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RESEARCH ARTICLE

Adoption and potential of agri-environmental schemes in Europe: Cross-regional evidence from interviews with farmers

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Abstract

1. In Europe and elsewhere, agri-environmental schemes (AES) are designed to reduce agriculture's impacts on the environment. Designing effective schemes requires an understanding of the reasons that drive farmers' decisions whether to adopt AES.
2. Currently, most insights come from individual case studies or structured surveys based on predefined questions. There is a paucity of studies that do not rely on rigid preconceptions about relevant behavioural factors while also offering a geographically and socio-culturally broad perspective that can address the cultural and institutional context-specificity of behavioural studies. Also, most studies focus on the adoption decision, while implementation decisions and their consequences for the ecological effectiveness of AES remain understudied.
3. In this article, we present the results from semi-structured farmer interviews conducted in five agricultural landscapes across Europe. The results are used to uncover reasons for AES adoption as well as the implications of AES implementation decisions for their ecological effectiveness.
4. The main reason for AES adoption that was common across case study regions is the interplay of opportunity costs and payment levels, which has negative implications for the ecological effectiveness of AES as farmers prioritized marginal land or adopted non-additional AES. Among reasons that vary across regions, tenure relations and the role of ecological reasoning stand out.
5. We find that AES are unlikely to trigger broader shifts towards sustainable management but there is some potential for improvement, mainly by increasing the flexibility, spatial targeting and ecological ambition of the schemes.

KEYWORDS
agri-environmental policy, agri-environmental schemes, conservation, farm interviews, farmer behaviour

1 | INTRODUCTION

Agriculture is a major source of environmental impacts (Beckmann et al., 2019; Clark et al., 2020; Zabel et al., 2019), while also being affected by climate change (Carter et al., 2018; Jägermeyr et al., 2021) and biodiversity loss (Seppelt et al., 2021). Despite its ambitious goals and increasing focus on environmental concerns (Erjavec & Erjavec, 2021), the European Union's (EU) Common Agricultural Policy (CAP) has been criticized for failing to deliver on environmental objectives (Pe'er et al., 2019). Within the CAP, agri-environmental schemes (AES; officially, agri-environment and climate measures) are the primary instrument oriented toward 'preserv[ing] and promot[ing] the necessary changes to agricultural practices that make a positive contribution to the environment and climate' (European Union, 2013). AES payments accounted for about 7% (nearly 20 billion EUR) of the total CAP funding period 2014–2020 (Pe'er et al., 2019). Given their voluntary character, the effectiveness of AES in addressing environmental challenges is substantially driven by farmers' willingness to adopt them. Therefore, understanding the reasons farmers have to (not) adopt is crucial in order to improve current agri-environmental policy in the EU.

An increasingly broad body of literature demonstrates the complexity of European farmers' environmentally relevant motivations and behaviour, including specifically the adoption of AES (for reviews, see Bartkowski & Bartke, 2018; Dessart et al., 2019; Lastra-Bravo et al., 2015). Many studies investigated the effects of pre-selected factors (based on structured questionnaires), some of them in multiple European countries (e.g. Barnes et al., 2019). While a number of behavioural theories and frameworks have been applied in the context of farming, the set of behavioural factors relevant for specific behaviours is usually not clear (see Epanchin-Niell et al., 2022). Therefore, more open, exploratory approaches can be particularly insightful in providing a deeper understanding of the adoption of AES by farmers while being sensitive to contextual factors such as the specific AES, the socio-cultural background or the local environmental conditions. These factors can be central to explaining the differences in farmers' responses to policy interventions (Bartkowski et al., 2022).

Numerous studies of this kind have been conducted in the context of AES adoption (e.g. Burton et al., 2008; Coyne et al., 2021; Riley, 2016; Wittstock et al., 2022). However, the context specificity comes at a cost: different foci of applications in different countries make generalization difficult, as results may be driven by local cultural, institutional or social idiosyncrasies. For instance, Gütschow et al. (2021) stress in this context the importance of farmers' action space, that is the set of actions that the farmer can feasibly perform, which is circumscribed by the characteristics of the farm business, the legal framework, the market environment and so forth. Farmers' decisions are embedded in a socio-cultural context, as reflected, for example in social norms, but also historically grown institutional frameworks and economic structures (le Polain de Waroux et al., 2021). These specificities differ strongly across regions and countries with different political, economic and social histories as well as different biophysical environments (see also Malek & Verburg, 2020). Similarly, farmers' action space is strongly affected by institutional specificities external to AES, which are themselves driven by the socio-cultural context (and vice versa) (le Polain de Waroux et al., 2021). For instance, in Eastern European countries, the post-communist transition has played a formative role, especially the diverse approaches to land reform (Hartvigsen, 2014).

The environmental context (e.g. landscape structure, soil quality, etc.) also affects the action space and has been found to influence AES adoption (see Paulus et al., 2022; Wittstock et al., 2022). Where and how AES are implemented influences their ecological effectiveness (e.g. Batáry et al., 2015; Sidemo-Holm et al., 2018), that is their success in contributing to ecological goals such as biodiversity protection or climate change mitigation.

To address these challenges and augment the existing literature, we here present the results of a cross-regional comparative study based on semi-structured interviews with farmers about their reasons for AES adoption and implementation. Instead of looking at adoption versus non-adoption in a binary way, we also address the question of *how* and *for which reasons* AES are implemented (e.g. where they are located), which can be decisive for their ecological effectiveness.[1] The study was conducted in five case studies situated in the United Kingdom, Spain, Germany, Czechia and Serbia, showcasing the diversity of environmental, agricultural and socio-cultural contexts in Europe and offering a (geographically) broad and (topically) deep perspective on the reasons behind AES adoption.

We focus on two interrelated research questions:

1. What are farmers' reasons to (not) adopt AES?
2. Which reasons determine how farmers implement AES and how can this affect the ecological effectiveness of the schemes?

To address these questions while leveraging a systematic cross-regional approach, we look at both commonalities and differences across case studies. Given the heterogeneity of our case studies and the inclusion of different farmer types, differences between and within case study regions are to be expected. Because of this substantial heterogeneity, we assume that common reasons for AES (non-)adoption identified in our study hint at generalizability beyond our case studies.

[1]By 'adoption', we mean the decision to enrol in an AES; 'implementation' signifies the decision where and how to implement the specific practices mandated by the AES contract.

Conversely, we see differences among case studies as a potential for learning—we therefore link them, wherever possible, to socio-cultural and institutional specificities of the case study regions. Lastly, we derive a number of general policy implications and apply the insights to some recently discussed innovations and reforms relevant to AES.

2 | CASE STUDIES

The study was conducted in five case study regions, together covering five different environmental strata of Europe (Metzger et al., 2012; see Figure 1; Table 1): Humber (United Kingdom, UK), Catalonia (Spain), Mulde river basin (Germany), South Moravia (Czechia) and Bačka (Serbia). Note that the set of case studies includes a country that is not yet an EU member (Serbia) as well as a country that was a member of the EU between 1973 and 2020 (UK). Accordingly, in Serbia there are no AES or analogous policy instruments; meanwhile, the UK has a long history of AES, which continues after Brexit (Hill, 2021) but outside the CAP. We include Serbia to see what farmers think about this instrument hypothetically, in a region where there are no 'path dependencies' and learning effects related to the historical implementation.

In all five regions, wheat is among the most widely cultivated crops; other typical crops vary across regions. In Humber, Catalonia and the Mulde region, grasslands play a large role (particularly in upland areas). While in Humber almost all farms are owned by natural persons, in the Mulde region the share of farm holdings owned by

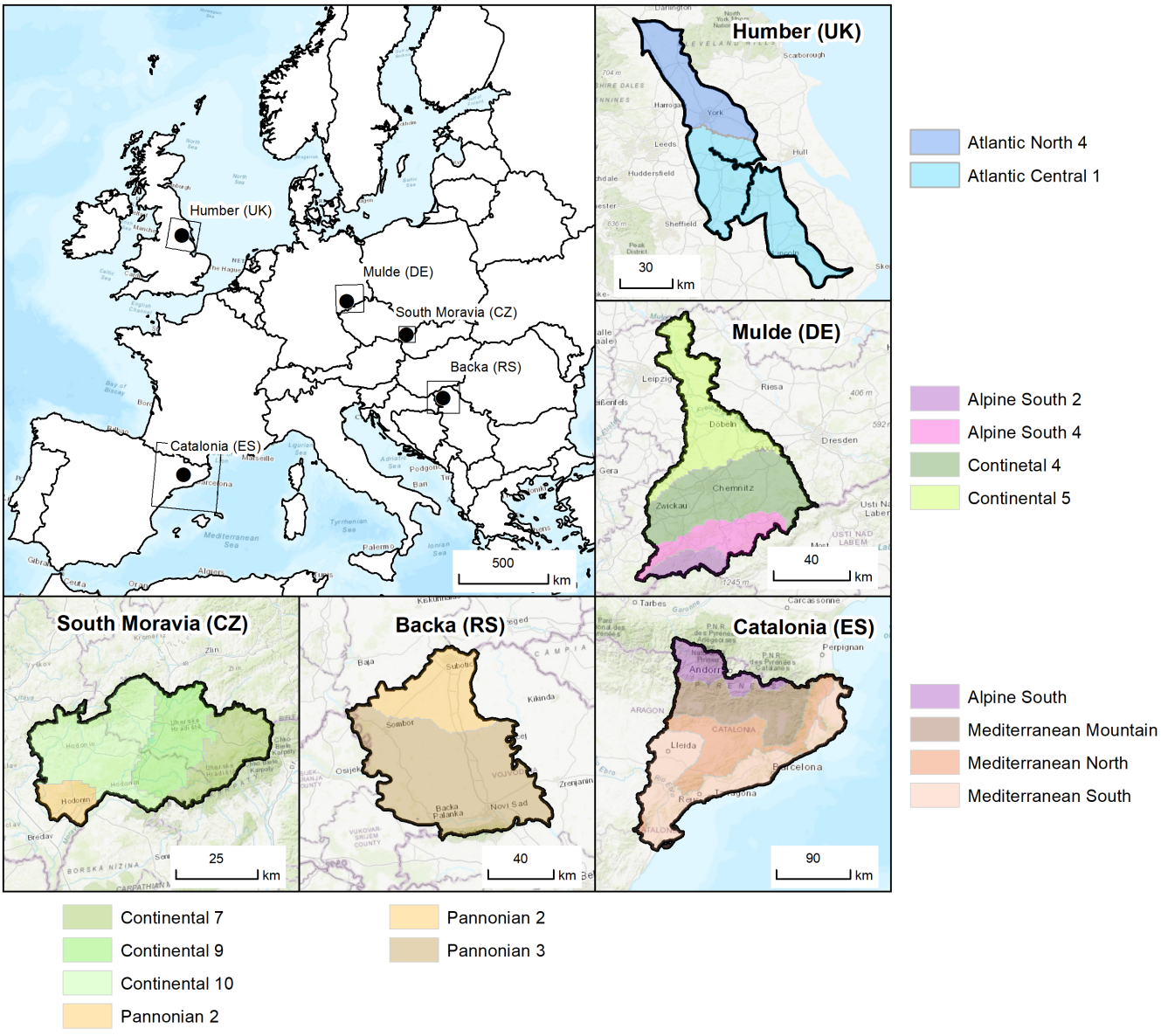

FIGURE 1 Case study regions including environmental strata (UK, DE, CZ, RS)/zones (ES) (source: own work). Each case study area is divided according to the Environmental Stratification of Europe. The stratification is based on a principal component analysis of climate, elevation and soil conditions in Europe and the dataset is described in Metzger et al. (2012). As the Catalan case study is substantially larger, the coarser environmental zones are being used for Catalonia, resulting in four zones.

TABLE 1 Basic information about the case study regions.

	Humber (UK)	Catalonia (ES)	Mulde (DE)	South Moravia (CZ)	Bačka (RS)
EnS/EnZ	Atlantic	Mediterranean, Alpine	Continental, Alpine	Continental, Pannonian	Pannonian
Typical crops	Wheat, grassland, rapeseed	Grassland, barley, wheat	Grassland, wheat, barley	Wheat, maize, rapeseed	Wheat, maize, soya
Mean farm size (hectare)	**52**	**19**	**93**	**94**	51
Share of farm owned by natural persons (holdings/area)	*96%/93%*	*89%/73%*	ca. *80%*/ca. *30%*	ca. *89%*/ca. *24%*	>70% (area)
Share of leased land	*31%*	*30%*	ca. *70%*	ca. *76%*	ca. 24%
Share of organic farms area	**2%**	**14%**	**7%**	**16%**	*0.6%*
Share of farms participating in AES	**47%**	**38%**	**47%**	**47%**	0

Note: Own calculations based on LPIS/IACS data (bold), Eurostat (italic). In the absence of case-study-specific information about farm ownership and land lease, these data are approximations based on Eurostat data for NUTS2 regions that correspond imperfectly with the case study regions. The information about the Serbian case study is based on the 2020 Statistical Yearbook of the Republic of Serbia (country-level data) and Karapandžin (2018) (farm size; Vojvodina region).

Abbreviations: AES, agri-environmental schemes; EnS, environmental strata; EnZ, environmental zones.

legal persons is at 20%, and these farms cultivate 70% of the land area. The share of organic farms also varies substantially—for example, in Humber and Bačka there are very few organic farms, while in South Moravia the share of the area cultivated by them is around 16% (Table 1). Also, there are notable differences in the share of leased land, which is at 70%–80% in the Mulde region and South Moravia and only around 30% in Bačka, Humber and Catalonia.

3 | METHODS

3.1 | Interview campaign

The qualitative data used in this study were collected during a semi-structured interview campaign in January–May 2020. The interviews were based on a common protocol developed specifically for this study (see Supplementary Material B). It included open-ended questions on the farmer's background, attitudes toward farming, reflection on ecological aspects and, in particular, reasons for (not) participating in AES. Basic socio-demographic data were collected by means of a questionnaire that was completed at the beginning of the interview. In each case study region, interviews were conducted by native speakers from the project team. In preparation for the campaign, a one-day in-person interviewer workshop was held on 5 December 2019; furthermore, interviewers were provided with guidelines for conducting interviews and data analysis (see Supplementary Material C). The interview campaign started immediately, without pilot interviews.

Sampling (i.e. selection of farmers for the interviews) was based on two criteria: (1) the Environmental Stratification of Europe (Metzger et al., 2012) (see Figure 1) and (2) four theoretical farmer profiles, based on the Farmers of the Future classification developed by Joint Research Centre for the EU (non-professional/non-profit/hobby farmers, professional independent arable farmers, professional independent livestock farmers and company/co-operative appointed managers; see Krzysztofowicz et al., 2020). The goal was to interview 1–3 farmers for each profile/stratum combination per case study. Beyond that, the sampling strategy aimed at capturing as much of the heterogeneity of the farmer population as possible (see also Wittstock et al., 2022).

The interviews were conducted face-to-face and by telephone: the switch to telephone interviews was a necessary response to restrictions imposed in the case study regions due to the COVID-19 pandemic. Ethical approval was obtained from the Business, Environment and Social Sciences (AREA) Research Ethics Committee of the University of Leeds (AREA 19-093). All interviewees signed information and consent forms. All interviews were audio-recorded for further analysis. Informed written consent was obtained from all interviewees. Overall, 124 interviews were conducted (see Table 2).

3.2 | Data analysis

Qualitative content analysis was applied to the transcribed and anonymized interviews (Schreier, 2012), supported by the software f4analyse (Dresing et al., 2015). The analysis was based on an iteratively developed coding frame with deductively developed categories and inductively specified subcategories (see Supplementary Material D). A preliminary coding frame was applied to three interviews from each case study and was then differentiated jointly to develop a final coding frame. This final coding frame was used in all case study. The coded transcripts were then used to

TABLE 2 Overview of the interview sample.

Case study	No. of interviews (of which by telephone)	AES participants (share)	Organic farms (share)	Women/men
Humber (UK)	16 (2)	9 (56.3%)	1 (6.3%)	3/13
Catalonia (ES)	47 (23)	31 (66.0%)	19 (40.4%)	17/30
Mulde (DE)	14 (0)	11 (77.6%)	3 (21.4%)	3/11
South Moravia (CZ)	22 (17)	21 (95.5%)	9 (40.9%)	2/20
Bačka (RS)	25 (22)	0 (0.0%)	4 (16%)	2/23
Total	124 (62)	72 (58.1%)	36 (29.0%)	27/97

Abbreviation: AES, agri-environmental schemes.

generate summaries of main themes from each case study region. To embed the results in the socio-cultural and institutional context, the interview data were combined with case-study-specific expert knowledge and complementary literature analysis.

Based on these data, we categorize the identified adoption reasons in *commonalities* (reasons that appear across case studies and have similar effects) and *differences* (reasons that appear only in some case studies or have distinct effects across case studies). We interpret commonalities as hints at generalizable insights, without claiming that our analysis is sufficient to establish generalizability. Conversely, identified differences can be viewed as a minimum level of heterogeneity—analyses going beyond our set of case studies would likely find further differences with respect to these reasons.

We distinguish in the analysis between reasons for and against adoption, and reasons behind implementation decisions. For the latter, we combine our results with insights from ecological literature as well as the respective expertise of the authors to provide indications of the likely consequences of implementation decisions for the ecological effectiveness of AES. The implications for ecological effectiveness are therefore indirect and strongly linked to the concept of additionality (Engel, 2016), that is whether AES lead to an actual change of practice or rather subsidize a practice that the farmer was already implementing on their land (or, at least, was already considering to implement). Furthermore, the spatial placement of AES plays an important role in determining their ecological effectiveness—while on marginal land, they may entail the lowest opportunity costs, it may well be the intensively managed, productive areas where they would make the most significant difference in terms of ecological effectiveness (see Biffi et al., 2021; Früh-Müller et al., 2019; Paulus et al., 2022). Also, to be ecologically effective, most AES need to be adopted long-term themselves (e.g. Boetzl et al., 2021) or to induce long-term implementation of the practices. In this context, the internalization of agri-environmental policy objectives is crucial for the continued adoption of environmentally friendly practices after AES funding ends. It has been demonstrated that participation in AES can lead to internalization of the schemes' objectives (Riley, 2016).[2] We thus look at the reasons for adoption and—especially—for implementation of AES as hints towards the factors that affect the ecological effectiveness of AES: additionality, placement, long-term vision and internalization of ecological objectives.

In this study, the Serbian case study has a somewhat special role. Serbian farmers were interviewed about hypothetical decisions, while in other case studies, the interviews also addressed actual adoption of AES. Therefore, the main role of the Serbian case study is in broadening the spectrum of considered socio–cultural and institutional contexts. We therefore use it mainly as a source of additional examples and illustrations. Furthermore, we consider the insights from Bačka only when analysing the reasons for adoption of AES. Conversely, their consideration in the context of the analysis of implementation and its consequences would be too speculative, so we base it on the other four case studies alone.

4 | RESULTS

First, we present the reasons for and against the adoption of AES, dividing them into reasons common across case study regions and reasons that are specific to individual regions (all reasons are summarized and briefly defined in Table 3). Second, we present indications of ecological effectiveness based on reasons for implementation decisions. For reasons of brevity, we provide quotes only for selected results. The full list of quotes supporting each claim can be found in the Supplementary Material A.

4.1 | Reasons for and against AES adoption

4.1.1 | Commonalities

The main reasons affecting AES adoption are economic considerations (particularly opportunity costs) and fit with established farm practices. The less challenging the implementation of a practice incentivized by AES, the more likely is its adoption. In some cases, AES may simply 'nudge' the farmer who has already been on the fence whether to adopt or not. Various auxiliary factors can be decisive here—either the practice is already implemented or there is marginal land that can be easily enrolled in the AES because

[2]Conversely, the growing literature on motivational crowding in the context of payments for ecosystem services demonstrates the complexity and context-specificity of the effects of monetary incentives on the motivation of land users to engage in sustainable management (see Rode et al., 2015).

TABLE 3 Overview of discussed reasons from adoption of AES.

Reasons for adoption	Definitions
Commonalities	
Economic considerations	Reasons related to the farm business, especially to payment levels and opportunity costs of AES adoption
Fit with established practices	Compatibility of AES measures with farm practices in terms of equipment, use of plots, etc
Advisory services	Availability and quality of advisory services related to AES
Low bureaucratic load	Amount of bureaucratic tasks related to AES management and the extent to which these are cognitively demanding
Flexibility of schemes	Perceived adaptability of the AES to local conditions and the strictness of rules and their enforcement
Differences	
Conducive tenure arrangements	Tenure arrangements including contract length, relationship to landlords, etc
Farm size and organization	Size and organizational structure of the farm
Trust in policy and administration	General level of trust in policy and administration responsible for AES, especially in relation to corruption
Ecological reasoning and perceived ecological effectiveness	Consideration of the ecological effects of the AES and beliefs related to these effects

Abbreviation: AES, agri-environmental schemes.

the income foregone there will be negligible or there are other reasons to implement the practice, so AES provide a windfall profit:

> So where the schemes match up with how we'd like to manage that land, then it's obviously ideal 'cause we are then getting a source of funding. (UK_A1_1)

In that sense, adoption is strongly driven by the farmers' action space, particularly its economic component. AES may expand this action space by providing additional income. Similarly, in the case of result-based schemes, farmers may have land where they know the requested species are already there:

> [W]e use grassland measure 1A, i.e. species-rich grassland with at least four characteristic species [...]. Even in the last two dry years, it [the required species] was detectable without any problems. (DE_A2_2)

However, design characteristics also play an important role in AES adoption. AES are often perceived as overly inflexible, rigid, restrictive and undermining the farmer's decision-making autonomy.

It was a common theme in the interviews that farmers believe the AES are not context-specific and thus not relevant to the particular situation of their farms. The wish to have more flexibility in implementation was voiced frequently, in some cases linked to fear of the risk of not receiving or having to repay (parts of) the payment because of minor violations of the AES conditions—a particularly important consideration if the economic gains from participation are low:

> [Other farmers] are very nervous about being inspected, a lot of them have been inspected, had to repay back [sic!] money, and they're very nervous about meeting prescriptions of the schemes. (UK_A11_1)

The bureaucratic and administrative effort associated with applying for and implementing AES is considered excessive by some farmers:

> There's so much paperwork involved that I'm rather putting my energy elsewhere. (CZ_A4_1)

However, the bureaucratic requirements are not only perceived as undermining autonomy and distrust in the farmer's expertise—they can also aggravate inequities by favouring large farms that can afford to pay someone to take care of AES administration:

> You know these big farms that do it, they will have a secretary, they will have something. [...] To fill in applications, to look online and find the information. (UK_A13_1)

A reason against adoption that was raised multiple times was the lack of trust in policy and administration. Scepticism towards the CAP in general was pronounced rather strongly in the Mulde region. However, it is not clear how strong the effect of this general scepticism (or lack thereof) is on AES adoption. Meanwhile, interviewees in Bačka cited fear of corruption as a reason for scepticism towards agricultural

policy, including AES. Bačka is an outlier here.[3] However, also in South Moravia, there were hints at a more general scepticism towards the state's involvement in agriculture.

Advisory services, which lie at the boundary between action space and AES design characteristics, were mentioned in some case studies as an enabling factor. More generally, this reflects the need for a well-organized flow of knowledge and information, irrespective of whether AES have a long history (as in Humber) or are still only a prospect for the future (as in Bačka).

4.1.2 | Differences

In addition to the common reasons for and against AES adoption, there are many reasons that vary across the case study regions. We consider two types of variation: some reasons are only invoked in a subset of regions; in other cases, the same general reason is invoked, but it has different consequences across case study regions. We focus here particularly on the latter.

The most widely yet differently discussed theme is tenure. As shown in Table 1, the share of leased land varies across case study regions; still, in all countries, it is non-negligible (between 24% and 76%) and therefore potentially affecting AES adoption via its restricting effect on farmers' action space. However, because of how tenure is institutionalized across countries, it has very different consequences for AES adoption. In Humber, where long-term tenure (contracts over decades or more) is not uncommon, landlords are reported to be a driving force of AES adoption:

> So it's sometimes a bit of a challenge with folks. Even though a lot of them are in Agri-environment schemes themselves, they still see it primarily as a food production agricultural business. [...] So that's where there's sometimes a bit of clash between my tenants and myself. (UK_A1_2, a landowner)

Meanwhile, in the Mulde region, some landlords are perceived as sceptical of or even 'not understanding' AES, which makes the farmers think twice before they adopt AES:

> With the landlords, of course, you have to say that you try to address it cautiously. [W]e have already broken off measures because of such things [landlords being against it]. (DE_A13_1)

This is particularly problematic in the case of conversion of arable land into grassland as part of an AES, as it is legally prohibited in Germany to reverse this and convert permanent grassland (older than 5 years) back to arable land.

The length of the tenure contract (and, thus, tenure security) affects AES adoption. In Bačka, where the state is an important 'landlord', accounting for about 20% of land leases (Karapandžin, 2018), short-term contracts are common. At the same time, the current institutional framework makes land for lease scarce, which is due to several factors, including restitution (mainly to churches), privatizations and the prioritization of legal persons for longer-term leases:

> [W]e no longer have state land here, due to various things, churches and these tycoons[4] that have appeared... (RS_A5_1)

Thus, while tenure appears to affect AES adoption across case studies, it does so in very different ways and with different consequences, depending on the particular institutional framework of each country.

A related matter that also affects farmers' action space is farm organization. It is particularly relevant in Catalonia, where some farms are organized in cooperatives and are often not directly involved in AES selection and administration: delegation of AES administrative tasks to third parties is common:

> The truth is I have never been very informed, because the farmers' association does it for me [...]. (ES_A45_1)

Ecological reasoning, that is the consideration of and attention to (perceived) ecological effectiveness, was a surprisingly little pronounced reason for adoption in most case study regions. Exceptions were found in Humber, Catalonia and, to a lesser extent, South Moravia, where willingness to improve the environment was mentioned as a reason to adopt AES:

> As I say, I do love looking at nature, and [...] seeing the barn owls floating around the grass margins at night or in the morning. I do like to see deer walking around [...] I would not say I'm fanatical about conservation, but it's nice to see it. So yeah, that's why we first went into it. [...] [I]t wasn't for the money, but the money paid for doing it. (UK_A5_1)

However, this kind of ecological reasoning as such may not translate into AES adoption if ecological effectiveness is questioned by the farmers:

> Then, of course, the whole thing must also have an ecological purpose somewhere, because there are also programs where you can also ask yourself

[3]According to Transparency International's Corruption Perceptions Index (CPI), Serbia is among the most corruption-prone countries in Europe (score of 38/100, rank 96 globally). Czechia follows with a score of 54 (rank 49), Spain with 61 (34), UK with 78 (11) and Germany with 80 (10). See https://www.transparency.org/en/cpi/2021 [retrieved on 2 February 2022].

[4]'Tajkun', common term for beneficiaries of cronyism in the era of president Slobodan Milošević (1991–2000).

> the question: does that make any sense at all? (DE_A11_2)

In South Moravia, this has been linked to the scheme's duration (see also Section 4.2 below):

> I have established grasslands with the White Carpathian seed mixture here. It has been ten years, and we are not where we should be yet, and we have done additional sowing already. Simply, grassland, that's twenty years. It's nothing for a short-term [five-year] contract [...] it [the desired outcome] may not show. (CZ_A14_1)

4.2 | Implementation decisions and ecological effectiveness

The interviews suggest that implementation and opportunity costs rather than expected ecological effectiveness drive the selection of plots to be enrolled in AES (see Section 4.1). While these two may coincide, they often will not (see Section 3.2). Moreover, the additionality of AES can be questioned based on the responses of many farmers; they are often simply viewed as a way to receive compensation for something that would be implemented on the farm anyway, as it 'makes sense':

> I would do the same job, would not I? [...] If applying for the subsidy means more work or more effort than the benefit I can get, then we would not apply for it. (ES_A21_1)

> Well, it fits insofar as we have always done the flower strips ourselves in the past. [...] so this program has now fit in quite well. (DE_A8_1)

This is hardly surprising given that many farmers complain that AES payments barely cover the costs of their implementation.[5]

In favour of long-term AES implementation, farmers in Humber complained that schemes are sometimes discontinued:

> If you put ten years' funding into a scheme and the scheme disappears and the farmer removes all the areas, that ten years has been completely wasted. That's a complete waste of taxpayers' money, and that's what's happened on a lot of farms [...]. (UK_A4_1)

Some farmers declared their willingness to continue implementation even after the scheme expires. However, this may simply reflect that farmers would have implemented that practice anyway, with or without the incentive of AES, so their participation is ultimately non-additional and creates a windfall gain (see Section 4.1.1 above).

Given how many farmers (especially in the Mulde region) questioned the ecological effectiveness of current AES, lamented the inadequacy of advisory services or were generally sceptical of the agricultural policy framework (in the Mulde region and South Moravia), it does not appear that current AES successfully induce an internalization of their ecological objectives.

The already discussed tenure relations can also affect the expected ecological effectiveness. If tenure contracts are short or if landlords oppose more far-reaching changes on their land (as in the Mulde region), only minimal, easily reversible AES will be adopted, if any at all. On the other hand, in South Moravia, farmers expressed preference for longer-term AES, as long as they had correspondingly long-term tenure contracts:

> [A]griculture is not for a year or two. That is why we want long-term contracts because agriculture cannot turn in a different direction every five or seven years. The public should say what it wants from farmers, what it will eventually pay them, and go in that direction for at least twenty years. And over the course of those twenty years, some things may be reconsidered [...]. (CZ_A20_1)

5 | DISCUSSION

The main reasons driving the adoption of AES across our case studies are related to both farmers' action space and scheme design: economic considerations (mainly the interplay of opportunity costs and payment level), fit with established practices, bureaucratic load and the (in)flexibility of the schemes. Furthermore, tenure, farm organization and structure, trust towards policy and administration as well as perceived ecological effectiveness play a role, although with substantial differences among the case study regions. Especially for tenure, the historically and culturally driven institutional context proved decisive for the role and importance of this reason for AES adoption.

The importance of economic considerations is very much in line with the literature (Bartkowski & Bartke, 2018; Lastra-Bravo et al., 2015) and can be expected to be particularly important for more ecologically ambitious AES, which usually imply higher costs (Baaken, 2022). Deeper change in practices, e.g. a switch towards agroforestry, regenerative farming or agroecology, is usually investment-heavy (new machines, new skills, additional labour) and goes along with financial risks. Higher payments would likely increase adoption but they would also increase the overall cost of schemes and possibly lead to trade-offs with other areas of public expenditure. Alternative funding sources might be an option. In the post-Brexit UK, the potential for harnessing the investment of the private sector is being explored as a route to increase adoption through

[5]This is to be expected, as payments are based on average cost incurred and income forgone. Assuming a roughly symmetrical statistical distribution of the latter, about half of all farms will see the payments as too low.

the integration of environmental commitments in guaranteed-price for product contracts (e.g. Biffi et al., 2022) or by stacking public and private funds in collaborative scheme models (e.g. Landscape Enterprise networks; Gosal et al., 2020). Alternatively, as has already been discussed in the literature (Hasund & Johansson, 2016), one could use the so-far untapped potential offered by World Trade Organization rules, which are often quoted as a main factor against higher payment levels. Normally, agri-environmental payments fall in the so-called 'Green Box', which allows covering implementation and opportunity costs only. However, the EU could also declare payments within the so-called 'Amber Box' for non-exempt (i.e. non-Green Box) support, for which the EU has a rather large margin below the allowed ceiling.

The second-most important and universally prevalent reason—fit with established farm practices—is more ambivalent in terms of policy implications. Increasing context-sensitivity of schemes seems to address the extreme cases, in which available AES do not match individual farms' contexts at all. This would also necessarily address another barrier, which is the perceived inflexibility of many AES, which exists despite AES options being defined at lower administrative levels (e.g. federal states in Germany). Possible options include result-based payments (Burton & Schwarz, 2013; Herzon et al., 2018) and improved spatial targeting of schemes (Wätzold et al., 2016). The former are widely believed to increase ecological effectiveness and cost-effectiveness, though at the cost of high monitoring costs and risk for farmers (Burton & Schwarz, 2013). Particularly the risk is likely to have a negative impact on adoption, as suggested by our interviews, in which farmers voiced some scepticism because of the risk of investing into the scheme without reaping the reward, due to external factors beyond their influence. Given the trade-off between undesirable risk and desirable flexibility, the overall ecological effectiveness of a shift to result-based schemes depends on both adoption rates and the likely increase in the effectiveness per plot. Available options to increase adoption while retaining (parts of) the advantages of result-based schemes are the combination with a result-independent base payment (Derissen & Quaas, 2013) or payments by modelled (rather than measured) results (Bartkowski et al., 2021).

Fit with established practices may also mean that farmers tend to adopt easy-to-implement AES with minimal additionality. In this context, *improving* the fit will hardly solve the problem of low additionality and problematic ecological effectiveness. Instead, shifting the menu of AES towards more ambitious schemes is required, for example by removing relatively ineffective (e.g. badly targeted buffer strip AES, see Sidemo-Holm et al., 2018) and adding more ambitious ones (e.g. multiannual flowering strips or fallow land, see Boetzl et al., 2021; Tarjuelo et al., 2020). However, farmers who mainly use AES as a source of income from marginal land might shy away from adopting more ambitious (and, thus, costlier) AES, as long as less ambitious options are on the menu. For instance, in the UK the most popular 20 AES options comprise >75% of contracts, out of a total number of options in the Countryside Stewardship of >250. On the other hand, higher ecological ambition would likely reduce the extent to which farmers (e.g. in the Mulde region) question the ecological effectiveness and sensibility of AES. Similarly to the case of result-based AES, depending on how strong the two opposing effects play out (lower adoption, higher effectiveness per AES), the overall effect on the environment may be either positive or negative or even largely unchanged.

Regarding the action space within which farmers operate and make AES adoption decisions, two important issues arise. First, the provision of easily accessible support through advisory services would likely improve the situation and may contribute to buttressing beliefs about the ecological effectiveness of schemes. This would likely require streamlining and strengthening the currently highly diverse advisory services landscape in the EU (Knierim et al., 2017). Second, we found that land tenure can play an important role in AES adoption, in ways that depend very much on the institutional context of each region. This corroborates results from the literature that show that security can make tenure become a non-issue in terms of sustainable farming practices (e.g. Leonhardt et al., 2019). However, the experiences of farmers in our German and Serbian case studies, especially when contrasted with Humber, show that tenure security is not the only relevant parameter—the relations between owners and tenants can also be of high importance. Thus, increasing tenure security and possibly introducing further regulations regarding the content of land lease contracts would be possible policy interventions to address this issue.

In this study, we provided tentative and indirect insights into the link between AES implementation decisions and ecological effectiveness. We see here a large potential for future studies to address this link more explicitly. Also, the potential of AES to induce lasting, long-term behaviour change towards sustainable management remains unclear. Our results can only hint at the limited potential of AES as currently designed to achieve this goal. Ultimately, the question remains whether AES can be the main instrument in a transformation towards sustainable agriculture and if not, which other instruments are needed. These questions require more research combining different perspectives across disciplines and socio-cultural and environmental contexts.

It is important to emphasize that our study has an explorative character. While semi-structured interviews allow to capture a broad range of reasons behind farmers' behaviour, including reasons not expected by the researchers, they do so in an unavoidably unstructured way. In many cases, it may make sense to build upon this kind of explorative insights by means of other, e.g. quantitative methods such as surveys, possibly using structured frameworks and behavioural models (e.g. Klöckner, 2013). The explorative character of our study means that many results are tentative and indirect, although in line with e.g. a geospatial analysis of the drivers of AES implementation in the Mulde region (Paulus et al., 2022). In addition to the already mentioned ecological effectiveness, this especially holds for the cultural and institutional heterogeneity underlying the differences between the case studies. Here, again, more dedicated research is required to better understand the role culture as well as socio-cultural and institutional heterogeneity play for the adoption of AES and sustainable farming practices more general (see le Polain

de Waroux et al., 2021). This would be particularly important for generalizability of findings from individual case studies.

6 | CONCLUSIONS

In this article, we presented the results of a cross-regional semi-structured interview study that aimed at uncovering the reasons behind the adoption of AES in different European countries. Our focus was on two interrelated research questions: Why are AES (not) adopted? How are AES implemented, and how does this affect the expected ecological effectiveness of the schemes?

With respect to the first question, we found that the main reasons driving the adoption of AES across our case studies are related to both farmers' action space and scheme design. Particularly, low payments and high opportunity costs, bad fit with established practices, high bureaucratic load and the inflexibility of the schemes affect adoption negatively. Conversely, while tenure, farm organization and structure, trust towards policy and administration as well as the perceived ecological effectiveness of AES play a role, we observe differences among the case study regions. Especially for tenure, the historically and culturally driven institutional context proved decisive for the role and importance of this reason for AES adoption.

Regarding the second question, we found indications that the decisions which plots to enrol in an AES are driven mainly by opportunity costs and fit with established practices, not so much by the expected ecological effect. AES are often adopted on marginal land or where the incentivized practices have already been implemented (or planned) before. Therefore, ecological effectiveness and additionality of current AES are questionable. In some cases, changes in the surrounding institutional framework (especially tenure security and regulation of land lease contracts) could reduce barriers to the adoption of more ambitious AES.

Our results provide some indications regarding the potential of selected AES reform proposals. Particularly result-based payments might overcome some of the barriers found through our interviews (given farmers' wariness of the associated uncertainty, preferably combined with some action-based base payments). For high-ambition AES, the overall effect will likely depend on the relative effects on adoption rates (likely negative) and effectiveness (positive). A more general insight is that there seems to be a need for higher payment levels, especially for more ambitious schemes. Nonetheless, it remains doubtful that even reformed AES can fulfil their implicit role as the central instrument in the transformation of European agriculture towards sustainability.

AUTHOR CONTRIBUTIONS

Bartosz Bartkowski: conceptualization, methodology, analysis, writing—original draft & revisions. **Michael Beckmann**: supervision, writing—review & editing. **Marek Bednář**: investigation. **Sofia Biffi**: investigation, writing—review & editing. **Cristina Domingo-Marimon**: investigation, supervision, writing—review & editing. **Minučer Mesaroš**: investigation. **Charlotte Schüßler**: analysis, writing—review & editing. **Bořivoj Šarapatka**: investigation. **Sonja Tarčak**: Writing—review & editing. **Tomáš Václavík**: supervision, visualization, writing—review & editing. **Guy Ziv**: project administration, supervision, writing—review & editing. **Felix Wittstock**: methodology, investigation.

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CONFLICT OF INTEREST STATEMENT

The authors are not aware of any conflict of interest associated with this article.

DATA AVAILABILITY STATEMENT

The interview data used in this article cannot be made publicly available due to privacy protection considerations.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

Supplementary Material A: Quotes referred to in the manuscript.

Supplementary Material B: Interview protocol.

Supplementary Material C: Interview guidelines.

Supplementary Material D: Coding frame.

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