Agricultural insurance: The solution to many economic problems.

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Abstract: Agricultural insurance is a useful tool for the development of the agricultural sector and for the growth of the economy. Agricultural insurance products help farmers manage the risk of agricultural production. It reduces the effects of losses and damages in case of natural disasters, influences the increase of investments in agriculture, improves the biosecurity of the farm, increases the value of the capital and serves as a loan guarantee. The agricultural sector is an important source of income and employment for a significant number of people around the world. Farmers' participation in the insurance market stabilizes farmers' income as it provides them with compensation in case of natural disasters, helping them to continue the productive activity of the farm. When buying insurance products, producers use more effective methods for agricultural risks management. Agricultural insurance reduces farmers' stress. The size of the effect of agricultural insurance schemes on economy indicators is related with the terms of the contract and the producer's risk preference. To increase the effectiveness of agricultural insurance, it is necessary the increase the financial knowledge of farmers, the use of sustainable agricultural practices, the diversification insurance models, the use of modern technologies, the definition of the role of agricultural insurance, the cooperation of interest groups for the success of agricultural insurance schemes, government helps, etc. In this study we will theoretically analyze the importance of farmers' participation in the agricultural insurance market. We will analyze the impact of agricultural insurance on agricultural sector, on agricultural production and on various economic indicators.

Keywords: agricultural insurance products, production, economy, profit, growth.

1 Introduction

Agricultural insurance includes businesses and individuals dealing with agricultural production, livestock, aquaculture, forestry, animals with high market value, greenhouse products, etc. According to Groupe Atlas (2017) agricultural products are threatened by a large number of risks. These risks are particularly high in

undeveloped countries or in developing countries where the conditions for growing agricultural products are minimal, there is no hygiene, there is no medical care for animals and the owners have minimal knowledge about the care of agricultural products in terms of growth and quality. In order to reduce these risks and develop rural and agricultural areas, the agricultural insurance system should be established, which is a key element in the development of agriculture and the stability of farmers' incomes when they face natural disasters (Wang et al. 2011).

In the conditions of global economy, the limited number of agricultural insurance products is in shortcoming of farmers in developing countries, since developed countries have a greater number of agricultural insurance products to offer. Farmers who are affected by natural disasters cultivate a limited number of agricultural products, shrinking not only their revenue but also tax income. The decrease in tax revenues reduces the state's ability to finance social services such as natural disasters. Income from exports decreases as a result of the reduction of exported products. Relocation from rural zones to urban ones increases, financial markets decrease and the demand for economic support to control crises increases. On macro level, poverty will increase. In order to decrease all these consequences, it is required to create a successful agricultural insurance system, which will not only help farmers to be more competitive in international markets, but will also affect the improvement of other economic indicators. Close cooperation between the government, insurance companies and farmers is important for the success development of agricultural insurance market.

The objectives of this study are:

- To theoretically examine the importance of farmers' in development countries participation in the agricultural insurance market.
- To identify the main categories of agricultural insurance products.
- To analyze the influence of agricultural insurance on agricultural sector, on agricultural production and on various economic indicators.

2 Categories of agricultural insurance products

The variety of insurance products offered by a country depends on government subsidies, information on insurance contracts, and the appropriate infrastructure for offering these products. Agricultural insurance products are divided into three broad categories, which include premium-based products, index-based products and multi-risk insurance products (Ray, 1981). The characteristics of each category are presented below.

- Single risk insurance products - this type of product covers clearly defined risks in specific areas such as hail, flood, fire, etc. Farmers are compensated only if the cause of the damage is determined. The price of the product is determined and computed on the cost of production or estimated production value (Cass et al.1996). These products are widely

offered by insurance companies. The risks that these products cover are small. They are called compensation-based products.

- Multiple - risk insurance products - these insurance products cover two or more risks, such as risks from natural disasters, plant or livestock disasters, etc. Compensation is based on ascertained losses of the insurer against a predetermined yield. Some contemporary multi-risk insurance products provide income (Baimisheva et al. 2019). According to the authors assessing the damage is expensive as the insurer must visit the farm at least twice, before the damage occurs and after the damage occurs in order to assess the loss. Products with multiple risks require farmers to use standard or best practices for preserving agricultural products. This type of insurance is not suitable for small farms
- Index-based insurance products - Index-based insurance connects payments with an observable, reliable and sustainable index. Some examples of indices are rainfall, temperature, animal mortality, river flows, etc. Data are evaluated easily and quickly. These products offer transparency in the calculation of loss assessment, fast payment of damages and low cost of damage assessment (Binswanger-Mkhize, 2012). In contrast to multiple insurance products that only insure yields, index insurance products also insure production quality. A weakness of these products is that in some cases, due to the lack of a strong link between the index and the yield of the farm, protection may not be provided. For example, a fire insurance product does not pay anything if the destruction of production comes as a result of disasters (Adeyinka et al. 2022). Therefore, farmers buy index insurance products when a considerable part of premium is subsidized by the government. The problem of asymmetric information can also reduce the willingness of farmers to adopt this type of product. Although this type of insurance is difficult for farmers to understand, it has always attracted the interest of insurance companies.

In developing countries, agricultural insurance programs are underdeveloped and include:

a. Microinsurance related to credit – participants are generally small farmers, who make regular premium payments to microfinance institutions in relation to their risk benefits. Microinsurance uses the same principles as traditional insurance in terms of policy pricing, underwriting, loss assessment, reinsurance, etc. Different to traditional insurance, these products are only available for low-income farmers.
b. Macro insurance – according to this scheme, governments benefit quick payments in the form of help in case of natural disasters.
c. Modified macro insurance– small farmers receive payments in case of disaster from the company they have negotiated. This company can be the company from which farmers buy inputs, cooperative, etc.

3 The role of agricultural insurance in agricultural production

Natural disasters cause serious damage to agricultural production. Agricultural insurance influences the stability of agricultural production by compensating farmers for losses caused by natural disasters. Many academics have studied the role that agricultural insurance has in reducing the negative consequences of natural disasters. Some of these studies have verified the positive impact that the development in insurance has on the growth in agricultural production.(Olumide & Akinbode, 2014) conducted a primary data study in Ondo, Nigeria. The study proved that the increase of farmers involvement in the insurance schemes has increased the investments in agriculture and therefore the agricultural production has also increased. Agricultural insurance, in addition to risk diversification, serves to ensure agricultural production, stabilizes the rural economy and protects farmers' profits (Zhan & Cao, 2010). The promotion of the agricultural system positively affects the promotion of agricultural production (Chen, 2020). Zeng et al., (2022) analyzed the effect of the agricultural insurance scheme on the economy. They concluded that agricultural insurance influences agricultural production positively and negatively before and after the occurrence of a disaster. The impact before the disaster is positive and negative (premium payment) and mostly positive after the disaster. According to Baskaran & Maher (2021) agricultural insurance is an instrument that can be used to reduce the instability of incomes, to increase elasticity and serve to increase productivity in the agricultural sector. The insurance company helps mitigate the losses caused by natural disasters or epidemics, it helps farmers to get loans to purchase agricultural equipment, which further influence the improvement of productivity (Li & Wang, 2021). From the analysis of ten years of panel data for thirty one provinces and cities, (Caifei, 2020) proved that the impact of agricultural insurance on agricultural production is major and increases with the increase of risk.

Kujawska et al., (2021) studied the correlation between the provision of agricultural products, agricultural production and the environment. Using technical methods for arrange preference according to resemblance to an ideal result, they empirically proved that there was a shared relationship between agricultural insurance, land productivity and the environment. According to the result of their study, the level of insurance coverage promotes the growth of land productivity. Spörri et al., (2012) studied the effect of insurance products on the economic performance of production farms in Hungary. Through an equation, they connected the economic performance model variables such as farm characteristics, farm manager characteristics, production characteristics with insurance demand model variables such as the farm manager's behavior and his attitude towards risk, the farm's exposure to risk, risk management methods, etc. According to this study they concluded a negative relationship between insurance and farm profit, land productivity and labor productivity.

Sihem (2017) studied a panel data for twenty three American and European countries for 15-year to analyze the link among agricultural insurance and agricultural productivity growth. To measure the productivity of the land, the author used seven independent variables in an independent linear regression model such as insurance coverage, climatic conditions, human capital stock indicators, exposure compensation, agricultural credit, production risk indicators and the stock of physical capital. This study concluded that as a result of the growth of the agricultural insurance market, we will have an increase in agricultural productivity. Zou et al., (2022) studied variables such as gross agricultural production, agricultural insurance premium expenses, the expanse of crops planted, the irrigated area, the rate of pesticide application, education, spatial dimensions of rural roads, the degree of urbanization, etc. to study the role of agricultural insurance in increasing agricultural output. Through various instrumental regressions based on a panel data of 31 provinces, they reach the conclusion that additional expenditures in agricultural insurance programs significantly increase agricultural production in China. Zhang et al., (2023) explored the pig insurance market in Deqing County, China. They concluded that farmers who exit the pig insurance scheme are inclined to reduce pig production. The authors evaluate pig insurance not only as a means of reducing risk, but as a way to promote pig production. According to Boyd et al., (2013) livestock insurance, through the sufficient livestock inputs, affects the production of livestock and the increase food security.

4 The effect of insurance on some important economic indicators

Crop insurance is the main tool for maintaining the sustainability of income, promoting technology, stimulating investments and increasing credit in agriculture. (Nagentran & Rajendran, 2017). According to (Grannis & Bruch, 2006) participation in livestock insurance schemes provides farmers with payments for the part of expenses that are not compensated by the government. By participating in livestock insurance, producers can use more effective methods for managing agricultural risks, which affects the biosecurity of the farm.

Livestock insurance provides several services such as stabilizing farmers' incomes, increasing the capital value, reducing livestock risks and helping to develop the productive activity of the farm. (Ray, 1981).

Many farmers, due to low income and lack of capital, cannot get loans. This situation affects the slowing of the improvement of the agricultural sector. Agricultural insurance schemes serve to overcome such difficulties. By purchasing livestock insurance products, farmers' access to loans increases (Nagentran & Rajendran, 2017).

Agricultural insurance is an instrument used by farmers to stabilize income in the situation of the destruction of agricultural production as a result of unfavorable

events. (Halcrow, 1949). Ke & Wang (2002) studied the effect of agricultural insurance on the income of farmers in 31 provinces of China for the period from 2007 to 2009. The analysis of their study showed that agricultural insurance has a positive impact on increasing farmers income . This impact is evident in the income of farmers with high or medium income. Kujawska et. al (2021) studied the relationship among crop insurance and soil production in Poland. The authors found that increasing the level of insurance coverage causes an increase in land productivity. According to the authors, farms with a low level of productivity had an average insurance value two times smaller than farms with a great level of production.

Agricultural insurance is difficult to apply when agriculture is in survival conditions, where product variability is high and farmers' awareness of agricultural insurance schemes is low. Agricultural insurance helps in agricultural risk management, stabilizes incomes, encourages investment and helps farmers in developing countries transition from survival agriculture to sustainable agriculture (Mârza et al. 2015). Agricultural insurance enables the repayment of loans, increases the budgetary stability of fiscal expenditures related to agriculture by transferring the climate risk to the private sector, promotes the growth of the agricultural sector, creates new jobs, reduces the possibility for fiscal outflow, reduces corruption and has a positive effect in food security and in macroeconomic stability of the country (Baskaran et al., 2021). Riesling (2017) relates the importance of agricultural insurance schemes to income stability, debt repayment even during periods of agricultural production decline, technological advancement and production growth.

Despite the importance of this sector in the development of agriculture and beyond, in developing countries the government investments for the agricultural subdivision are generally insignificant in relation to the revenue and employment offered by this segment. There are no options for farmers in case of fatalities. The creation of a fund by the governments of these countries for agricultural insurance corporations would decrease the value of the insurance premium and inspire farmers in developing countries to promote different crops by growing yield and varying the products planted.

In the table below, we have presented some researches done by different authors on the effects that agricultural insurance has in different economic indicators.

Authors	Indicators that are affected by agricultural insurance	The effect
(Wang et al. 2011), (Nagentran & Rajendran, 2017); (Ray, 1981); (Halcrow, 1949); Ke & Wang (2002); Riesling (2017)	Income	↑
(Olumide & Akinbode, 2014); (Baskaran & Maher, 2021); (Li & Wang, 2021); (Caifei, 2020); (Kujawska, Rzechuła, Tyszko, & Soliwoda, 2021); (Sihem, 2017); (Ray, 1981); Riesling (2017)	Agricultural production	↑
(Zhan & Cao, 2010),(Baskaran & Maher, Brookings, 2021)	Profit of farmers The economy	↑ ↑
(Zeng, Qi, & Wang , 2022);	The economy	↑/↓
(Li & Wang, 2021); (Nagentran & Rajendran, 2017); Baskaran & Maher, Brookings,2021)	Loan	↑
Spörri, Barath, Bokusheva, & Ferto, 2012)	Profit of farmers Land productivity Labor productivity	↓ ↓ ↓
(Ray, 1981)	Equity value	↑
Mârza et al. 2015; Riesling (2017)	Investment	↑
Baskaran & Maher, Brookings, 2021)	Fiscal expenses Food safety Employment Corruption	↓ ↑ ↑ ↓

Table 1

The importance of agricultural insurance in economic indicators according to different authors

Conclusions

Agricultural insurance has an important role in the growth of the agricultural sector and in the development of the economy. Agricultural products are threatened by a large number of risks. In order to reduce these risks and develop agricultural sector, the agricultural insurance system should be established. To increase the success of agricultural insurance, it is essential the intensification of financial knowledge of farmers, the use of sustainable agricultural practices, the variation of insurance models, the use of contemporary technologies, the collaboration of interest groups for the accomplishment of agricultural insurance schemes, government helps, etc. Agricultural insurance products include three broad categories, which are premium-based products, index-based products and multi-risk insurance products. Single risk insurance products covers clearly defined risks in specific areas such as hail, flood, fire, etc. Multiple - risk insurance products covers two or more risks, such as risks from natural disasters, plant or livestock disasters, etc. Index-based insurance products connects payments with an observable, reliable and sustainable index.
The development of the agricultural system positively affects the promotion of agricultural production. Many academics have verified the positive impact that the increase in insurance has on the increase in agricultural production. The increase of farmers participation in the insurance schemes increases the investments in agriculture and therefore the agricultural production also increases. Agricultural insurance is a tool that can be used to reduce the instability of incomes, to increase elasticity and serve to increase productivity in the agricultural sector. The insurance company helps mitigate the losses caused by natural disasters or epidemics, it helps farmers to get loans to purchase agricultural equipment, which further influence the improvement of productivity. Agricultural insurance affects farmers profit, land productivity, labor productivity, equity value, investment, fiscal expenses, food safety, employment, corruption and other important economic indicators.

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