Predicament and Development of Agricultural Insurance in China

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Abstract Starting from the predicament for agricultural insurance development in China, we use the principle of economics and game theory to analyze the causation of the difficulty in developing agricultural insurance based on apprehending the connotation of agricultural insurance. And related countermeasures and suggestions on how to get through difficult situation and revitalize agricultural insurance are put forward.
Keywords Agricultural insurance; Shrinking; Innovation; China

Developing agricultural insurance is an important mean for stabilizing the agricultural economy, and it plays active role in establishing and perfecting agricultural protection system and promoting the healthy development of rural economy. In recent years, due to the exacerbation of agricultural risk and the adjustment of agricultural industrial structure, more peasants hope that this umbrella (agricultural insurance) can guarantee their production and life. However, according to the data publicized by the Insurance Regulatory Commission, the premium income of agricultural insurance in China in 2006 is 0.848 billion yuan, occupying 0.54% of the premium income of property insurance. Since the reinstatement of agricultural insurance in 1982, only several professional insurance companies have offered this service. The supply of agricultural insurance is far from the needs of peasants, 1980s, it has been in depressing for a long time. At the time of flourishing development of urban insurance in China, the agricultural insurance, however, is shrinking. At present, only four professional insurance companies in China offer this service. And the insurance types have declined from more than 60 to less than 30. Table 1 shows that the agricultural premium income in China increased from 0,561 to 0.848 billion yuan in 1993 –2006, and the premium increased by 0.154 billion yuan in 1993 –1998 with 5.70% annual average increase. Meanwhile, the annual average growth of premium income in Property Insurance Company increased by 4.98%. The premium income in China decreased from 0.632 billion yuan to 0.400 billion yuan in 1999 –2004 reducing by 0.232 billion yuan within 6 years with 8.74% annual average decrease. And the proportion of agricultural premium income in the premium income of Property Insurance Company declined from 1.20% in 1999 to 0.36% in 2004, indicating continuous shrinkage in agricultural insurance of China. The income of agricultural insurance rose in 2005 and 2006, and was 75% higher in 2005 than that in 2004 over the same period, then rose slightly in 2006. Proportion of agricultural premium income in the premium income of Property Insurance Company increased with steady variation during the two years. The total premium income of agricultural insurance in China from 1993 to 2006 was 7.513 billion yuan with 6.184 billion yuan of total payments and 83.23% average compensation ratio. The high compensation ratio and operation expenditure together make agricultural insurance service always in a deficit state. Though the government has stopped levying the business tax of agricultural insurance since 1996, it is insignificant compared with the high compensation ratio and risk. Commercial insurance companies’ escaping from the huge agricultural insurance market makes the development of agricultural insurance development very difficult in China.

1 Scientific connotation of agricultural insurance
Agricultural insurance refers to a kind of insurance offering guarantee for economic loss to agricultural workers engaged in farming and breeding when suffering from natural disaster and contingency1).

According to the agricultural types, agricultural insurance is divided into farming insurance, breeding insurance and forest insurance in China. According to the nature of damage, it is classified into nature disaster insurance, disease death insurance and accident loss insurance. Agricultural insurance is divided into basic liability insurance and all risks insurance according to the limitation of liability. The main insurance types of agricultural insurance in China are agricultural products insurance, livestock products insurance, aquatic product insurance, forest fire insurance, hail disaster insurance and so on.

2 Development status of agricultural insurance in China
Since the reinstatement of agricultural insurance in the

3 Cause analysis of the difficult development of agricultural insurance
3.1 Analysis from the aspect of economics principles
At present, the development of agricultural insurance has
reached a stalemate and even shrunk. Its causation is various. Many scholars in insurance industry and practical workers have discussed and analyzed this problem from different angles. We analyze from the aspect of welfare economics, and study on the deep reason causing the insufficient effective supply and shrinking development of agricultural insurance in China.

In welfare economics, goods or products are divided into private goods, pure public goods and quasi-public goods according to their exclusiveness and competitiveness. The pure public goods is neither exclusiveness nor competitiveness, but has externality of cost and income. Pure private goods has both competitiveness and exclusiveness of consumption and it also shows independence in consumption, i.e., the product is not impacted by externality. When the product fulfills the former two conditions but dissatisfies the third condition, it becomes quasi-public goods. Thus agricultural insurance belongs to quasi-public goods with significant positive externality. Peasants pay premium for agricultural insurance, which not only ensures stable income, but also guarantees the successful reproduction of agriculture and the stabilization of national economy. In the same way, insurance institutions offer agricultural insurance product and play the macroscopic function mentioned above. Therefore, it is considered that agricultural insurance is quasi-public goods with positive externality.

Table 1 Income status of national agricultural insurance company and property insurance company from 1993 to 2006

<table>
<thead>
<tr>
<th>Year</th>
<th>Agricultural insurance income</th>
<th>Property insurance income</th>
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<tbody>
<tr>
<td></td>
<td>$Y_1$</td>
<td>Absolute number</td>
</tr>
<tr>
<td></td>
<td>$\times 10^6$ yuan</td>
<td>Increase at the same period last year</td>
</tr>
<tr>
<td>1993</td>
<td>5.61</td>
<td>458.87</td>
</tr>
<tr>
<td>1994</td>
<td>5.04</td>
<td>376.42</td>
</tr>
<tr>
<td>1995</td>
<td>4.96</td>
<td>453.32</td>
</tr>
<tr>
<td>1996</td>
<td>5.75</td>
<td>538.33</td>
</tr>
<tr>
<td>1997</td>
<td>5.76</td>
<td>382.23</td>
</tr>
<tr>
<td>1998</td>
<td>7.15</td>
<td>505.74</td>
</tr>
<tr>
<td>1999</td>
<td>6.32</td>
<td>527.22</td>
</tr>
<tr>
<td>2000</td>
<td>4.04</td>
<td>608.00</td>
</tr>
<tr>
<td>2001</td>
<td>3.07</td>
<td>685.00</td>
</tr>
<tr>
<td>2002</td>
<td>3.31</td>
<td>780.00</td>
</tr>
<tr>
<td>2003</td>
<td>4.64</td>
<td>869.40</td>
</tr>
<tr>
<td>2004</td>
<td>4.00</td>
<td>125.00</td>
</tr>
<tr>
<td>2005</td>
<td>7.00</td>
<td>1283.00</td>
</tr>
<tr>
<td>2006</td>
<td>8.48</td>
<td>1579.14</td>
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</table>


Welfare economics argues that positive externality is a part of benefit value not considered as product income by producers. Hence, Marginal Social Benefit (MSB) exceeds Marginal Private Benefit (MPB). Here we should distinguish three kinds of marginal benefits: Marginal Social Benefit (MSB), the total estimation of all benefited individuals because of offering a unit of the commodity or labor service; Marginal Private Benefit (MPB), the sum of the estimation of direct benefited individual because of buying the commodity or labor service from a unit; Marginal External Benefit (MEB), the sum of the estimation of indirect benefited individual because of buying the commodity or labor service from a unit. Hence we have $MSB = MPB + MEB$, and $MSB > MPB$.

Fig.1 illustrates the existence of positive externality of agricultural insurance. Regardless of the positive externality, $MSC = MPC$ stands for the supply curve of agricultural insurance in commercial insurance company. $MPB$ is the demand curve. Intersection point $M$ of the supply and demand curves determines the equilibrium point $Q_m$ of output. Due to the existence of positive externality $MEB$ of agricultural insurance, $MPB$ should shift to right till $MSB$; Intersection point $E$ of $MSB$ and $MSC$ determines the output level $Q_e$. Offering $Q_m$ output is relatively reasonable for commercial insurance company from the perspective of profit maximization, because the toll pricing at each output level can only be equivalent to $MPB$ (on the $P_m$ point). If the price still keeping at $P_m$, the society expected output $Q_e$ must cause the deficit of commercial insurance company.

Without government subsidy, positive externality of agricultural insurance makes the optimum supply volume of social expectation more than that of supplier ($Q_e > Q_m$). In this case, if we carry out production according to the optimum supply volume of commercial insurance company ($Q_m$), the supply of...
agricultural insurance is inevitably insufficient, which eventually leads to efficiency loss. However, if we offer agricultural insurance according to the optimum supply volume of social expectation \((Q_s)\), commercial insurance company bears deficit, because the price can only keeps at the \(P_s\) and the payment ratio of agricultural insurance is high. Agricultural insurance business eventually shrinks and the insurance company exits the field of agricultural insurance.

### 3.2 Analysis from the aspect of game theory

The game between supply and demand of agricultural insurance (peasants and insurance company) is a typical game of static and complete information. Payoff matrix of the two is shown in Table 2.

<table>
<thead>
<tr>
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<th>Insurance company</th>
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<tr>
<td></td>
<td>Running</td>
</tr>
<tr>
<td>Peasant</td>
<td>Purchase ((3, -1))</td>
</tr>
<tr>
<td></td>
<td>No purchase</td>
</tr>
</tbody>
</table>

When peasants buy the agricultural insurance offered by insurance company, they should pay 2 units cost and gain 5 units benefit. After deducting cost, the payment level is 3 units, composed of visible and invisible economic securities. The visible economic security will compensate peasants for economic loss after agricultural risk; while the invisible economic security is a sense of security and a kind of immaterial spiritual security. Peasants who buy the agricultural insurance can actively introduce new technique, adjust product structure, enlarge production scale, carry out agricultural investment without considering the risks. Insurance company gains 2 units payment in running agricultural insurance, but its payment ratio is as high as 3 units, hence the payment level is \(-1\). When the peasants want to buy agricultural insurance while the insurance company does not serve it, the payment level for insurance company is 0. When peasants are not paid by the insurance, the payment level is \(-2\); when peasants don’t buy agricultural insurance, the agricultural risks cannot be ensured and the payment level is \(-1\). In this case, the insurance companies are unable to recoup cost and the payment level is \(-1\); if the insurance company does not sell agricultural insurance and the payment level is 0.

Both the peasants and insurance companies are rational economic men with the purpose of maximum profit in the game. Assuming that peasants buy agricultural insurance but the optimum strategy for insurance companies is not selling, peasants don’t buy agricultural insurance, the optimum strategy for insurance companies is still not selling. And the insurance companies have a dominant strategy, that is, no matter peasants buy the agricultural insurance or not, insurance companies select do not sell agricultural insurance. If the insurance companies do not sell agricultural insurance, the peasants have to choose not purchase. Thus, the equilibrium of the game is \((-1, 0)\), indicating that no matter peasants buy the agricultural insurance or not, insurance companies do not sell it. Therefore, the effective supply of agricultural insurance in China is insufficient, and it is not surprising that its development is increasingly shrinking.

### 3.3 Analysis from the practical point of view

Agricultural insurance cannot meet the objective demand of agricultural economic development severely, and there are various reasons for this phenomenon:

1. The low per capita net income of peasants and the hindered insurance consumption. Per capita net income of peasants increased by 2665.4 yuan in China from 1993 to 2006 with 11.02% annual increasing rate. Fig. 2 illustrates that the per capita net income of peasants in China shows the trend of steady rising. The annual increasing rate of peasants’ net income per capita in China showed downtrend from 1994 (32.49%) to 2000 (1.49%). Annual increasing rate of per capita net income rose slowly from 2000 to 2004 in general, and shows fluctuation in 2002 and 2003. Increasing rate of rural per capita net income in 2005 and 2006 declined a little. Meanwhile the disposable income of urban resident per capita rose up, and it increased by 9182.1 yuan from 1993 to 2006, 3.44 times of the total increment of rural per capita net income. And the income gap between urban residents and peasants kept on enlarging.

![Fig. 2] Rural per capita net income, disposable income of urban resident per capita and their increasing rates in related years

Income level of peasants in China is relatively low. After deducting the tax and fee, necessities of life, children’s education fees, purchase for fertilizer and pesticide and so on, the disposable income is limited. It is unacceptable for most peasants to use some residual income to buy agricultural insurance with high premium rate (9% -10%)\(^{14}\). Moreover, the scale of agricultural insurance is controlled strictly with complex operation and usually great divergence between compensation evaluation by both sides concerned. Therefore, even the peasants who are willing to participate in insurance have to choose to give up finally.

2. The high risk for managing agricultural insurance and the serious institution deficit. Since the launch of agricultural insurance, it plays certain role in ensuring peasants benefit and stabilizing agricultural production. However, the contradiction between social security properties of agricultural insurance and the profit objective of insurance company is increasingly serious. Agriculture is greatly affected by nature and market fac-
tors, and there are not enough insured agricultural managers, thus the law of large number effect cannot be formed. In addition, the widely distribution of agricultural insurance and the complex compensation work cause the relatively concentrated insurance services and high payment ratio. For example, the total income of agricultural insurance premium in Life Insurance Company was 7.000 billion yuan from 1982 to 2001, but the total payment reached 6.200 billion yuan with 88.6% average payment ratio. Adding 15% – 20% operating expenses, the Life Insurance Company lost about 0.600 billion yuan in managing agricultural insurance in recent 20 years.

(3) The lack of corresponding system guarantee and the insufficient government support. Unlike disaster relief by the civil administration department and the common commercial insurance, agricultural insurance involves the rural income redistribution, which coincides with the policy goal formulated by government. At present, only business tax is free in China, which is significantly not enough. Government should make related laws and regulations and improve financial subsidy in order to make the insurance companies gain the benefit. However, in fact, the current agricultural insurance market is nonprofit and is in deficit state for a long time. In this case, Property Insurance Company will not enter into this field without relatively high government subsidy. Agriculture insurance is a socialized systematic project with government behavior as the foundation. Department concerned should implement the related supporting policies as soon as possible. Otherwise, agricultural insurance can only stay in the “appeal” stage.

(4) Scarcity of agricultural insurance professionals and the poor quality of service. Professionals engaged in agricultural insurance in China are only more than 9 000 in the year 2000. There are only 3 person in the administrative areas above county level on average. Such few people should deal with the agricultural insurance for 0.8 billion rural population. Their workload can be imagined. The service quality can not be improved, and the enlargement of business scope and the improvement of professional level are influenced without enough insurance professionals. The problem of improving service quality directly related to the benefit of vast peasants and the further development of agricultural insurance services. Without the management and operation by high quality business talents, the situation of agricultural insurance services with high risk and serious deficit cannot be solved.

(5) The consciousness of risk and the high risk of morality of peasants. The concept of self-sufficient natural economy dominates the peasant in China while the risk consciousness is indifferent. Especially in the agricultural underdeveloped area, the problem of food and clothing has not yet been solved, not to mention buying insurance. In the east area with relatively high industrialization and commercialization levels, although most peasants have realized that agricultural insurance is an effective way to compensate economic loss, almost no peasant is very clear about the scope and definition of agricultural insurance. Moral good faith in agricultural insurance is also lacked, the problems of joint crop claim and joint disaster claim frequently happen, which perplexes the operation work offered by insurance company and has already seriously influenced the development of the service[4].

4 Countermeasures for the development of agricultural insurance

Agricultural insurance in China is underdeveloped, on the other side, has large development space. We should take active countermeasures, adopt international experiences, establish and perfect agricultural insurance system in China, and promote the overall development of rural economy based on the situation of China.

(1) Establish and perfect the related laws about agricultural insurance in China to bring it into a legalized operation cycle. Legislative department should make the Agricultural Insurance Law as soon as possible. The management purpose, characteristics, business principles, organization form, insurance coverage, premium rate, insurance liability of agriculture insurance must be prescribed by law as well as the supervision on agricultural insurance by correlated mechanisms. We should support agricultural insurance by the financial accumulation of taxation lever, and take the realization of social stability as main goal. With the development of agriculture and the whole national economics, the establishment of agricultural insurance system in China urgently needs the protection of healthy policy system. The clear definition of legal provisions and the systematization of law are the basic embodiment of legislation of agricultural insurance system.

(2) Strengthen the power of policy support, establish the commercial operation mode and policy-related business of agricultural insurance. We should strengthen the government-support agricultural insurance, establish the financial and tax policy systems of governments at all levels, and develop agricultural insurance in China from multiple channels and management bodies (including introducing foreign insurance organizations which operating agricultural insurance business). Government should be responsible for setting up policy agricultural insurance institutions, develop agricultural insurance business, take the responsibility of ensuring the healthy development of agricultural insurance, and enlarging the support of policies. For example, on the one hand, they should subsidize the insurance company for operating expenses of agricultural insurance, carry out tax deduction to make up for the agricultural insurance loss of insurance company, encourage the insurance company to offer agricultural insurance services actively, and increase the supply of agricultural insurance. On the other hand, they should subsidize the applicants for agricultural insurance, namely the peasant, and enhance their insured purchase ability of agricultural insurance in order to increase their need for agricultural insurance.

(3) Establish agricultural reinsurance system, disperse the management risk of agricultural insurance. The basic function of agricultural reinsurance is to disperse the risk responsibility of agricultural insurer. The abilities of compensation and risk undertaking of agricultural insurance are limited by its economic condition and the characteristics of difficult management and high compensation ratio. In this case, reinsurance is needed to disperse risk and to allocate loss in a wider scope. The department in charge of agricultural insurance should fully
arouse the enthusiasm of reinsurance companies at home and abroad to make them study on the reinsurance mechanism and agricultural reinsurance proposal, to disperse management risk of agricultural insurance, and to sustain the stable development of agricultural insurance business.

(4) Energetically carry out the propaganda work on agricultural insurance, improve the comprehensive quality of peasants. Firstly, we should strengthen the propaganda of the function of agricultural insurance, improve the risk consciousness of peasants, make peasants realize that agricultural insurance is an important approach to protect and promote agriculture and to transfer risks, encourage peasants to actively participate in agricultural insurance. Secondly, we should develop the overall training work on peasants’ quality and skill, and improve the insurance consciousness of peasants and their ability to fight against natural disasters.

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中国农业保险面临的困境及发展研究

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摘要 中国农业保险的发展自 20 世纪 90 年代初以来处于停滞不前, 日益萎缩的状况。笔者在分析了农业保险内涵的基础上, 分析了中国农业保险的发展现状。在分析中国保险演变发展的同时, 农业保险却日益萎缩, 农业保险费用的 60 个降到现在的不到 30 个, 高于余额率使农业经营一直处于亏损状态。农业保险发展中受困的原因是多方面的, 作者从 3 个方面进行了分析: ①经济运行经济学原理说明了农业保险的正外部性, 由于社会期望的最佳供应量多于生产者的最佳供应量, 必然导致农业保险供应不足, 最终导致效率损失; ②通过分析农业和保险公司之间的博弈分析, 得出了一个均衡解, 即农民是否购买农业保险, 保险公司都不愿经营农民业务; ③一般化了农业发展后于农业发展的 5 点现实原因。最后, 提出了发展农业保险的相关对策建议: ①建立健全中国农业的相关法规, 把农业保险纳入法制化运营的轨道; ②加大政策扶持力度, 建立农业的商业化运作模式; ③构建农业保险体系, 分散农业的经营风险; ④大力发展农业保险的宣传工作, 提高农民的综合素质。

关键词 农业保险; 萎缩; 创新

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1990 年以来山东耕地变化及人口、经济发展的关系研究

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摘要 根据中国山东省 1990~2006 年的数据资料, 运用统计分析方法, 分析了 17 年来山东省耕地资源与其人口增长、经济发展之间的动态关系, 建立了山东省及内部各区域耕地面积变化与人口、GDP、人均 GDP 之间的线性回归模型。结果显示, 1990~2006 年, 山东省耕地面积经历了由低速增长到稳中减少的复杂过程, 17 年来, 山东省耕地面积、人均耕地面积及占占全国耕地面积的比例均呈下降趋势, 但前者下降幅度不显著, 建立了山东省耕地面积与人口、GDP 之间的线性回归模型。结果显示, 山东省耕地面积与人口、GDP 之间的线性回归模型。结果显示, 山东省耕地面积与人口、GDP 之间的线性回归模型。结果显示, 山东省耕地面积与人口、GDP 之间的线性回归模型。结果显示, 山东省耕地面积与人口、GDP 之间的线性回归模型。结果显示, 山东省耕地面积与人口、GDP 之间的线性回归模型。结果显示, 山东省耕地面积与人口、GDP 之间的线性回归模型。结果显示, 山东省耕地面积与人口、GDP 之间的线性回归模型。结果显示, 山东省耕地面积与人口、GDP 之间的线性回归模型。结果显示, 山东省耕地面积与人口、GDP 之间的线性回归模型。结果显示, 山东省耕地面积与人口、GDP 之间的线性回归模型。结果显示, 山东省耕地面积与人口、GDP 之间的线性回归模型。结果显示, 山东省耕地面积与人口、GDP 之间的线性回归模型。结果显示, 山东省耕地面积与人口、GDP 之间的线性回归模型。结果显示, 山东省耕地面积与人口、GDP 之间的线性回归模型。结果显示, 山东省耕地面积与人口、GDP 之间的线性回归模型。结果显示, 山东省耕地面积与人口、GDP 之间的线性回归模型。结果显示, 山东省耕