

Targetti, Stefano; Niedermayr, Andreas; Häfner, Kati; Schaller, Lena

Article

New pathways for improved delivery of public goods from agriculture and forestry

Bio-based and Applied Economics (BAE)

Provided in Cooperation with:

Firenze University Press

Suggested Citation: Targetti, Stefano; Niedermayr, Andreas; Häfner, Kati; Schaller, Lena (2024) : New pathways for improved delivery of public goods from agriculture and forestry, Bio-based and Applied Economics (BAE), ISSN 2280-6172, Firenze University Press, Florence, Vol. 13, Iss. 1, pp. 3-11,
<https://doi.org/10.36253/bae-15862>

This Version is available at:

<https://hdl.handle.net/10419/321785>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.



<https://creativecommons.org/licenses/by/4.0/>



Citation: Targetti, S., Niedermayr, A., Häfner, K., & Schaller, L. (2024). New pathways for improved delivery of public goods from agriculture and forestry. *Bio-based and Applied Economics* 13(1): 3-11. doi: 10.36253/bae-15862

Received: February 29, 2024

Accepted: March 7, 2024

Published: May 20, 2024

Data Availability Statement: All relevant data are within the paper and its Supporting Information files.

Competing Interests: The Author(s) declare(s) no conflict of interest.

Guest Editors: Stefano Targetti, Andreas Niedermayr, Kati Häfner, Lena Schaller

ORCID

ST: 0000-0002-2154-546X

AN: 0000-0001-7691-4296

KH: 0000-0001-6413-4540

LS: 0000-0002-8313-8798

New pathways for improved delivery of public goods from agriculture and forestry

STEFANO TARGETTI^{1,*}, ANDREAS NIEDERMAYR², KATI HÄFNER³, LENA SCHALLER²

¹ University of Bologna, Department of Agricultural and Food Sciences, Viale Fanin, 50 - 40127 Bologna, Italy

² University of Natural Resources and Life Sciences, Vienna, Department of Economics and Social Sciences, Institute of Agricultural and Forestry Economics, Feistmantelstrasse 4, 1180 Vienna, Austria

³ Leibniz Centre for Agricultural Landscape Research (ZALF), Eberswalder Str. 84, 15374 Müncheberg, Germany

*Corresponding author. E-mail: stefano.targetti@unibo.it

1. INTRODUCTION

This special issue of Bio-based and Applied Economics (BAE) features a selection of five papers developed within the EU H2020 project 'CONtract SOLutions for Effective and lasting delivery of agri-environmental-climate public goods by EU agriculture and forestry' (CONSOLE) (H2020-RUR-2018-2, GA No. 817949). CONSOLE has been comprehensively investigating the effectiveness, efficiency and longevity of innovative contract solutions for the provision of Agri-Environmental-Climatic Public Goods (AECPGs), the acceptance of such contracts amongst European farmers and stakeholders, as well as the drivers and mechanisms influencing the implementation.

Despite large budgets for policies devoted to environmental objectives, the ongoing decline in the provision of AECPGs in many European agricultural and forest ecosystems and the growing societal concerns about ecological issues make it necessary to improve the environmental effectiveness in particular of the Common Agricultural Policy (CAP) (Pe'er et al., 2022). The Green Deal of the EU and the Farm-to-Fork Strategy are part of the EU's plan to respond to these challenges. They highlight the relevance of the agricultural sector for the provision of a multitude of AECPGs, such as biodiversity, climate regulation, water and soil protection. To achieve real change, in addition to rethinking and strengthening actions set by the Agri-Environmental and Climate Schemes (AECS), the attention towards innovative, more effective, and efficient instruments is increasing (Targetti et al., 2022). The most prominent examples are result-based and value chain-based solutions, as well as approaches that promote collective implementation. In addition, land tenure contracts with environmental requirements are in the focus of interest. Although promising, all of these tools involve a number of challenges for their successful design and implementation, such as acceptance and enablement of

farmers, knowledge and training needs, equity/fairness, and compatibility with agricultural business.

In this editorial paper, we describe the CONSOLE framework as a major background for the evaluation of novel contract solutions and the development of the research papers for this special issue. The framework describes three main topics covered by the papers in this special issue: Innovative designs (of AECS), attitudes of farmers toward these new approaches, and drivers for their successful implementation.

In the following, we first describe the CONSOLE framework and then present different aspects concerning contract design and innovative contractual options of AECS. Finally, we introduce the papers of the special issue of BAE: 'New pathways for an improved delivery of public goods from agriculture and forestry'.

2. THE CONSOLE FRAMEWORK

The analytical framework developed in the CONSOLE project aims at the identification of a set of contract elements to be considered in the design and analysis of AECS (Fig. 1). Specifically, it identifies elements and factors characterizing an agri-environmental contract along three main groups (Viaggi et al., 2022):

- *Contract design* includes the specific elements characterising AECS contract like objective, duration, level of payment, etc.;

- *Mechanisms and impact* comprise the factors that influence the effectiveness of the contract such as attitude of farmers which in turn affect the acceptability of the scheme, etc.;
- *System features* consists of a range of drivers including governance, market, and local-scale conditions that affect the impact and efficiency of a contract.

Besides these elements, factors, and drivers that define and influence the success or failure of a contract, the framework also indicates a set of *performance criteria*. These criteria are directly or indirectly related to several items included in the contract design, mechanisms and system features. For instance, acceptance, longevity, effectiveness, profitability, etc. are only some of the criteria that can be considered in the evaluation of a contract and are related to farm-level characteristics (for example, farm structure, farmers' attitudes) and regional-level characteristics (for example, environmental conditions, formal and informal institutions).

3. CONTRACT DESIGN: CURRENT AGRI-ENVIRONMENTAL AND CLIMATE SCHEMES AND POTENTIAL FOR INNOVATIVE SOLUTIONS

The provision of public goods by agriculture is largely determined by the management and practices applied at the farm and regional scale. Therefore, policies usually include a variety of instruments to improve the environmental performance. Currently, the main approach of

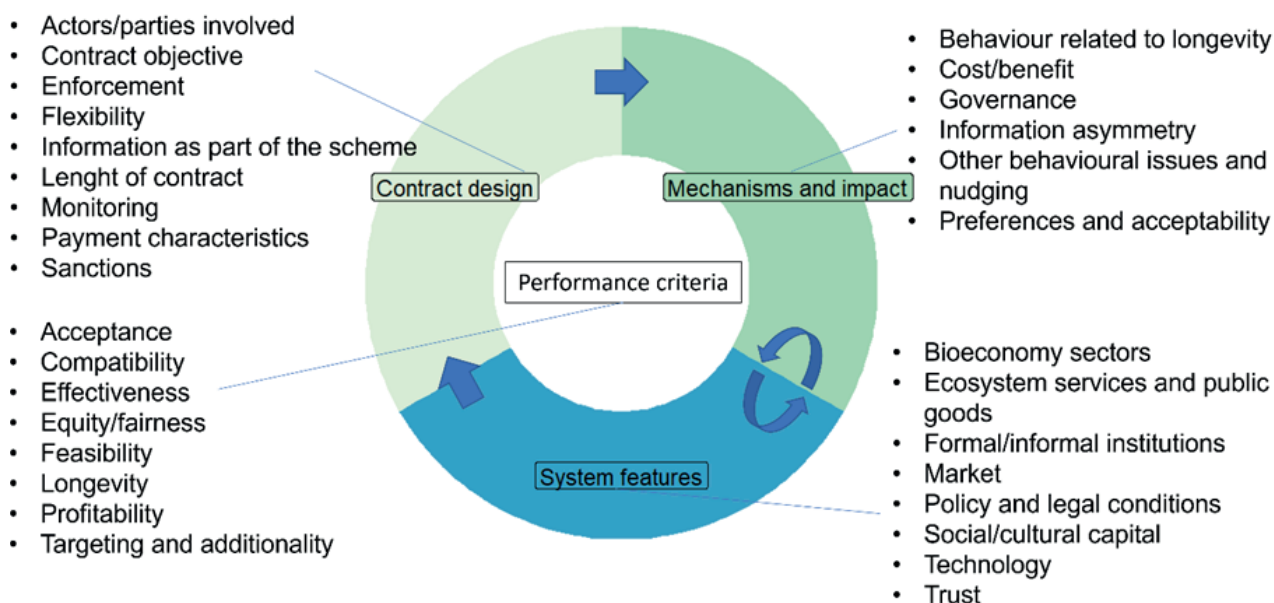


Figure 1. Analytical framework developed in the CONSOLE project for the analysis and design of agri-environmental and climate contracts (d'Alberto et al., 2024).

agricultural policy efforts to maintain and/or improve AECPGs on farmland are voluntary action-based AECS. These schemes consist of prescribed practices, and participating farmers receive monetary compensation for income forgone and increased costs associated with the implementation of the practices considered capable of improving the environmental performance of the farm. Such payment schemes are relatively simple to implement, do not require complicated monitoring and do not incur inequality concerns (usually the same ‘average’ price is offered to farmers for undertaking a given action). Action-based AECS are acknowledged to have positive effects on the environment (Herzog et al., 2005), while their overall environmental effectiveness remains relatively low considering the financial resources put into these schemes (Batory et al., 2015). Such schemes incur a range of problems, as they typically over-reward ‘all but the marginal producer’ (Hanley et al., 2012). This effect is linked to the actual provision of public goods from farmland, which is affected by spatial variation of opportunity costs and information asymmetries between ‘sellers’ and ‘buyers’ of AECPGs, leading to a spatial policy mistargeting, but also potential spatial under-provision/under-supply of AECPGs (Zasada et al., 2017). The availability of local-scale information could improve the spatial targeting of policies and improve the cost-effectiveness of payments, but such a detailed level of information is usually challenging or not affordable to collect (Ferraro, 2008). Other negative aspects of action-based AECS that are often criticized comprise a range of less tangible impacts related to the potential risks of commodification of public goods and the disconnect between the objectives of the scheme and the values and moral responsibility of farmers. Moreover, another criticism is related to the long-term effects of action-based AECS. An essential condition to ensure permanent environmental improvements is to link farmers’ acceptance of a scheme with a major attitudinal change that corresponds to their interests and values (Burton et al., 2008). Farmers with interest in agroecology, for example, tend to dislike having to rely on payments for good behavior and, in some cases, prefer to be remunerated by the market because their business model is successful. Farmers recognizing an inherent value of nature, for instance, are found to apply more holistic management strategies benefiting a diversity of AECPGs (Klebl et al., 2024).

3.1 From action-based to result-based schemes

To tackle the low efficiency and effectiveness of action-based AECS, a stronger focus on what is actually achieved in terms of environmental goals is considered

a relevant improvement. Result-based approaches in this respect are innovative solutions because they are based on a direct link between payment and the achievement of environmental goals, while no requirement of the implementation of specific practices is included. This allows farmers to be more flexible in their management, but these contracts score significantly worse in terms of practicability, and therefore their application on a large scale is rare (Drechsler, 2017). The two main limitations of result-based schemes concern the uncertainty of payment as it is dependent on the achievement of an environmental result, and the ability to measure it. These limitations considerably reduce the acceptance of these contracts because farmers incur risks of failing to achieve the aims and are exposed to public scrutiny as they become a seller of public goods (Haaren and Bathke, 2008; Atari et al., 2009). On a more general level, the additionality of result-based approaches is a relevant concern. In other words, doubts are raised about the prospect of paying farmers for results that would be actually delivered even without the policy intervention. Indeed, result-based payments potentially incentivize land enrollment where the target result is already achieved, resulting in a zero-additionality effect (Uthes and Matzdorf, 2013).

3.2 Collective implementation

To improve the capacity of AECS to deliver public goods such as farmland biodiversity, the coordination of interventions at the landscape level to maximize the positive outcome (for example, adopting ‘green’ practices in different landholdings) is also proposed. In contractual solutions based on collective implementation and/or cooperation, farmers and/or private/public landowners voluntarily enter a joint, collective partnership to commonly deliver a specific environmental or climate action goal. This means that farmers, foresters (and other stakeholders) cooperate (by establishing an entity with or without legal personality) to achieve a specific environmental target. Contract solutions that propose collective implementation or cooperative/collaborative elements often address a territorial/landscape level to deliver public goods “across field borders”. They aim especially for environmental results, which can hardly be improved by measures on singular fields and plots (e.g., water quality, maintenance of habitats, peatland rewetting). The environmental effectiveness of coordination depends on the public good addressed. For example, in the case of habitat maintenance for a particular target species it relates to the habitat requirement of that species. In cases where the spatial characteristics of habitats and land ownership

do not overlap, collective contracts are more efficient in ensuring “economies of configuration” (Franks, 2011). The design of collective AECS is relevant, as it targets groups of landowners, rather than individuals, so that agri-environmental efforts are spatially coordinated (Prager, 2015). In general, collective and cooperative/colaborative approaches can be used to address problems that cannot be solved individually or to achieve specific environmental improvements that can be achieved better by working together.

Collective approaches are nevertheless affected by an increased complexity of the policy design and higher transaction costs, which limit the adoption of the schemes (Zavalloni et al., 2019). In general, the success of collective contracts depends on the willingness of neighboring land managers to work together, on the existence of formal or informal institutions capable of implementing and coordinating the contract and the perceptions of these coordinating institutions (Franks, 2011; Häfner and Piorr, 2021).

3.3 Value chain-based solutions

Some contract solutions consider the delivery of public goods in connection with the production of private goods. These solutions are motivated by engaging different or all parts of a value chain, and the environmental benefits provided by the supplying farms are often part of the food companies'/retailers' marketing strategies. In a value-chain contract, farmers accept to meet specific environmental requirements and receive monetary support from market actors. Possible examples are reduced fertilization, higher animal welfare standards, preservation of biodiversity, etc. The monetary support can take the form of sale guarantees, price premiums, and/or the use and marketing of products under specific brands. Moreover, some value chain-related contractual solutions provide an example of a way to better support and market organic production.

Value chain contracts are essentially based on the capacity of the market to reward the public goods attached to the production of a specific private good (food). The advantage is the reliance on market mechanisms and the more direct link with consumers without incurring in the distortionary effects of incentives or regulations. However, conveying information about the environmental performance of a product is not always straightforward. Following economic principles, Jack et al. (2008) notice that people are likely not disposed to pay for something that they can receive for free. That differentiates between public goods like drinking water where the beneficiaries see a direct advantage, and other goods

that are non-excludable like climate change mitigation or biodiversity. This means that discrimination of the link between product and environmental performance is necessary, and not all public goods have the same communicative grip. For example, AECPGs related to regulating services are characterized by an indirect contribution to society (Diaz et al., 2018) and thus could be more difficult to attach to a product compared to AECPGs related to e.g. cultural services (Targetti et al., 2021). Short supply chains are easier to develop because the link between consumers and promoted AECPGs is more direct, while the inclusion of large-scale public goods such as the mitigation of climate change is more difficult. A common problem concerns the need to mark up the value chain products with labels. Given the high number of labels that are present on market shelves, labelling of public good related products risks being not effective in communicating with consumers. Another problem of value chain contracts is the distribution of the added value along the value chain. Value chain contracts include a wide range of different approaches and arrangements between different actors along the value chain. In a recent report, Biber-Freudenberger et al. (2019) concluded that the actors that should be targeted by policy to promote biodiversity are farmers and consumers, at each end of the value chain. This can strengthen the position of the farmer in the value chain through stronger bottom-up approaches. There are risks, however, that farmers have not enough bargaining power in comparison to big food companies or retailers. This risk involves mistrust in the contract by farmers and to some extent by the consumers that may value a food product for the level of fairness and transparency of its production process. Additionally, also the majority of currently implemented value-chain approaches are based on action-based measures, potentially lacking environmental effectiveness (Bredemeier et al., 2022).

3.4 Land tenure contracts with environmental requirements

A common drawback of AECS also concerns the trade-off between acceptance by farmers and length of contract. In general, longer contracts are less attractive to farmers because their room for maneuver is limited (Raina et al., 2021). However, longer contracts are often more effective or even necessary to achieve an environmental target. This involves the relevance of land tenure contracts including land tenure arrangements with environmental clauses. Indeed, these types of contract are usually able to reduce the trade-off between contract length and acceptance as the possibility to benefit from reduced loans for a longer time range is seen positively by a land-tenant.

For the FAO, “*Land tenure is the relationship, legally or customarily defined, between people, as individuals or groups, with respect to land. (For convenience, ‘land’ is used here to include other natural resources such as water and trees.) Land tenure is an institution, that is, rules invented by societies to regulate behavior. The rules of tenure define how property rights to land are to be allocated within societies. They define how access is granted to the rights to use, control, and transfer land, as well as the associated responsibilities and restrictions. In simple terms, land tenure systems determine who can use what resources for how long, and under what conditions*”¹. The terms land tenure and land rights are often used interchangeably. Land tenure contracts devoted to the improvement of AECPGs have clauses for the improvement or conservation of environmental assets. Landowners (private or public) lease their land to farmers, foresters, or third parties under certain conditions and accept a lower lease payment to compensate for additional environmental or climate action efforts by farmers. These efforts serve to achieve some form of ecological or environmental improvement. However, these contract types may be hampered by legal issues or not considered at all by private owners.

In many cases and usually in more marginal areas, landowners are not interested in selling the land, but have interest in preserving their land in good conditions. For instance, particular forms of properties (e.g. public lands, Church properties, foundations, etc.) have institutional mandates (formal or informal) of good management. In other cases, land fragmentation causes transactional problems that hinder organization and rational management. In these cases, forms of land tenure with clauses can be effective. However, the success of these contracts is often linked to arranging an easy and comprehensible contract type for the owners and/or the availability of an intermediary actor able to manage the contracts efficiently (Napoléone et al., 1995; The Nature Conservancy, 2019).

4. PRESENTATION OF THE SPECIAL ISSUE

In this chapter we present the five papers included in this special issue and how they are related to the aspects outlined in the previous chapter.

The paper of Tyllianakis (2023) assesses the perspectives of upland Yorkshire farmers in the United Kingdom (UK) regarding the Landscape Recovery scheme, a soon to be rolled out agri-environmental initiative designed to promote collaborative efforts for landscape-

wide environmental improvements. With the UK having left the EU, proposals are being made in its agricultural policy to move away from ‘Direct Basic Payments’ for farmers and implement a system with a stronger focus on ‘public money for public goods’. The Landscape Recovery scheme is the most ambitious scheme within this new envisioned system. Employing Q methodology, the paper identifies diverse viewpoints among farmers, who largely depend on government subsidies and are involved mainly in sheep and beef farming. Specifically, the analysis uncovered three main discourses: pragmatic yet environmentally conscious farmers, pragmatic objectors, and risk-averse environmentalists. Pragmatic yet environmentally conscious farmers are in general open to AECS, as they perceive them as a means to achieve their two main goals (financial survival and environmental stewardship), but are at the same time resistant to the Landscape Recovery scheme, citing its complexity and perceived misalignment with these goals. Pragmatic objectors prioritize financial compensation and reduced bureaucracy, showing resistance to long-term contracts, collaborative efforts and contracts addressing the delivery of multiple AECPGs. Risk-averse environmentalists show a varied interest in environmental issues, particularly ones related to climate change, but prefer simpler contracts in terms of monitoring, indicating a preference for schemes that are less demanding (and risky) yet environmentally beneficial. Across these discourses the results reveal a general preference for “broad and shallow” AECS that offer straightforward requirements, as opposed to the more ambitious Landscape Recovery scheme, and a desire to merge economically viable practices with environmental objectives. Aspects regarding payments, free advice, duration and scope seem to inhibit the endorsement of the Landscape Recovery scheme. Overall, this case study provides unique insights into farmers’ viewpoints on these innovative concepts the UK is planning to introduce. It is also highly interesting from the perspective of EU agricultural policy, which also plans to move more into this direction, even though the author makes clear that generalizing the findings is not possible and also outside the purpose of Q methodology.

Le Gloux and Dupraz (2023) do not explore new AECS, but rather carry out an ex-ante analysis of the potential effects of reallocating the Common Agricultural Policy (CAP) budget from income support to already existing environmental incentives, specifically AECS and organic farming (OF) support, using French farm accountancy data network (FADN) data from 2015 to 2019. The methodological approach of the study involves estimating a generalized Tobit model for the voluntary

¹ “3. WHAT IS LAND TENURE” (available at: <http://www.fao.org/3/y4307e/y4307e05.htm#TopOfPage>).

adoption of these environmental contracts and acceptable farm-level payment triggering this adoption, predicting new adoption probabilities and acceptable farm-level payments under reduced direct payments, and simulating budget reallocation towards environmental incentives. The analysis is based on an unbalanced panel of 36,251 farm observations, providing insights into the total farm-level payments received for AECS and OF support contracts. The findings indicate that reallocating an additional 7.5% of direct payments towards AECS and OF support significantly increases participation rates in these programs. This effect is attributed to two main incentives: increased public funding for environmental commitments and the indirect influence of reduced direct payments, which lowers the acceptable farm-level payment for participating in OF support. However, the study also acknowledges limitations, including insufficient information to capture the diversity of AECS eligibility and measures adopted by farmers, unobserved factors influencing adoption decisions, and the potential market repercussions of significant policy changes. In conclusion, the study suggests that decreasing direct payments with little environmental conditionality and increasing targeted payments for environmental public goods can enhance the adoption of sustainable farming practices. While the current regulation's transfer limit may not suffice to meet the Farm to Fork target of 25% organic land, it can substantially contribute to this goal. Finally, the study calls for further research to refine the modelling of environmental contract adoption, highlighting the need to consider intrinsic farmer motivations and locational factors more comprehensively.

The work of Eichhorn et al. (2023) addresses the challenge of understanding factors that support or hinder the implementation of novel AECS, specifically result-based and collective schemes within the European Union. The research fills a gap in existing literature by systematically investigating the macro-environmental factors affecting the adoption of these novel schemes, moving beyond individual case studies and farmer surveys to a more holistic, structured analysis. The study thus posed research questions centered on the macro-environmental impacts on AECS adoption, employing a Political, Economic, Social, Technological, Legal, and Environmental (PESTLE) analysis framework. This approach provides a comprehensive method to categorize and understand the external factors affecting AECS. Data was collected through an online survey conducted in spring 2021 with 85 stakeholders from Austria and Germany, encompassing a broad range of participants involved in the design, implementation, and control of AECS, including government agencies, environmental

organizations, and agricultural associations. The study's main findings reveal that economic, legal, and social factors are the most influential in the adoption of AECS, with economic incentives, clear legal frameworks, and social dynamics being pivotal. The unpredictability of nature was identified as a significant challenge for result-based schemes, whereas collective schemes emphasized the importance of social relations and farmer attitudes. Discussion within the study highlighted the nuanced implications of these factors on policy and practice, stressing the importance of addressing both external and internal influences on farmer decisions. The conclusions drawn suggest that the PESTLE approach effectively identifies critical factors influencing AECS adoption, providing strategic insights for policymakers and stakeholders. Looking forward, the study calls for further research into comparative analyses across countries, more in-depth investigations of differences between external factors for result-based and collective contracts and deeper examination of stakeholder influences.

The study of D'Alberto et al. (2023) goes back to an individual case-study analysis, but covers a broader scope of innovative contract solutions. Specifically, it investigates the perceptions of farmers in Emilia-Romagna, Italy, regarding four novel agri-environmental contract solutions, namely result-based (RB), collective (Co), value chain (VC), and land tenure with environmental clauses (LT). The study assesses farmers' perceptions of the understandability, applicability, and economic benefits of these contracts, as well as their willingness to enroll, using ordered logistic regression models that incorporate socio-demographic characteristics, structural features of the holdings, and preferences for 13 individual contract features. Key findings reveal that farmers' acceptance of innovative contract solutions is influenced by their age, with older farmers generally showing lower levels of acceptability and willingness to enroll. Previous experience with similar measures significantly affects farmers' perceptions, particularly enhancing the understandability of collective and value chain contracts. Structural characteristics of the holdings, such as exposure to trade channels, sales amount, and farm size, also play a crucial role in shaping perceptions of contract solutions. The study concludes that farmers are open to the investigated contract solutions, but acceptance varies based on individual and farm characteristics, necessitating careful consideration in policy design. For one, RB contracts are favored by organic producers and those involved in nature conservation, highlighting the importance of understanding and perceived applicability of result-based instruments. Co-contracts face opposition from larger farms due to

perceived inapplicability, but are welcomed by recipients of direct CAP payments. VC and LT contracts' attractiveness is strongly linked to farmers' previous experiences with similar measures, with a lack of such experience making these contracts seem complex and untrustworthy. VC contracts are moreover particularly attractive to farms already engaged in value chains, emphasizing the importance of understandability and applicability in these contexts. Overall, the study suggests that the successful implementation of improved contract solutions could be achieved through a flexible mix of instruments tailored to farmers' needs, incorporating a variety of contractual elements to enhance design and acceptance.

Finally, the paper of Bradfield et al. (2023) again carried out a cross-country analysis on innovative contract solutions. It evaluates the perceptions of land managers and stakeholders regarding the understandability, applicability, and economic benefits of four innovative agri-environmental contract types (results-based, collective action, value chain, and land tenure contracts) across twelve European countries, with a focused analysis on Ireland. The methodological approach entailed a survey of 2,275 land managers and 486 stakeholders. The Irish subset comprised 210 land managers and 16 stakeholders, highlighting the significance of agriculture in Ireland, where 72% of land is agriculturally used, the highest in the EU. Key findings indicate that most land managers agree that results-based contracts are understandable, applicable, and economically beneficial. However, there's a noticeable disparity in Ireland, with a lower proportion of land managers compared to other European countries agreeing that value chain and land tenure contracts are comprehensible and applicable to their farm. The study underscores the necessity for enhanced promotion and education concerning collective action contracts throughout Europe, emphasizing their critical role in public goods management. The conclusion suggests a pressing need for policies that offer financial certainty and autonomy to farmers, particularly in Ireland, to bolster the adoption of these innovative contracts. Furthermore, the study calls for increased practical exposure and education about these contract types to improve understanding and applicability, notably for collective action, value chain, and land tenure contracts which are less familiar to Irish land managers.

AUTHORS' CONTRIBUTION

The authors have contributed in equal parts to the development of the paper.

REFERENCES

- Atari, D. O. A., Yiridoe, E. K., Smale, S., & Duinker, P. N. (2009). What motivates farmers to participate in the Nova Scotia environmental farm plan program? Evidence and environmental policy implications. *Journal of Environmental Management*, 90(2), 1269–1279.
- Batáry, P., Dicks, L. v., Kleijn, D., & Sutherland, W. J. (2015). The role of agri-environment schemes in conservation and environmental management. *Conservation Biology*, 29(4), 1006–1016. <https://doi.org/10.1111/cobi.12536>
- Biber-Freudenberger, L., Ferrara, V., Gibassier, D., Glover, J., Grabs, J., Grace, M., Hoermann, S., Targetti, S. 2019. How can environmental regulators support business to improve the outcomes of their operations for biodiversity, with a focus on small and medium-sized enterprises in the food and beverage sector in Europe? Report prepared by an EKLIPSE Expert Working Group. UK Centre for Ecology & Hydrology, Wallingford, United Kingdom.
- Bradfield, T., Hennessy, T., D'Alberto, R. and Haltia, E., 2023. The Use of Innovative Contracts to Provide Agri-Environmental Public Goods: Comparing Attitudes Between Ireland and Other European Countries. *Bio-based and Applied Economics*, this issue. <https://doi.org/10.36253/bae-14444>
- Bredemeier, B., Herrmann, S., Sattler, C., Prager, K., van Bussel, L. G. J., & Rex, J. (2022). Insights into innovative contract design to improve the integration of biodiversity and ecosystem services in agricultural management. In *Ecosystem Services* (Vol. 55). Elsevier B.V. <https://doi.org/10.1016/j.ecoser.2022.101430>
- Burton, Rob J.F., Kuczera, C., & Schwarz, G. (2008). Exploring farmers' cultural resistance to voluntary agri-environmental schemes. *Sociologia Ruralis*, 48(1), 16–37. <https://doi.org/10.1111/j.1467-9523.2008.00452.x>
- D'Alberto, R., Raggi, M. and Viaggi, D., 2023. Innovative contract solutions for the Agri-Environmental-Climate Public Goods provision: Which features meet the farmers' approval? Insights from Emilia-Romagna (Italy). *Bio-based and Applied Economics*, this issue. <https://doi.org/10.36253/bae-14016>
- D'Alberto, R., Targetti, S., Schaller, L.L., Bartolini, F., Eichhorn, T., Haltia, E., Harmanny, D.S., Le Gloux, F., Nikolov, D., Runge, T., Vergamini, D., Viaggi, D. 2024. A European perspective on acceptability of innovative agri-environment-climate contract solutions. *Land Use Policy* 141, 107120.
- Díaz, S., Pascual, U., Stenseke, M., Martín-López, B., Watson, R.T., Molnár, Z., Hill, R., Chan, K.M., Baste, I.A., Brauman, K.A. and Polasky, S., 2018. Assessing nature's contributions to people. *Science*, 359(6373), 270–272.

- Drechsler, M., 2017. Performance of Input- and Output-based Payments for the Conservation of Mobile Species. *Ecol. Econ.*, 134, 49–56. <https://doi.org/10.1016/j.ecolecon.2016.12.022>
- Eichhorn, T., Schaller, L., Hamunen, K. and Runge, T., 2023. Exploring macro-environmental factors influencing adoption of result-based and collective agri-environmental measures: A PESTLE approach based on stakeholder statements. *Bio-based and Applied Economics*, this issue. <https://doi.org/10.36253/bae-14489>
- Ferraro, P.J., 2008. Asymmetric information and contract design for payments for environmental services. *Ecol. Econ.*, 65, 810–821. <https://doi.org/10.1016/j.ecolecon.2007.07.029>
- Franks, J. R. (2011). The collective provision of environmental goods: a discussion of contractual issues. *Journal of Environmental Planning and Management*, 54(5), 637–660.
- Haaren, C. V. & Bathke, M. (2008). Integrated landscape planning and remuneration of agri-environmental services: results of a case study in the Fuhrberg region of Germany. *Journal of Environmental Management*, 89(3), 209–221.
- Häfner, K., & Piorr, A. (2021). Farmers' perception of coordinating institutions in agri-environmental measures – The example of peatland management for the provision of public goods on a landscape scale. *Land Use Policy*, 107. <https://doi.org/10.1016/j.landusepol.2020.104947>
- Hanley, N., Banerjee, S., Lennox, G.D., Armsworth, P.R., 2012. How should we incentivize private landowners to “produce” more biodiversity? *Oxf. Rev. Econ. Policy*, 28, 93–113. <https://doi.org/10.1093/oxrep/grs002>
- Herzog, F., 2005. Agri-environment schemes as landscape experiments. *Agriculture, Ecosystems & Environment*, 108(3), pp. 175–177.
- Jack, B.K., Kousky, C., Sims, K.R.E. (2008). Designing payments for ecosystem services: Lessons from previous experience with incentive-based mechanisms. *PNAS*, 105, (28), 9465–9470.
- Klebl, F., Parisi, A., Häfner, K., Adler, A., Barreiro, S., Bodea, F. V., Brönnimann, V., de Vries, J. P. R., dos Santos, A., Hood, A. S. C., Melts, I., Popa, R., Vajna, F., Velado-Alonso, E., & Kernecker, M. L. (2024). How values and perceptions shape farmers' biodiversity management: Insights from ten European countries. *Biological Conservation*, 291, 110496. <https://doi.org/10.1016/j.biocon.2024.110496>
- Le Gloux, F. and Dupraz, P., 2024. Upscaling environmental incentives in the Common Agricultural Policy: an ex-ante evaluation method applied with the Farm Accountancy Data Network. *Bio-based and Applied Economics*, this issue. <https://doi.org/10.36253/bae-14414>
- Napoleone, C., Roque, O., Bourbouze, A., & Jouve, A.-M. (1995). Aménagement communal participatif à Montpezat ou l'élaboration, avec les habitants, d'un schéma directeur cohérent. *Le Courrier de l'environnement de l'INRA*, 24(24), 13–28.
- Péer, G., Finn, J.A., Díaz, M., Birkenstock, M., Lakner, S., Röder, N., Kazakova, Y., Šumrada, T., Bezák, P., Concepción, E.D. and Dänhardt, J., 2022. How can the European Common Agricultural Policy help halt biodiversity loss? Recommendations by over 300 experts. *Conservation Letters*, 15(6), p.e12901.
- Prager, K. (2015). Agri-environmental collaboratives for landscape management in Europe. *Current Opinion in Environmental Sustainability*, 12, 59–66. <https://doi.org/10.1016/j.cosust.2014.10.009>
- Raina, N., Zavalloni, M., Targetti, S., D'Alberto, R., Raggi, M., & Viaggi, D. (2021). A systematic review of attributes used in choice experiments for agri-environmental contracts. *Bio-based and Applied Economics*, 10(2), 137–152.
- Targetti, S., Marconi, V., Raggi, M., Piorr, A., Villanueva, A. J., Häfner, K., Kurttila, M., Letki, N., Costica, M., Nikolov, D., & Viaggi, D. (2022). Provision of public goods and bads by agriculture and forestry. An analysis of stakeholders' perception of factors, issues and mechanisms. *Bio-based and Applied Economics*, 11(4), 351–371. <https://doi.org/10.36253/bae-12843>
- The Nature Conservancy (2019). The forest bank. Conservation options for woodland owners. Available at <https://www.nature.org/content/dam/tnc/nature/en/documents/Forest-Bank-Fact-Sheet-Nov2020.pdf>
- Tyllianakis, E., 2023. Assessing the Landscape Recovery Scheme in the UK: a Q methodology study in Yorkshire, UK. *Bio-based and Applied Economics*, this issue. <https://doi.org/10.36253/bae-13941>
- Uthes, S., & Matzdorf, B. (2013). Studies on agri-environmental measures: A survey of the literature. *Environmental Management*, 51(1), 251–266. <https://doi.org/10.1007/s00267-012-9959-6>
- Viaggi, D., Raina, N., Targetti, S., 2022. Deliverable D1.4 Short Design Guide for Practitioners (Independent document providing a short version of Deliverable 1.4).
- Zasada, I., Häfner, K., Schaller, L., van Zanten, B. T., Lefebvre, M., Malak-Rawlikowska, A., Nikolov, D., Rodríguez-Entrena, M., Manrique, R., Ungaro, F., Zavalloni, M., Delattre, L., Piorr, A., Kantelhardt, J., Verburg, P. H., & Viaggi, D. (2017). A conceptual model to integrate the regional context in landscape

policy, management and contribution to rural development: Literature review and European case study evidence. *Geoforum*, 82. <https://doi.org/10.1016/j.geoforum.2017.03.012>

Zavalloni, M., Raggi, M. and Viaggi, D., 2019. Agri-environmental policies and public goods: an assessment of coalition incentives and minimum participation rules. *Environmental and resource economics*, 72(4), 1023–1040.