring economic losses to the insurance company. The application of satellite remote sensing technology to agricultural insurance can quickly and accurately judge the growth situation and the disaster situation of the insured crops, which reduces the farmers to a certain extent .Information asymmetry with insurance companies, thus alleviating the problem of moral hazard and inverse selection. For example, in 2020, Taiping Property Insurance started with repeated insurance and false insurance, and cooperated with Jiagtiandi Technology Co., Ltd. to launch the "E agricultural insurance" project. The project of remote sensing satellite images, crop planting species, planting area data, with the help of big data technology of the data superposition analysis, draw the agricultural insurance business panorama, let farmers to online insurance, self-help claims, at the same time, the insurance company can also through comparing the plot data, crop data and policy data, determine whether there is repeated insurance, false insurance behavior, reasonable to avoid farmers' moral hazard and adverse selection, promote the benign development of agricultural insurance business.

3.3. Improve the Enthusiasm of Farmers to Participate in the Insurance

Although our province is a big agricultural province in the whole country, the agricultural insurance also has a very big market, but the overall agricultural insurance level still shows not strong but not active phenomenon. Because the insurance consciousness of farmers is not strong, not willing to insure caused the insurance density and insurance depth of our province

is relatively backward. But with the digital popularity of the insurance industry, improve the electronic degree of insurance, the Anhui province government and insurance companies also gradually popularize agricultural online insurance service platform, insured farmers can know more information about agricultural products through the Internet, other insurance companies also innovative new insurance products, not only reflected in the product design, in the underwriting each link also reflected. The introduction of satellite remote sensing technology into the insurance link can not only facilitate the exhibition of insurance companies to both insured farmers and insurance companies, but also provide farmers with the growth status, climate monitoring, danger early warning and other additional services, so as to expand the needs of farmers and improve the enthusiasm of farmers for insurance. For example, the risk management sector included in the e Agricultural Insurance APP integrates many functions, such as meteorological certificate, disaster warning, risk map, meteorological service and Smart agricultural Rui field, to provide farmers with rich and accurate risk data and information, and help farmers take reasonable disaster prevention and loss reduction measures.

4. Application of Remote Sensing Technology to Agricultural Insurance Problems

4.1. Anti-Verification of the Moral Hazard Exists

Moral hazard detection plays an important role in the application of remote sensing technology in traditional agricultural insurance, mainly to prevent moral hazard. The important role of remote sensing technology in traditional agricultural insurance is to carry out moral hazard detection to prevent the increase of project risk level and the occurrence of insurance fraud due to the occurrence of moral hazard. At the same time, commercial insurance companies are reluctant to disclose the verification function of remote sensing to prevent verification partners from developing an anti-verification business. However, the insurance contract signed by the insurance company and the applicant and the procedures for performing the contract should be open and transparent. Therefore, if the review content is not disclosed, the insurance contract is violated, and the relationship between insurance companies and policyholders may deteriorate if remote sensing technology is often used to detect moral hazard.

4.2. The Value-Added Effect of Traditional Business is not Obvious

On the basis of the traditional insurance claim business, the application of remote sensing technology is mainly reflected in the business operation of mechanical automation. The use of remote sensing technology essentially does not reduce the insurance business link, but only optimizes the traditional business model through scientific and technological means. The application of remote sensing technology in agricultural insurance only makes underwriting and claims settlement more intelligent, but it does not simplify business processes. However, remote sensing index insurance and other index insurance aim to reduce part of the process in the insurance business. A scientific and fair index can help insurance companies to avoid processing and verifying the amount of claims and fraud, thus reducing the cost caused by moral hazard and reverse. However, it is still worth noting that there are still a lack of comparative evaluation studies between the costs and benefits of index insurance and claim insurance.

4.3. Limitation of Technical Factors

Agricultural index insurance, and remote sensing technology developed by agricultural insurance, is widely used, but because the current technical level is not high, the index insurance is facing many problems in the process of development. The first is the problem of data continuity. Due to the limitation of the current technical level, the satellite images obtained by remote sensing technology can not guarantee the continuous provision of data, and then this

cannot meet the requirements of stable and sustainable data flow development of agricultural insurance, which limits the application of remote sensing technology of agricultural index insurance to some extent. Secondly, the data quality cannot be guaranteed, because the satellite sensor will be disturbed by some external factors in the process of sensing, and the data obtained may be noisy due to the influence of some undetected meteorological conditions. Finally, there is the spatial resolution of data, remote sensing technology has the role of high resolution of data, and it may need to obtain more profits through high resolution data in the loss assessment link. But for agricultural index insurance does not need such a high spatial resolution.

5. Give Full Play to the "Insurance + Remote Sensing" to Help the Rural Revitalization and Development in Anhui Province Suggestions

5.1. Improve Relevant Laws, Regulations and Policies

The Regulations on agricultural insurance-related laws cannot meet the current development situation, so the relevant government departments have recently issued the Agricultural Insurance Law and made relevant amendments to the Regulations. In the newly revised laws and policies, more attention is paid to the practical problems of the current development of agricultural insurance. In view of the disadvantages exposed by the combination of high and new science and technology and agricultural insurance, more targeted laws are established in the process of formulating laws and regulations. Under the restriction of relevant laws, the combination of science and technology and agricultural insurance is more compliant and standardized. In this process, it not only protects the interests of insurance companies, but also makes the application of science and technology more legal and compliant. To ensure that insurance companies can actively innovate in a healthier legal environment, and promote the development of China's agricultural insurance in the direction of high-tech and high-quality.

5.2. Formulate Standardized Procedures to Reduce the Information Difference between Both Sides

Information asymmetry between insurance companies and customers is the insurance companies in the process of development, so the information asymmetry between insurance companies and farmers, the cause of the information asymmetry mainly has two aspects, on the one hand is the application of remote sensing technology in agriculture did not form a unified standard, on the other hand is due to the limitation of agricultural knowledge level of remote sensing image cannot be good understanding and recognition. For the two issues mentioned above, Because the insurance industry actively cooperates with relevant technical departments to formulate the standardization system of remote sensing technology applied to each process of agricultural insurance, At the same time, the model and indicators used by remote sensing technology are unified and specified, So that insurance companies can not choose remote sensing technology at will; In addition, insurance companies can publicize the relevant knowledge of remote sensing technology to farmers through two online and offline ways, Online, the relevant knowledge about remote sensing technology can be embedded through a network platform, Some knowledge popularization activities can be organized offline, Through these ways, let the farmers better understand the relevant knowledge and application process of remote sensing technology, So that farmers can better identify the remote sensing technology, Can make the information use of remote sensing technology more transparent, To some extent, we can reduce the moral hazard caused by insurance companies in order to obtain unjust enrichment.

5.3. Optimize the Financial Environment and Service Technology of Remote Sensing Technology

Form a consensus on building satellite remote sensing technology infrastructure, accelerate the pace of financial industry construction, improve the financial ecological environment; build the technical infrastructure such as the Internet of Things platform and remote sensing image recognition services, promote agricultural remote sensing monitoring, combine satellite remote sensing technology and drones, sensors and other facilities to monitor agricultural assets and environmental changes, realize intelligent management, boost credit risk control, inclusive finance and supply chain finance business innovation and development. Further explore the innovative ideas of satellite remote sensing technology and financial scene integration, study infrared remote sensing, luminous remote sensing and other new technologies, and in nong matching, forestry monitoring and other financial credit scene innovation, continuously explore business scenarios, gradually enhance the satellite remote sensing system construction capacity, achieve business empowerment; satellite remote sensing image analysis ability as an important part of the bank risk control system, effectively control credit risks, accelerate the implementation of innovative application scenarios, enhance the ability of financial technology to support business development. Satellite remote sensing technology, as an emerging technology of the financial industry application, has not yet formed a unified standard, especially in the financial industry with strong regulatory requirements, it is suggested to actively carry out the formulation of satellite remote sensing technology standards in the financial field, establish and improve the application and access standards, and promote the standard application and rapid development of the financial industry.

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