Index Insurance as a Tool to Improve the Russian System of Insuring Risks of Agricultural Organizations with State Support

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Abstract:

The Russian system of insuring risks of agricultural organizations requires a qualitative restructuring based on the increased responsibility of insurers and state participation. Low rates of developing the system of insuring risks of agricultural organizations with state support require seeking for new forms of insurance in the current conditions.

The article points out that the use of the index insurance is currently one of the priority directions for the development of the country's agribusiness in general. An algorithm for creating an index insurance service is presented, the purpose of which is to substantiate the possibility of applying index insurance under the conditions of risky farming.

A comparative analysis of the economic efficiency of index insurance of the regional grain crops and insurance of grain crops with state support was conducted. It was concluded that the use of index insurance could be useful for other regions that were identical to Kalmykia in terms of natural and climatic environment.

The theoretical results obtained by the author can be considered as one of the priority directions for the development of the theoretical and methodological toolkit for insuring risks of agricultural organizations, can become a theoretical and empirical factual foundation for the formation of scientific grounds for regional economic policy in relation to agricultural organizations based on coordinating the interests of the triad of participants: state authorities, agricultural organizations, insurance organizations, as well as program forecasting and project developments.

Keywords: *Index insurance, insurance of grain crops with state support, agriculture, risks.*

JEL Classification: *G20, G22.*

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1. Introduction

Insurance with state support in most of the economically developed countries is one of the main tools of risk management in agricultural production, the use of which does not violate the World Trade Organization (WTO) rules that ensure the sustainability of the industry in case of adverse natural events (Bobyleva *et al.,* 2013). The objective reason for the need to develop insurance of agricultural producers in Russia is that most of the land is in the risky farming zone and is subject to various natural disasters. At the same time, not all such risks can be eliminated by agrotechnical means and organizational solutions.

Risk is an unavoidable factor of agricultural production (Baboshkina, 2016). Nazarova (2015) distinguished the following specifics of the risks manifestation in agriculture in this regard: *"diversity, unpredictability, repeatability, wide territorial variation, high variability in the extent of damage, specific and regional differentiation among countries, high local cumulativeness, large scale, long-term consequences".*

It is obvious that the correct definition of risk factors that influence both production and financial performance is of primary importance for any success-focused organization. A comprehensive and proper accounting of risk is of fundamental importance in agriculture, since the dependence of the conditions and results of production on random, primarily weather, factors is particularly high. The weather component of the risk is associated with other types of risks in agriculture, and together they form a rather serious problem, which, if ignored, can lead to unfortunate consequences (Akhmedova, n. d.).

The papers of Gokhman (1929), Zhichkin (2013), Kotar (2014), Lomakina (2011), Nikitin (2008), Nosov (n. d.), Parakhin (2011), Shcherbakov (2013), Shpilina *et al.* (2017), Ilina *et al.* (2017) and others are devoted to the study of the theoretical and methodological foundations of insuring the risks of agricultural organizations with state support. Despite the existence of many publications of foreign and domestic authors, which serve as the basis for developing theoretical and practical recommendations for developing the system of insuring agricultural organizations' risks in modern conditions, not all aspects of the topic under consideration have been studied, which allows to conduct scientific searches.

It is necessary to revise several fundamental principles of the existing practice to insure agricultural risks, considering the standpoint of interests of the triad: state, insurance organizations, agricultural organizations. For example, from the standpoint of the state it is a sustainable development of agriculture, from the standpoint of insurance organizations it is minimizing risks and increasing profitability, from the standpoint of agricultural organizations it is reducing losses and opportunity to pay less.

The financial crisis of state agricultural organizations and the absence of unified market statistics or unified system of risk assessment reflected in guaranteed payments currently do not allow to increase the volume of insurance. For example, the rate of growth in insurance premiums of Russian agricultural organizations has been declining lately and has virtually no effect on ensuring a stable development of the agricultural sector, thus failing to protect the interests of agricultural producers from large-scale natural risks. Under such conditions, certain measures are required to find the best model for developing the system of insuring risks of Russian agricultural organizations. The foregoing suggests that the scientific challenge of creating an efficient system of insuring the agricultural risks continues to be a special and urgent trend for modern domestic science. Besides, the stated scientific challenge is directly related to the national interests of the country, the solution of which is aimed at ensuring food security (autonomy), depending on the basic potential of agricultural production.

Baldov and Suslov (2016) note in this regard that it is necessary to *"develop an adequate strategy for economic transformation in the agrarian sector and improve the management mechanism."* One of the most promising areas in addressing the stated challenge is the use of index insurance in agriculture.

Theoretical, methodological and practical aspects of index insurance to protect the harvest of agricultural organizations and their incomes are considered in the studies of many scientists such as Agibalov and Obraztsova (2013), Antonova (2008), Efimov (2014), Zhichkin and Shumilina (2011), Ivanova (2015), Mahul and Stutle (2010), Makhdieva (2017), Shpilina *et al.* (2017) and others.

2. Materials and methods

The study uses official data from the Department of the Federal State Statistics Service for the Astrakhan region and the Republic of Kalmykia, the Ministry of Agriculture of the Republic of Kalmykia. General theoretical methods of cognition in the concept of index insurance were applied. Four natural and economic zones of the region were distinguished in the article, using the method of zoning, for convenience and the clarity of calculations. Yields of grain crops, size of the insurance premium, price of reimbursement, economic efficiency of index insurance of grain crops and insurance of grain crops with state support were determined, using an integrated approach. Analytical methods of statistics and economics were applied to assess the system of index insurance, comparative and logical analysis was also conducted.

3. Results

Arshba (2014) believes that *"Rational placement of agricultural production by natural and economic zones is considered one of the important conditions able to increase the agricultural production and make it cheaper. With a view to rational*

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grouping of lands, the zoning method is used, which takes into account such factors as the degree of influence of natural and climatic conditions, soil structure, terrain, and a set of cultivated crops." As such, the Republic of Kalmykia includes 4 natural and economic zones:

- ✓ zone I – Northern (Maloderbetovsky, Ketchenerovsky, Oktyabrsky, Sarpinsky districts);
- ✓ zone II – Eastern (Chernozemelsky, Lagansky, Yustinsky, Yashkulsky districts);
- ✓ zone III – Western (Gorodovikovsky, Yashaltinsky districts);
- ✓ zone IV – Central (the city of Elista, Tselinny, Priutnensky, Iki-Burulsky districts).

Characteristics of the factors of agricultural production in the Republic of Kalmykia in the context of 4 natural and economic zones are presented in Table 1.

**Table 1.** *Characteristics of agricultural production in the Republic of Kalmykia (Natyrova 2005).*

Zone	Content
Northern	Decrease in the overall efficiency of agricultural production, pronounced trends of the decline in the livestock headcount. A significant degree of manifestation of degradation processes.
Eastern	The highest degree of agriculture unfavorability (commonplace desertification) leading to a socioeconomic crisis.
Western	The lowest degree of agriculture unfavorability, intensive farming. Weak degree of manifestation of degradation processes.
Central	Average degree of manifestation of degradation processes, which affects crop production and the trend of the decline in the livestock headcount.

As the data of Table 2 reveal, the agricultural production of the region is greatly influenced not only by weather, but also by anthropogenic factors leading to negative farming conditions. Drought is typical for the region under consideration. As such, ignoring natural risks in combination with other types of risks can lead to adverse consequences for the regional agricultural producers (Figure 1). Proceeding from the above, Kalmykia belongs to regions with risky farming. The lack of a clear system of insuring risks of agricultural organizations is a significant problem for the region. Despite the extensive foreign practice in this area, Russia has not been able to make the insurance system more efficient and affordable for farmers.

Until recently, the practical application of index insurance in agriculture has been carried out within pilot projects and has not been widely spread in Russia. Advantages of index insurance cannot be underestimated and include: public

information on yields across the country, region, district, low administrative costs, etc. Along with the advantages, the shortcomings can be highlighted, including: efficiency is higher only in regions with a homogeneous economic zone, sampling errors and counts in determining average yields (Naminova, 2016).

Figure 1. *Risk tree for agricultural production in Kalmykia (compiled by the authors)*
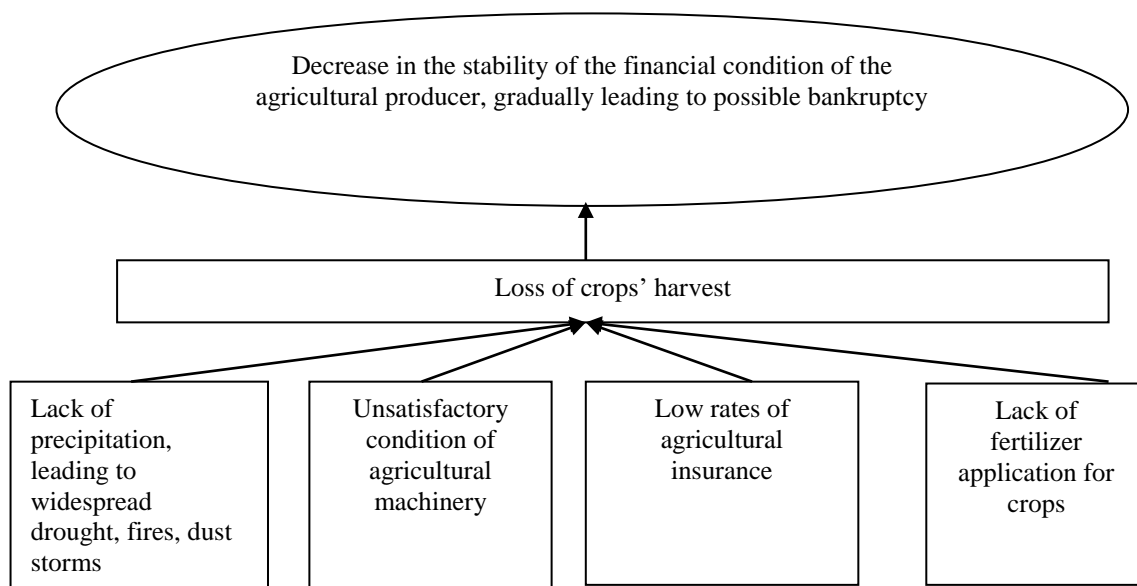
At the same time, Deputy Head of the Financial Policy Department V. Balakireva notes: *"The Russian Ministry of Finance is going to begin analyzing the opportunities and prerequisites for introducing index insurance in agriculture in Russia in the near future"* (Russia – Ministry of Finance analyzes the possibilities of applying index insurance in the agricultural sector).

The concept of index insurance is that a generalizing factor (yield, income) or a specific, dominant factor (rainfall, temperature) is selected, which is the center of the mechanism of the program for determining the insured event. The insured event itself is the excess of a certain threshold level of the selected factor. Drivers that have led to the transition of the chosen parameter through the threshold number value are traditional agricultural risks: drought, overwatering, hail, mudslide, frost, etc. When deciding on the insurance payment, the insurer and the insured apply not to facts of the availability and size of these risks, but to a single numerical indicator index. This is the difference between the system under consideration and other forms of insurance. India is generally considered as the birthplace of weather indices (Mahul and Stutle, 2010).

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4. Discussion

Agricultural enterprises of the Republic of Kalmykia were selected within the study, grouped into three natural and economic zones: Western, Central, and Northern. The fourth zone, Eastern, was excluded due to commonplace desertification, entailing the degradation of crop areas. The study covers crop insurance based on the yield index of a given Kalmykian natural and economic zone. The following algorithm of actions was developed when processing the received data:

1.   First, the average level of grain crops' productivity in the Western, Central and Northern zones of the republic was found for 2005-2015. In this regard, the official data of the Department of the Federal State Statistics Service for the Astrakhan region and the Republic of Kalmykia (Official website of the Department of the Federal State Statistics Service for the Astrakhan region and the Republic of Kalmykia), the Ministry of Agriculture of the Republic of Kalmykia (Official website of the Ministry of Agriculture of the Republic of Kalmykia) were used.

2.   Then the amount of the insurance premium payable at the end of the contract of index yield insurance was calculated. Agibalov and Obraztsova (2013) point out in their study that *"When determining the insurance rate for index insurance, a general analysis of yields in the region is used, which explains why the costs of conducting index insurance significantly lower than in traditional insurance. This is because the insurance rate does not include the cost of risk assessment for each insured but conducts an overall yield analysis in the area. Due to this, index crop insurance rates will be lower than the current rates used".* Proceeding from the above and considering that the insurance rate for grain crops' insurance under the traditional scheme in Kalmykia is 6-7%, index insurance is taken arbitrarily as 5%. Based on international experience in this field, the authors have determined insurance coverage equal to 80% with zero level of unconditional franchise (Table 2). The algorithm for calculating each indicator under consideration is presented in the tables below.

Table 2. *Insurance premium for index insurance of grain crops by the natural and economic zones of the Republic of Kalmykia**

#	Name	Western zone	Central zone	Northern zone
1.	Average yield, dt/ha	30.6	14.8	12.7
2.	Average selling price, rub/dt	570.0	588.0	590.0
3.	Insurance value, rub. (line 1*line 2)	17,442	8,702.4	7,493
4.	Insurance coverage, rub. (line 3*80%)	13,953.6	6,961.92	5,994.4
5.	Insurance premium, rub. (line 4*5%)	697.68	348.096	299.72

Note: **Table is compiled and calculated by the authors using (Official website of the Department of the Federal State Statistics Service for the Astrakhan region and the Republic of Kalmykia; Official website of the Ministry of Agriculture of the Republic of Kalmykia).*

3.   The price of reimbursement was calculated at the next stage (Table 3). It shows what amount of insurance compensation falls on a unit of reducing the minimum yield below the average yield level.

Table 3. *Price of reimbursement for grain crops**

#	Name	Western zone	Central zone	Northern zone
1.	Average yield, dt/ha	30.6	14.8	12.7
2.	Average minimum yield for 2005-2015	23.2	8.4	6.9
3.	Deviation of the average yield from the minimum (line 1 - line 2)	7.4	6.4	5.8
4.	Insurance coverage, rub. (calculated in Table 1)	13,953.6	6,961.92	5,994.4
5.	Price of reimbursement in case of a decline in yield by 1 dt, in rub. (line 4/line 3)	1,885.62	1,087.8	1,033.52

Note: **Table is compiled and calculated by the authors using (Official website of the Department of the Federal State Statistics Service for the Astrakhan region and the Republic of Kalmykia; Official website of the Ministry of Agriculture of the Republic of Kalmykia).*

The price of reimbursement was determined by distributing the insurance coverage between the average yield and the average minimum yield across zones over the period under study. The amount of insurance compensation will grow as the actual yield approaches (from above) the indicator of the average minimum yield. In this case, if the actual yield is equal to the average minimum yield or below this level, the entire insurance coverage under the insurance contract should be paid in full (Table 3).

4.   The next step was to calculate the insurance compensation for the index insurance of the grain crops' yield (Table 4).

Table 4. *Insurance reimbursement for index insurance of the grain crops' yield by the natural and economic zones of Kalmykia in 2015**

#	Name	Western zone	Central zone	Northern zone
1.	Actual yield in 2015, dt/ha	24.8	11.6	8.2
2.	Average yield, dt/ha	30.6	14.8	12.7
3.	Average minimum yield for 2005-2015	23.2	8.4	6.9
4.	Deviation of the actual yield from the minimum	1.6	0	0
5.	Insurance coverage, rub.	13,953.6	6,961.92	5,994.4
6.	Price of reimbursement in case of a decline in yield by 1 dt, in rub.	1,885.62	1,087.8	1,033.52
7.	Insurance reimbursement, rub. (line 4*line 6)	3,016.99	6,961.92	5,994.4

Note: **Table is calculated by the authors.*

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Data in Table 3 reveal that the actual yield of grain crops in 2015 was lower than the average yield (Figure 2), this fact indicates the existence of an insured event (Western zone – 24.8 <30.6, Central zone – 11.6 <14.8, Northern zone – 8.2 <12.7).

Figure 2. *Condition for calculating the insurance reimbursement for index grain crops' insurance.*

$$Y_a < Y_{av}$$

Insured event

Insurance reimbursement
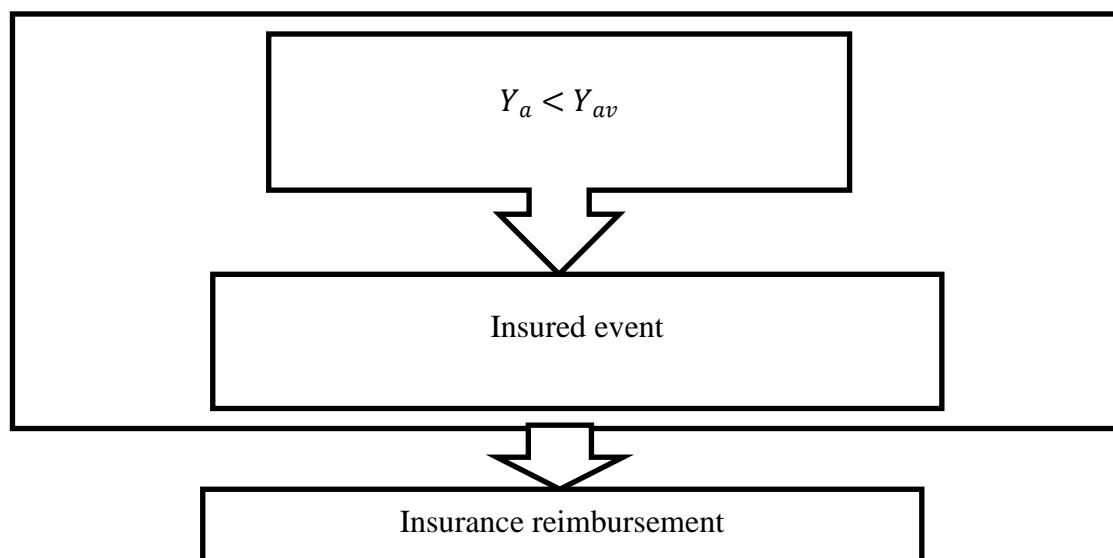
If the actual yield falls below the level of the average minimum yield, the insured will receive the full amount of the insurance coverage. If the opposite occurs, then the calculation of the insurance reimbursement is required. Doing so requires finding the deviation of the actual yield from the average yield and multiplying it by the price of reimbursement.

5. The efficiency of applying the index insurance system was found (Table 5).

Table 5. *Efficiency of applying the index insurance system in the conditions of Kalmykia*.*

#	Name	Western zone	Central zone	Northern zone	Average for the republic
1.	Insurance premium, rub.	697.68	348.10	299.72	448.50
2.	Insurance reimbursement, rub. (data calculated in Table 4)	3,016.99	6,961.92	5,994.4	5,324.44
3.	Difference between insurance reimbursement and insurance premium, rub. (line 2 - line 1)	2,319.31	6,613.82	5,694.68	4,875.94
4.	Ratio of the insurance premium to the insurance reimbursement, %	23.13	5.00	5.00	8.42

	(line 1/line 2) *100				

Note: *Table is calculated by the authors.*

Data in Table 5 indicate that for the Western natural and economic zone, the insurance premium is 697.68 rub. and the amount of insurance payment is 3,016.99 rub.; these indicators amount to 348.10 rub. and 6,961.92 rub., accordingly, for the Central zone, while the insurance premium is 299.72 rub. and the amount of insurance payment is 5,994.4 rub. for the Northern zone.

For the Republic of Kalmykia in general, the figures are 448.50 rub. and 5,324.44 rubles. This suggests that the amount of the alleged insurance premium is much lower than the possible insurance payments and is 8.42% on average. The next step is a comparative analysis of the economic efficiency of the grain crops' index insurance and grain crops' insurance with state support (Table 6).

Table 6. *Comparative analysis of economic efficiency of grain crops' index insurance and grain crops' insurance with state support*.

#	Name	Western zone	Central zone	Northern zone
	For grain crops' insurance with state support			
1.	Price of 1 centner of yield, rub.	570.0	588.0	590.0
2.	Average insurance coverage, thous. rub.: a) for grain crops' insurance with state support	17,442.0	8,702.4	7,493.4
	b) for index insurance	13,953.6	6,961.92	5,994.4
3.	Insurance premium, rub. (insurance of risks of agricultural organizations with state support) (line 2"a"*6.7)/100**	1,168.61	583.06	502.06
4.	Insurance premium, rub. (index insurance)	697.68	348.10	299.72
5.	Economic effect of using index insurance, rub.	470.93	234.96	202.34

Note: *Table is calculated by the authors, **Line 3 was calculated using an insurance rate of 6.7%.*

Based on the calculations made, the following conclusion can be drawn. The economic effect from introduction of grain crops' index insurance in Kalmykia will amount to 470.93 rub. for the Western natural economic zone, 234.96 rub. for the Central zone, and 202.34 rub. for the Northern zone.

5. Conclusion

The obtained results suggest the expediency of using index insurance under conditions of risky farming in Kalmykia. The calculations made indicate which system (the system of grain crops' index insurance or insurance of grain crops with state support) is preferable for different natural and economic zones of Kalmykia to

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get the highest guaranteed insurance premium in the coming season. The use of index insurance can also be useful for regions that are like Kalmykia in terms of natural and climatic environment. The use of index insurance must correlate with the territorial features and opportunities of agricultural organizations in the region, along with the ongoing agrarian policy.

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