Analysis on the effect of farmer income of policy-based agricultural insurance

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**ABSTRACT**

The effect of policy-oriented agricultural insurance on increasing farmers’ income has been controversial all the time. In light of this, this paper first clarifies the operation mechanism of policy-oriented agricultural insurance and its influence mechanism on farmers’ income from the theoratical level. Secondly, the fixed-effect model and panel quantile regression are used to empirically test the income effect of policy-based agricultural insurance on farmers, especially the effect on farmers of different income groups based on the panel data of 31 provinces (autonomous regions and municipalities directly under the central government) in China from 2007 to 2019. The results show that although policy-oriented agricultural insurance is beneficial to the increase of farmers’ income on the whole, which has significant heterogeneity on farmers of different income groups, and its influence becomes greater with the increase of farmers’ income. In the future, China should attach importance to the design of differentiated subsidy system, adhere to demand orientation so as to be vigilant that agricultural insurance will become the inducement of widening income gap in rural areas on the basis of vigorously develop policy-based agricultural insurance in a continuous manner.

**Introduction**

At the beginning of 2001, the Central Agriculture Work Conference pointed out that the prominent problem in agriculture and rural work at the beginning of the twenty-first century was the difficulty in increasing farmers’ income with the main performance that the per capita net income of farmers has been growing slowly for many years, the income of many pure farmers has remained unchanged or even decreased, and the income gap between urban and rural residents is still widening. In order to increase farmers’ income in a steady manner. In 2004, The CPC Central Committee and the State Council promulgated the No. 1 document Opinions on Policies for Promoting the Increase of Farmers Income concerning agriculture, rural areas and farmers in the new era, which, for the first time, proposed policy agricultural insurance system, and parts of some products and pilot for insurance are selected, and the spirit of the guidance of government subsidies is given. Issues relating to ‘agriculture, rural areas and farmers’ are the core to increase farmers’ income. In order to further strengthen the work related to agriculture, rural areas and farmers, the No. 1 document Opinions on Developing Modern Agriculture Actively and Promoting the Construction of a New Socialist Countryside in 2007 once again proposed to expand the scope of the pilot insurance for policy-based agriculture. The central government, provincial government and municipal (county) government will provide insurance premium subsidies to rural households participating in the insurance in accordance with the principle of government guidance, policy support, market operation and voluntary participation of farmers. In recent years, with the new demands of supply-side structural reform in agriculture in China and rural revitalisation strategy in the new era, policy-based agricultural insurance has become more significant in the agricultural support and protection system. Agricultural insurance is a useful tool for landowners to mitigate losses caused by natural disasters like floods, drought, and pest attacks epidemics. It helps the farmers to acquire loans and finance for the purchase of new technology, tools, and machinery in order to improve and maintain their productivity. It lowers the likelihood of a business failure. In agriculture, equipment and property are employed in activities that can be damaged or destroyed in a brief moment caused by human error. Agricultural insurance can assist mitigate these hazards. It also helps farmers manage their
cash flow and offers a cash reserve in which to repair damaged businesses. In September 2019, the Ministry of Finance, the Ministry of Agriculture and Rural Affairs, the China Banking Regulatory Commission, the Insurance Regulatory Commission and the Forestry and Grassland Administration issued the Guiding Opinions on Accelerating the High-quality Development of Agricultural Insurance, proposing new requirements on improving service capacity, optimising operation mechanism and strengthening infrastructure construction of agricultural insurance, which better meet the growing demand for risk protection in agriculture, rural areas and farmers.

Under the high attention and strong support of the central government. Since the launch of policy-based agricultural insurance system in 2004 and the implementation of pilot financial premium subsidies in 2007 and the coverage of subsidies in 31 provinces (autonomous regions and municipalities directly under the central government) in 2012, China’s premium income has reversed the previously languishing trend, and agricultural insurance has maintained a good momentum of sustainable development. China’s premium income increased from 5.18 billion yuan in 2007–81.5 billion yuan in 2020, compared with 67.2 billion yuan in the previous year with an increase of 21.3% year on year and the growth rate of premium significantly outperforms the growth rate of the property insurance industry. Risk protection has increased from 112.6 billion for 49.61 million rural households in 2007–3.6 trillion for 180 million rural households in 2019. Since 2008, more than 240 billion yuan of insurance reparations have been paid to 360 million agricultural insurance households. At present, the national agricultural insurance has covered more than 270 kinds of crop varieties, basically covering bulk agricultural products that are important to the national economy and people’s livelihood and food security. There is no doubt that the scale of policy-based agricultural insurance in China has steadily ranked the first in Asia and the second in the world.

Agricultural insurance is divided into three categories: animal farm insurance, crop insurance schemes, and farm asset and machinery agricultural programmes. However, while the agricultural insurance market is booming, there are some problems in some areas, such as the shortage of financial subsidy funds at the city (county) level, the single type of insurance, the deviation between insurance company survey and actual compensation payment, the weak awareness of farmers’ participation in insurance, and the serious moral hazard. More importantly, most of China’s current policy-based agricultural insurance only covers direct physical and chemical costs such as seed cost, fertiliser cost, pesticide cost, irrigation cost, machine tillage cost and plastic film cost during agricultural production, which fails to cover land rent, labour and other costs. Taking rice as an example, the insurance amount is 226.7-500 yuan per Mu, but the total cost of planting rice is 1,108.34 yuan per mu, and the insurance amount only accounts for 20.45-45.11% of the cost per mu. Once a serious natural disaster occurs, the economic losses suffered by farmers cannot be compensated enough, which will directly affect the expected income level of farmers. At the beginning, the government established the policy-based agricultural insurance system to enable all the people to share the fruits of the reform and development that supported agriculture and benefited farmers. However, during the more than ten years of policy-based agricultural insurance development and based on the China Rural Statistical Yearbook, the per capita income of rural residents in China is divided into five equal groups from low to high. The ratio of per capita income of rural residents in the high–low-income groups has risen from 7.52:1 in 2008–10.2:1 in 2020, and the gap among rural residents has widened significantly.

As the core of issues relating to agriculture, rural areas and farmers, increasing farmers’ income is a common concern of all sectors of society, and also an important embodiment of agricultural insurance services for agriculture, rural areas and farmers. Therefore, with the development of policy-based agricultural insurance in China, what kind of impact will it have on the income effect of farmers in China? Generally speaking, income effect is divided into income level and income gap. So, in other words, will policy-based agricultural insurance really increase the income level of farmers? In particular, can farmers of different income levels share the development dividend of this policy? This is the essence of the question that this paper tries to explore.

Literature review

Against the background of accelerating the realisation of agricultural modernisation, to ensure the stable growth of farmers’ income has become one of the important policy objectives of China’s agricultural insurance at this stage (Guozhu and Qiao 2018). Since the central finance increased the budget item of agricultural insurance premium subsidy in 2007, agricultural insurance has become an important part of China’s agricultural support and protection policies. The relationship between policy-based agricultural insurance and farmers’ income has become a hot topic of concern and exploration from all walks of life.

It can be found from previous literature that the research on the relationship between agricultural
insurance and household income can be traced back to the 1980s. As early as (1986), Yamauchi studied farmers who bought rice insurance in Aomori Prefecture, Japan, and found, after analysis, that agricultural insurance was conducive to stabilising farmers’ incomes during severe disaster years. Ashimwe (2016) studied the impact of agricultural insurance schemes on household income of Rwandan farmers and found that the annual household income of uninsured farmers was on average $100 less than that of insured farmers. Armand et al. (2018) explored the impact of rice insurance scheme on farmers’ income in the Philippines, and found that the economic burden of insured farmers was significantly reduced, and the average loss of uninsured farms was 94% higher than that of insured farms.

On the basis of drawing on the research conclusions of foreign scholars, According to China’s national conditions, domestic scholars mainly explored the income effect of agricultural insurance on farmers from the following aspects. First, agricultural insurance explores the relationship between agricultural output scale or output and farmers’ income. As the family welfare is concentrated to work, the focus of agricultural production is shifted from grain planting to non-grain industries, leading to the negative impact of policy-based agricultural insurance under fiscal subsidies on the scale of agricultural output and the obvious lack of incentive intensity on farmers’ income (Zhuo et al. 2019). Secondly, the development level or popularisation of policy-based agricultural insurance can be used to measure the income increase of farmers. Wenxiang and Shengwei (2019) believe that there is a distinct threshold effect on the impact of agricultural insurance on farmers’ income. Only when the income of farmers increases to a certain extent, the effect of increasing the income of farmers will appear. Based on the idea of quasi-natural experiment, Ma Jiujie et al. (2020) took the policy-based agricultural insurance pilot programme in various provinces of China as exogenous impact and the long-term impact of the promotion of policy-based agricultural insurance on the income and income structure of rural residents is evaluated. Third, the government redistributes national income between disaster-affected and non-disaster-affected farmers through premium subsidies, thus affecting the expected income of farmers. Policy-based agricultural insurance encourages farmers to make decision on insurance participation through premium subsidies. Premium subsidies are tax breaks that can be collected in advance and given directly to the health insurance company each monthly to lessen the quantity of premium you have had to pay. The insured farmers change the planting structure and increase the demand for agricultural insurance, so that agricultural insurance covers the planting risk of food crops and plays a stabiliser role for the income of food and agriculture (Wei and Rong 2016).

However, Zhang Zurong and Guojun (2016) pointed out that although fiscal subsidies stimulated agricultural production, they increased the supply of agricultural products and led to lower prices of agricultural products, which may have a negative impact on farmers’ income and at the same time, make adverse selection and moral hazard more serious. Fourthly, focusing on rural poor groups, the paper measures the impact of policy-based agricultural insurance on the income level of poor households. Liu Hancheng and Tao Jianping (2020), based on the data of China Family Panel Studies (CFPS) from 2014 to 2018, found that the slanted agricultural insurance poverty alleviation policy could significantly improve the income level of the rural poor households, but its effect on poverty alleviation was different, and the phenomenon of returning to poverty while getting rid of poverty still existed in rural areas. Through the analysis of the income level and income structure of rural residents in poor areas, Zhang Wei (2020) found that agricultural insurance with a higher guarantee level can significantly improve the disposable income of farmers in poor areas after natural disasters, and achieve the policy effect of targeted poverty alleviation.

In fact, policy-based agricultural insurance is a means of transfer payment implemented by the government with premium subsidies. It transfers part of national income to the insured farmers, minimises the occurrence of ‘poverty caused by disasters’ and ‘poverty returned due to disasters’, and gives full play to the role of stabiliser for agricultural production and amplifier for financial resource. Throughout the literature at home and abroad, the research on the relationship between agricultural insurance and household income is increasingly rich, which provides a broad idea for the study of this paper. However, in the existing literature research, there is no consensus on the argument that whether agricultural insurance contributes to the increase of farmers’ income. Importantly, the existing literature only examines the overall effect of policy-based agricultural insurance on farmers’ income when evaluating the policy, without considering the heterogeneity of different income groups, and it is not clear whether different income groups share the policy dividend in agricultural insurance evenly.

In view of this, Based on the panel data of China’s 31 provinces (autonomous regions and municipalities directly under the central government) in 2007-2019,
this paper analyzes the income effect of policy-based agricultural insurance on farmers with special focuses on exploring the impact on farmers of different income levels, making up the gap in previous studies, and thus providing effective reference for exploring the development model and reform path of agricultural insurance suitable for the development of modern agriculture in China.

Theoretical analysis

Operation mechanism of policy-based agricultural insurance

Policy-based agricultural insurance is an agricultural support and protection policy that supports and benefits farmers, which is represented by the core stakeholders of farmers, insurance companies and the government. Farmers are the demand party of agricultural insurance. In order to avoid risks, farmers need to pay a certain premium and sign insurance contracts with insurance companies. After suffering losses of disasters and accidents within the scope of insurance liability, they can get insurance compensation.

No financial compensation will be received if the premium is not paid, which shows that agricultural insurance enjoys the attribute of private goods. The bulk of products and services used in the marketplace are private goods. Pure private products, on the other hand, are excludable and competitive in the market system. But unlike all personal belongings, as the supplier of agricultural insurance, insurance companies often take some high-tech measures (such as anti-aircraft guns bombard clouds to prevent hail and increase rain) to prevent disasters and losses in order to reduce the probability of risk occurrence and the degree of loss in the process of agricultural production and pursue profit maximisation. Insurance company as an agricultural insurance provider, often in order to reduce the probability of occurrence of a risk in the process of agricultural production and the loss rate, pursue benefit maximisation, will take some high-tech (e.g. anti-aircraft artillery bombardment clouds to prevent hail precipitation) measures of disaster prevention security, which gives uninsured farmers a chance for ‘free ride’. Free riding is viewed as a failure of the free market economy in its traditional form. When certain community members refuse to pay their good proportion to the expenses of a common resource, a problem arises. The refusal to participate makes it financially unfeasible to supply the commodity. From such point of view, agricultural insurance has the attribute of public goods. Therefore, agricultural insurance is a quasi-public good between private goods and public goods. Partially situations, partial competition, partial root causes of defects, and partial withdraw are features of quasi-public commodities, which are shared by both commercial and public goods. Markets for such items are regarded inadequate, and their absence would’ve been regarded inefficient and a market imperfection if they were not provided by market economics. The absolute opposite of a public good is a private good. Through use of public commodities is normally open to everyone, and one party’s usage has no bearing on the other’s ability to use it. However, it is not separate, it is impossible to control another from using the good. Many public products are available for free. Private goods have an economic cost whenever a person decides one thing over another when public products have none. Public items are available to even individuals who have not paid any taxes, described as free-riders, while private commodities are not.

Additional causes for agricultural sowing delays include a lack of seed, fertiliser, and irrigation. Low plant population has become one of the leading causes of low agricultural output, as crop yields are defined by the number of productive plants per unit area. Low plant density is caused by poor seedling growth, a lack of moisture in the seed bed, and a rough seed bed. Farmers suffer significant losses as a result of insufficient precipitation and ongoing drought. Irrigation water must be available on a consistent basis in order to maintain crop yields.

Agriculture is a natural weak industry, the production process is vulnerable to climate, disasters and other natural factors. Its own characteristics cause the high risk of production, which leads to the high premium of agricultural insurance. Therefore, the supply curve of agricultural insurance always stays at a high price level, which makes it difficult for farmers’ willingness to participate in insurance to be transformed into effective demand. Under this circumstance, the market failure of ‘double sluggish trend in supply and demand’ emerged. As the sponsor of agricultural insurance, the governments at the central, provincial and municipal (county) levels encourage insurance institutions to operate agricultural insurance and attract and encourage peasant households to participate in the insurance through subsidies to specific agricultural insurance premiums, so as to maximise social utility.

As can be seen from the above that the economic attribute of policy-based agricultural insurance quasi-public goods determines that it fails to achieve the balance between supply and demand through pure commercial operation, and governments at all levels must provide financial support. Because farmers, insurance
Policy-oriented agricultural insurance subject game model parameter is set as follows, assuming that farmers meet the hypothesis of ‘rational economic man’, and farmers income is \( R \), compensation of insurance companies refers to \( M \), the operation cost of insurance companies denotes \( C \), agricultural insurance premium subsidies demonstrate \( \delta \), premiums paid by farmers are \( P \) (\( P < \delta \)), subsidies by government to insurance companies signify \( I \), inputs of farmers are \( X \), the price vector \( W \) of input \( X \), minimum value of returns is \( R_0 \), maximum value of the benefits is \( R^0 \).

According to the expected utility model of farmers’ participation in agricultural insurance and insurance companies constructed by Chambers (1989), this paper analyzes the influence of premium subsidies on farmers’ decision-making behaviour of participation in agricultural insurance and on the supply behaviour of insurance companies. Private companies that offer protection to farmers might benefit from a greater knowledge of the factors that influence insurance acceptance. Rural insurance is among the most essential tools for managing crop production among the different options available. When buying insurance, a person exchanges the unknown future costs and the risk for the predictable and comparatively low premium price. Its goal is to lower the cost of rural insurance policies for producers, hence increasing the usage of this risk measure. Chambers (1989) expressed the expected utility of farmers’ participation in agricultural insurance as follows:

\[
EU = \int_{R_0}^{R} U(R + M - \delta - WX) dG(R, X) \quad (1)
\]

The expected utility of an insurance company is expressed as follows:

\[
V = \int_{R_0}^{R} U(\delta - M - C) dG(R, X) \quad (2)
\]

When policy-based agricultural insurance is subsidiised by the government, the utility of farmers participating in agricultural insurance is as follows:

\[
EU^* = \int_{R_0}^{R} U(R + M - P - WX) dG(R, X) \quad (3)
\]

If \( EU < EU^* \) and \( V < 0 \), farmers, at this time, are not willing to participate in insurance, insurance companies are reluctant to operate policy-based agricultural insurance. On the basis of government subsidies \( I \) to insurance companies and premium subsidies to farmers \( \delta - P \), as a result, \( V + I > 0 \) and \( EU^* + (\delta - P) > EU \) prove to be valid. Therefore, (insurance participation and operation) will appear as a Nash equilibrium Table 1.

From the above game process and results, it can be clearly seen that in policy-based agricultural insurance, farmers, insurance companies and the government are independent to each other and that influence each other. The equilibrium result of the tripartite game between farmers, insurance companies and government is that the government subsidise agricultural insurance, farmers participate in agricultural insurance, and the insurance company pays for the performance of the contract. However, the necessary condition for the balance among the three is that the government subsidy can make up for the insurance company’s compensation and keep the premium price within the range that farmers can accept. Federal subsidies are included in the Affordable Care Act (ACA) to assist people in paying for insurance. Instead, insurers simply increase premiums, which are generally offset by increased premium subsidies, making insurance even more affordable for many consumers.

**The impact of policy-based agricultural insurance on farmers’ income**

The most basic function of agricultural insurance is to disperse and transfer agricultural risks and provide economic compensation for farmers suffering losses (Lv Xiaoying 2012). In those areas with high agricultural insurance coverage, agricultural insurance reparations have actually become the main source of funds for their agricultural reproduction (Tuo Guozhu 2012). Because the compensation does not fall under the category of natural calamities, the Commission found this sort of action to be Government assistance to promote the growth of specific economic activities. To offer producers with health insurance and financial assistance in the eventuality that any of the declared crops fails due to natural disasters, pests, or illnesses. To promote farmers to use innovative farming techniques, high-
value supplies, and advanced technologies in agriculture. Compared with other risk management tools, the biggest advantage of policy-based agricultural insurance is that farmers can obtain several or even dozens of times the risk protection effect through a small amount of premium fund input after the government provides premium subsidies. Agriculture risks come from various places. In agriculture, there really are numerous risk management techniques which can be employed to minimise, transmit, or deal with hazards. Financial, market-based, and weather-index-based risk management tools are among the available options.

In other words, in the insurance economic activities, the increase of farmers’ premium expenditure will cause the increase of disaster risk compensation income in the way of multiplier acceleration. After farmers receive direct economic compensation, they can purchase production materials for the next period for quick resumption of production to slow down the fluctuation of income, so as to achieve the effect of increasing income. Policy-based agricultural insurance can not only provide more economic compensation for farmers suffering from disasters by using multiplier effect, but also has obvious welfare spillover effect. Spillover effects are a form of network impact that has become more prevalent as trade and share prices have reinforced financial ties among countries. Its welfare spillover effect is reflected in the economic activities of farmers participating in agricultural insurance, which will bring the external economic benefits of credit rationing to farmers.

Due to the high risk of agricultural production, the uncertainty of repayment ability of farmers and the lack of suitable collateral for farmers, most financial institutions are usually reluctant to offer loans to ordinary farmers. The involvement of policy-based agricultural insurance not only dispersed agricultural production risks, but also improved the ability to resist disasters, effectively enhanced the confidence of financial institutions in rural credit, and effectively broke the bottleneck of loan difficulties and limited financing channels for insured farmers. In particular, the No. 1 document of the central government in 2016 proposed to continue to establish an interactive mechanism between agriculture-related credit and agricultural insurance, and actively explored loans pledged by agricultural insurance policies, which provided policy support for the interactive mechanism between bank and insurance. In this way, after participating in agricultural insurance, peasant households can apply for agriculture-related loans from financial institutions to expand production scale, improve production conditions and increase agricultural income.

On the other hand, since the implementation of policy-based agricultural insurance premium subsidy pilot in 2007, it has stimulated the enthusiasm of professional farmers and part-time farmers to participate in the insurance. Many insured farmers have changed their planting intentions and planting structure and increased the planting area of highly subsidised crops. Zhongkun and Jianping (2015) believe that this move is likely to increase crop output and shift the supply curve to the right. However, there is less demand elasticity of agricultural products. The increase of output will cause large fluctuations in prices, resulting in the dissipation of welfare, which may lead to the phenomenon of Cheap grain harms the peasants and increase of production while decrease of income Figure 1.

The demand for policy-based agricultural insurance refers to the quantity that farmers are willing and able to purchase agricultural insurance in a certain period of time under a certain probability of risk occurrence and premium rate. This means that the consumption willingness and consumption ability of farmers jointly determine the demand for agricultural insurance, which are indispensable. In terms of consumption

![Figure 1. Theoretical frame diagram of policy-based agricultural insurance and farmer income.](image-url)
power, insurance products, as a kind of ‘commodity’, are closely related to the purchasing power of farmers, that is, the income level of farmers determines whether the potential demand for insurance can be transformed into effective demand. Only when it is transformed into effective demand can policy-based agricultural insurance play its expected effect, disperse risks and make up for the economic compensation of farmers after the disaster.

For low-income people, due to the limited overall income level, although they have a strong desire to avoid risks by purchasing agricultural insurance, their ability to purchase agricultural insurance is extremely limited except for the basic living expenses of the whole family, such as basic food, clothing, housing and transportation. Even if part of funds are used for insurance participation, they fail to cover insurance for all the plants and the whole area. In this way, once risks occur, agricultural insurance has limited effect for all the plants and the whole area. In this way, once risks occur, agricultural insurance has limited influence on post-disaster compensation and farmers' operating income. Middle-income people have been able to meet the basic needs of life, but because the economic foundation is not stable, there is a potential risk of becoming low-income people at any time. Although the purchase intention is strong and they are insured, the cost of insurance is bound to crowd out investment in agricultural production, such as pesticides, fertilisers and other means of production. This will lead to unexpected yield of the final output of agriculture, and income growth will be affected accordingly. People with high income have a very solid financial foundation and all their needs in life can be satisfied.

In addition to premium, a lot of funds are invested into the agricultural production. The use of chemical fertilisers, pesticides, film and other means of production and the level of agricultural mechanisation are bound to be higher than that of middle and low-income groups, and their ability to resist risks will naturally be enhanced. In conclusion, there is a coupling relationship between agricultural insurance and different household income levels, that is, the marginal propensity to consume agricultural insurance increases with the increase of household income level, and the impact of agricultural insurance on the income of different groups increases with the increase of household income level.

Through the above analysis, the overall impact of policy-based agricultural insurance on the increase and decrease of farmers’ income and the impact results of different income groups can be proved theoretically. However, the actual effect still needs to be further proved by empirical analysis.

Research design

Data collection and processing

Although the central government proposed to establish a policy-based agricultural insurance system in 2004, it was not until 2007 that the government implemented premium subsidies, and some provinces were gradually included in the pilot areas of agricultural insurance subsidised by the central government. Therefore, in consideration of the comprehensiveness and availability of data, this paper takes 2007 as the starting year for empirical analysis, and selects the panel data of 31 provinces (autonomous regions and municipalities directly under the central government) from 2007 to 2019 for analysis. In addition, in order to test the robustness of the regression results, per capita compensation level was used to replace agricultural insurance density for a second regression. At the same time, in order to accurately analyze the income effects of policy-based agricultural insurance on farmers in different regions of China, 31 provinces (autonomous regions and municipalities directly under the central government) were divided into two regions according to the level of economic development for analysis.

Relevant data used for empirical analysis in this paper derive from China Insurance Yearbook, China Statistical Yearbook, China Rural Statistical Yearbook, China Yearbook of Household Survey, EPS statistical data analysis platform and statistical yearbooks of provinces (autonomous regions and municipalities directly under the central government) over the years.

In terms of data processing, the rural consumer price index (Year 2007 = 100) was used to reduce the per capita household operating net income and insurance premium income in order to avoid the impact of price changes. In order to reduce heteroscedasticity, the natural logarithms of farmer income level, agricultural insurance density, per capita compensation level, per capita fixed asset investment, agricultural operation scale and agricultural modernisation level were taken. For the missing data of some provinces, linear interpolation method is adopted to process.stata15.0 software was used for data processing and model estimation.

Variable selection and descriptive statistics

This article takes ‘farmers income level’ as the explained variable, ‘the agricultural insurance development level’ as explanatory variables. On the premise of controlling other factors that affect farmers’ income, this paper focuses on explaining whether policy-based agricultural insurance has influence on farmers’ income level, and
whether there is heterogeneity for farmers with different income levels.

**Farmer income level**

Through a review of previous research literature, it is found that there are two indicators related to income level: ‘personal disposable income’ and ‘per capita net income’. Based on the variable selection principle of Wenxiang and Shengwei (2019), Zhongkun and Jianping (2015), Zhou Wenhai et al. (2014), this paper holds that the agricultural operation income of farmers, forestry, animal husbandry, fishing and other agricultural operations accounts for more than 80% of the index, which can better measure the agricultural income level of farmers. In addition, in order to analyze the impact of policy-based agricultural insurance on the household income of farmers at different income levels in a clearer manner, representative quantile of 0.1, 0.25, 0.5, 0.75 and 0.9 are selected for division and discussion of the impact of agricultural insurance on the farmer income such as very low income, low income, middle income, high income and very high income levels.

**Development level of agricultural insurance**

Generally speaking, the speed of development of insurance is mainly reflected in insurance density (premium income/agricultural working population), insurance depth (premium income/added value of primary industry) and compensation level (insurance indemnity/agricultural working population). Zhou Wenhai et al. (2014) believe that the impact of agricultural insurance on farmers’ income is mainly reflected in two ways before and after the disaster: The pre-disaster refers to the condition that insurance companies collect premiums by signing insurance contracts with farmers, but the impact of risks on farmers’ income has not yet occurred. The post-disaster refers to the condition that the insurance company compensates the farmers for the risk after the farmers suffer from the agricultural risk, which further affects the income level of farmers. Referred to Zhou Wenhai’s viewpoint, this paper selected ‘agricultural insurance density’ and ‘per capita compensation level’ as measuring indicators. The greater the value, the better the development of policy-based agricultural insurance and the larger the scale.

**Control variables**

(1) Financial support for agriculture: In order to support the rapid development of rural economy and effectively solve the issues relating to agriculture, rural areas and farmers, local financial department allocates a large amount of funds in agriculture, forestry and water affairs every year. The ratio between expenditure in agriculture, forestry and water affairs and the total expenditure of final accounts of public finance for demonstration.

(2) Investment in per capita fixed asset: Investment in fixed asset plays a dominant role in rural economic development. Increasing rural fixed asset investment can increase the original rural fixed assets, improve the comprehensive agricultural production capacity, improve rural production and living conditions, and then directly increase the income of farmers.

(3) Scale of agricultural operation: The development of agricultural production in China cannot be separated from land supply. Land is an important factor in agricultural production and also an important criterion for the classification of different income levels. Generally, the scale of land in high-income groups is larger than that in low-income groups. In this paper, the ratio of total agricultural sown area to rural population is used to show the scale of agricultural production.

(4) Agricultural modernisation level: Agricultural mechanisation is one of the important manifestations of China’s agricultural modernisation. The use of high-tech agricultural machinery and equipment can improve agricultural production conditions, improve agricultural production efficiency, reduce manpower consumption in agricultural production, farmers can have extra time to get other business income. In this paper, the agricultural modernisation level of China is measured by the total power of agricultural machinery per hectare of crop sown area.

(5) Industrial structure: Concerning the concept of development economics, industrial structure refers to the connections and interrelationships among production factors within an industry and among industries, that is, the proportion of agriculture, industry and service industry in a country’s economic structure. The lower the proportion of agriculture in the national economy, the more channels farmers will have to earn income, and the more reasonable the industrial structure will be.

(6) Degree of disaster: Experience shows that the affected area in the sown area of crops will seriously affect whether farmers participate in policy-based agricultural insurance. If the farmers in the previous year were hit by serious disasters, the farmers would actively participate in agricultural insurance in order to avoid risks, which would affect the agricultural operating income level in the future.
The specific descriptive statistical analysis of the variables used in the empirical analysis in this paper is shown in Table 2.

### Model construction

Considering that the panel data of 31 provinces (autonomous regions and municipalities directly under the central government) in China from 2007 to 2019 are used in this paper, it is necessary to test the econometric model so as to select a more suitable panel model to empirically explore the effect of policy-based agricultural insurance on the increase of household income. After the Hausman test, P values of 31 provinces (autonomous regions and municipalities directly under the central government), eastern and central regions, and western regions are all less than 0.05, so a variable intercept model with fixed effect should be constructed. Based on the above analysis of variables affecting household income level, the benchmark model of this study is set as follows:

\[
\text{Lnincome}_{op,i} = \alpha + \beta \text{LnIns}_{i} + \gamma \text{X}_{i} + \delta_i + \epsilon_{it} \tag{4}
\]

In Equation (4): \(\text{Lnincome}_{op,i}\) is used to measure the income level of rural households, the model is expressed as ‘per capita household operating net income of rural residents’; \(\text{LnIns}_{i}\) serves as the core explanatory variables to measure the development level of agricultural insurance, ‘Agricultural insurance density’ \(\text{Lndensity}_{i}\) and \(\text{Lnindemnity}_{i}\), \(\text{X}_{i}\) represents a group of control variables, including financial support for agriculture, per capita investment in fixed assets, scale of agricultural operation, level of agricultural modernisation, industrial structure, and degree of disaster. \(\delta_i\) represents the individual fixed effect that remains unchanged with time. \(\epsilon_{it}\) is the random disturbance term independent of the explanatory variable. The subscript \(i\) represents the 31 provinces (autonomous regions and municipalities directly under the central government) of China, and \(t\) represents the corresponding period from 2007 to 2019.

After an empirical analysis of whether policy-based agricultural insurance can increase the income of farmers, this paper further uses the ‘quantile regression’ theory proposed by Koenker and Bassett (1978) to conduct panel quantile regression to estimate the degree of influence of policy-based agricultural insurance on farmers of different income levels. The principle is to study the relationship between the explanatory variables and the explained variables based on the explained conditional distribution. The regression curves of different quantiles are different, which can reflect the relationship between variables more...
comprehensively. At the same time, due to the wide geographical area of China, there are some differences in economic development among different regions, and the quantile regression is not so strict on the distribution of errors, so the estimated results are more robust. Regression Analysis is a regularly utilised method in investigation where a link between three variables is needed to be formed and their impacts on crop yield determined. Crop yield is a regression coefficient, while the other variables are independent variables. In applied agricultural economics, multiple regression models are utilised for two primary reasons: predicting and making statistical conclusions about effect of exogenous variables and dependent variables. In both circumstances, accurate estimation of the model coefficients is critical. Panel quantile regression needs to change Model (1) into the following form:

\[
Q_{\text{Lnincome,op,ij}}(\tau|\text{Lnins,inc}_{ij}, X_{ij}) = \alpha_i + \beta_1(\tau)\text{Lnins,inc}_{ij} + \beta_2(\tau)X_{ij} \tag{5}
\]

In the Equation (5), the fixed effect does not change with the change of the quantile, while the coefficients of the core explanatory variable \(\text{Lnins,inc}_{ij}\) and control variable \(X_{ij}\) both change with different quantile conditions. By minimising the absolute deviation, we can get:

\[
\arg\min_{\alpha,\beta} \sum_{j=1}^{5} \sum_{i=1}^{31} \sum_{t=1}^{11} w_{ij} |\tau_j - \arg\max_{\tau} \sum_{j=1}^{5} \sum_{i=1}^{31} \sum_{t=1}^{11} w_{ij} \rho_{ij} (\text{Lnincome,op,ij} - \alpha_i - \beta_1(\tau)\text{Lnins,inc}_{ij} - \beta_2(\tau)X_{ij}) + \lambda \sum_{j=1}^{31} |\alpha_j| \tag{6}
\]

Where: \(w_{ij}\) represents the weight of the quantile \(\tau_j\) and \(\lambda\) represents the adjustment coefficient.

**Empirical test**

**Empirical results and analysis**

**The income effect of policy-based agricultural insurance on farmers**

Firstly, a fixed effect model is used to estimate the samples in this paper. Empirical analysis of whether policy-based agricultural insurance can help increase the income level of farmers is conducted, and then five representative quantiles of 0.1, 0.25, 0.5, 0.75 and 0.9 are selected respectively to represent the quantile regression of extremely low-income group, low-income and middle-income groups, high income and high-income group to further analyze the differential benefit of different income groups of farmers in the policy of agricultural insurance.

First of all, the impact of the core explanatory variable ‘agricultural insurance density’ on the income level of the insured households was analyzed. In the regression results of the fixed-effect model at the national level, ‘agricultural insurance density’ is significantly positively correlated with ‘per capita household operating net income of farmers’ at the 1% level, and the regression coefficient is 0.127, that is, every 1% of increase in ‘agricultural insurance density’ will increase the operating net income of the overall farmers in the country by 0.127%. According to the regression results of each sub-site, all the quantiles were significantly positive correlated at the 1% level, and the regression coefficients fluctuated between [0.0660,0.119]. Except that the regression coefficient of the 0.25 quantile in the low-income group decreased by 0.0008% compared with the 0.1 quantile in the very low-income group, the other regression coefficients increased with the increase of the quantile level, and the estimated coefficient of the extremely high income group was 0.0522 higher than that of the very low income group.

This indicates that since the implementation of the agricultural insurance subsidy policy in 2007, China’s agricultural insurance has effectively resolved the uncertain factors brought by agricultural risks to farmers’ income, which significantly promoted the improvement of the overall income level of farmers, and the income-increasing effect of policy-based agricultural insurance has been continuously enhanced with the improvement of farmers’ income level. In other words, farmers of different income groups fail to get balanced benefits from policy-based agricultural insurance. The higher the income of insured farmers, the stronger the income-increasing effect, that is, policy-based agricultural insurance expands the income gap between low-income groups and high-income groups in a disguised way. Throughout regions and types of companies, physical sales forces and intermediates are responsible for the vast majority of insurer marketing. While the proportion of business handled through these routes has shifted over the last year as more clients move internet, they continue to be the key channels for life, business, and general liability fire and accident insurance.

Secondly, the influence of other important control variables on the increase effect of farmers’ operating net income is analyzed. Except that the agricultural mechanisation level of the extremely high income group passed the significant positive test at the level of 5%, the agricultural mechanisation level and the agricultural operation scale passed the significant positive test at the level of 1% in each sub-site of the fixed
effect model and the panel quantile regression model. Specifically, the level of agricultural mechanisation above the sown area of crops per hectare showed a ‘U-shaped’ characteristic with the increase of quantile, which means that the improvement effect of agricultural mechanisation level is relatively unbalanced. Therefore, agricultural machinery should be widely promoted to improve productivity by using science and technology. The regression coefficient of the scale of agricultural operation at different loci was different from that of the mechanisation level, which showed a general downward trend with the increase of the quantile, and the very low-income group was 0.225 percentage points higher than that of the very high income group. Under the background of small-scale peasant economy in China, low-income farmers are relatively dependent on land. They mainly rely on land for agricultural production to obtain income without other channels to increase their income.

In case of disasters, agricultural production will be reduced, which will be devastating to low-income families, and it also proves the need to improve the level of policy-based agricultural insurance. The per capita fixed asset investment has a positive effect on the household income level, and has passed the significance test of 1% level in each sub-site. Different from the level of agricultural mechanisation, the scale of agricultural operation and the per capita investment in fixed assets, the level of disaster significantly inhibited the increase of household income, and had a significant negative effect at the level of 1% in most sub-sites. This is because after the disaster, the crop yield per hectare sown area will decline, resulting in a decrease in farmers’ income, which directly explains the importance of agricultural insurance Table 3.

### Regression results by regions

Considering China’s vast territory, diverse geographical landforms and different ecological environments, agricultural risks have obvious spatial distribution characteristics, risk losses show regional and aggregative characteristics, and agricultural risk management may also have spatial spillover effects. Therefore, the whole country is divided into three regions: eastern, central and western, and the eastern and central provinces are further combined to conduct sub-sample regression respectively according to the classification standard of the National Statistical Yearbook. The dummy variable representing regional differences is introduced, and the value of dummy variable is 1 for the provinces in the eastern and central regions, while the value of other provinces is 2. The specific results are shown in Tables 4 and 5.

From the perspective of regions, although ‘agricultural insurance density’ has a significant promoting effect on the overall income of farmers at the 1% level in the eastern and central regions and the western regions, the influence intensity of ‘per capita household operating net income of farmers’ in the eastern and central regions is higher than that in the western regions at 0.003. The quantile regression result in Table 4, Table 5 shows that the effect of ‘agricultural insurance density’ on the operating net income of rural residents in the eastern, central and western regions is the same as the regression results of the whole country. The regression coefficient increased with the increase of the sub-locus, and the effect on the low end of the income distribution was weak, while the effect on the middle and high end income groups was strong. Policy-based agricultural insurance does not give equal consideration to while improving efficiency. Insured

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**Table 3. Regression results of the impact of “agricultural insurance density” on rural household income in 31 provinces (autonomous regions and municipalities directly under the central government) in China.**

| Variable  | Fixed effects model | q=0.1  | q=0.25 | q=0.5  | q=0.75 | q=0.9  |
|-----------|---------------------|--------|--------|--------|--------|--------|
| Lnndensity | 0.127*** (0.0137)   | 0.0668*** (0.0043) | 0.0600*** (0.0053) | 0.0826*** (0.0028) | 0.0979*** (0.0052) | 0.119*** (0.0090) |
| Lnlinvest  | 0.0119 (0.0388)     | 0.257*** (0.0136)  | 0.378*** (0.0053)  | 0.0309*** (0.00316) | 0.225*** (0.00383) | 0.364*** (0.00316) |
| Lnmech     | 0.443*** (0.0771)   | 0.255*** (0.0105)  | 0.179*** (0.0214)  | 0.0894*** (0.0222) | 0.105*** (0.0180)  | 0.0478** (0.0180)  |
| Lnfarmland | 0.267*** (0.0804)   | 0.481*** (0.0110)  | 0.440*** (0.0068)  | 0.390*** (0.0316)  | 0.397*** (0.0144)  | 0.256*** (0.0612)  |
| Finance    | 0.0115 (0.0074)     | −0.0147*** (0.0011) | −0.0514*** (0.0011) | −0.0120** (0.0010) | −0.0302*** (0.0041) | −0.0519*** (0.0032) |
| Structure  | −0.0458*** (0.0083) | 0.0172*** (0.0040) | 0.0195*** (0.0005) | 0.0068*** (0.0016) | 0.0096*** (0.0017) | 0.00625** (0.0023) |
| Disaster   | −0.00254* (0.0010)  | −0.00276*** (0.0006) | −0.00615*** (0.0002) | −0.00647*** (0.0005) | −0.00151*** (0.0005) | −0.00625** (0.0009) |

Note: The estimated value of quantile was obtained after 1000 times of iterations by the Bootstrap method. The values in brackets are standard deviations;***, ** and * indicate that statistical results are significant at 1%, 5% and 10% levels respectively.
farmers of different income levels do not get equal benefits from policy-based agricultural insurance. Farmers at the high end of the income distribution gain significantly more income from agricultural insurance than those at the low end of the income distribution, which is consistent with the empirical conclusion of the whole country above.

For other control variables, no matter in the eastern and central regions or the western regions, the disaster degree is always an important explanatory variable that hinders the increase of farmers’ income. As long as the natural risk or market price fluctuation risk occurs, the expected output or price of agricultural products will be reduced to a certain extent, thus affecting the increase of farmers’ income. The level of agricultural mechanisation has passed the significant positive test of 1% level in the eastern and central regions, but the modernisation role of mechanisation level in agricultural production has not been fully utilised in the western regions. This shows that the promotion of agricultural machinery is relatively common in the eastern and central regions of China. With the help of mechanical power, farmers have effectively improved production efficiency and thus promoted the growth of operating income.

### Robustness test

In order to prove the reliability of the conclusions, the method of replacing the core explanatory variables is adopted in this paper to test the robustness of the relevant conclusions. To replace *agricultural insurance density with per capita indemnity level*, and a regression analysis of the impact of agricultural insurance development level on farmers’ income is conducted.

Based on regression results in the Table 6, except that the regression coefficient of the low-income group was slightly lower than that of the very low-income group, *Per capita indemnity level* passed the significant level positive test in the estimation coefficients of both the fixed-effect model and panel quantile regression, and the promoting effect became more

### Table 4. Regression results of the impact of “agricultural insurance density” on farmers’ income in the eastern and central regions.

| Variable   | Fixed effects model | q=0.1    | q=0.25   | q=0.5    | q=0.75   | q=0.9    |
|------------|---------------------|----------|----------|----------|----------|----------|
| Ln Density | 0.125***            | 0.0144***| 0.0145***| 0.0910***| 0.114*** | 0.154*** |
|            | (0.0193)            | (0.0035) | (0.0035) | (0.0044) | (0.0072) | (0.0052) |
| Ln Invest  | 0.0168              | 0.291*** | 0.326*** | 0.358*** | 0.322*** | 0.327*** |
|            | (0.0592)            | (0.0084) | (0.0246) | (0.0663) | (0.0129) | (0.0168) |
| Ln Mech    | 0.448***            | 0.205*** | 0.113*   | 0.370*** | 0.163*** | 0.142*** |
|            | (0.0968)            | (0.0048) | (0.0379) | (0.0708) | (0.0150) | (0.0172) |
| Ln Farmland| 0.243*              | 0.397*** | 0.390*** | 0.349*** | 0.316*** | 0.137*** |
|            | (0.0994)            | (0.0094) | (0.0184) | (0.0239) | (0.0267) | (0.0145) |
| Finance    | 0.0146              | 0.000547| -0.0117**| 0.0211** | -0.0292***| -0.0123**|
|            | (0.0106)            | (0.0029) | (0.0026) | (0.0076) | (0.0017) | (0.0042) |
| Structure  | -0.0417***          | 0.0264***| -0.00176 | 0.00144* | 0.0115*** | 0.00846***|
|            | (0.0116)            | (0.0016) | (0.0011) | (0.0006) | (0.0017) | (0.0022) |
| Disaster   | -0.00234            | -0.00325**| -0.00176**| -0.00167**| -0.00240**| -0.00159***|
|            | (0.0014)            | (0.0003) | (0.0004) | (0.0004) | (0.0008) | (0.0005) |

Note: The estimated value of quantile was obtained after 1000 times of iterations by the Bootstrap method. The values in brackets are standard deviations; *** and ** indicate that statistical results are significant at 1%, 5% and 10% levels respectively.

### Table 5. Regression results of the influence of “agricultural insurance density” on farmers’ income in western China.

| Variable   | Fixed effects model | q=0.1    | q=0.25   | q=0.5    | q=0.75   | q=0.9    |
|------------|---------------------|----------|----------|----------|----------|----------|
| Ln Density | 0.122***            | 0.0945***| 0.108*** | 0.131*** | 0.132*** | 0.141*** |
|            | (0.0148)            | (0.0179) | (0.0151) | (0.0146) | (0.0178) | (0.0042) |
| Ln Invest  | -0.0269             | 0.147*** | 0.190*** | 0.238*** | 0.259*** | 0.296*** |
|            | (0.0390)            | (0.0158) | (0.0110) | (0.0133) | (0.0373) | (0.0289) |
| Ln Mech    | 0.0264              | -0.177** | -0.070** | -0.0705**| -0.00756***| -0.217** |
|            | (0.1500)            | (0.0506) | (0.0216) | (0.0019) | (0.0544) | (0.0631) |
| Ln Farmland| 0.861***            | 0.0168   | 0.0830** | -0.190***| -0.0645 | -0.0228 |
|            | (0.1808)            | (0.0779) | (0.0303) | (0.0157) | (0.0644) | (0.0739) |
| Finance    | -0.000771           | 0.0325***| 0.00952***| 0.00630***| 0.000114 | -0.00228 |
|            | (0.0083)            | (0.0077) | (0.0024) | (0.0017) | (0.0086) | (0.0068) |
| Structure  | -0.0008**           | 0.00443  | -0.00161 | -0.00625 | -0.0136** | -0.0144 |
|            | (0.0109)            | (0.0036) | (0.0081) | (0.0043) | (0.0026) | (0.0123) |
| Disaster   | -0.00038**          | -0.00550***| -0.00756***| -0.00832***| -0.00592**| -0.00346|
|            | (0.0013)            | (0.0004) | (0.0009) | (0.0006) | (0.0007) | (0.0035) |

Note: The estimated value of quantile was obtained after 1000 times of iterations by the Bootstrap method. The values in brackets are standard deviations; *** and ** indicate that statistical results are significant at 1%, 5% and 10% levels respectively.
Table 6. Regression results of the impact of “per capita compensation level” on rural household income in 31 provinces (autonomous regions and municipalities directly under the central government).

| Variable      | Fixed effects model | q=0.1 | q=0.25 | q=0.5 | q=0.75 | q=0.9 |
|---------------|---------------------|-------|--------|-------|--------|-------|
| Lnindemnity   | 0.0707***           | 0.0500*** | 0.0154*** | 0.0593*** | 0.0925*** | 0.102*** |
|               | (0.0113)            | (0.0027) | (0.0058) | (0.0041) | (0.0014) | (0.0104) |
| Lninvest      | 0.0396              | 0.319*** | 0.217*** | 0.199*** | 0.354*** | 0.371*** |
|               | (0.0415)            | (0.0105) | (0.0137) | (0.0205) | (0.0070) | (0.0257) |
| Lnmech       | 0.461***            | 0.275*** | 0.254*** | 0.441*** | 0.124*** | 0.066*** |
|               | (0.0814)            | (0.0308) | (0.0174) | (0.0149) | (0.0067) | (0.0317) |
| Lnfarmland    | 0.384***            | 0.378*** | 0.364*** | 0.515*** | 0.305*** | 0.286*** |
|               | (0.0838)            | (0.0219) | (0.0306) | (0.0217) | (0.0057) | (0.0239) |
| Finance       | 0.0160*             | −0.00442 | −0.00205 | −0.0243*** | −0.0396*** | −0.0503*** |
|               | (0.0079)            | (0.0065) | (0.0041) | (0.0021) | (0.0011) | (0.0032) |
| Structure     | −0.0511***          | 0.0328*** | 0.00864 | 0.0299*** | 0.00112 | −0.00512 |
|               | (0.0087)            | (0.0035) | (0.0045) | (0.0008) | (0.0015) | (0.0057) |
| Disaster      | −0.00411***         | −0.00223*** | −0.00591*** | −0.00432*** | −0.00327*** | −0.00361*** |
|               | (0.0011)            | (0.0003) | (0.0004) | (0.0002) | (0.0002) | (0.0007) |

Note: The estimated value of quantile was obtained after 1000 times of iterations by the Bootstrap method. The values in brackets are standard deviations; ***, ** and * indicate that statistical results are significant at 1%, 5% and 10% levels respectively.

obvious with the increase of household income level, which was basically consistent with the previous research conclusions. Therefore, the research conclusion of this paper is robust and credible. For other control variables, agricultural mechanisation level, agricultural operation scale and per capita fixed asset investment all have a positive impact on the increase of household income level, and the regression coefficients of most quantile are significantly positive at the 1% level. The degree of disaster passed the 1% level significant negative test in the fixed effect model and each quantile, which indicated that the degree of disaster had a serious impact on the further improvement of farmers’ income level, and the increase of farmers’ income had a negative inhibiting effect. These are the same as the empirical results in Table 3, which further demonstrates that the estimation results in this paper are relatively robust.

Conclusion

Based on the panel data of 31 provinces (autonomous regions and municipalities directly under the central government) from 2007 to 2019, this paper adopts theoretical analysis and empirical test to answer the question of whether policy-based agricultural insurance has increased the income level of farmers and whether farmers of different income groups have obtained the income of policy-based agricultural insurance in a balanced way. The study found that, in the whole country or in the eastern and central regions or in the western regions, policy-based agricultural insurance has significantly improved the income level of farmers. However, as we further estimate the benefits of policy-based agricultural insurance for farmers at different quantile, we find that the driving effect of policy-based agricultural insurance on income is not balanced, and the driving effect becomes more obvious with the increase of farmers’ income level. Compared with low-income groups, policy-based agricultural insurance has a more obvious effect on increasing the income of middle- and high-income groups. In addition, this study also found that the level of agricultural mechanisation has a significant promoting effect on the increase of household income; The degree of disaster is an important factor that restricts the increase of household income level.

Based on the above research conclusions, the following policy implications are obtained as:

First, we are committed to vigorously developing policy-based agricultural insurance to meet the requirements of the new situation. Although policy-based agricultural insurance has different effects on farmers of different income levels, it promotes the increase of farmers’ income on the whole. As China’s economy enters a new era of high-quality development, agricultural insurance should serve the rural revitalisation strategy and meet the needs of modern agricultural development that is taken as the starting point. We will continue to increase the publicity of agricultural insurance, encourage more rural households to participate in agricultural insurance, and give better play to the leverage and multiplier effect of agricultural insurance.

Second, the effect of policy-based agricultural insurance on farmers’ income is subject to the level of farmers’ income, so we should adhere to the demand-oriented approach and be vigilant that agricultural insurance will be transformed into the inducement for the expansion of income gap in rural areas. In recent years, taking the Rural Revitalization as an opportunity, China has been committed to promoting the process of
agricultural modernisation, and medium- and high-level operating entities such as large farmers, family farms, farmers’ cooperatives and leading enterprises with large scale and large investment have become an important force to lead agricultural modernisation and improve comprehensive agricultural benefits. Although land transfer and other policies have not been fully perfected, business entities in rural areas present dual characteristics. The ‘one-size-fits-all’ approach of ‘low security and wide coverage’ in China has long been unable to meet the risk management needs of agricultural operators of different income levels. Therefore, we should gradually introduce differentiated regional yield insurance, agricultural product price additional insurance, price index insurance, income insurance and other multi-level new agricultural insurance products, in order to meet the insurance needs of different income management groups, so as to maximise the welfare effect of agricultural insurance. In addition, the lack of income of low-income groups severely restricts their demand for policy-based agricultural insurance. Government departments should try their best to broaden the income increasing channels of low-income farmers by improving their vocational skills and income-earning ability, so as to promote the sustained and rapid growth of farmers’ income.

Third, we should pay attention to the regional differences in agricultural insurance development and explore the design of differentiated subsidy systems. The level of economic development determines the degree of financial development, and insurance is no exception. From the results of empirical analysis, we can see that there are certain differences in the effect of farmers’ income increase in different regions, such as the intensity of financial support for agriculture, the level of agricultural modernisation, the per capita investment in fixed assets, and the scale of agricultural operation. Although governments at all levels have been paying increasing attention to agricultural insurance in recent years, the current subsidy policy defines the subsidy proportion uniformly according to the region, which is in fact the average subsidy among regions. This will directly lead to some large agricultural counties, areas with weak finance ability to bear a heavy subsidy pressure. More seriously, subsidy funds in some area cannot be in place in time.

Therefore, we should scientifically implement differentiated agricultural insurance fiscal subsidy policies for regions with different levels of economic development according to factors such as agricultural production scale, financial basis and agricultural output of each region, and reduce the proportion of agricultural insurance fiscal subsidy for developed regions where local governments and commercial institutions are capable and motivated to develop agricultural insurance. We will concentrate more fiscal funds to develop the agricultural industry as the pillar. In poverty-stricken areas where economic development is relatively backward and local financial funds are insufficient, measures should be taken according to local conditions.

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