REDUCATION OF VOLATILITY YIELD AND PRICES IN CORN PRODUCTION USING REVENUE INSURANCE[1]

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Summary

Revenue insurance represents a new risk management tool in agriculture, based on the difference between the guaranteed and actual revenue of the entire farm or some production. Most commonly, crops that have a significant share in the structure of planting or significant yield are insured with the application of this tool. Mercantile corn is the most important field crop in Serbia, and climatic conditions and price changes have a huge impact on its production. As one of the aspects of struggle with volatility of revenues there is a possibility to insure the corn revenue, by concluding the insurance agreement. However, the revenue insurance is very slightly applied in the world, while in our country in recent years is in its infancy. This paper analyzes the economic and legal aspects of the insurance model in order to determine the basic mechanisms of its functioning, as well as the conditions that must be fulfilled so that conclusion of the agreement would have an economic justification for both parties (farmers and financial institutions). It also examines the normative framework for the conclusion of this agreement and stresses the differences relative to the classic insurance contract.

Key words: *corn, insurance, price, volatility, yield.*

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Introduction

It is significant to comprehend the nature of the risk, such as its origins, distribution and connection with other risks, as well as the ability of certain instruments to reduce it, in order to develop sound risk management strategies (Hardaker et al., 1997). Before they spend money on the payment of insurance premiums, farmers will do everything they can to reduce their economic risk by using some of the internal methods for risk management (risk avoidance, diversification or forming reserves) (Marković, Jovanović, 2011). If none of these methods do not bring adequate results, farmers have to resort to external instruments for risk management (transfer risk or insurance), and one of the dominant ways is to insure their production.

Generally speaking, all types of the insurances can be offered by the principle of specialization and universality. Risk insurance (mostly hail) is a typical example of the first principle, while the principle of universality includes protection from a number of risks and appropriate coverage level, so there is the guaranteed yield insurance, revenue insurance, net income insurance, etc. (Weidenfeld, 1991, Schlieper, 1997). While hail insurance is usually offered by private insurers as a specialized type of insurance, more complex and more universal insurance models belong to the domain of the public sector or it is a form of public-private partnership (Wright, Hewitt, 1994). It is certain that these more complex forms of insurance, considering the types of risk that are being covered, the method of calculating insurance premium, methods of determining insurance indemnity and other relevant parameters, could not survive without government subsidies (Binswanger, 1986). It all points to the fact that these concepts of insurance become an integral part of the national agricultural policy and thus tends to affect the conservation and stabilization of farmers' income, increase in average income and improvement of credit ability of the insured, the stabilization of markets, increased productivity of agricultural production, as well as conservation and environmental protection (Ray, 1991).

In the past, the most discussed topics were various aspects of yield insurances. With this insurance, price change risk falls on the farmers. For this reason, the research center of attention comes to the issue of revenue insurance respectively the farmers' income. Revenue insurance is a combination of yield and price insurance, and in this case indemnity shall be made if revenue reaches the appropriate level (Marković, 2013). It means that this model allows insurance from revenue reduction caused by price fall, lower level of yield or a combination of these two causes (Bielza Maria et al., 2002). During 1994 this new insurance product appeared in two forms in the US market. The first form was consisted of individual production lines, where the difference between the predetermined amount of revenue and realized revenue of a certain product was compensated. Another form was related to the whole farm, and here payment has occurred if the total farm income is lower than a predefined amount (Berg, 2001).

By conclusion of the revenue insurance agreement with insurance organization, farmer reduces the variability of his/her incomes, but he/she still cannot influence the changes

that occur on the expenditure side. This could be partly solved by introducing coverage margin insurance, where the intention was to protect the variability of the expected net income, and in this way to cover the expected variable costs (mainly costs of inputs such as seed, fertilizer, pesticides, fuel), what will certainly be the subject of research in a new study.

Farmers will realize significant savings with the revenue insurance, given that with the purchase of a policy they will be insured at the same time from a reduction in yield, and the reduction of the market price as well (Mishra, Goodwin, 2006).

The aim of the research in this paper is to explain the role and importance of revenue insurance, as well as to point to the possibility of its application on the Serbian market in the case of concluded revenue insurance agreement in major field crops.

Materials and methods

The paper uses data of corn yields from the individual farm in Novi Sad municipality. Also, statistics on field yields that are based in the period of 10 years were also available. In this way the conditions for reliable and transparent procedure for the establishment of regional or individual yield were fulfilled. This means that the correct application of yield insurance is the first prerequisite for revenue insurance.

On the other hand, historical data on the corn price in the selected time period is used. Changes in yields and prices, including their regional diversity are key drivers of agricultural incomes, and thus the starting point for risk analysis. The relationship between yield and price is of the key importance because it largely determines the possibility of potential loss.

With realization of their products, farmer achieves appropriate market revenue, as a product of the actual yields and price during the harvest ($R = p$). To prevent variability (volatility) of this parameter, he/she can enter into a contract with the insurance company and thus can predetermine guaranteed future income which represents guaranteed revenue, and which is defined as the product of the average yield, price during planting and coverage level:

$$R_g = y_i p_i \ \delta \tag{1}$$

In the basic type of revenue insurance, change in yield (price) is defined by reducing the yield or price fall following harvest compared with the planned values. In the event of failure to achieve the guaranteed income a farmer is entitled to indemnity which represents the difference between the guaranteed revenue and realized revenue (Knight and Coble, 1997):

$$P_m = Max\big[0, (y_i p_i \ \delta \ - p \ )\big] \tag{2}$$

The starting point for the determination of each insurance premium is the expectation of occurrence of the corresponding harmful event (Berg, 2001). In the revenue insurance,

it is calculated according to the following formula:

$$P_i = H\{\boldsymbol{p} \ \langle y_i p_i \ \delta\} E\left(y_i p_i \ \delta - \boldsymbol{p} \ \middle| \boldsymbol{p} \ \langle y_i p_i \ \delta\right) \tag{3}$$

where $H\{\boldsymbol{p} \ \langle y_i p_i \ \delta\}$ means the probability of occurrence of harmful event, and the

expression $E\left(y_i p_i \ \delta - \boldsymbol{p} \ \middle| \boldsymbol{p} \ \langle y_i p_i \ \delta\right)$ is the expected value operator. In other words, the expected damage is calculated as the product of probability that the realized revenue is below the guaranteed value and of the expected value that assigned parameter will not be achieved, or that guaranteed revenue will not be achieved.

Insurance premium is calculated in the model which corresponds ultimately to the expected harm (i.e. fair premium and net risk premium) and it does not lead to the expected increase in income. In this way, the rule that the insurance is risk management tool is being respected, so it is not a mean of income support. In this case, the insurance

premium corresponds to the expected value of damages, with the caveat that ($\overline{y_i}$)

corresponds to the expected amount of yield, and ($\overline{p_i}$) is expected price of the product:

$$E(P_m) = E\left(Max\left[0, (\overline{y_i p_i} \ \delta \ - \boldsymbol{p} \ )\right]\right) \tag{4}$$

The sum of the market (realized) revenue and insurance benefit represents the gross revenue (5), and if premium was deducted from it, it would be received the net revenue (6):

$$R_b = \boldsymbol{p} \ + Max\left[0, (y_i p_i \ \delta \ - \boldsymbol{p} \ )\right] \tag{5}$$

$$R_n = -E\left(Max\left[0, (\overline{y_i p_i} \ \delta \ - \boldsymbol{p} \ )\right]\right) + \boldsymbol{p} \ + Max\left[0, (y_i p_i \ \delta \ - \boldsymbol{p} \ )\right] \tag{6}$$

Gross revenue does not necessarily have to be equal to the guaranteed revenue since in the case that the realized (market) revenue was beyond the guaranteed, there will be no payment of insurance indemnity. On the other hand, the net revenue is higher than the market (realized) revenue, except in case when this is greater than the guaranteed revenue.

Results and discussions

Application of revenue insurance in the world

Based on one of the basic principles of insurance – revenue insurance should be quantitative and measurable, and also unpredictable and not manipulated by farmer, and its premium must be economically feasible and achievable. On the other hand, this type of insurance requires historical data, or an appropriate risk analysis of one of the three components - yield, price or yield-price correlation.

In the early 90's, the United States and Canada began developing the first models of the revenue insurance policies (Goodwin, Ker, 1998), while today this type of insurance is the predominant form of risk management in the United States. During the 90s there was the introduction of new insurance programs (CAT-Police and Revenue comprehensive cover). Farmers have the obligation to pay relatively low administrative fee, otherwise guaranteed them protection from yield loss, and also indemnity in case of reduction of product prices (Marković, 2013). Here we can talk about three concepts: basic insurance against extreme crop and fruit damages (CAT-Police), supplementary insurance with varying coverage level and insurance indemnity (Buy-Up Police), as well as insurance from a reduction in yield and / or product price (Crop Revenue Coverage) (Berg, 2001).

Government support has a decisive influence on the functioning of this type of insurance, and the program covers more than 80% of the ten most important crops. For a large number of crops and fruits, public-private insurance system, supported by the Federal Crop Insurance Corporation (FCIC), and administered by the Agency for Risk Management (RMA), offers revenue insurance (income) with different types of cover. Currently 70% of insurance premium FCIC is for individual revenue coverage with a share of 15% to 30%. The public sector subsidizes 60% of the premium and co-financed losses in proportion to weight loss. However, on the other hand, the government has provided grants to farmers who have suffered damage from natural disasters, which resulted in reducing the number of interested to insure their crops. For this reason, it is recommended that in future the government, in case of accidents, provides assistance only to insured farmers (Meuwissen et al., 1999).

In 1999 the project Adjusted Gross Revenue (AGR) has started, and aim of this program was to establish revenue insurance of the entire farm, and thus it secured revenue losses based on changes in the average yield and prices of selected crops in the five-year period. This project lasted until 2001, initially in five states, and the process of calculating the guaranteed revenue was based on the data of Tax Administration (Skees, 1999).

Canada has introduced revenue insurance in the Alberta province, which is highly supported by the state.

In Brazil, as one of the most developed agricultural regions in the world, the system of crop insurance did not work or was almost absent for many years. Since 2006, the system of subsidizing insurance premium has been introducing, which leads to an improvement of the situation in this sector. However, due to poor integration in measures of agricultural policy and the lack of stability, participation (subsidizing) unfortunately stagnating or even declining since 2009. At that time, starts the initiative to introduce revenue insurance, which required strengthening of financial regulations, but it has not found support from the public and the government. This is the result of the fact that Brazil does not have a developed infrastructure for agricultural insurance, as well as the regional price mechanisms, and if they do exist, they are not available to the extent necessary to insure the revenue.

Since 2008, the EU has enabled Member States to use part of their budget for co-financing of agricultural insurance. However, only a few countries have used this possibility. A study conducted in the EU was focused on the changes in farmers' income, as a determinant of risk management, and pointed out that there is expressed interest in income insurance. This type of insurance is still present to a lesser extent in the private sector, rather than revenue insurance. This lies in the fact that the income is a more comprehensive concept from revenue and that, in this case should take into account more risk factors which will be at the same time under strong political influence (e.g. import and export tariffs, the system of subsidizing income). Within the focus of income support for EU farmers, a much greater impact has social, rather than production, and market aspect. Therefore, taking into account the tight budget of the EU and the discussion that is largely focused on the future of direct payments, it could be concluded that government support for comprehensive yield insurance (revenue) remains very limited.

In France there have been attempts to establish a pilot project for revenue insurance. Although there is very limited government support for the yield insurance, there was no support for this pilot project which would also, in addition to the yield, insure the product price.

On the other hand, for decades the system of agricultural insurance in Spain is completely based on public-private partnership and provides a wide range of risk coverage that reduce crop yields, but without insurance of price.

In Serbia, since 2014, a product was developed which can insure crops against the risk of income loss (revenue loss). Revenue insurance covers the difference between the guaranteed insured revenue and realized revenue. Insured event is the reduction of insured guaranteed revenue due to the occurrence of any of the contractual natural risks or price change risk. Natural risks include hail, fire and thunderbolt (mandatory coverage), storm and drought (in case of corn). Fall in prices belongs to a group of financial risk and here the coverage is also a mandatory. The subject of insurance are wheat and corn, and revenue insurance can be arranged during April, May and June, since then the first estimates of the prices of these crops after harvest are being provided. Expected price is agreed on the basis of the Paris Stock Exchange and Budapest, and current market trends in Serbia. Actual prices are determined on the basis of the prices actually achieved on the Commodity Exchange in Novi Sad. The insurance agreement determines the level of coverage, and the damage is compensated if the realized insured revenue was less than the contractual revenue and if it happened at least one of the above insured risks. On this basis, damage compensation represents the difference between the guaranteed insured income and realized income (Generali Insurance, 2014).

Analysis of the economic and legal aspects of the revenue insurance in the case of reducing the volatility of revenues in corn production

Establishing a balance between the growth of agricultural production and reducing risk

factors is the priority of every farm. In addition to negative climatic factors, the major threat to business is the drop in the price of their products. In this case, volume and price risk are mutually connected, and the benefits from insurance means covering the difference between guaranteed and realized revenue.

When it comes to indemnity payment on the basis of this insurance, it is not of great importance whether it was just a yield, or price (or both factors together) that affected harvests income (realized revenue) to be below the guaranteed revenue. Instead, this insurance shall compensate whenever any of these factors fall short.

Yield and price components are being determined twice, which represents significant characteristic of this type of insurance. First time when the average yield is being determined is before entering into an agreement, or before planting the selected crop, based on yield data in the previous period (5-10 years), which is important when you are defining the guaranteed revenue, as well as the coverage level. On the other hand, determination of the initial price, based on the data from the stock exchange, is also an important item in defining the guaranteed revenue, as well as the premium. During the harvest, the same parameters (yield and price) are observed again, since the amount of realized revenue and the eventual indemnity payment depends on their value.

Calculation of the actuarial fair insurance premium, taking into account the relationship between price and yield risks, is the main challenge of conducting revenue insurance. The importance of community consideration of risks, manifests itself in that periods of low yields may be accompanied by high prices. If a decline in yields and prices happens at the same time, this would lead to lower fair premium rates (Ahmed, Teresa Serra, 2015).

In tab. 1 it can be seen that in the first case in the production period between planting and harvest, it starts from the price fall, while in the third case the price growth has happened. In the second case forecasted price during planting is realized. In this way, only in model A, insurance indemnity payment according to formula (2) did not happen. This is due to the fact that a yield of 60 dt/ha, and despite the lower price, the market revenue exceeds the guaranteed revenue (Equation 1). In two other cases, which start from a larger reduction in yield, comes to the indemnity payment, which is in the third case, higher by 70 €/ha. The difference is that in the third case distinction between reduced yield (16.67%) and price increase (10%) is less pronounced, while in the second case appreciable reduction in yield is present (33.33%), and the price has remained on the same level.

Including the calculation of the expected amount of insurance premium (Formula 4), which is reduced by the amount of state subsidy, and by calculating the gross and net revenue (formula 5 and 6), we can see that their amounts in the second and third case are the same, indicating that guaranteed revenue is realized. If we look at the net revenue of all three variants, it is certain that the guaranteed net value exceeds the marginal cost of production and thus provides the farmer adequate margin coverage, which excludes in this case the need for additional insurance against loss of net income.

Table 1. Example of revenue insurance at corn

B A S I C D A T A	UM	Model A	Model B	Model C
Actual yield	dt/ha	60.00	50.00	40.00
Price during harvest	€/dt	10.00	11.00	12.00
Average yield (5-10 years)	dt/ha	75.00	75.00	75.00
Price during planting	€/dt	11.00	11.00	11.00
Level of coverage	%	70.00	70.00	70.00
D E R I V E D I N D I C A T O R S				
Market revenue	€/ha	600.00	550.00	480.00
Guaranteed revenue	€/ha	577.50	577.50	577.50
Indemnity	€/ha	0.00	27.50	97.50
Gross revenue	€/ha	600.00	577.50	577.50
Insurance premium*	€/ha	30.00	30.00	30.00
Net revenue	€/ha	570.00	547.50	547.50

* After deduction of state subsidy

Source: Authors-based on their calculations

The revenue insurance agreement should not be applied in our law for several reasons. The first reason is of an economic nature (Veselinović et al., 2014), because most of our agricultural producers does not have sufficient financial resources to insure their crops from basic and additional risks, so they are not able to insure the value of agricultural production. Another reason lies in the lack of interest of the insurance companies for this type of insurance, and therefore the agreement that would be concluded, but also insufficient education of agricultural producers in Serbia in terms of the characteristics of this agreement. The third reason is the lack of legal and theoretical practice in this area. The following example is intended to consider the possible elements of the revenue insurance agreement:

Table 2. Example of corn revenue insurance agreement

Revenue Insurance Agreement
Parties
Agricultural economy Petar Đurđev   Generali Futog, Vidovdanska 24, Serbia   Belgrade, Koce Racina 3, Serbia (Insured)   (Insurer)
Article 1. Subject of the agreement The subject of this agreement is Revenue Insurer's payment of monetary indemnity to the Revenue Insured, which refers to the income on the line of mercantile corn, which will be planted in 2016, on a total area of 150 ha on a plot (cat. No. plot) in cadaster municipality of Futog. The basis for the payment is the difference between the guaranteed revenue and established or realized revenue.

Article 2.
Guaranteed revenue
Guaranteed revenue on 150 hectares planted with mercantile corn on the plot referred to in Article 1 of this Agreement is ...... RSD.

Article 3.
Realized revenue
Realized revenue is determined by taking into account total yield of mercantile corn on the entire area, expressed in kilograms, on the plot from Article 1 of this Agreement and the price of corn on Commodity Exchange in Novi Sad, taking average price, counting from the date of completion until the day of harvest. Commencement day of the harvest, bearing in mind created conditions for grain maturity and weather conditions, determines the Insured giving notice to the Insurer, provided that the total duration of the harvest should not be longer than 7 days. Possible changes in this period, due to the weather or other circumstances are harmonized by Insured and Insurer together. Corn yield is determined based on the measurement of yields on 10 benchmark places, the size of per 1 ha, and the average yield on these plots is multiplied by the total number of hectares (150) and thus gives a total value of yield. The price on the Commodity Exchange shall be determined in accordance with the rules referred to in paragraph 1 of this Article, taking into account the official data from the Commodity Exchange announced on the official website of the Commodity Exchange.

Article 4.
Premium
The Revenue Insured pays Insurer a premium which insures less than the revenue in the amount of RSD .... per ha, totaling .... RSD. The premium is paid within the set deadlines, as follows: (to define the terms of premium payment).

Article 5.
Indemnity for revenue less than the guaranteed
Revenue Insurer is obliged to pay monetary amount to the Revenue Insured corresponding to the difference between the determined revenue and the guaranteed revenue, if the actual revenue is less than the guaranteed revenue.

Article 6.
Participation of the Insured in risk coverage
Insured accounts for 10% in the risk coverage.

Article 7.
Control of application agro technical and other measures
Insured is obliged to conduct agro technical measures at least within realized in the previous reference period, and the presentation of these measures is attached to this agreement and it is its integral part. The authorized person of insurance company shall perform control of agricultural practices, which may affect the corn yield on the plot referred to in Article 1 of this Agreement.

Article 8.   Settlement of disputes   For the settlement of disputes relating to this agreement, competence belongs to ad hoc arbitration, which will form the Parties, in that way each party shall appoint one arbitrator, and appointed arbitrators shall appoint the third arbitrator, who is also president of the ad hoc arbitration. Decision of ad hoc arbitration has the force of a court judgment. Ad hoc arbitration rules will apply to the rules of International Arbitration Chamber of Commerce of Serbia.
Article 9.   Number of copies of the contract   The contract was concluded in four (4) copies, 2 of which are for each party.
Article 10.   Place and time of the conclusion of the agreement   The contract was concluded in Novi Sad, 17 November 2015.
Insured   Insurer   Signature   Signature

Source: Authors-based on their analysis and research

The revenue insurance agreement is by its legal nature sui generis (Carić et al., 2011). It has in its content and elements of the insurance contract on the weather conditions, but also the fluctuations in market prices. For the farmer who insures value of agricultural production, it represents safety and in terms of the variability of weather parameters, but also the volatility of stock prices of agricultural products. In agricultural production, it can also mean the insurance against unforeseen plant diseases. Compared to the classic insurance agreement it means that this agreement covers more risks in one (Veselinović, 2011). In this way, with payment of a single premium insurance will comprise the insurance against more uncertain events, which is not characteristic of classical insurance agreement.

Conclusion

Based on the above example of revenue insurance in Serbia, as well as a review of the situation of this type of insurance in certain countries, it is evident that it represents a very significant support to the further stabilization of farm income. As with the insurance with comprehensive coverage of yield (guaranteed yield insurance), for the significant penetration of revenue insurance on the market as a whole, it is necessary to strengthen the support of the state. Consequently, in parallel, it is important that potential users or customers acquaint with the economic aspects of the functioning of this type of insurance.

On the other hand, it is very important to conduct a research survey in order to examine the opinions of domestic stock markets and the attitudes of local investment funds, insurers

and banks on the basic indicators related to revenue insurance. It would therefore be necessary to provide appropriate technical assumptions on stock exchanges, as well as the specialization of insurers to work with this model of insurance. The basic condition for this is the formation of knowledge through education and creating preconditions through equipping financial institutions and the stock markets. Also, a comprehensive analysis of the legal aspects, by comparative analysis and by making standard agreements, it would contribute to its easier implementation in economic practice.

Literature

1. Ahmed O., Serra Teresa (2015): *Economic analysis of the introduction of agricultural revenue insurance contracts in Spain using statistical* copulas, Agricultural Economics, Vol. 46, No. 1, pp. 69-79, Blackwell Publishing, Malden, United States.

2. Berg, E. (2001): *Analyse des Systems der Ernte- und Einkommensversicherungen in den USA*. Abschlußbericht zum Forschungsvorhaben gefördert von der Deutschen Forschungsgemeinschaft, Aktenzeichen: BE 1341/4-1, Bonn.

3. Bielza, Maria, Garrido, A., Sumpsi, J. M. (2002): *Revenue insurance as an income stabilisation policy: An application to the Spanish olive oil sector*. X[th] EAAE Congress "Exploring Diversity in the European Agri-Food System", Zaragoza, Spain.

4. Binswanger, H. P. (1986): *Risk Aversion, Collateral Requirements, and the Markets for Credit and Insurance in Rural Areas*. In: Hazell, P., Pomareda, C. and Valdés, A. (Eds.): Crop Insurance for Agricultural Development, Baltimore, pp. 67-86.

5. Carić, S., Vitez, M., Raičević, V., Veselinović, J. (2011): *Privredno pravo*. Fakultet za ekonomiju i inženjerski menadžment, Novi Sad.

6. Goodwin, B.K., Ker, A.P. (1998): *Revenue insurance: a new dimension in risk management*, Choices, Vol. 13, No. 4, pp. 24-27, AAEA, United States.

7. Hardaker, J.B., Huirne, R.B.M., Anderson, J.R., Lien G. (1997): *Coping with Risk in Agriculture*, CABI Publishing, Wallingford, United States.

8. Knight, T. O., Coble, K. H. (1997): *Survey of U.S. Multiple Peril Crop Insurance Literature since 1980*. Review of Agricultural Economics, Vol. 19, No. 1, pp. 128-156, Oxford Journals, United States.

9. Marković, T. (2013): *Vremenski derivati i upravljanje rizikom u poljoprivredi*, Univerzitet u Novom Sadu, Poljoprivredni fakultet, Novi Sad.

10. Marković, T., Jovanović, M. (2011): *Rainfall insurance in wheat production with weather derivatives,* Economics of Agriculture, Vol. 58, No. 2, pp. 179-189, IAE Belgrade, Belgrade, Serbia.

11. Meuwissen, M. P., Huirne, R., Hardaker, J. B. (1999): *The feasibility of farm revenue insurance in Australia*. In 1999 Conference (43th), January 20-22,

Australian Agricultural and Resource Economics Society, Christchurch, New Zealand (No. 124090).

12. Mishra, A. K., Goodwin, B. K. (2006): *Revenue insurance purchase decisions of farmers*. Applied Economics, Vol. 38, No. 2, pp. 149-159, Routledge, Abingdon, United Kingdom of Great Britain.

13. Ray, P.K. (1991): *A Practical Guide to Multi-Risk Insurance for Developing Countries*, New Delhi.

14. Schlieper, P. (1997): *Reduktion des pflanzlichen Produktionsrisikos durch eine Ertragsausfallversicherung*. In: Bauer, S., Hermann, R., Kuhlmann, F. (Hrsg.): Märkte der Agrarund Ernährungswirtschaft - Analyse, einzelwirtschaftliche Strategien, staatliche Einflußnahme, Schriften der Gesellschaft für Wirtschafts- und Sozialwissenschaften des Landbaues e.V., Bd. 33, S. 219-232, Münster-Hiltrup, Germany.

15. Skees, J. R. (1999): *Agricultural Risk Management or Income Enhancement*. Regulation, Vol. 22, No. 1, pp. 35-43, Cato Institute, Washington, USA.

16. Veselinović J. (2011): *Privredno pravo*. Univerzitet u Novom Sadu, Poljoprivredni fakultet, Novi Sad.

17. Veselinović, J., Marković, T., Đukić, S. (2014): *Analysis of Legal and Economic Aspects of Precipitation Weather Derivatives for Serbian Agricultural Sector*, Economics of Agriculture, Vol. 61, No. 4, pp. 1053-1067, Belgrade, Serbia.

18. Weidenfeld, G. (1991): *All-Risks Versicherung*, Bergisch-Gladbach, Köln.

19. Wright, B. D., Hewitt, J. A. (1994): *All-Risk Crop Insurance: Lessons from Theory and Experience*. In: Hueth, D.L. and Furtan, W.H. (Eds.): Economics of Agricultural Crop Insurance: Theory and Evidence, Natural Resource Management and Policy, Dordrecht, pp. 73-112.

20. http://www.generali.rs/Data/Files/tnu09ou0201_posebni_uslovi_za_osiguranje_useva_i_plodova_20151022.pdf

SMANJENJE VOLATILNOSTI PRINOSA I CENE U PROIZVODNJI KUKURUZA PRIMENOM OSIGURANJA VREDNOSTI PROIZVODNJE

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Rezime

Osiguranje vrednosti proizvodnje predstavlja novi instrument za upravljanje rizikom u poljoprivredi, a zasniva se na razlici garantovane i realizovane vrednosti proizvodnje celokupnog gazdinstva ili pojedinih linija proizvodnje. Primenom ovog instrumenta najčešće se osiguravaju oni usevi koji imaju značajno učešće u strukturi setve ili značajan prinos. Merkantilni kukuruz je najvažnija ratarska kultura u Srbiji, a klimatski uslovi i promena cene imaju veoma veliki uticaj na njegovu proizvodnju. Kao jedan od vidova borbe sa volatilnošću prihoda javlja se mogućnost osiguranja vrednosti proizodnje kukuruza, zaključenjem ugovora o osiguranju. Međutim, osiguranje vrednosti proizvodnje veoma se malo primenjuje u svetu, dok se kod nas poslednjih godina tek uvodi. U ovom radu analiziraju se ekonomski i pravni aspekti ovog modela osiguranja sa ciljem utvrđivanja osnovnih mehanizama njegovog funkcionisanja, ali i uslova koji se moraju ispuniti da bi zaključenje ugovora imalo ekonomsku opravdanost za obe ugovorne strane (poljoprivrednike i finansijske institucije). Takođe, istražuje se i normativni okvir za sklapanje ovog ugovora i naglašava razlika u odnosu na klasični ugovor o osiguranju.

Ključne reči: *volatilnost, kukuruz, osiguranje, prinos, cena.*

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