

RISK MANAGEMENT IN AGRICULTURE AND AGRARIAN POLICY

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Abstract

The experience of private-state-public risk management schemes in the part of farmers' revenue and income assurance programs in countries the main world exporters of agricultural product has been overviewed. To evaluate economic background for crop revenue and income assurance programs in Ukraine the correlations between the production fluctuations (yield) and prices, revenues, profit from grain crops were calculated. The meanings of coefficients of correlations testify chaotic fluctuations of price and production results, strong influence of the macroeconomic factors on the prices and financial results of agricultural producers in the emergence economy. There was concluded, that under such conditions the revenue and income assurance programs better, than yield insurance programs, catch falls of natural, market and macroeconomic environment to provide sustainability of agriculture.

Keywords: agrarian policy, agricultural enterprises, insurance, price, profit, revenue, risk management.

JEL Classification: H5, M110, Q1, P32

1 Introduction

Agriculture is well known as high risky area of business. There are a lot of sources of risks for farmers: weather and climate changes, plant diseases, insects, livestock epidemics, fluctuations of prices, terms of credit, government regulations. The European Association of Agricultural Economists confirms: "In the last years it has become obvious that the previous generation of EU farmers grew up in a relatively stable risks environment but the current and next generations are confronted with an increasing number of risks" ("Prospects for agricultural insurance in

Europe”, 2016). It should be noted that risks in agriculture transform into risks of food safety, social and political stability, rural development, sustainable development.

The 2030 Agenda for Sustainable Development, adopted at the United Nations Assembly in 2015, defines core 17 Sustainable Development Goals (SDGs) for “a plan of action for people, planet and prosperity”. Experts of FAO stress: “As the fundamental connection between people and the planet, sustainable food and agriculture are at the heart of the 2030 Agenda” (“Food and Agriculture”, 2016). But the rapid changes in the world are transforming into more extreme and frequent fluctuations in agricultural production conditions, agri-food markets. Achieving the transformation to sustainable agriculture has become a major challenge.

Due to the estimates of M. Miranda and J. Glauber (1997), a portfolio of geographically diversified contracts of crop insurance was much as twenty times riskier than a portfolio of conventional health or automobile insurance contracts. The private and public schemes of risks reduction for farmers were developed and introduced in many countries – leaders of agricultural production and export. Updating of risk management schemes is important direction on the way to sustainable agriculture and SDGs achievement under conditions of modern challenges.

Ukraine with rich resources potential of agricultural and food production, 40% of export of agricultural and food products in total value of merchandise export has opened up agricultural risk management technologies neither at micro-level nor at macro-level. PSE is still lowest among European countries; this indicator of state support of farmers was even negative last years. In 2015 PSE was estimated -2.23% of GDP and -9.5% of GFR (“Producer and consumer support estimate data”, OECD, 2017). The Law of Ukraine “On State Budget of Ukraine for 2018” allocates 945 million UAH (€ 27,8 million, €1.4 per hectare) for financial support of agricultural production and 66 million UAH (€ 1.9 million) for partly reimbursement of interest of credits, but this support does not include risk management programs.

The risk management schemes have to include wide range of sources of risks in agriculture, tools of its reduction. This paper is aimed to summarize modern experience of risk management in the part of farmers’ revenue and income assurance in the state programs in the countries, that are the main world exporters of agricultural product, and to evaluate economic background for crop revenue and income assurance programs in Ukraine.

2 Data and Methods

The research is based on the overview of legal framework of agrarian policy in the USA, EU, Canada, Ukraine; analytical reports of FAO, OECD, the Institute for the Protection and Security of the Citizens.

The survey of production and commercial results of some agricultural enterprises (farms) of Kharkiv region (Ukraine) was carried out. The statistical reports and financial statements of these enterprises, the Bulletins of State Statistical Service of Ukraine on results of production and sales of agricultural product (2011-2015) were analyzed.

Logical operations, surveys of agricultural enterprises, statistical data collection and analysis were used. The correlation analysis has been implemented for revealing connections between production fluctuations and prices, revenues, profit from grain crops. This analysis dealt with the level of enterprises, as well the level of national agriculture. The scope of the fluctuations was defined by means of variation indicators. The fluctuations of production results were considered on the base of the fluctuations of the crops yield. Dynamic of crop yield was chosen for evaluation of production fluctuation since it better reflect production risks and give possibilities to avoid the influence of the changes of sowed area due to farmers' decisions on the results of production (in comparison with the amount of production). For calculations, data systematization Microsoft Excel was used.

3 Results and Discussions

New challenges gave rise the special attention to risk management as the monitoring, identification, assessment, and activities to direct, coordinate and control the systems with regard to minimize probability and/ or impact of unfortunate events or to maximize the realization of opportunities (ISO 31000). EAAE put the question, whether agricultural policy should further develop into a risk management policy (2015).

In the USA the Agricultural Act of 2014 offered two new government programs – Price Loss Coverage (PLC) and Agriculture Risk Coverage (ARC) for American farmers. Price Loss Coverage Program works like insurance for farmers in the case of prices reduction, and government takes some market risks of farmers. But the market price mechanism works such way that reduction of prices often is a consequence of the growth of supply and vice versa. It is fairer for public institute to take private risk exactly due to the market failure in the provision of fair income for producers. In this case the state programs targeted to

the compensation of farmers' income losses may better mend market inefficiency than programs connected to the price fluctuations.

The relationship between yield and market prices is important factor for grounding of income stabilization and insurance programs. C. Zulauph (2002) calculated coefficient of correlation between average annual prices and average annual yield of some crops in the USA for 1986-1999. He confirmed the tight negative correlation between average annual prices and crops yield. So under tight negative correlation reduction of yield is compensated by price growth. Such conclusions have built the theoretical basis for implementation of revenue assurance programs in the USA in the early 2000.

Due to the Farm Bill of 2014 producers participating in Agriculture Risk Coverage (ARC) Program may choose county-based or individual coverage. For producers choosing county-based ARC, payments are provided when county crop revenue drops below 86% of the county benchmark revenue. Special part of the US Agricultural Acts is "Crop insurance".

The investigation of the practice of agricultural insurance in the USA has showed, that the wide range of the insurance products is offered by many private insurance companies. They work in agreement with the USDA Risk Management Agency. About 45% of field crops production value were insured (23% in the EU) ("Agricultural Insurance Schemes", 2006). The yield insurance covers many risks of crop production in the US. There have been also developed and introduced revenue and income insurances. Revenue insurance combines yield and price insurance. Income insurance takes also into account the costs of production.

The amount of premium and indemnities due to the insurance programs for the producers of some crops in the USA in 2014-2015 are in the Table1. These data testify that the indemnities cover the paid premium in some years. The premium subsidies amounted 58% of total premiums.

Table 1 Amount of premiums and indemnities due to crops insurance programs in the USA

Crop	Year	Premium, 1,000 dollars	Indemnities, 1,000 dollars
Barley	2014	53,410	61,401
	2015	69,085	37,329
Corn	2014	3649,571	3842,778
	2015	3685,913	1677,587
Sunflower	2014	344,517	757,076
	2015	306,477	428,374

Crop	Year	Premium, 1,000 dollars	Indemnities, 1,000 dollars
Wheat	2014	1453,541	1643,091
	2015	1284,514	1218,538

Source: NASS, USDA, 2017.

In Canada insurance income program (Canadian Agricultural Income Stabilization, CAIS) substituted two former programs: NISA or Net Income Stabilization Account and CFIP or Canadian Farm Income Program. Due to the CAIS farmers put an amount of money every year in the individual stabilization account, which they can withdraw in a year of big losses. A share of funding in the case when producers need to make withdrawals from their accounts is paid by government. The subsidies from the Federal and the provincial governments consist 66% of the premiums of insurance programs.

Special example of institute of market risk reduction is the Canadian Wheat Board (CWB), which is aimed to ensure the most profitable for farmers' grain prices and competitiveness of Canadian wheat and barley and so to reduce market risks for producers.

The set of Regulations and Multiannual Financial Framework were adopted in the 2013-2014 and provided guidelines and rules of the next stage of CAP of the EU. The EU practice includes agricultural insurance or/and mutual fund schemes to help farmers manage yield and price risk. It was also authorized the use of EU funds to support innovative insurance products such as area-based yield index insurance or weather index insurance. The total amount of agricultural insurance premium in the EU was estimated around €1.5 billion per year, with public subsidy of approximately €500 million. The average amount of insurance indemnities was near €1.1 billion ("Risk Management and Agricultural Schemes in Europe", 2009). The perspectives of income stabilization programs in the EU are argued by many scientists (El Benni, N., Finger, R. and Meuwissen, M.P.M., 2016).

So, in the USA, EU, Canada the private, state and public endeavors insure and divide the burden of agricultural risks, provide stabilization of farm income, insurance programs are designed to cover the production risks associated with the uncertainty of weather conditions, and risks of fluctuations of farmers' income.

In spite of high level of risks of agribusiness insurance in agribusiness in Ukraine has not developed: there is limited range of insurance products, insurance premiums are high, very small insurance coverage of agricultural land. In 2015 there were insured 869 thousand hectares (4.2% of land of agricultural enterprises or 2.4% of land of agricultural enterprises and individuals). More than

a half of total amount of agricultural insurance contracts is the contracts of bank collateral. The rate of indemnities was from 9.7% in 2015 to 50.9% in 2012.

The Law of Ukraine "On State Support to Agriculture" (June 24, 2004 # 1877-IV) announced the creation of the Fund for Agricultural Insurance Subsidies of Ukraine (FAIS) and the provision of compensation of 50% of insurance premium paid by agricultural producers. The Law of Ukraine "On the State Budget of Ukraine for 2005" (February, 23, 2004 # 2285-IV) provided allocation of UAH 54 million as a subsidies to reduce the cost of insurance premiums actually paid by agricultural producers, but only UAH 5.8 million of them were used, that is, the volume of insurance coverage turned out to be less than expected, and in 2006 the state subsidies of agricultural insurance were set at UAH 10 million. In 2010 the state program of subsidies of insurance premiums was stopped and has not renewed in spite of its positive influence on the development of agricultural insurance.

Most widely extended crop insurance is related to yield losses. New insurance product design, state programs of assurance of farmers' incomes development should be based on the analysis of production and market fluctuations. It is clue question concern the degree of market ability to mend the production falls, their influence on the revenue and farmers' income and respectively their financial possibilities to continue produce vital important for food security products.

Grain production is a base of Ukrainian agriculture. More than 50% (55% in 2015) of total sowed area is under grain crops, mainly wheat and corn (Table 2). This fact caused the focus of our investigations in the grain production, first of all, wheat and corn production.

Table 2 Sowed area under crops in Ukraine, thousands hectares

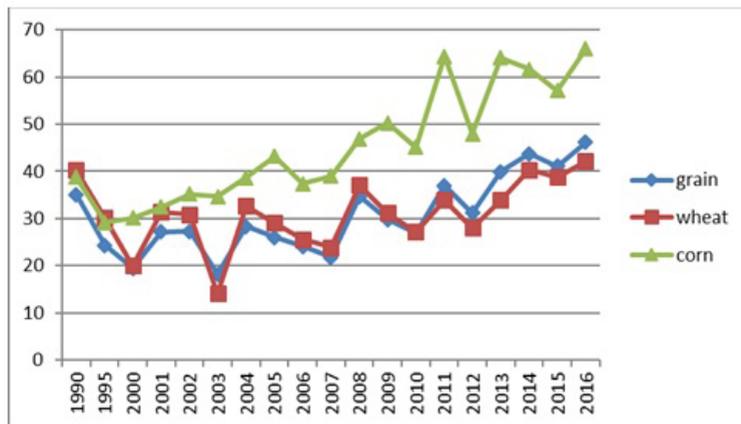
Year	Total	Grain	Wheat	Corn
2011	27670	15724	6499	3620
2012	27801	15449	5534	4625
2013	28329	16210	6684	4893
2014	27329	14801	6061	4691
2015	26902	14739	6867	4123

Source: Data of State Statistical Service of Ukraine.

The grain yield is extremely unstable in Ukraine, but demonstrates good growth after 2007. The differences between maximum and minimum levels of average year yield for last ten years (2007-2016) were 2.1 times for grain crops, 1.8 times

for wheat, 1.7 times for corn. Figure 1 demonstrated yield fluctuation for grain, wheat and corn in Ukraine.

Figure 1 **Grain yield in Ukraine, centners per hectare**



Source: Data of State Statistical Service of Ukraine.

In spite of new technologies of last decade variation of grain yield still be very high in Ukraine. The results of calculations of the coefficients of variation of average annual grain crops yield prove this fact (Table 3). The coefficient of variation of grain crops yield did not become lower in 2008-2016 in compare with 2002-2007.

Table 3 **Coefficient of variation of average annual grain crops yield in Ukraine**

Crops	2002-2007	2008-2016
Grain	0,159381	0,179030
Winter wheat	0,246941	0,152739
Corn	0,113616	0,150882

Source: Author's calculations.

Risks of losses due to the yield fluctuation might be compensated by prices changes. The correlations between grain crops yield and prices, revenue from sales and profit were checked for some agricultural enterprises of Kharkiv region for 2011-2015. The results of calculations are in Table 4. No one of coefficient of correlation of Table 4 confirms tight inverse connection between yield and prices, yield and revenue from sales, yield and profit from sales of grain crops.

Table 4 Coefficient of correlation between average annual yield and prices, revenue and profit from sales of grain and leguminous crops, wheat, corn of some Ukrainian agricultural enterprises in 2011-2015

Enterprises	Crops	Coefficient of correlation between		
		yield and prices	yield and revenue from sales	yield and profit
1. Agroprogress	Grain and leguminous crops	0,68437	0,87603	0,51246
	Wheat	0,50882	0,78368	0,49227
	Corn	-0,61574	0,73689	0,02874
2. Profagro	Grain and leguminous crops	-0,24134	0,55171	0,15776
	Wheat	0,38424	0,23714	0,65954
	Corn	-0,31178	-0,96330	0,85132
3. Promin	Grain and leguminous crops	0,51911	0,70825	0,69254
	Wheat	0,96272	0,82720	0,85792
	Corn	0,25914	0,33698	0,42235

Source: Author's calculations.

Actually agricultural enterprises are working under conditions that close to pure competitions and no one of them can influence on the market prices and supply. We have tested the correlation between the average year grain crops yield and prices, revenues and profit from these crops sales in Ukraine for 2011-2015. The results of calculations are in Table 5.

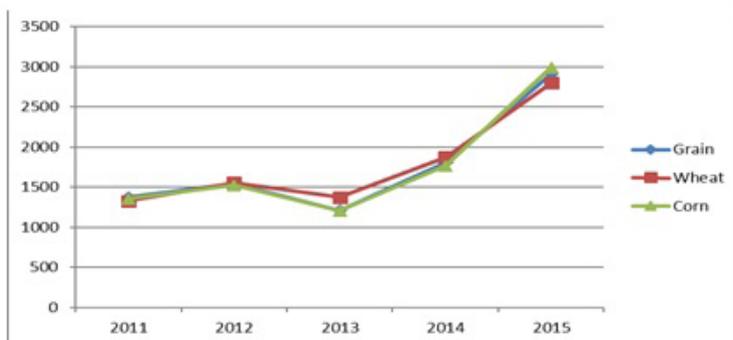
Table 5 Coefficient of correlation between average yield and prices, revenue and profit from sales of grain crops, wheat, and corn in Ukraine in 2011-2015

Crops	Coefficient of correlation between		
	yield and prices	yield and revenue from sales	yield and profit
Grain and leguminous crops	0,35402	0,44083	0,38850
Wheat	0,60380	0,61788	0,74195
Corn	-0,23885	-0,18221	-0,17909

Source: Author's calculations.

Due to these calculations the slow direct connection are observed between yield and prices, yield and revenue from sales, and yield and profit for wheat. The coefficients of correlations for grain crops and corn do not confirm any connections between yield and prices. So, another, than crops yield, factors affected stronger on the prices fluctuations (Figure 2) and revenues of farmers in this period.

Figure 2 Average annual grain crops prices in Ukraine, UAH per ton



Source: Data of State Statistical Service of Ukraine.

Prices of grain of Ukrainian enterprises moved mainly due to inflation in the national economy, world market prices and dynamics of exchange rate. In spite of economic crises in Ukraine, GDP reduction after 2013 agricultural enterprises generated profit, 88.9% of agricultural enterprises in 2015 got net profit.

Also there have been revealed tight correlations between grain yield in some agricultural enterprises and average in the Ukraine in 2011-2015 (Table 6).

Table 6 Coefficient of correlation between grain yield in selected agricultural enterprises and average in the Ukraine in 2011-2015

Enterprise	Coefficient of correlation
Agroprogress	0,74909
Profagro	0,82967
Promin	0,91158

Source: Author's calculations.

This fact testifies that common factors (weather, macroeconomics conditions) influenced on the grain yield of selected for survey agricultural enterprises, and

grain yield was less depended on specific factors (for example, management of enterprises). So these enterprises faced mainly with systemic risks of yield reduction.

4 Conclusions

It is reasonable, and the experience of developed countries confirms that the risks of agricultural production has been taken by all society on the base of PSPP (private-state-public partnership) in the provisions of assurance schemes in agriculture, whose main participants are agricultural producers, state, insurance and loss adjusters agencies, mutual funds, professional unions and organizations. Income stabilization programs provide compensation of market failure more efficiently than many other insurance programs.

In Ukraine risk management programs, including revenue and income insurance programs, have not been implemented at the level of producers, at the level of mutual funds, producers unions, and at the level of state. The construction of the efficient agricultural risk management system needs the development of institutional framework and its functional contents. The design of diversified portfolio of insurance products, including revenue and income insurance, will contribute to the efficient agricultural risk management system.

The received meanings of coefficients of correlation between average annual grain yield and prices, revenue, profit testify chaotic fluctuations of price and grain production results at the enterprises and national levels in Ukraine in 2011-2015, strong influence of the macroeconomic factors on the prices and financial results of agricultural producers in the emergence economy. Under such conditions the revenue and income assurance programs better way catch falls of natural, market and macroeconomic environment to provide sustainability of agriculture.

For the development of the efficient private-state-public revenue and income insurance schemes for crops production the investigation of relationships of results of production of other agricultural products, prices, farmers' incomes has to be done, the theoretical ground for the reference prices, that give possibilities to catch market failure more precisely, has to be built.

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