Proceedings of EKONBIZ 2026
ISBN: 978-99955-45-52-9
UDK: 631.1.016:005.311.11(497.11)

Submitted: 21.04.2026.
Accepted: 27.05.2026.
Original Article

AGRICULTURAL INSURANCE AS A FINANCIAL INSTRUMENT FOR ENHANCING CLIMATE RESILIENCE OF AGRICULTURE IN THE REPUBLIC OF SERBIA

Jadranka Đurović Todorović
Faculty of Economics, University of Niš, Niš, Serbia
jadranka.djurovic@eknfak.ni.ac.rs
ORCID: 0000-0002-8910-2067

Marina Đorđević
Faculty of Economics, University of Niš, Niš, Serbia
marina.djordjevic@eknfak.ni.ac.rs
ORCID: 0000-0002-9909-315X

Ivana Filipović
Faculty of Economics, University of Niš, Niš, Serbia
ivana.filipovic@eknfak.ni.ac.rs
ORCID: 0000-0002-8594-6887

Milica Ristić Cakić
Faculty of Economics, University of Niš, Niš, Serbia
milica.ristic@eknfak.ni.ac.rs
ORCID: 0000-0003-3665-2361

This paper is the result of research conducted within the framework of obligations under the Agreement on the transfer of funds for the financing of scientific research activities in 2026 (reference number 451-03-34/2026-03), concluded between the Ministry of Science, Technological Development and Innovation of the Republic of Serbia and the Faculty of Economics, University of Niš.

Abstract: *The increasing frequency and intensity of climate extremes have significantly increased the exposure of the agricultural sector to production and income risks, generating substantial fiscal pressures through extraordinary state interventions. Against this background, the subsidization of agricultural insurance premiums has emerged as an important instrument for strengthening agricultural risk management and supporting the development of agricultural insurance markets.The aim of this paper is to examine the development of agricultural insurance in Serbia and to analyse the role of public support measures, particularly premium subsidies, in strengthening the position of agricultural insurance within the non-life insurance sector. The analysis is based on trends in the share of agricultural insurance premiums in total non-life insurance premiums, as well as on the dynamics of agricultural subsidies in Serbia and selected European countries. The findings indicate that the expansion of public support has been accompanied by the gradual growth of agricultural insurance within the Serbian insurance market, suggesting the increasing importance of insurance mechanisms in managing climate-related agricultural risks. The paper contributes to the discussion on the role of fiscal policy in supporting agricultural risk management and strengthening the institutional framework for climate adaptation in agriculture.*

Key words*: agricultural insurance, climate resilience, public finance, premium subsidies, climate risk, Serbia.*

JEL classification*: G22, Q14, Q18, Q28*

1. INTRODUCTION

As the intensity and frequency of climate change–induced extreme weather events increase, accompanied by heightened volatility in agricultural commodity markets, uncertainty within agricultural production systems has escalated substantially. At the global level, climate

change systematically amplifies the probability of severe hazard events. For instance, the likelihood of experiencing a statistically defined "once-in-a-century" flood over a 70-year lifespan has risen from approximately 63% for individuals born in 1990 to about 86% for those born in 2025. This trend reflects the fact that floods classified as centennial events in the pre-industrial climate (1850–1900) were already occurring around 30% more frequently by 1990 and, under current climate commitments—corresponding to projected global warming of approximately 2.6°C to 3.0°C by 2100—are expected to occur more than two and a half times as often by 2025 relative to the historical baseline (UNDRR, 2025).

Data reported by the United Nations Office for Disaster Risk Reduction (UNDRR) indicate that the share of agricultural losses from climate-related disasters relative to gross domestic product (GDP) increased by 23% between 2000 and 2021, with smallholder farmers absorbing approximately 76% of total recorded losses (UNDRR, 2022). Complementary evidence provided by the Food and Agriculture Organization (FAO) underscores the scale and structural implications of these disruptions. Over the past three decades, disasters have generated cumulative agricultural losses estimated at USD 3.26 trillion globally, equivalent to an annual average of approximately USD 99 billion, or nearly 4% of global agricultural GDP. In physical output terms, between 1991 and 2023, disaster events resulted in the loss of approximately 4.6 billion tonnes of cereals, 2.8 billion tonnes of fruits and vegetables, and 900 million tonnes of meat and dairy products. These aggregate production shortfalls correspond to an average daily per capita reduction of roughly 320 kilocalories—representing between 13% and 16% of typical human energy requirements—thereby highlighting not only economic losses but also significant implications for global food security and nutritional adequacy (FAO, 2025).

Within this risk-intensive environment, agricultural insurance emerges as a pivotal market-based mechanism for risk pooling and transfer. Its function extends beyond ex post compensation, positioning it as an integral instrument of rural development and climate adaptation policy. By indemnifying farmers against losses arising from natural hazards and adverse market fluctuations, agricultural insurance reduces income volatility and mitigates the likelihood that vulnerable households will fall into, or revert to, poverty. Empirical findings suggest that insurance coverage contributes to measurable reductionsby financial damages from natural disasters (hail, flood, drought), pests, and diseases, allowing farmers to recover investments and maintain financial stability (Hung et al.,2025; Bhattacharya & Biswas, 2024; Yoder et al.,2025).

Moreover, access to insurance strengthens farmers' risk-bearing capacity and encourages investment in productivity-enhancing technologies, improved inputs, and farm expansion (Carter et al., 2016). In this respect, agricultural insurance facilitates structural transformation and supports broader processes of agricultural modernization. Its stabilizing effects generate positive spillovers across upstream and downstream value chains by sustaining production continuity and reducing systemic risk. Simultaneously, the expansion of agricultural insurance markets stimulates the development and capitalization of domestic insurance and reinsurance sectors, thereby contributing to financial sector deepening and overall economic resilience (Cao, 2013).

Against this conceptual and empirical backdrop, the present study aims to examine whether, and to what extent, public support for agricultural insurance contributes to reducing climate sensitivity and stabilizing agricultural production in Serbia. The analysis proceeds from the assumption that increased public support for agricultural insurance, particularly through premium subsidies, contributes to the development and expansion of agricultural insurance in Serbia, reflected in the growing share of agricultural insurance premiums within total non-life insurance premiums..

2. LITERATURE REVIEW

Agriculture, as an economic activity, is highly sensitive to climate change (IPCC, 2014) and, at the same time, is strongly dependent on climatic conditions, as agricultural productivity and product quality are directly influenced by various climate-related factors (McArthur, 2016). The adverse impacts of climate change on agriculture, as well as the risks it poses to future food security, have been consistently confirmed by empirical studies conducted over recent decades (Gammans et al., 2017). Changes in air temperature and water availability, combined with increased variability in weather conditions, exert a direct influence on crop yields (Lobell & Gourdji, 2012). In the short term, shifts in precipitation patterns driven by rising global temperatures increase the likelihood of crop failure, while in the long term, they contribute to a decline in overall agricultural production. Furthermore, climate change affects animal species, and the decline in pollinator populations has multiple and far-reaching consequences for agricultural production systems (Pacifici et al., 2015).

Furthermore, the impacts of climate change on agricultural production extend beyond biophysical

effects and may lead to significant economic and social consequences (Jacobs et al., 2019). In this regard, climate-induced disruptions in agricultural output are expected to contribute to rising prices of key staple crops, including rice, wheat, maize, and soybeans, which in turn exert upward pressure on meat prices. As a consequence, climate change is projected to result in a slight reduction in meat consumption, alongside a more pronounced decline in cereal consumption. Looking ahead, projections indicate that by 2050, reduced agricultural productivity and increased price volatility will lead to a substantial decrease in calorie availability, thereby exacerbating global undernourishment. In particular, the prevalence of child malnutrition is expected to increase by approximately 20% compared to a scenario without the effects of climate change (Nelson et al., 2009).

Extreme events such as droughts and floods, which are intensified by climate change, further exacerbate crop productivity losses, generate substantial economic damages, and ultimately compromise food quality (Arora, 2019). In addition, climate change exerts a wide range of effects on rural economies, including impacts on agricultural productivity, farm household income, and asset values. More specifically, as agriculture represents the primary source of income for the majority of rural communities, these populations are disproportionately exposed to the adverse effects of climate change, which threatens their livelihoods and undermines their fundamental role in ensuring food security (Chandio et al., 2020). Against this backdrop, and considering the cumulative impacts of climate change on agricultural production, the vulnerability of the agricultural sector has become increasingly pronounced over time. According to the Intergovernmental Panel on Climate Change (IPCC), climate vulnerability is defined as a function of exposure, sensitivity, and adaptive capacity (IPCC, 2022). Within this framework, climate resilience refers to the ability of a system to absorb shocks, adapt to changing conditions, and maintain its core functions and structural stability.

The adaptive capacity of agriculture to climate change is fundamentally conditioned by the quality of the institutional framework, the availability and accessibility of financial instruments, and the level of technological development within the sector. In this regard, enhancing the degree of agricultural adaptation to climate change represents a critical policy objective, wherein the state assumes a legitimate and proactive role in the design and implementation of mechanisms for climate risk management (Olesen & Bindi, 2004). Within this institutional context, agricultural insurance has been widely recognized and promoted by leading international and intergovernmental organizations—such as the IPCC (2019) , World Bank (2024), and the Ministry of Environmental Protection of Serbia (2023) —as a key market-based instrument for climate change adaptation. Its relevance is particularly pronounced in developing countries, where exposure to climatic risks is high and coping capacities are often limited. In support of this objective, extensive capacity-building initiatives have been undertaken to strengthen the competencies of key stakeholders involved in climate risk management. These efforts have included the provision of targeted training programs and technical assistance to institutions such as ministries of agriculture and environment, financial institutions, insurance providers and intermediaries, farmer organizations, and public decision-makers. The overarching aim of such interventions is to facilitate the formulation of context-specific policy frameworks and regulatory arrangements that underpin the development of efficient, accessible, and well-functioning agricultural insurance markets.

In this framework, agricultural insurance functions as a critical instrument for enhancing resilience by mitigating the adverse effects of climate-induced yield variability and income instability (Di Falco et al., 2014). By providing indemnity payments following adverse events, it stabilizes farm income, improves liquidity, and facilitates continued investment in production activities. At the same time, insurance coverage enhances farmers' access to credit by serving as a risk-reducing mechanism for financial institutions, thereby supporting capital investment and technological upgrading (Elabed et al, 2013). Its effectiveness is further reinforced when integrated with the adoption of innovative and climate-resilient technologies, contributing to long-term adaptive capacity. Beyond farm-level impacts, agricultural insurance generates broader socio-economic benefits, including improved food security, more stable household consumption, and increased resilience among both crop and livestock producers (Yoder et al., 2025; Fu et al., 2024; Louren et al., 2021).

Moreover, by lowering the exposure to production risks—alongside complementary strategies such as conservation tillage, irrigation, and the adoption of improved crop varieties—agricultural insurance creates a more secure decision-making environment for farmers. In particular, it reduces the disincentives faced by risk-averse producers, encouraging them to adopt more advanced but potentially riskier adaptive innovations that offer higher expected returns. In this sense, agricultural

insurance extends beyond a purely protective function, acting as a catalyst for technological adoption, productivity growth, and broader agricultural development.

The role of the state in agricultural insurance is multidimensional and extends beyond direct financial support to encompass institutional, regulatory, and developmental functions. One of the key justifications for such intervention arises from the specific nature of agricultural risks, which are often covariate, meaning that they affect a large number of producers simultaneously, as in the case of droughts, floods, or other climatic extremes.

This structure of risk limits the efficiency of purely market-based insurance mechanisms, as it constrains risk diversification and increases the likelihood of systemic losses (Miranda & Glauber, 1997).

In this context, public intervention is not only a response to market failures but also a mechanism for maintaining the stability and continuity of agricultural production. A central instrument of such intervention is the subsidization of insurance premiums, which lowers entry barriers for farmers and facilitates wider adoption of insurance schemes. The strategic importance of this instrument is reflected in its widespread use across different agricultural systems, including both developing and advanced economies, where the public sector assumes a significant role in supporting risk management frameworks (Radović, 2020).

The rationale for sustained state involvement is further reinforced by structural constraints inherent to private insurance markets.

These constraints are particularly evident in the limited capacity of insurers and reinsurers to absorb systemic risks associated with climate variability and natural disasters. Additionally, elevated administrative and operational costs reduce the commercial viability of agricultural insurance products, especially in environments characterized by high uncertainty and information asymmetry. In the absence of public support, these factors would likely result in prohibitively high premium levels, thereby restricting access to insurance and weakening the overall resilience of the agricultural sector.

From a theoretical perspective, such intervention can also be understood through the lens of quasi-public goods. Agricultural insurance exhibits features that justify collective action, including its broader socio-economic benefits and its role in stabilizing production and rural incomes (Hou & Wang, 2024). Under these conditions, the state assumes a dual function—as a financial supporter and as a key actor in shaping the institutional environment necessary for the effective functioning of insurance markets, including the promotion of public–private partnerships.

Taken together, the interaction between covariate climate risks, market imperfections, and fiscal considerations provides a coherent justification for an active and sustained role of the state in the design and implementation of agricultural insurance systems, with premium subsidization emerging as a central, yet complementary, policy instrument.

3. EMPIRICAL ANALYSIS OF AGRICULTURAL INSURANCE DEVELOPMENT IN THE REPUBLIC OF SERBIA

Building upon the theoretical and empirical insights presented in the previous sections, which emphasize the importance of agricultural insurance as a mechanism for climate risk management and income stabilization, the following section focuses on the analysis of its development and structural position within the insurance market in Serbia.

In order to assess the relative importance and dynamics of agricultural insurance, it is necessary to examine its share within the broader segment of non-life insurance.

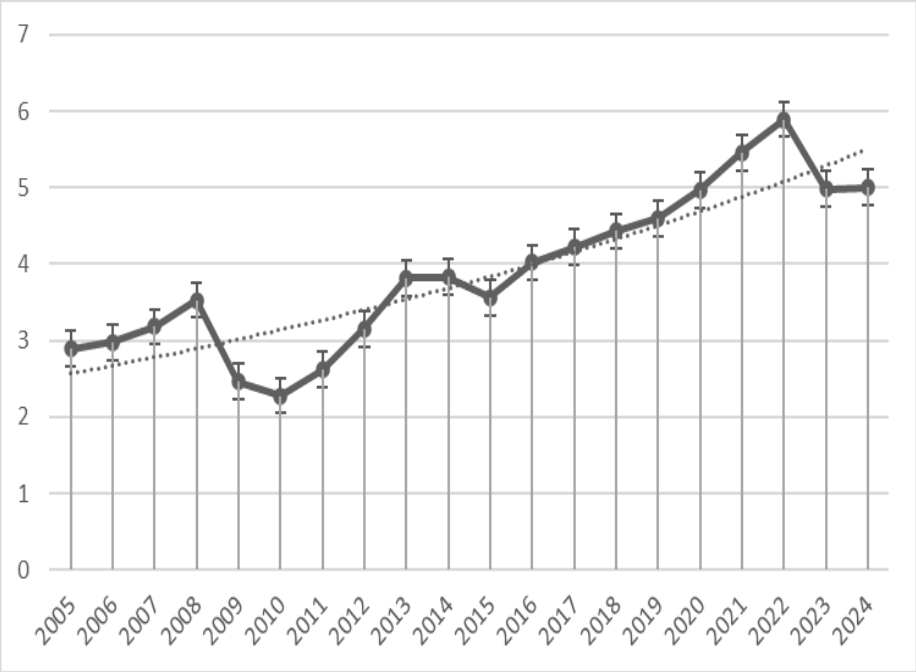
This indicator provides valuable insights into the level of market penetration of agricultural insurance, as well as into the degree to which this segment has evolved in response to increasing climate risks and policy support measures.

The share of total agricultural insurance premiums in total non-life insurance premiums reflects not only the demand for insurance coverage among agricultural producers but also the level of development of insurance products tailored to agricultural risks.

At the same time, this indicator indirectly captures the effects of public policy, particularly premium subsidies, on the expansion of insurance coverage.

A higher and growing share may indicate an increasing awareness of risk management practices among farmers, improved accessibility of insurance products, and stronger institutional support. Conversely, a persistently low share may suggest structural constraints, such as limited demand, insufficient financial incentives, or underdeveloped insurance markets.

Graph 1: Share of total agricultural insurance premiums in total non-life insurance premiums in Serbia, 2005–2024



Source: *Author's calculation based on data from the National Bank of Serbia.*

Figure 1 illustrates the share of total agricultural insurance premiums in total non-life insurance premiums in Serbia over the period 2005–2024. The observed trend indicates a gradual but non-linear increase in the relative importance of agricultural insurance within the overall insurance market.

At the beginning of the observed period, the share of agricultural insurance premiums was relatively modest, amounting to approximately 2.89% in 2005. This level reflects the limited development of agricultural insurance, characterized by low market penetration and insufficient demand among agricultural producers. In the following years, the indicator exhibits moderate growth, reaching 3.53%, followed by a temporary decline to 2.28%, which may be associated with structural constraints in the insurance market, limited awareness among farmers, or unfavorable economic conditions.

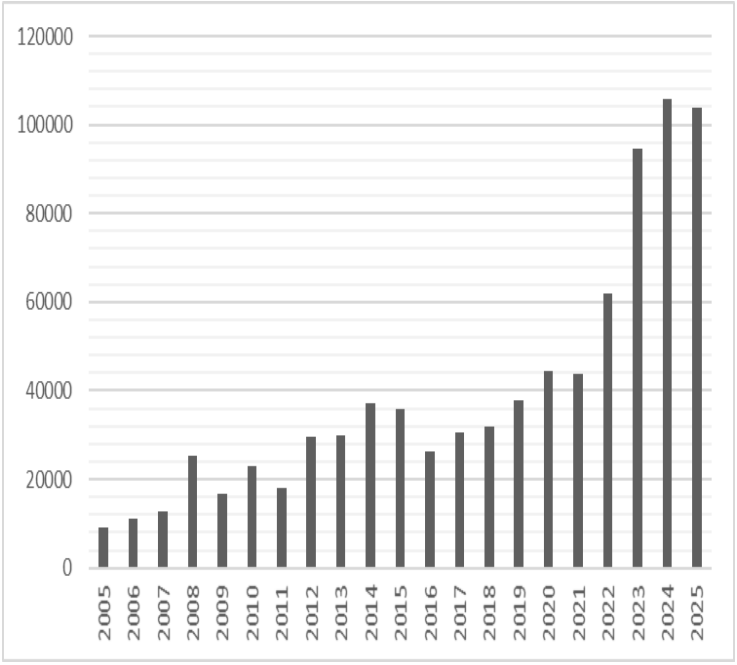
From the mid-2010s onwards, a more pronounced upward trend becomes evident. The share increases steadily, surpassing 4% and reaching a peak of approximately 5.89% toward the end of the observed period (Figure 1). This dynamic suggests a strengthening of the agricultural insurance segment, likely driven by a combination of increased climate risks, improved availability of insurance products, and the expansion of public support mechanisms, particularly premium subsidies.

Despite this positive trend, the fluctuations observed throughout the period indicate that the development of agricultural insurance remains sensitive to both market conditions and policy interventions. The slight decline recorded in the final years (from 5.89% to around 5% in 2024) may reflect short-term adjustments in the insurance market or changes in the structure of non-life insurance premiums.

Overall, the results suggest that agricultural insurance has gained importance within the Serbian insurance sector over time, although its share remains relatively moderate. This finding points to the existence of untapped potential for further expansion, as well as the continued relevance of public policy measures aimed at strengthening insurance uptake and enhancing the resilience of the agricultural sector.

Building upon the analysis of the structural position and development of agricultural insurance within the non-life insurance market (Figure 1), it is necessary to incorporate the fiscal dimension in order to obtain a more comprehensive understanding of the underlying drivers of insurance expansion. In this context, public expenditures on agricultural subsidies represent a key policy instrument through which the state influences both the accessibility and the uptake of agricultural insurance. In addition to subsidizing insurance premiums, the state also provides direct subsidies to agricultural producers to support their production.

Graph 2: Agricultural subsidies in Serbia, 2005-2024 (in million RSD)



Source: Author's calculations based on the Bulletin of Public Finance, Ministry of Finance of the Republic of Serbia.

Figure 2 presents the level of agricultural subsidies in Serbia over the period 2005–2024, expressed in millions of dinars. As illustrated, public expenditures exhibit a clear upward trend over the observed period, although accompanied by noticeable fluctuations. At the beginning of the period, subsidy levels were relatively modest, amounting to approximately RSD 8.9 billion. In subsequent years, expenditures increased significantly, exceeding RSD 25 billion, followed by intermittent declines and renewed growth.

A particularly pronounced expansion is observed in the later years, when total allocations surpass RSD 60 billion and eventually exceed RSD 100 billion. This trend indicates an intensification of fiscal support to the agricultural sector, which may be interpreted as a policy response to increasing climate-related risks, as well as to the need for stabilizing agricultural production and supporting farmers' incomes.

When considered jointly with the trends presented in Figure 1, the increase in agricultural subsidies provides an important explanatory context for the observed expansion of agricultural insurance. In particular, the growth in public expenditures—especially those related to premium subsidization—can be expected to lower the effective cost of insurance for farmers, thereby stimulating demand and increasing the coverage of insured agricultural areas.

From an analytical perspective, these dynamics are directly aligned with the central research assumption of this study, according to which a higher level of public support for agricultural insurance contributes to reducing climate sensitivity and improving the stability of agricultural production. In this sense, public expenditures on subsidies represent a key explanatory factor linking fiscal policy with the development of insurance mechanisms and, ultimately, with the resilience of the agricultural sector.

Accordingly, the observed trends in subsidy allocation not only reflect the increasing fiscal engagement of the state in the agricultural sector but also provide a crucial foundation for the empirical analysis that follows. In particular, public expenditures on subsidies are introduced as a central explanatory variable in the econometric framework, through which their impact on agricultural insurance development and production stability will be formally assessed.

4. SUBSIDIES ON CEREALS IN THE EUROPEAN CONTEXT

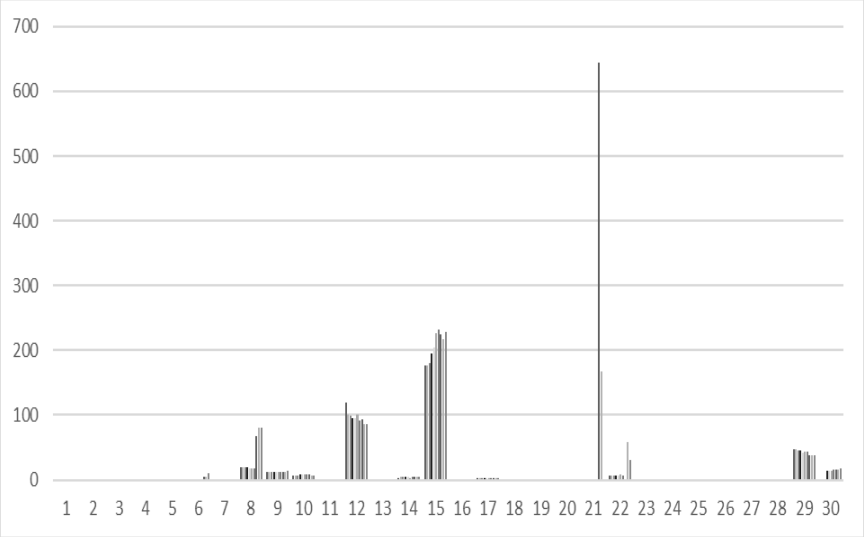
In order to complement the previous analysis, which focused on the overall level and structure of agricultural subsidies, it is useful to introduce a more disaggregated perspective by examining support allocated to specific agricultural segments. In this context, the following section focuses on subsidies directed toward cereal production, as one of the most important and climate-sensitive components of agricultural activity in Europe.

The analysis of subsidies on cereals (including seeds) provides additional insight into the allocation of public support within agriculture, allowing for a more precise understanding of policy priorities across countries. Unlike the previous section, which examined aggregate agricultural subsidies, this part of the analysis is limited to a specific production segment and should therefore be interpreted as a complementary, sectoral perspective.

Given the significant role of cereals in ensuring food security, as well as their high sensitivity to climatic variability, examining this segment is particularly relevant in the context of climate risk management. At the same time, differences in the level of support across countries may reflect structural characteristics of agricultural production, the relative importance of cereal crops, and the design of national policy measures within the broader framework of the Common Agricultural Policy.

Accordingly, the following analysis presents a comparative overview of subsidies on cereals across European countries, with the aim of identifying differences in the scale and distribution of support, as well as their implications for production stability and resilience.

Graph 3: Subsidies on cereals (including seeds) in European countries, 2016-2025 (million euro)



Note: Countries included in the analysis: (1) Belgium, (2) Bulgaria, (3) Czechia, (4) Denmark, (5) Germany, (6) Estonia, (7) Ireland, (8) Greece, (9) Spain, (10) France, (11) Croatia, (12) Italy, (13) Cyprus, (14) Latvia, (15) Lithuania, (16) Luxembourg, (17) Hungary, (18) Malta, (19) Netherlands, (20) Austria, (21) Poland, (22) Portugal, (23) Romania, (24) Slovenia, (25) Slovakia, (26) Finland, (27) Sweden, (28) Iceland, (29) Norway, (30) Switzerland.

**The analysis includes EU Member States as well as selected non-EU European countries (Norway, Switzerland, and Iceland) in order to provide a broader comparative perspective.*

Source: Author's calculations based on Eurostat, Agricultural subsidies dataset.

Figure 3 illustrates the level of subsidies on cereals (including seeds) across European countries over the observed period. The results reveal substantial heterogeneity both across countries and over time, indicating significant differences in the allocation of public support within this specific agricultural segment.

At the aggregate level, the overall trend suggests a moderate increase in support, accompanied by noticeable fluctuations in certain years. These variations may reflect adjustments in policy measures, responses to market conditions, or the impact of external shocks, including climate-related disturbances affecting cereal production.

At the country level, the distribution of subsidies is highly uneven. Lithuania consistently records the highest levels of support, with values exceeding 200 million euro in recent years, indicating a strong policy focus on cereal production. Italy also maintains relatively high levels of subsidies, although with a gradual declining trend over time. In addition, a pronounced spike is observed in Poland in one of the later years, representing a clear deviation from the general pattern.

In contrast, several countries report minimal or near-zero levels of subsidies on cereals throughout most of the observed period. This may suggest either a lower strategic importance of cereal production within their agricultural systems or a reliance on alternative forms of support not captured by this specific indicator.

These differences highlight the heterogeneity of policy approaches across European countries, reflecting variations in production structures, climate exposure, and national policy priorities. Overall, the sectoral analysis of subsidies on cereals complements the aggregate perspective and provides additional insight into the role of targeted public support in climate-sensitive segments of agriculture.

CONCLUSION

The findings suggest that agricultural insurance, supported through public subsidy mechanisms, represents an increasingly important component of broader agricultural risk management and climate adaptation policies. In conditions of growing exposure to climate-related risks, the role of the state in designing and implementing effective support mechanisms becomes particularly significant for strengthening the resilience and sustainability of agricultural production.

The empirical findings indicate that the development of agricultural insurance in Serbia has been accompanied by a gradual increase in its share within the non-life insurance market, suggesting a strengthening of its role as a risk management tool. At the same time, public expenditures on agricultural subsidies have increased significantly over the observed period, reflecting a growing fiscal commitment to supporting agricultural production and mitigating climate-related risks.

However, the analysis also reveals that the dynamics of public support have been characterized by noticeable fluctuations, indicating the absence of a fully stable and predictable policy framework. Such variability may reduce the long-term effectiveness of agricultural insurance as a mechanism for risk transfer and production stabilization. In this regard, the consistency, predictability, and targeting of public expenditures emerge as key determinants of policy effectiveness.

The analysis of subsidies in European countries, observed through the cereals sector, indicates significant differences in the level and distribution of support within this segment. The observed heterogeneity across countries reflects differences in production structures, the importance of cereals within national agricultural systems, and variations in policy approaches. This sectoral perspective further confirms that the allocation of public resources in agriculture is strongly influenced by the specific characteristics of individual production segments.

From a policy perspective, the findings suggest that further improvements in the design and implementation of agricultural subsidies in Serbia are necessary in order to enhance their effectiveness and fiscal efficiency. In particular, stronger integration between subsidy schemes and agricultural insurance mechanisms could contribute to increasing insurance coverage, reducing production volatility, and improving overall resilience to climate shocks.

Overall, the results of this study underline the importance of establishing a stable and well-coordinated policy framework that combines financial support with market-based risk management instruments. Such an approach is essential for strengthening resilience, ensuring production stability, and enhancing the long-term sustainability of the agricultural sector in the context of ongoing climate change.

REFERENCES

[1] Allen, P., Van Dusen, D., Lundy, J., Gliessman, S. (2009). Integrating social, environmental, and economic issues in sustainable agriculture. *American Journal of Alternative Agriculture*, 6, 34-39.

[2] United Nations Office for Disaster Risk Reduction (UNDRR). Global Assessment Report on Disaster Risk Reduction: Our World at Risk; UNDRR: Geneva, Switzerland, 2022.

[3] FAO. 2025. The Impact of Disasters on Agriculture and Food Security 2025 – Digital solutions for reducing risks and impacts. Rome.https://doi.org/10.4060/cd7185en

[4] Huang, Z., Su, K., & Wang, S. (2025). The role of agricultural insurance in promoting farmers' green production behavior: The moderating effect of legal trust. Finance Research Letters, 80, 107269.

[5] Bhattacharya, S., & Biswas, B. (2024). Role of Crop Insurance in Sustainable Agriculture Practices: A Global Perspective.

[6] Nelson, G., Rosegrant, C., Koo, M.W., Robertson, J., Sulser, R., Zhu, T., ... Lee, D. (2009). Climate change: Impact on agriculture and costs of adaptation (21). Intl Food Policy Res Inst.

[7] Olesen, J. E., Bindi, M. (2004). Agricultural impacts and adaptations to climate change in Europe. Farm Policy Journal, 1(3), 36-46.

[8] Yoder, L., Wardropper, C., Irvine, R., & Harden, S. (2025). Cover crops as climate insurance: Exploring the role of crop insurance discounts to promote climate adaptation and mitigate risk. Journal of Environmental Management, 373, 123506.

[9] Carter M.R.; Cheng, L.; Sarris, A. Where and how index insurance can boost the adoption of improved agricultural technologies. J. Dev. Econ. 2016, 118, 59–71.

[10] Cao, W.F. Interaction Mechanism Between Agricultural Insurance and Agricultural Modernization. Macroeconomics 2013, 106–111.

[11] United Nations Office for Disaster Risk Reduction. (2025). Global Assessment Report on Disaster Risk Reduction 2025: Resilience Pays: Financing and Investing for Our Future. Stylus Publishing, LLC.

[12] Intergovernmental Panel on Climate Change (IPCC). (2014). Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change, Cambridge University Press,. Cambridge and New York

[13] IPCC, 2022: Climate Change 2022: Impacts, Adaptation, and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [H.-O. Pörtner, D.C. Roberts, M. Tignor, E.S. Poloczanska, K. Mintenbeck, A. Alegría, M. Craig, S. Langsdorf, S. Löschke, V. Möller, A. Okem, B. Rama (eds.)]. Cambridge University Press. Cambridge University Press, Cambridge, UK and New York, NY, USA, 3056 pp., doi:10.1017/9781009325844.

[14] IPCC, 2019: Climate Change and Land: an IPCC special report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems [P.R. Shukla, J. Skea, E. Calvo Buendia, V. Masson-Delmotte, H.-O. Pörtner, D. C. Roberts, P. Zhai, R. Slade, S. Connors, R. van Diemen, M. Ferrat, E. Haughey, S. Luz, S. Neogi, M. Pathak, J. Petzold, J. Portugal Pereira, P. Vyas, E. Huntley, K. Kissick, M. Belkacemi, and J. Malley (eds.)]. https://www.ipcc.ch/srccl/cite-report/

[15] World Bank. (2024). Western Balkans 6 Country Climate and Development Report. Serbia—Country Climate and Development ReportWashington, DC: The World Bank. https://www.worldbank.org/en/country/serbia/publication/serbia-country-climate-and-development-report

[16] Ministry of Environmental Protection of Serbia (2023) Program for Adaptation to Altered Climatic Conditions for the Period 2023 to 2030, https://www.ekologija.gov.rs/sites/default/files/2024-01/program-prilagodjavanja-na-izmenjene-klimatske-uslove-za-period-od-2023-do-2030-godine.pdf

[17] Di Falco, S., Bozzola, M., Adinolfi, F., & Capitanio, F. (2014). Crop insurance as a strategy for adapting to climate change. Journal ofAgricultural Economics, 65(2), 485–504. https://doi.org/10.1111/1477-9552.12053

[18] Elabed, G., Bellemare, M. F., Carter, M. R., & Guirkinger, C. (2013). Managing basis risk with multiscale index insurance. AgriculturalEconomics, 44(4-5), 419–431. https://doi.org/10.1111/agec.12025

[19] Loreau, M., Barbier, M., Filotas, E., Gravel, D., Isbell, F., Miller, S.J., Montoya, J.M., Wang, S., Aussenac, R., Germain, R., Thompson, P.L., Gonzalez, A. and Dee, L.E. (2021), Biodiversity as insurance: from concept to measurement and application. Biol Rev, 96: 2333-2354. https://doi.org/10.1111/brv.12756

[20] Fu, L.-S., Qin, T., Li, G.-Q., & Wang, S.-G. (2024). Efficiency of Agricultural Insurance in Facilitating Modern Agriculture Development: From the Perspective of Production Factor Allocation. Sustainability, 16(14), 6223. https://doi.org/10.3390/su16146223

[21] Radović, G. Đ. (2020). Foreign experience in agricultural insurance. Tokovi osiguranja, 36(4), 78-109. DOI: 10.5937/tokosig2004078R

[22] Hou D, Wang X. (2024). Unveiling the role of agricultural insurance in driving rural industry revitalization in China. Heliyon. doi: 10.1016/j.heliyon.2024.e34483

[23] Miranda, M. J., & Glauber, J. W. (1997). Systemic Risk, Reinsurance, and the Failure of Crop Insurance Markets. American Journal of Agricultural Economics, 79(1), 206–215. https://doi.org/10.2307/124395

[24] McArthur, J. W. (2016). Agriculture in the COP21 Agenda, in: COP21 at Paris: What to expect. The issues, the actors, and the road ahead on climate change, Global Economy and Development, Brookings Institution, Washington, DC. 37-42.

[25] Gammans, M., Mérel, P., Ortiz-Bobea, A. (2017). Negative impacts of climate change on cereal yields: statistical evidence from France. Environmental Research Letters, 12(5): 054007. https://doi.org/10.1088/1748-9326/aa6b0c

[26] Lobell, D. B., Gourdji, S. M. (2012). The influence of climate change on global crop productivity. Plant physiology, 160(4), 1686-1697.

[27] Pacifici, M., Foden, W. B., Visconti, P., Watson, J. E., Butchart, S. H., Kovacs, K. M., ... Rondinini, C. (2015). Assessing species vulnerability to climate change. Nature climate change, 5(3), 215-224

[28] Jacobs, C., Berglund, M., Kurnik, B., Dworak, T., Marras, S., Mereu, V., Michetti, M. (2019). Climate change adaptation in the agriculture sector in Europe. European Environment Agency (EEA), 4.

[29] Arora, N.K. (2019). Impact of climate change on agriculture production and its sustainable solutions. Environmental Sustainability, 2, 95–96. https://doi.org/10.1007/s42398-019-00078-w

[30] Chandio, A.A., Jiang, Y., Rehman, A. and Rauf, A. (2020), Short and long-run impacts of climate change on agriculture: an empirical evidence from China. International Journal of Climate Change Strategies and Management, 12 (2), 201-221. https://doi.org/10.1108/IJCCSM-05-2019-0026

This work is licensed under the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License